INFORME FINAL DE CONCLUSIONES DE LA CONSULTA PRELIMINAR AL MERCADO “PLATAFORMA INNOVADORA DE PURIFICACIÓN Y PRODUCCIÓN DE MOLÉCULAS PEQUEÑAS EN ENTORNOS DE INVESTIGACIÓN”.

MARZO 2024

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1. INTRODUCCIÓN

Las inmunoterapias contra el cáncer, sobre todo las de bloqueo PD-1 y PD-L1 han revolucionado la oncología, y se aplican rutinariamente a más de 50 distintos tipos tumorales. Sin embargo, entre el 50 y el 70% de los pacientes tratados con estas terapias no responde al tratamiento.

La razón principal del fallo de estas inmunoterapias se debe a la expansión de células mieloides inmunosupresoras, que inactivan al sistema inmunitario en los pacientes. Esta inactivación hace que no respondan a los anticuerpos terapéuticos, por lo que el proceso de identificación y caracterización de estas moléculas pequeñas es de interés para el desarrollo de nuevos medicamentos y tratamientos, tanto desde la industria farmacéutica como desde el sistema público de investigación. Estos datos ponen en relevancia el potencial impacto de la presente propuesta, para el cual se pone a disposición, como caso de uso, una molécula que podría mejorar la eficacia de tratamientos anti-cáncer en aproximadamente 50 tipos tumorales, además de facilitar el acercamiento e investigación, por grupos del ecosistema público de investigación, de otros casos y moléculas pequeñas que logren resultados similares.

Hay que remarcar que el elemento clave en la falta de respuesta de los tratamientos es el perfil inmunosupresor del sistema inmunitario de los enfermos, especialmente la presencia de células mieloides inmunosupresoras en sangre y tumor. Estas células provocan el fallo de las células efectoras anti-tumorales, que no responden a los tratamientos, favoreciendo la progresión tumoral. Estos descubrimientos han desencadenado numerosos estudios con diferentes moléculas con capacidades inmunomoduladoras. Sin embargo, hasta el momento no ha sido posible modificar con éxito las células mieloides en pacientes de cáncer para evitar sus capacidades inhibitorias. Hasta la fecha, se han llevado a cabo numerosos ensayos clínicos utilizando otros fármacos con estos fines, pero ninguno ha llegado a la práctica clínica debido a la baja eficacia demostrada in vivo con estos fármacos.

Para poder llevar a cabo dichos estudios, es necesario la producción de moléculas pequeñas. Actualmente, los investigadores biomédicos y clínicos no disponen de una plataforma especializada en la purificación y producción de moléculas pequeñas en entornos de investigación en las cantidades necesarias, que, además, cumplan los requisitos necesarios para su progreso hacia ensayos clínicos en grado clínico y en cantidad suficiente como para poder continuar con las investigaciones clínicas pertinentes.

La Unidad de OncoInmunología de Navarrabiomed posee una muy amplia experiencia en inmunoterapias contra el cáncer, y su aplicación en tratamientos clínicos. Hasta la fecha, el grupo ha identificado perfiles inmunitarios asociados a respuesta o su falta, en pacientes oncológicos tratados con inmunoterapia de bloqueo PD-1/PD-L1. Estos perfiles inmunitarios se sustentan en los tipos de células mieloides circulantes en sangre periférica. La resistencia a inmunoterapia está muy fuertemente condicionada por una elevación significativa en el número de células mieloides con perfil inmunosupresor, tanto en el tumor como en sangre circulante. La Unidad de OncoInmunología de Navarrabiomed lleva a cabo estos estudios en colaboración con el Servicio de Oncología Médica del Hospital Universitario de Navarra (HUN).

A fin de desarrollar una plataforma innovadora de purificación y producción de moléculas pequeñas en entornos de investigación para los grupos de investigación y los grupos clínicos de los sistemas públicos de salud, la Fundación Miguel Servet (en adelante, FMS) junto con Navarrabiomed (en adelante, NB) ha identificado una oportunidad en la línea FID (Fomento de la innovación desde la Demanda) del Ministerio de Ciencia e Innovación y los fondos con que este programa cuenta para el periodo 2021-2027. De este modo, con el objeto de presentar una propuesta lo mejor articulada posible y que disponga de una información suficiente y completa, FMS -NB ha decidido lanzar un reto al mercado, apostando por un proceso de Consulta Preliminar al Mercado como herramienta para impulsar y dinamizar el ecosistema e incentivar al mercado a innovar e incrementar su propuesta de valor.

Así, tras un análisis preliminar de viabilidad e interés estratégico, avalado por el Ministerio de Ciencia e Innovación, FMS -NB ha identificado que la plataforma innovadora de purificación y producción de moléculas pequeñas asequible en grado clínico, que facilite, acelere y mejore el ciclo de descubrimiento de moléculas pequeñas susceptibles de llevar a ensayos clínicos, presenta gran valor e interés para los grupos de investigación y los grupos clínicos del Departamento de Salud del Gobierno de Navarra.

La ley Foral 2/2018, de 13 de abril, de Contratos Públicos, modificada posteriormente mediante la Ley Foral 17/2021, de 21 de octubre, incluye, en el artículo 48, las Consultas Preliminares al Mercado. Los poderes adjudicadores pueden abordar la realización de consultas preliminares del mercado (en adelante, CPM) a fin de preparar la posible contratación e informar a los operadores económicos acerca de sus planes y de los

requisitos que se exigirán para concurrir al eventual procedimiento de adjudicación, así como el resto de aspectos que se han de tener en cuenta en un proceso de este tipo.

2. MARCO JURÍDICO DE LA CONSULTA PRELIMINAR

La CPM se regula de acuerdo con lo establecido en el artículo 48 de la ley Foral 2/2018, de 13 de abril de Contratos Públicos. Este artículo, dispone lo siguiente:

1. “Los órganos de contratación podrán realizar estudios de mercado y dirigir consultas a terceros, que podrán ser expertos o autoridades independientes o empresas o profesionales activos en el mercado con la finalidad de preparar correctamente la licitación e informarles acerca de sus planes y de los requisitos que exigirán para concurrir al procedimiento. Dicho asesoramiento podrá ser utilizado por el órgano de contratación para planificar el procedimiento de licitación y, también, durante la tramitación del mismo.

No obstante, el órgano de contratación no podrá revelar a los participantes en el procedimiento las soluciones propuestas por los otros participantes, de manera que las soluciones aportadas sólo serán conocidas íntegramente por la entidad contratante, que las ponderará y las incorporará, en su caso, en la definición del objeto del contrato.

2. Las consultas preliminares de mercado se llevarán a cabo preferentemente a través del Portal de Contratación con el objetivo de no falsear la competencia o vulnerar los principios de no discriminación y transparencia. En su caso, la decisión de no utilizar el Portal de Contratación deberá quedar suficientemente motivada en el expediente.

3. Cuando concurra a la licitación alguna de las empresas o profesionales previamente consultadas, deberá informarse de ello a los demás participantes y proporcionarles la misma información y documentación que a aquellas, de manera que la participación en las consultas preliminares de mercado no genere incentivos o ventajas en la adjudicación de los contratos para las empresas participantes.

4. Del proceso de consultas preliminares de mercado no puede resultar un objeto contractual tan concreto y delimitado que se ajuste únicamente a las características técnicas de uno de los participantes, de manera que se produzca una restricción injustificada de la competencia”.

El pasado 27 de octubre de 2023 se publicó en el Portal de contratación de Navarra, la Consulta Preliminar del Mercado “plataforma innovadora de purificación y producción de

moléculas pequeñas en entornos de investigación", accesible a través del siguiente enlace: https://n9.cl/qcntw

3. OBJETO

El objeto principal de la presente CPM es recopilar la información necesaria relativa al reto planteado (Anexo I) para preparar correctamente posibles futuras licitaciones, así como para informar a los operadores económicos de los requerimientos de contratación.

La presente consulta pretende evaluar las capacidades del mercado a efectos de proveer soluciones innovadoras y sostenibles al reto planteado, así como promover la participación en la misma de personas físicas y jurídicas, y de cara a una eventual compra pública de innovación u otro instrumento de contratación pública.

4. PROCEDIMIENTO

La convocatoria de participación fue abierta y dirigida a personas físicas o jurídicas, públicas o privadas con conocimiento en los retos planteados por la FMS-NB.

Las entidades participantes se ciñeron a las reglas de la resolución, enviando sus propuestas a través de la web de la FMS-NB:
https://www.navarrabiomed.es/es/innovacion/CPI

En todo el proceso de CPM se aplicaron los principios de transparencia, igualdad de trato y no discriminación ni falseamiento de la competencia, siendo una prueba de ello la publicación de las dudas recogidas en el documento de preguntas frecuentes (FAQs) y las conclusiones a través de este informe.

La publicación de este informe de conclusiones responde a lo indicado en el artículo 48 de la ley Foral 2/2018, de 13 de abril, de Contratos Públicos:

"Cuando el órgano de contratación haya realizado las consultas a que se refiere el presente artículo, hará constar en un informe las actuaciones realizadas. En el informe se relacionarán los estudios realizados y sus autores, las entidades consultadas, las cuestiones que se les han formulado y las respuestas a las mismas. Este informe estará motivado, formará parte del expediente de contratación, y estará sujeto a las mismas obligaciones de publicidad que los pliegos de condiciones, publicándose en todo caso en el perfil del contratante del órgano de contratación."

5. ACTUACIONES REALIZADAS

La documentación relativa a la presente CPM fue publicada y difundida, a efectos de no distorsionar la competencia, en el Portal de contratación de Gobierno de Navarra, en la siguiente dirección electrónica: https://n9.cl/qcntw donde se reflejan los siguientes documentos en inglés y castellano:

1. Bases de la convocatoria de la CPM.
2. Anexo I.
3. Formulario de solicitud para la participación en la consulta
4. Formulario para consultas
5. Documento de preguntas frecuentes.

Lo anterior a efectos de que puedan tener acceso y posibilidad de realizar aportaciones todos los posibles interesados, en cumplimiento de lo previsto en el artículo 48 de la ley Foral 2/2018, de 13 de abril, de Contratos Públicos.

“Antes de iniciarse la consulta, el órgano de contratación publicará en el perfil de contratante ubicado en la Plataforma de contratación del Sector Público o servicio de información equivalente a nivel autonómico el objeto de la misma, cuándo se iniciará esta y las denominaciones de los terceros que vayan a participar en la consulta, a efectos de que puedan tener acceso y posibilidad de realizar aportaciones todos los posibles interesados. Asimismo, en el perfil del contratante se publicarán las razones que motiven la elección de los asesores externos que resulten seleccionados”

Con el objetivo de dar visibilidad al proceso, se ha hecho difusión de éste a través de un evento de lanzamiento, promovido por Navarrabiomed, centro mixto de investigación biomédica gestionado por la FMS e impulsado por el Gobierno de Navarra y la Universidad Pública de Navarra.

Asimismo, se ha publicado la grabación de dicho acto de lanzamiento de la CPM que cuenta con 165 visualizaciones y está disponible a través del siguiente enlace: https://www.youtube.com/watch?v=geU5fnEZWKM

Las entidades que fueron presencialmente al acto están listadas a continuación:

EMPRESAS ASISTENTES A LA JORNADA DE LANZAMIENTO
Welab

CEIN
UCB Pharma
ADItech
Ardena
Viscofan
Darwin Biomed
Galapagos Biopharma
Saygon
Biotex
Enforced Group

El periodo de preguntas sobre el proceso de CPM y el reto estuvo abierto hasta el 13 de noviembre de 2023 (incluido) y el 20 de noviembre de 2023 a las 23:59h, finalizó el plazo de recepción de propuestas de la CPM y, tras analizar las propuestas, el equipo técnico optó por invitar al posterior proceso de entrevistas a las entidades participantes, con el objetivo de aclarar ciertas cuestiones y dudas que surgieron durante el análisis. Las entrevistas fueron agendadas y convocadas por el equipo técnico utilizando la plataforma Teams. El presente informe incluye una tabla, en el apartado 6 PARTICIPACIÓN y apartado 7 ANÁLISIS DE PROPUESTAS, con la recopilación de las propuestas recibidas, así como un listado de las entidades con las que se mantuvieron reuniones.

Para la realización de todas estas actuaciones en la consulta, se ha contado con el asesoramiento de Science & Innovation Link Office por su conocimiento y experiencia en procedimientos de similar naturaleza.

Para un correcto entendimiento de la situación, es fundamental resaltar que, tras la realización de las primeras entrevistas y la obtención de conclusiones preliminares, se determinó la necesidad de realizar nuevas entrevistas con varios de los participantes. En diciembre de 2023, se publicó una primera versión del informe que ofrecía algunas conclusiones preliminares basadas en los datos disponibles hasta ese momento. Sin embargo, conscientes de la importancia de obtener una comprensión más profunda y

precisa, durante los meses de enero y febrero de 2024, se llevaron a cabo entrevistas adicionales con las entidades participantes y sus socios para el desarrollo de moléculas pequeñas de origen natural. Este proceso adicional no solo permitió obtener más información sobre las propuestas presentadas, sino que también proporcionó la oportunidad de aclarar dudas y profundizar en aspectos específicos con los participantes. Como resultado, se logró una evaluación más exhaustiva y completa de todas las propuestas recibidas, lo que enriqueció significativamente el contenido del informe final, y, por ende, de la consulta permitiendo extraer nuevas conclusiones relevantes.

6. PARTICIPACIÓN

En el plazo concedido para la presentación de propuestas, indicado en las bases de participación, han cumplimentado el formulario correspondiente 4 proponentes que aparecen citados en la siguiente relación:

NOMBRE DE LA ENTIDAD PROPONENTE
ACONDICIONAMIENTO TARRASENSE
MULTIVERSE COMPUTING
SAYGOM
TECNALIA PHARMALABS Y APPLUS+

A. EMPRESAS QUE FUERON CONVOCADAS A ENTREVISTA EN EL MARCO DE LA CONSULTA

Con el objetivo de obtener más información en detalle, el equipo técnico del proyecto determinó pertinente realizar entrevistas con todas las entidades solicitantes. Asimismo, el equipo técnico preparó una serie de preguntas con la finalidad de resolver dudas específicas de las propuestas durante el proceso de entrevistas. Las preguntas estaban dirigidas a:

- Cobertura del alcance técnico
- Carácter innovador de la propuesta
- Aspectos diferenciales de la propuesta

- Limitaciones a considerar en el marco del proyecto

Las entidades solicitantes y participantes durante el proceso de entrevistas se muestran a continuación:

NOMBRE DE LA ENTIDAD PROPONENTE
ACONDICIONAMIENTO TARRASENSE
MULTIVERSE COMPUTING
SAYGOM
TECNALIA PHARMALABS Y APPLUS+

7. ANÁLISIS DE PROPUESTAS

A. DATOS DE PARTICIPACIÓN

En total se recibieron 4 propuestas de soluciones en la CPM sobre *"Plataforma innovadora de purificación y producción de moléculas pequeñas en entornos de investigación*" y se realizaron un total de 4 entrevistas en la primera ronda entre noviembre y diciembre de 2023 y otras 4 entrevistas adicionales en la segunda ronda de entrevistas mantenida entre enero y febrero de 2024., respecto a lo que cabe destacar los siguientes puntos:

- Se han recibido propuestas con información muy relevante para el reto, sirviendo para determinar la arquitectura y características básicas de la solución a desarrollar.
- La participación ha incluido empresas de todo tamaño, desde grandes multinacionales hasta empresas de carácter local. De las 4 entidades participantes, 2 pertenecen a la empresa privada y 2 a centros tecnológicos.
- En cuanto a su tamaño, destaca la participación de grandes entidades (2 propuestas), una entidad mediana y una entidad pequeña.
- En cuanto a su procedencia, de las 4 entidades participantes, una entidad es Navarra. De las 3 entidades restantes, 1 pertenece al tejido empresarial nacional y 2 son empresas internacionales.

- En cuanto al área de dedicación de los participantes, contamos con una empresa del área de actividad orientadas a la investigación científica y el desarrollo tecnológico, además de empresas dedicadas a nichos tecnológicos más específicos, como actividades de programación informática, fabricación de otra maquinaria para usos específicos n.c.o.p. o servicios técnicos de ingeniería y otras actividades relacionadas con el asesoramiento técnico.

Para el caso concreto que aquí se presenta, se considera que las propuestas, complementadas por la información compartida durante las entrevistas realizadas por parte de los operadores económicos participantes en la consulta, han aportado la información necesaria para una eventual licitación.

Cabe destacar

B. CONCLUSIONES GENERALES OBTENIDAS EN EL PROCESO

En términos procedimentales, el proceso de gestión de la información para los trámites de la CPM ha funcionado correctamente; no se han producido incidencias, y en todo momento han estado disponibles los formularios, documentos y presentaciones en el Portal de la Contratación de Navarra y en la página web de FMS -NB. La consulta perseguía recopilar posibles soluciones y recomendaciones de las empresas participantes relativas a los futuros retos que desea afrontar la FMS -NB. Para ello, se estructuró un formulario con cuestiones relativas a cada una de las partes del planteamiento inicial de la solución, con el objetivo de identificar la información necesaria para articular la posterior licitación.

A continuación, se exponen las siguientes **conclusiones generales:**

- Como parte de las propuestas se diferencian dos ámbitos de actuación:
  - Un primer ámbito que engloba soluciones parciales aplicables al reto planteado en la presente consulta.
  - Un segundo ámbito orientado a una solución completa al reto de la presente consulta.
- De la presente consulta y relacionado con el punto anterior, se concluye que la solución completa actualmente no existe en el mercado. Esto demuestra la innovación que supone el proyecto a desarrollar y que, previsiblemente, una única entidad no podrá dar respuesta al reto, de manera global. La solución propuesta, por tanto, favorecerá tanto la innovación como la colaboración entre diferentes entidades del ecosistema.

- A raíz de la existencia de estos dos ámbitos, a la hora de elaborar los pliegos, se tendrá en cuenta cómo podrían complementarse para elevar el grado de innovación de la propuesta, haciéndola más específica y concreta. En concreto, se ha identificado la posible incorporación de la tecnología de Inteligencia Artificial (IA) para la optimización de procesos como elemento innovador adicional.
- La consulta ha permitido corroborar que existe también innovación en la optimización de los procesos de investigación que permitirían reducir el impacto ambiental en conjunto. Adicionalmente, se ha constatado que innovar en hacer el proceso más verde es un elemento en el que están de acuerdo todas las entidades participantes.
- En línea con la conclusión anterior, de manera concreta, una de las características más relevantes identificadas durante el trabajo de definición del reto y el análisis de las soluciones propuestas es la necesidad de que los sistemas de extracción usen métodos “verdes” que reduzcan al mínimo la utilización de solventes orgánicos durante el proceso.
- Tras la primera ronda de entrevistas mantenidas, entre noviembre y diciembre de 2023, con las empresas participantes y entender mejor el alcance de las soluciones propuestas, existe una correlación entre las propuestas parciales que manifiestan TRLs bajos (aprox TRL 4-5) y la propuesta completa con un TRL de 7-8. Una posible explicación a este fenómeno es que es debido a que actualmente no existe una solución integral y global para el reto.
- Dada la discrepancia entre las soluciones parciales y globales, se decidió convocar a nuestras entrevistas de CPM durante enero y febrero de 2024 con el objetivo de entender mejor el estado del arte en cuanto a la tecnología del reto. Tras la nueva ronda de entrevistas realizadas, se ha constatado que la solución global no contaba con el suficiente detalle tecnológico que justificara un TRL tan alto (7-8) y, por tanto, se concluye que el nivel global de TRLs es de entre 4 y 7 para el reto propuesto
- Adicionalmente cabe destacar que se han llevado a cabo estudios complementarios sobre el estado del arte que complementan al actual informe de CPM. En concreto, se trata del Informe Tecnológico de Patentes (ITP) por parte de la Oficina Española de Patentes y Marcas (ver anexo IV del presente documento) y del informe de Vigilancia Tecnológica (VT): “*Innovative platform*

for the purification and production of small molecules" (ver anexo V del presente documento).

- Tal y como se indica en el ITP del anexo IV: *el desarrollo de una plataforma que permita la obtención de moléculas en grado clínico es amplio y complejo, y requiere de un "know how" muy específico. Por lo tanto, a la luz de los documentos recuperados, y dependiendo de parámetros tales como la materia prima de origen, la pureza y concentración de la molécula de interés o su aplicación final, las soluciones propuestas podrían presentar carácter innovador*"
- Como también se indica en el informe de VT: "*En conclusión, las plataformas innovadoras para la purificación y producción de pequeñas moléculas de origen natural suponen un cambio de paradigma en el campo de productos naturales químicos.*
- De ambos informes se concluye el potencial innovador del reto planteado, así como del amplio interés del mercado público y privado en el impulso del presente reto por la gran relevancia del mismo y el potencial impacto en el sector. Adicionalmente demuestran que el estado del arte se encuentra en TRLs intermedios (4 -7):
- Relacionado con el interés e impacto previamente mencionado, cabe destacar que la CPM ha permitido verificar que las empresas participantes cuentan con líneas de investigación alineadas con el presente reto y que han mostrado su interés de disponer de fondos para llevar a cabo un desarrollo posterior en el caso de resultados positivos de la primera fase del reto.
- De las conclusiones anteriormente expuestas se concluye que la modalidad de contratación más adecuada para los desarrollos del proyecto de innovación será la de compra pública precomercial que permitiría fases de investigación para el desarrollo y evaluación de diversas tecnologías orientadas a la consecución del reto planteado en la presente CPM.

C. CONCLUSIONES TÉCNICAS

De acuerdo con los resultados obtenidos, en cada uno de los formularios compartidos por los operadores participantes y las entrevistas mantenidas, las principales características y capacidades que se tendrán en cuenta en la futura licitación de CPI serán las siguientes (no siendo éste un listado exhaustivo):

- A través de la presente consulta se ha podido verificar que uno de los elementos innovadores que no existe actualmente en el mercado está relacionado con el flujo de trabajo que se pretende desarrollar a través de la plataforma.
- Como propuesta preliminar de la información extraída de la consulta, este modelo de integración tecnológica deberá estar apoyado por una estructura que integre al menos lo siguiente:
    - Fase 1: Producción de nuevas moléculas
    - Fase 2: Producción de producto acabado para los ensayos clínicos
    - Ensayos preclínicos (farmacocinética, toxicología, etc.)
- Adicionalmente se deberá tener en cuenta los siguientes pasos necesarios para el objetivo del reto a resolver:
    - 1. Extracción y purificación (hasta la obtención de molécula)
    - 2. Escalado (hasta cantidades necesarias para el proyecto)
    - 3. Pruebas de toxicidad. Adicionalmente contendrán porcentajes relativos de pureza del producto en cada etapa del proceso, un análisis fisicoquímico aplicado al producto y se realice un coste asociado a cada etapa del proceso, incluyendo los gastos de gestión de residuos.
- En línea con lo anterior, de las propuestas recibidas, así como de las entrevistas realizadas, se concluye que una solución innovadora que integre lo especificado en los dos puntos anteriores en el flujo de trabajo, aportará una mayor flexibilidad para responder a los requisitos del proyecto generando mayor impacto.
- De las propuestas también cabe extraer que la plataforma se centrará en moléculas pequeñas de origen natural (no síntesis) puesto que los procesos para este tipo de moléculas (Fase 1) es un servicio que actualmente no existe y, por ende, ha sido corroborado con el mercado la innovación a este respecto.
- De las propuestas cabe extraer que existen métodos de extracción y purificación parcial a nivel de investigación, que no están disponibles en el mercado actualmente confirmando el carácter innovacion del presente reto.
- Aprovechando tecnologías avanzadas y enfoques interdisciplinarios, como la microfluídica, la nanotecnología o la integración de la inteligencia artificial (IA) y los algoritmos de aprendizaje automático, la plataforma innovadora propuesta para la purificación y producción de moléculas pequeñas de origen natural, puede significar un cambio significativo en el campo de la química de los productos naturales para desarrollar nuevos fármacos, ingredientes funcionales

y productos químicos industriales beneficiosos para la salud humana y el medio ambiente.

- Un aspecto clave será diseñar y construir una plataforma que según el protocolo de producción debería incluir el trabajo en condiciones GLP (Good Laboratory Practices) y GMP (Good Manufacturing Practices), detallando un sistema de seguimiento y calidad de los lotes de producción. Adicionalmente, se valorará como innovación clave del proyecto, que el diseño de la plataforma se pueda sistematizar y, es decir, que se pueda dar respuesta a distintas situaciones
- La solución deberá permitir que las preparaciones reúnan las características adecuadas de pureza, calidad y seguridad requeridas para su aprobación por la EMA como medicamento.
- La correcta definición de un plan de trabajo, pilotaje y evaluación común serán factores que, presumiblemente, se valorarán de forma positiva en las futuras ofertas.

ANEXO I. DESCRIPCIÓN DEL RETO

Las siguientes especificaciones de la necesidad no cubierta son orientativas. Estas especificaciones podrán evolucionar a medida que se vaya actualizando el estado del arte en cada uno de los ámbitos/tecnologías.

PLATAFORMA INNOVADORA DE PURIFICACIÓN Y PRODUCCIÓN DE MOLÉCULAS PEQUEÑAS EN ENTORNOS DE INVESTIGACIÓN

ANTECEDENTES

La inmunoterapia del cáncer basada en el bloqueo de puntos de control inmunológico ha revolucionado el tratamiento del cáncer. En el año 2000 se realizó el primer ensayo clínico usando anticuerpos bloqueantes de CTLA-4, aprobados en 2011 para melanoma. En muy pocos años, el cuadro de uso de anticuerpos bloqueantes ha cambiado radicalmente. Durante los últimos 12 años las terapias con anticuerpos bloqueantes se han aprobado para más de 50 tipos de cáncer (Caroline Robert Nature Comunications (PMID: 32732879)). Actualmente se han transformado en los tratamientos oncológicos más extensos, tanto en primeras como en segundas líneas de tratamiento, así como monoterapia o en combinación con quimioterapia. En la actualidad hay más de 3.000 ensayos clínicos en marcha. El mercado de estos productos está creciendo (https://www.precedenceresearch.com/immune-checkpoint-inhibitors-market) a un ritmo notable, con la expectativa de alcanzar los 148 mil millones de euros. Sin embargo, el precio de los tratamientos sigue siendo muy alto (aproximadamente 2.500€/dosis/paciente. Un paciente recibe aproximadamente 15 dosis anuales). Y la mayor parte de los pacientes no responden, lo que se traduce en un coste altísimo para los sistemas públicos de salud. Por ejemplo, solo en Navarra, el gasto anual en 2022 de tratamientos de inmunoterapia fue de 30.812.470 €. Además del alto coste de los tratamientos oncológicos, la producción podría ser mejorable mediante la reducción de componentes que suponen desechos altamente químicos y altas cantidades de recursos naturales, como el caso del agua empleada.

Las inmunoterapias contra el cáncer, sobre todo las de bloqueo PD-1 y PD-L1 han revolucionado la oncología, y se aplican rutinariamente a más de 50 distintos tipos tumorales. Sin embargo, hay entre el 50 y el 70% de los pacientes tratados con estas terapias no responde al tratamiento. La razón principal del fallo de estas inmunoterapias se debe a la expansión de células mieloides inmunosupresoras, que inactivan al sistema inmunitario en los pacientes. Esta inactivación hace que no respondan a los anticuerpos

terapéuticos, por lo que el proceso de identificación y caracterización de estas moléculas pequeñas es de interés para el desarrollo de nuevos medicamentos y tratamientos, tanto desde la industria farmacéutica como desde el sistema público de investigación. Estos datos ponen en relevancia el potencial impacto de la presente propuesta, facilitando el acercamiento e investigación, por grupos del ecosistema público de investigación, de moléculas pequeñas que logren resultados positivos en ensayos clínicos.

Para poder llevar a cabo dichos estudios, es necesario la producción de moléculas pequeñas. Actualmente, los investigadores biomédicos y clínicos no disponen de una plataforma especializada, incluyendo desde el equipo necesario para el desarrollo de los procesos como los protocolos, técnicas, procedimientos y sistemas de control y validación específicos asociados, en la producción de moléculas pequeñas en grado clínico y en cantidad suficiente como para poder continuar con las investigaciones clínicas pertinentes. Para validar la plataforma desarrollada, se propone trabajar con un primer caso de uso relacionado con las capacidades reprogramadoras de la molécula oleuropeína, que facilite la construcción y testado de los procesos y su ampliación a otras moléculas pequeñas.

La Unidad de OncoInmunología de Navarrabiomed posee una muy amplia experiencia en inmunoterapias contra el cáncer, y su aplicación en tratamientos clínicos. Hasta la fecha, el grupo ha identificado perfiles inmunitarios asociados a respuesta o su falta, en pacientes oncológicos tratados con inmunoterapia de bloqueo PD-1/PD-L1. La Unidad de OncoInmunología de Navarrabiomed lleva a cabo estos estudios en colaboración con el Servicio de Oncología Médica del Hospital Universitario de Navarra (HUN).

ESTADO DEL ARTE

PRODUCCIÓN CONOCIDA DE MOLÉCULAS PEQUEÑAS

Las terapias de bloqueo PD-1/PD-L1 fallan en la mayor parte de los pacientes con cáncer, lo que hace necesario el desarrollo de nuevas estrategias terapéuticas. Estas estrategias están actualmente basadas en la combinación de las inmunoterapias con otros tratamientos, que incluyen quimioterapia clásica, tratamientos dirigidos (moléculas pequeñas inhibidoras de rutas de señalización intracelular), y otra gran variedad de compuestos en etapas experimentales. Dentro de éstos, y como se ha mencionado previamente, la oleuropeína, en concreto se estudia como primer caso de uso que permita el correcto desarrollo, parametrización y validación del proceso de fabricación de la plataforma, con el objetivo de lograr un sistema que permita extrapolar os

resultados obtenidos a otros casos de uso. Estos objetivos se podrían alcanzar aplicando los principios de la "química verde" para desarrollar plataformas de producción y purificación de moléculas pequeñas no solo más asequibles y menos costosas, sino también menos dañinas medioambientalmente.

Los principios de la "química verde" han enfatizado la necesidad de incorporar las preocupaciones medioambientales mediante la adaptación de estrategias más sostenibles en procesos de síntesis de precisión, como por ejemplo la reducción de la cantidad de agentes químicos, mejorando los mecanismos de las reacciones de síntesis y purificación, y adoptando el uso de solventes benignos medioambientalmente (Abdussalam-Mohammed et al. Chem Meth. 2020. 4:408-423). Por ejemplo, la utilización de catálisis acídicas de Lewis poco agresivas (Procopio et al. J Agr. Food Chem. 2009, 57, 1161-1167). La Sociedad Americana de Química ha elaborado una guía de 12 principios para cumplir con unos amplios objetivos desarrollados por distintas comunidades regulatorias y empresariales, en forma de iniciativas de prevención de la polución (https://www.acs.org/greenchemistry/). Los objetivos generales comprenden desde una mejora de la protección de los cultivos, a una mejora de los productos comerciales y medicinas.

La Unidad de investigación de OncoInmunología de Navarrabiomed ha demostrado que la administración de adyuvantes (moléculas pequeñas) en combinación con inmunoterapia revierte la proliferación de diferentes tipos de cáncer en pacientes que no respondían a la inmunoterapia por sí misma. Estas moléculas pequeñas se obtienen a través de colaboraciones establecidas dentro del ámbito académico, o adquiriéndolas a través de empresas que las proporcionan en cantidades muy pequeñas. Una de las complicaciones más importantes para poder trasladar los resultados obtenidos con pequeñas muestras de moléculas candidatas, es la imposibilidad de obtenerlas en cantidades suficientes y con las características adecuadas para su progreso hacia ensayos clínicos. Como se menciona previamente, esto podría tener relevancia en más de 50 tipos de cáncer (Caroline Robert Nature Comunications (PMID: 32732879)) donde actualmente hay más de 3.000 ensayos clínicos en marcha relacionados con tratamientos oncológicos más extensos, tanto en primeras como en segundas líneas de tratamiento, así como monoterapia o en combinación con quimioterapia.

La mayoría de las empresas biotecnológicas que proporcionan los servicios de producción de moléculas pequeñas, lo hacen considerando cada caso individualmente, y generalmente a cantidades industriales, encareciendo y limitando la capacidad de

investigadores del sector público de realizar investigación basada en el uso de moléculas pequeñas. Actualmente, los investigadores biomédicos y clínicos no disponen de una plataforma especializada en la producción de moléculas pequeñas a las escalas necesarias y cumpliendo los requisitos necesarios para su progreso hacia ensayos clínicos. Por ello, estaríamos hablando de un TRL de partida 4, prueba de concepto, situación que se pretende contrastar con el mercado a través de la presente CPM.

Para demostrar la eficacia clínica de los distintos fármacos, es necesario su producción y purificación a unas escalas lo suficientemente grandes y en grado clínico para los grupos de investigación de los sistemas públicos de investigación. La creación de una plataforma que implemente técnicas, procesos y protocolos innovadores de producción y purificación de moléculas pequeñas en fase experimental solventaría el cuello de botella en el desarrollo clínico de nuevos fármacos frecuentemente asociado a la investigación pública. Por poner un ejemplo ilustrativo, en el año 2017 en Estados Unidos se aprobaron por la FDA 34 moléculas pequeñas para fines terapéuticos. La inversión anual aplicada para el desarrollo de pequeñas moléculas en total fue de 204.3 billones de dólares (Makurvet, F.D. Medicine in Drug Discovery 2021:9). Estos datos reflejan la desproporción entre los resultados finales y la inversión financiera destinada tanto por grupos de investigación académica como por empresas biotecnológicas para el desarrollo de moléculas pequeñas para tratamiento humano. Los gastos para el desarrollo de un medicamento (molécula pequeña) se han estimado entre los años 2009-2018 en torno a los mil millones de dólares como media por cada molécula que llega al mercado (Wouters et al. JAMA. 2020. 814-853) Estos datos indican claramente que la investigación traslacional pública, en ausencia de la participación de industria, tiene posibilidades muy reducidas de desarrollar hasta el final (desde el descubrimiento hasta el ensayo clínico y aprobación) de un fármaco. Tal y como se indica en los antecedentes del presente anexo, se trata de un mercado innovador con un elevado potencial de crecimiento (https://www.precedenceresearch.com/immune-checkpoint-inhibitors-market)

NECESIDAD NO CUBIERTA

La necesidad no cubierta actual, por tanto, se resume en que los investigadores traslacionales públicos requieren contar con la producción de dichas moléculas pequeñas en grado clínico en condiciones y en cantidad suficiente como para poder continuar con las investigaciones clínicas pertinentes y finalmente, desarrollar productos que puedan utilizarse como base en ensayos clínicos. Para poder demostrar la eficacia clínica de dicha plataforma se propone como primer caso de uso, para luego aplicarlo a otras moléculas pequeñas, el de la obtención de la oleuropeína en cantidades suficientes para su uso en ensayos y a un precio asequible para los grupos de investigación de Navarrabiomed y el ecosistema público de investigación. Estas preparaciones tienen que reunir las características adecuadas de pureza, calidad y seguridad requeridas para su aprobación por la EMA (European Medicines Agency) como medicamento. Esta posibilidad no se oferta por las empresas especializadas en el sector, que generalmente proporciona el servicio caso por caso, y generalmente a escalas industriales a un coste tan elevado que resulta una barrera para la progresión de la mayoría de las moléculas en fase experimental hacia ensayos clínicos.

Esta necesidad no cubierta es una de las prioridades en Salud de la Estrategia Española de Ciencia, Tecnología e Innovación 2021-2027, al tratar la innovación en “nuevas terapias”, un desafío estratégico tanto para administraciones como para operadores económicos.

OBJETIVO GENERAL

Desarrollar una innovadora plataforma optimizada que permita la purificación y producción de moléculas pequeñas en entornos de investigación para los grupos de investigación del Servicio Navarro de Salud, facilitando, acelerando y mejorando el ciclo de descubrimiento de moléculas pequeñas susceptibles de llevar a ensayos clínicos.

Para ello, la plataforma debe permitir que las preparaciones reúnan las características adecuadas de pureza, calidad y seguridad requeridas para su aprobación por la EMA como medicamento.

Como parte del desarrollo, se propone la molécula oleuropeína, como primer caso de uso que permita el correcto desarrollo, parametrización y validación del proceso de fabricación de la plataforma, con el objetivo de lograr un sistema que permita extrapolar los resultados obtenidos a otros casos de uso.

OBJETIVOS ESPECÍFICOS

Concretamente, la presente Consulta busca identificar soluciones específicas a los siguientes objetivos:

- Facilitar el acceso a los grupos de investigación de Navarrabiomed a una plataforma que produce moléculas pequeñas en grado clínico y en unas condiciones adecuadas para su uso posterior en ensayos clínicos, aumentando el rendimiento de purificación de moléculas pequeñas, y su grado de pureza.
- Mejorar los procedimientos de extracción de moléculas pequeñas en términos de eficiencia medioambiental y sostenibilidad, sin que esto afecte al rendimiento del proceso: disminución del gasto de agua durante el proceso, del uso de disolventes y compuestos con mínimo impacto medioambiental y limitando la utilización de reactivos de grado clínico altamente contaminantes.
- Acelerar el proceso de investigación de nuevas moléculas pequeñas, acortando el proceso de descubrimiento de nuevas terapias.
- Acelerar el proceso de selección de participantes en los ensayos clínicos, incrementando la eficacia de los tratamientos desarrollados a partir de las moléculas pequeñas identificadas y aumentando el número de pacientes finales que pudieran llegar a beneficiarse de los tratamientos desarrollados.

ACTIVIDADES A DESARROLLAR Y RESULTADOS ESPERADOS

1- DISEÑO FUNCIONAL DE LA PLATAFORMA

2- DESARROLLO E IMPLANTACIÓN DE LA PLATAFORMA

Se diseñará y construirá una plataforma innovadora de purificación y producción de moléculas pequeñas en entornos de investigación en condiciones de buenas prácticas de manufactura (GMP, EudraLex - Volume 4 (europa.eu)), para obtener los productos en grado clínico. Serán necesario considerar los siguientes aspectos:

2a. Proceso de obtención de producto inicial bruto y proveedor:

Obtención de las fuentes crudas para la purificación de las moléculas.

2b. Procesamiento y extracción

Los procesos iniciales de extracción y semi-purificación del producto en principio no requerirán condiciones de sala blanca.

2c. Proceso de purificación

Será necesario diseñar un proceso que cumpla con los requerimientos necesarios para establecer un sistema de purificación, muestreo, análisis y control de calidad de acuerdo con normas GMP. Dicho proceso podrá incluir sistemas de purificación por cromatografía. Y para determinar la pureza se podría realizar mediante técnicas de espectrometría de masas y 1H-NMR espectroscopía.

2d. Proceso de empaquetado

Será necesario proceder con el empaquetado del producto purificado en condiciones GMP, en viales adecuados para su posterior uso. Esto incluiría por ejemplo liofilizadores y sistemas automatizados de empaquetado.

2e. Proceso de cultivos celulares

Se realizará el procesado de las muestras biológicas procedentes de donantes humanos y animales de los modelos preclínicos, con el fin de caracterizar perfiles inmunológicos. Preferiblemente sería necesario establecer unas condiciones de bioseguridad 2.

2f. Sistemas de análisis y control de calidad del producto

Será necesario establecer un sistema de muestreo aleatorio de los productos y de cada proceso de producción siguiendo guías GMP.

El protocolo de producción debería incluir el trabajo en condiciones GLP (*Good Laboratory Practices*) y GMP (*Good Manufacturing Practices*), detallando un sistema de seguimiento y calidad de los lotes de producción. Estos apartados incluirían la implementación de técnicas y sistemas analíticos adecuados para garantizar la calidad del producto. Los sistemas de extracción serían unos métodos “verdes” que reducen al mínimo la utilización de solventes orgánicos durante el proceso.

3- VALIDACIÓN DE LA PLATAFORMA Y PRODUCCIÓN DE PRIMERAS UNIDADES

A) Validación de la plataforma innovadora:

Se utilizarían modelos pre-clínicos específicamente con los lotes preparativos de grado clínico. Los diseños experimentales se llevarán a cabo siguiendo las indicaciones de la EMA e incluirán (La EMA publica la versión 2 de la guía de Implementación EU IDMP 2.0 | Agencia Española de Medicamentos y Productos Sanitarios (aemps.gob.es)):

a. Ensayos de toxicidad.

b. Farmacocinética y farmacodinámica.

c. Evaluación de parámetros bioquímicos e inmunológicos.

d. Eficacia terapéutica y selección de dosis.

Se llevarán a cabo por una plataforma de control de calidad, en condiciones GLP (GMP) para asegurar en todo momento la trazabilidad.

El diseño experimental debería incluir el “sexo” como un factor no estocástico. Se definirán protocolos y estudios a dosis única y a dosis repetidas, y el diseño experimental contemplará la generación de modelos predictivos de farmacodinámica y farmacocinética que complementen los estudios.

El producto final (que se administre vía oral o inyectable) tendrá que adecuarse a los estándares ISO IDMP (Identification of Medicinal Product; La EMA publica la versión 2 de la guía de Implementación EU IDMP 2.0 | Agencia Española de Medicamentos y Productos Sanitarios (aemps.gob.es)), compuesto de cinco estándares separados (identificación única; información regulatoria dosis, unidades de presentación, rutas de administración y empaquetamiento; unidades de medida; información del producto farmacéutico; información regulatoria del producto farmacéutico).

Se incluirán:

3a. Estudios toxicológicos

Se deberá evaluar la dosis IC50 en los modelos utilizados en animales sanos, y la alteración de los órganos (si la hubiere) como hígado, riñones, bazo, o lo que se considere necesario para caracterizar adecuadamente la toxicidad del producto.

3b. Estudios de farmacocinética y farmacodinámica

Se deberá monitorizar la biodisponibilidad del fármaco en suero, la vida media y su metabolización. Estos estudios contemplarán la administración del compuesto a través de distintas rutas:

- Intravenosa.
- Intraperitoneal.
- Subcutánea.
- Oral.

Se pondrá especial atención a la vía oral, calculando la biodisponibilidad y vida media sistémicamente, dado que esta ruta de administración puede compensar en el diseño del protocolo clínico en voluntarios. Se cuantificará la pérdida del compuesto activo tras la administración oral, y su vida media en sangre periférica. En estos estudios, el fármaco se proporcionará en solución salina en los tres casos de administración.

El desarrollo de la formulación para la administración en ensayos clínicos seguirá a los resultados obtenidos.

B) Producción de primeras unidades de moléculas en grado clínico

Con las moléculas que se obtengan de los procesos anteriores, estarán disponibles las primeras unidades para proceder con los ensayos clínicos en un procedimiento posterior.

REQUISITOS MÍNIMOS TENTATIVOS

Los productos finales procedentes de la plataforma tendrán que producirse en condiciones de buenas prácticas de manufactura y adecuarse a los estándares ISO IDMP (Identification of Medicinal Products).

Para el desarrollo de la plataforma y el proceso de producción, purificación, análisis y empaquetamiento, se considerarán varios puntos relevantes:

- Porcentajes relativos de pureza del producto en cada etapa del proceso.
- Análisis físico-químicos aplicados al producto, así como análisis de ausencia de contaminantes de riesgo para uso humano. Se valorará la inclusión de análisis pre-clínicos de toxicidad tanto por procedimientos in vitro como in vivo, que sean relevantes para la aprobación del producto final por la EMA en las condiciones especificadas en la propuesta.
- Coste asociado a cada etapa del proceso, incluyendo los gastos de gestión de residuos.

ANEXO II: CASO DE USO: **OLEUROPEÍNA COMO MOLÉCULA REPROGRAMADORA DE CÉLULAS MIELOIDES Y POTENCIADORA DEL TRATAMIENTO CON IMNUNOTERAPIA**

La oleuropeína es el principal compuesto bioactivo del olivo (Olea europaea L. Oleaceae). Es un tipo de secoiridoide bioactivo fenólico conocido por sus efectos farmacológicos beneficiosos. Entre los múltiples efectos para la salud destacamos los efectos cardioprotectores, anticancerígenos, antimicrobianos, antiagregación plaquetaria, antiaterogénicos, neuroprotectores y antioxidantes.

El grupo de Oncoinmunología se ha centrado en su efecto inmunomodulador que es la menos conocida, y sus efectos sobre las inmunoterapias de bloqueo PD-L1/PD-1 en cáncer. No hay estudios en los que se evalúe el efecto de la oleuropeína purificada en células inmunitarias asociadas al microambiente tumoral. Algunos estudios analizan los efectos de extractos concentrados de productos del aceite de oliva, en los que oleuropeina está presente en porcentajes variables. En estos estudios con extractos se ha observado una disminución del ambiente inflamatorio.

Hasta el momento, no se había evaluado el efecto de la oleuropeína en combinación con tratamientos de bloqueo de PD-1/PD-L1 para el tratamiento de neoplasias. Así, su estudio se concentró en la caracterización del efecto de la oleuropeína sobre las distintas poblaciones mieloides supresoras en cuanto a fenotipo y función, además de sus efectos directos e indirectos sobre los linfocitos T. Como antecedentes sobre el caso de uso propuesto, resultados de la Unidad de investigación conforman la base experimental que sustenta la presente propuesta. En concreto, los descubrimientos obtenidos por la Unidad de OncoInmunología actualmente bajo trámite de patente (solicitud presentada en EPO, EP Application No. 23 382 523.1). La Unidad de investigación utilizó proteómica cuantitativa diferencial para estudiar la reprogramación de células mieloides asociadas al cáncer utilizando oleuropeína, un derivado bisfenólico de hojas de olivo (Olea Europaea) y de los subproductos desechados de la industria del aceite de oliva, que regula la inflamación y oxidación crónicas. Las inmunoterapias basadas en anticuerpos bloqueadores de la interacción PD-1/PD-L1 se combinaron con oleuropeína en ratones con tumores de pulmón y cáncer colorrectal. La oleuropeína reprogramó a las células mieloides supresoras monocíticas y granulocíticas, así como a los macrófagos asociados al tumor, hacia linajes celulares inmunoestimuladores. Los datos de proteómica cuantitativa diferencial descubrieron las rutas moleculares que se activan y desactivan en cada tipo celular, y que controlan los programas principales de diferenciación. El tratamiento con oleuropeína potenció las capacidades de las células mieloides para activar a los linfocitos T, y potenció el tratamiento con anticuerpo anti-

PD-1 independientemente de la forma de administración. Los tratamientos demostraron actividades terapéuticas potentes en cáncer de colon, y en modelos de cáncer de pulmón resistentes a inmunoterapia.

Por lo tanto, el uso de oleuropeína podría mejorar las respuestas clínicas en los pacientes oncológicos, especialmente en aquellos tratados con inmunoterapias de bloqueo PD-1/PD-L1. En línea con esta hipótesis, el tratamiento con oleuropeína de poblaciones inmunitarias aisladas de pacientes oncológicos resultó en la reprogramación de las poblaciones mieloides con perfil inmunosupresor hacia poblaciones inmunocompetentes e inmunoestimuladoras.

Los mecanismos subyacentes al fallo de las inmunoterapias de bloqueo son compartidos por la mayoría de los cánceres humanos para los que estos tratamientos están aprobados ((más de 50 cánceres de acuerdo con lo publicado por Caroline Robert en Nature Comunications (PMID: 32732879)), lo que pone de relevancia la importancia de mejorar estas terapias y su potencial impacto positivo en la sociedad.

Como ejemplo ilustrativo y para el caso de uso, la purificación de oleuropeína, se ha demostrado una extracción mejorada utilizando calentamiento dirigido por microondas en solventes de mínimo impacto medioambiental. Esta adaptación en el procedimiento supone un rendimiento máximo en un tiempo de extracción muy corto (10 minutos asociado a una recuperación del 2.17% de oleuropeína), utilizando agua como disolvente principal. Por comparativa, los procedimientos habituales implican sistemas convencionales de calentamiento mediante el reflujo de soluciones de agua/metanol, y tiempos muy prolongados de extracción (480 minutos, asociado a una recuperación de oleuropeína del 0.5%). La incorporación de estos pasos mejorados, aplicables a pequeñas moléculas tanto naturales como de síntesis, mejorarían no solo el impacto ambiental, sino un considerable ahorro de tiempo y coste. Estos principios no son exclusivos al caso de uso, sino que son aplicables a otros productos ya sea procedentes de síntesis, o a partir de materias primas naturales.

Integración de las tecnologías novedosas (más verdes/menos contaminantes), resultando en una reducción del impacto medioambiental del proceso. Esta reducción incluiría la disminución de la generación de residuos químicos altamente contaminantes y la reducción de los costes de eliminación. La Unidad de OncoInmunología ha utilizado una estrategia de extracción de oleuropeína que elimina el uso de solventes orgánicos, basada en una extracción con microondas. Esta estrategia no sólo es aplicable al caso

de uso, sino que es ampliable a la purificación de otras moléculas pequeñas, reduciendo el uso de materiales químicos altamente contaminantes.

ANEXO II FORMULARIO DE PARTICIPACIÓN*:

Se admitirán propuestas parciales o totales al reto planteado.

*Las entidades participantes se ciñeron a las reglas de la resolución, enviando sus propuestas a través de la web de la FMS https://www.navarrabiomed.es/es/innovacion/CPI y completando el formulario online que constaba de los siguientes apartados:

Datos Básicos		
Nombre de la entidad:		
Nombre de la propuesta de solución:		
Acrónimo de la propuesta de solución:		
¿Tiene intención de presentarse a futuras licitaciones relacionadas con el reto a los que este aplicando?	SÍ ☐ NO ☐	
Datos del participante		
Persona Física:	☐	
Persona Jurídica:	☐	
Sector o ámbito de actividad (CNAE):		
Principales actividades de la entidad:		
Tipo de Entidad (Autónomo, Empresa privada, Empresa pública, Centro de Investigación, Universidad, Centro Tecnológico, Otro):		
Año de constitución:		
Propuesta conjunta de varias personas físicas o jurídicas[1]:	SÍ ☐	NO ☐

[1] En caso de marcar sí, las siguientes preguntas han de responderse teniendo en cuenta las capacidades de ambas entidades.

Marque SÍ o NO.			
Tamaño de su entidad en la actualidad (Nº de personas en plantilla):			
Facturación total de su entidad en los últimos 3 ejercicios (€):	2022	2021	2020
Datos del interlocutor/representante			
Nombre del Interlocutor (o representante en caso de propuesta de solución conjunta):			
Cargo			
Teléfono:			
Correo Electrónico:			
Dirección:			
Información adicional			
¿Su entidad tiene facturación de tecnologías similares a las de la presente propuesta de solución en últimos 3 ejercicios?: Responda SÍ o NO.	SÍ ☐	NO ☐	
En caso de haber respondido SÍ a la pregunta anterior, diga cuál fue la facturación aproximada de tecnologías similares a las de esta propuesta de solución en los últimos 3 ejercicios (dato agrupado de los 3 ejercicios):			
¿Su entidad cuenta con experiencia previa en el desarrollo de plataformas o procedimientos similares a los aquí planteados?			
¿Considera que su entidad dispone de certificaciones relevantes para acometer los trabajos que propone?: Responda SÍ o NO.	SÍ ☐	NO ☐	
En caso de haber respondido SÍ a la pregunta anterior, indique cuáles son esas certificaciones (máx. 300 caracteres):			
¿Considera que el personal de su entidad tiene calificaciones relevantes para acometer los trabajos que propone?: Responda SÍ o NO.	SÍ ☐	NO ☐	

En caso de haber respondido SÍ a la pregunta anterior, indique cuáles son esas calificaciones (máx. 300 caracteres):		
¿Ha realizado inversión en I+D+i en los últimos 3 ejercicios?: Responda SÍ o NO.	SÍ ☐	NO ☐
En caso de haber respondido SÍ a la pregunta anterior, indique cuál ha sido el importe de dicha inversión en los últimos 3 ejercicios (dato agrupado de los 3 ejercicios):		
¿Su entidad ha obtenido financiación pública de concurrencia competitiva para proyectos de I+D en alguno de los 3 últimos ejercicios?: Responda SÍ o NO.	SÍ ☐	NO ☐
En caso de haber respondido SÍ a la pregunta anterior, indique el volumen de financiación captada en los últimos 3 ejercicios (dato agrupado de los 3 ejercicios):		
¿Su entidad cuenta con experiencia en la ejecución de proyectos en el ámbito del reto que se propone o similar?: Responda SÍ o NO.	SÍ ☐	NO ☐
En caso de haber respondido SÍ a la pregunta anterior indicar un breve resumen de la experiencia (ámbito, cliente, periodo de ejecución y breve descripción):		
Para el reto planteado, aportar información detallada con relación a investigaciones, desarrollo de soluciones, publicaciones, etc., realizados o realizándose cuyo objeto sea similar al indicado:		
Descripción de la propuesta de solución		
Breve resumen de la propuesta de solución: especificación funcional (máximo 1.250 caracteres) Descripción de la posible propuesta que pueda satisfacer la necesidad planteada, descrita desde un enfoque funcional.		
¿De qué requisitos técnicos, desde el punto de vista del equipamiento, sería necesario disponer para poder desarrollar su propuesta en el marco de la Fundación?		
¿Cómo se estructura el desarrollo de su propuesta? ¿Qué fases (análisis previo, desarrollo, validación, implantación, etc.) serían necesarias para lograr el		

objetivo planteado? Se ruega desglosar de la manera más detallada posible las diferentes etapas que comprenderían el proceso de desarrollo.	
Duración estimada para la ejecución de la propuesta de solución planteada (meses), en base a la planificación y fases propuestas en la pregunta anterior.	
Coste estimado del desarrollo de su propuesta de solución, incluyendo el desglose por partidas contemplando, al menos, gastos de personal, inversiones materiales, inversiones inmateriales y otros incluyendo gastos generales y beneficio industrial empleando precios sin IVA (€).	
Indique el impacto que generará el desarrollo de la solución propuesta (económico, profesional y organizativo). Se ruega tratar de cuantificar la variación estimada en los costes de los procesos de fabricación de las moléculas pequeñas para su uso en investigación.	
El proyecto planteado, ¿está en línea con su estrategia de negocio?: Explicar en qué línea y cómo.	
¿Cuáles considera que son los principales riesgos del proyecto?	
Indique las capacidades tecnológicas de las que dispone para hacer frente al desarrollo de los trabajos planteados.	
Indicar principales beneficios aportados por la solución propuesta (máx. 850 caracteres).	
I+D+i	
Elementos de innovación (nuevas tecnologías entregadas y soluciones innovadoras) o resultados de I+D esperados. Específicamente, diga cuáles son los elementos diferenciadores de su propuesta de solución frente a los productos y servicios que se encuentran ya disponibles en el mercado (máx. 850 caracteres):	
¿Qué características del proyecto y el alcance propuesto considera que son más importantes?	

¿Qué características de la plataforma desarrollada considera más relevantes para el seguimiento del desarrollo del proyecto?		
¿Cuáles son las principales ventajas que se encuentran de la propuesta de solución frente a otras? Indique los valores diferenciales de la propuesta:		
¿Qué criterios considera importantes para valorar su propuesta de solución?		
¿Existe información pública adicional acerca de los elementos de innovación considerados? (si la hubiere se ruega indicar la web, publicación, noticia, etc. correspondiente).		
Necesidades tecnológicas y no tecnológicas que la Fundación Miguel Servet deberían tener en cuenta para la aplicación de su propuesta de solución:		
Nivel de madurez actual en el que se encuentra su propuesta de solución (en caso de conocer en nivel de madurez tecnológica (TRL[2]) en el que se encuentra, indíquelo):		
Identificar fases de integración con tecnologías y servicios pre-existentes:		
Identificar las fases de pruebas y ensayos (en entornos reales del servicio público):		
Indicar fases de validación, certificación, estándares, etc.:		
Despliegue		
Indique las regulaciones, certificaciones y normativa asociada a la necesidad planteada:		
Considera que existe alguna limitación o barrera específica para el despliegue de la solución en el mercado	SÍ ☐	NO ☐

[2] TRL es una forma aceptada de medir el grado de madurez de una tecnología. Por lo tanto, si consideramos una tecnología concreta y tenemos información del TRL o nivel en el que se encuentra podremos hacernos una idea de su nivel de madurez. En la última hoja de este documento se encuentra la tabla de TRLs a seguir.

En caso de haber respondido SI, indique limitaciones y/o barreras.	
Aspectos funcionales de la propuesta	
Indique si su propuesta responde a las siguientes necesidades y objetivos planteados en el Anexo I: Descripción del Reto, y en caso afirmativo descríbalo.	
Describa cómo y en qué medida su propuesta podría facilitar el acceso a los grupos de investigación a una plataforma que produce moléculas pequeñas en grado clínico y en unas condiciones adecuadas para su uso posterior en ensayos clínicos.	
Describa cómo y en qué medida su propuesta podrá acelerar el proceso de investigación de nuevas moléculas pequeñas, acelerando el proceso de descubrimiento de nuevas terapias.	
Describa cómo y en qué medida su propuesta podrá dotar a los grupos de investigación de los medios para poder investigar nuevas moléculas pequeñas a utilizar en ensayos clínicos	
Describa cómo y en qué medida su propuesta permitirá acelerar el proceso de selección de participantes en los ensayos clínicos, incrementando la eficacia de los tratamientos desarrollados a partir de las moléculas pequeñas identificadas y aumentando el número de pacientes finales que pudieran llegar a beneficiarse de los tratamientos desarrollados.	
Describa cómo y en qué medida su propuesta permitirá reducir el impacto medio ambiental de los procedimientos de desarrollo de tratamientos utilizando la plataforma (Disminución de la generación de residuos químicos contaminantes, reducción de costes de eliminación, mejora de los procesos de extracción, uso de reactivos de grado clínico altamente contaminantes, etc.)	
Describa qué condiciones, cualidades o características considera clave para identificar moléculas pequeñas producidas en la plataforma con potencial para ser útiles para su uso posterior en ensayos clínicos y entornos de investigación.	

Describa en qué medida su solución mejoraría el rendimiento del proceso de purificación (y la pureza lograda) de moléculas pequeñas. ¿Las preparaciones de la plataforma, reúnen las características adecuadas de pureza, calidad y seguridad requeridas para su aprobación por la EMA como medicamento?		
Los productos obtenidos con su solución, ¿se podrían llegar a adecuar a los estándares ISO IDMP (Identification of Medicinal Products), en condiciones de buenas prácticas de manufactura (GMP)? En caso contrario, ¿qué sería necesario para lograrlo? ¿Cómo se plantean los análisis fisicoquímicos del producto, así como de ausencia de contaminantes de riesgo para uso humano?	Sí ☐	NO☐
En caso de haber respondido NO ¿qué sería necesario para lograrlo? ¿Cómo se plantean los análisis fisicoquímicos del producto, así como de ausencia de contaminantes de riesgo para uso humano?		
¿Se incluye, como parte de la propuesta, la posibilidad de realizar análisis preclínicos de toxicidad, tanto por procedimientos in vitro como in vivo, que sean relevantes para la aprobación como producto final por la EMA en las condiciones especificadas?		
Otros objetivos o necesidades no incluidas en el Anexo I: Descripción del Reto, pero que considera de interés para el proyecto.		
Propiedad intelectual		
Sobre los Derechos de Propiedad Intelectual e Industrial (DPII), a priori y por las características de su entidad, ¿Ésta tiene limitaciones para compartir los DPII con el organismo contratante o para establecer un royalty sobre las ventas futuras de la solución propuesta?:	SÍ ☐	NO ☐
En caso de haber respondido SÍ a la pregunta anterior, indique, ¿de qué tipo? o si no existen, ¿Qué porcentaje considera que podría ser compartido con el organismo contratante? ¿Qué porcentaje del precio de venta podría ser establecido como canon?:		

¿Qué otros modelos serían aceptables para su entidad a la hora de compartir los Derechos de Propiedad Intelectual e Industrial?	

Esta información, o parte de ella, se publicará en el informe final de conclusiones de la Consulta Preliminar al Mercado en aras de favorecer la colaboración entre los participantes, así como de estos agentes interesados que no hayan participado en la misma.

Declaraciones Obligatorias		
Autorizo a la Fundación Miguel Servet, al uso de los contenidos de las propuestas de solución. Este uso se limitará exclusivamente a la posible inclusión de los contenidos en el proceso de definición de las líneas de trabajo, que se concretará en los posibles pliegos de los posibles procedimientos de contratación que se tramiten ulteriormente.	SÍ ☐	NO ☐
La propuesta de solución presentada está libre de copyright o cualquier otro derecho de autor o empresarial que impida su libre uso por parte de la Fundación Miguel Servet o de cualquier otra entidad colaboradora en el desarrollo de futuros proyectos:	☐ SÍ ☐	NO ☐
Autorización de uso de los datos aportados	SÍ	NO
Importante: Autorizo a la Fundación Miguel Servet al almacenaje y difusión de los datos de contacto, a mantener accesible y actualizada la información necesaria, total o parcial, sobre la propuesta presentada y a divulgar la información o documentación técnica o comercial que, en su caso, no sea identificada como confidencial. Los derechos de acceso, rectificación, cancelación y oposición pueden ejercerse dirigiéndose a la siguiente dirección de correo electrónico: unidad.innovacion.salud@navarra.es	☐	☐

Relación de documentación adjunta aportada

En el caso de que la hubiese, indique la documentación que acompaña a su propuesta de solución y que proporcione más información acerca de la misma (máximo 1 archivo por propuesta). El anexo adicional que pueda adjuntar la organización al formulario podrá tener carácter confidencial total o parcial, si bien se ruega atenerse al formulario para facilitar su análisis.

La Fundación Miguel Servet respetará los aspectos que los participantes hayan definido como confidenciales, generalmente información técnica de carácter innovador. No será admisible que se efectúe una declaración genérica o que se determine que toda la información tiene carácter confidencial.

La documentación complementaria estará limitada a un único documento en formato .pdf cuya extensión no deberá ser superior a 30 páginas en formato A4, numeradas, incluyendo la portada y el índice.

Nombre del archivo:	Breve descripción	Confidencial[3]	
Formulario de participación		SÍ ☐	NO ☐
Documentación complementaria		SÍ ☐	NO ☐

Esta información, o parte de ella, puede ser publicada en el informe final de conclusiones de la Consulta Preliminar al Mercado en aras de favorecer la colaboración entre los participantes, así como de los agentes interesados que no hayan participado en la misma.

[3] Marcar en el caso de que la documentación correspondiente sea confidencial.

Niveles de Madurez de la Tecnología

TRL es una forma aceptada de medir el grado de madurez de una tecnología. Por lo tanto, si consideramos una tecnología concreta y tenemos información del TRL o nivel en el que se encuentra, podremos hacernos una idea de su nivel de madurez. Por favor, para unificar criterios, a la hora de indicar el TRL en la ficha sígase la escala TRL que se indica a continuación:

					CPP	CPTI	AI
TRL 1	ENTORNO DE LABORATORIO	INVESTIGACIÓN	PRUEBA DE CONCEPTO	INVESTIGACIÓN BÁSICA			
TRL 2				FORMULACIÓN TECNOLÓGICA			
TRL 3				INVESTIGACIÓN APLICADA			
TRL 4			PROTOTIPO DEMOSTRADOR	DESARROLLO A PEQUEÑA ESCALA			
TRL 5	ENTORNO DE SIMULACIÓN	DESARROLLO		DESARROLLO A ESCALA REAL			
TRL 6				PROTOTIPO VALIDADO EN ENTORNO SIMULADO			
TRL 7	ENTORNO REAL	INNOVACION		PROTOTIPO VALIDADO EN ENTORNO REAL			
TRL 8			PRODUCTO COMERCIALIZABLE	PRIMER SISTEMA COMERCIAL			
TRL 9			DESPLIEGUE	APLICACIÓN COMERCIAL			

ANEXO III: DOCUMENTO DE PREGUNTAS FRECUENTES EN UN PROCESO DE CONSULTA PRELIMINAR AL MERCADO (CPM)

PROCESO DE CONSULTA Y PARTICIPACIÓN

1. ¿Qué se busca con la Consulta?

Se busca la presentación de propuestas innovadoras destinadas a dar respuesta al reto planteado mediante el empleo de tecnologías que superen las prestaciones de las existentes actualmente en el mercado de plataformas innovadoras de purificación y producción de moléculas pequeñas en entornos de investigación.

Estas propuestas servirán para evaluar las capacidades del mercado y definir las especificaciones funcionales que impliquen innovación y sean factibles de alcanzarse a través de un instrumento de contratación pública.

El objeto de este tipo de procedimiento no es la recepción de ofertas, sino la recepción de soluciones que ayuden a resolver las necesidades no cubiertas.

2. ¿La Consulta tiene criterios de selección?

La Consulta no tiene criterios de selección. Habrá criterios específicos, en caso de darse, en las futuras licitaciones.

3. Las entidades participantes que no tengan sede social en España, ¿cómo participan? ¿tendrían problemas a la hora de optar a la futura licitación?

La convocatoria de consulta es abierta a toda persona física o jurídica. Para la futura licitación, tendrán capacidad para contratar con el sector público aquellas indicadas en la ley de contratos del sector público (CAPÍTULO II: Capacidad y solvencia del empresario), además de las españolas, en todo caso, las empresas no españolas de Estados miembros de la Unión Europea o de los Estados signatarios del Acuerdo sobre el Espacio Económico Europeo que, con arreglo a la legislación del Estado en que estén establecidas, se encuentren habilitadas para realizar la prestación de que se trate.

Cuando la legislación del Estado en que se encuentren establecidas estas empresas exija una autorización especial o la pertenencia a una determinada organización para poder prestar en él el servicio de que se trate, deberán acreditar que cumplen este requisito. Sin perjuicio de la aplicación de las obligaciones de España derivadas de acuerdos internacionales, las personas físicas o jurídicas de Estados no pertenecientes a la Unión Europea o de Estados signatarios del Acuerdo sobre el Espacio Económico Europeo deberán justificar mediante informe que el Estado de procedencia de la empresa extranjera admite a su vez la participación de empresas españolas en la contratación con los entes del sector público asimilables a los enumerados en el artículo 3, en forma sustancialmente análoga. Dicho informe será elaborado por la correspondiente Oficina Económica y Comercial de España en el exterior y se acompañará a la documentación que se presente.

En los contratos sujetos a regulación armonizada se prescindirá del informe sobre reciprocidad en relación con las empresas de Estados signatarios del Acuerdo sobre Contratación Pública de la Organización Mundial de Comercio. Adicionalmente, el pliego

de cláusulas administrativas particulares (PCAP) podrá exigir a las empresas no comunitarias que resulten adjudicatarias de contratos de obras que abran una sucursal en España, con designación de apoderados o representantes para sus operaciones, y que estén inscritas en el Registro Mercantil.

4. ¿Cuáles son los plazos de ejecución?

El plazo máximo de ejecución vendrá marcado por el desarrollo de los proyectos, y no se puede hacer una estimación preliminar por la amplitud de los retos abarcados.

5. ¿Se puede participar en varias propuestas a la vez?

Sí. Es posible presentar diferentes propuestas para cada ámbito.

6. ¿Es posible presentar una propuesta en colaboración con otra entidad?

Es posible tanto presentar propuestas de manera individual como de manera conjunta con otras entidades.

7. ¿Vincula la entrega de una propuesta para un futuro proceso de contratación?

Los posibles procedimientos de contratación futuros estarán abiertos a todas las propuestas posibles que cumplan las condiciones establecidas, hayan o no estado ligadas a la consulta preliminar al mercado. La entrega de propuestas en la consulta preliminar al mercado no comportará la generación de incentivos o ventajas para las empresas participantes a la hora de adjudicar futuros contratos, ni se reconocerá como criterio de adjudicación o como valor ponderable favorable.

8. ¿Se establece un TRL determinado para las soluciones aportadas?

No se establece un TRL determinado. No obstante, se espera contar con propuestas con un nivel de madurez como mínimo del TRL de partida 4, prueba de concepto.

9. ¿Se establecerá un modelo determinado de Derechos de Propiedad Intelectual e Industrial (DPII)?

No se establece a priori ningún modelo de regulación de los DPIIs, estando totalmente abierto a diferentes propuestas por parte de las entidades. No obstante, será necesario que las empresas participantes indiquen sus posibles limitaciones en cuestión de DPIIs y compartición de riesgos.

10. ¿Se prevén licitaciones parciales?

No se ha planteado un número determinado de licitaciones. Podrá haber una única licitación, o bien varias. Esto se despejará en el Informe de conclusiones de la Consulta Preliminar al Mercado.

11. ¿Ser adjudicatario de uno de los contratos de compra de innovación es compatible con la recepción de ayudas a la I+D+i para los proyectos?

Los proyectos serán compatibles con la recepción de ayudas complementarias a nivel nacional e internacional.

12. ¿Se publicará el listado de asistencia a la Jornada de Presentación de las Consultas Preliminares al Mercado?

Se publicarán en el Perfil de contratación de Gobierno de Navarra, y en la página web de Navarrabiomed.

13. ¿Cómo se puede obtener el formulario de solicitud?

El formulario se encuentra publicado en la página web de Navarrabiomed, en apartado Compra Pública Innovadora, y en la página web de CPI de Gobierno de Navarra.

14. ¿Cómo se contempla la confidencialidad de la documentación presentada?

Las entidades participantes incluirán en la información que faciliten su consentimiento expreso para que la Fundación Miguel Servet pueda difundir su participación y las cuestiones y/o soluciones planteadas en el procedimiento de consulta.

No obstante, la Fundación Miguel Servet no podrá divulgar la información técnica o comercial que, en su caso, haya sido facilitada por los participantes, designada por estos y razonada como confidencial.

Serán los participantes quienes deben identificar la documentación o la información técnica o comercial que consideran que tiene carácter confidencial.

Las entidades participantes podrán designar como confidenciales apartados específicos tanto del formulario de participación como de la documentación complementaria. Esta circunstancia deberá reflejarse claramente en el apartado del formulario designado para tal fin.

No será admisible que se efectúe una declaración genérica o que se determine que toda la información tiene carácter confidencial.

15. ¿La información de los formularios de solicitud en respuesta a la Consulta Preliminar al Mercado (no la de la documentación complementaria clasificada como confidencial), será siempre publicada a todos los proponentes?

La información del formulario clasificada como no confidencial por la entidad participante podrá ser publicada.

No obstante, el objetivo del informe final de conclusiones de la CPM es extraer conclusiones genéricas, y no nominativas, tras el análisis de la información recibida.

16. ¿Se puede entregar un formulario de solicitud totalmente confidencial, es decir, que pueda ser considerado tanto por la Fundación Miguel Servet para construir los pliegos de la licitación, pero que no se publique al resto de licitadores?

No será admisible que se efectúe una declaración genérica o que se determine que toda la información tiene carácter confidencial

Las entidades participantes podrán designar como confidenciales apartados específicos tanto del formulario de participación como de la documentación complementaria. Esta circunstancia deberá reflejarse claramente en el apartado del formulario designado para tal fin.

No obstante, la no confidencialidad no implica que en el informe final de conclusiones de la CPM se publique dicha información a título nominativo (ver pregunta anterior).

17. ¿Cuál es el formato para presentar la documentación anexa?

El formato de presentación será Word o pdf.

18. Una vez enviada la solicitud, ¿cuáles son los procedimientos?

Tras la consulta preliminar al mercado se dará publicidad de los resultados, respetando el principio de confidencialidad.

Si se estima procedente, se podrá comenzar con la redacción y la tramitación de la/s licitación/es a partir de las ideas de soluciones recogidas como resultado de la consulta. En cualquier caso, estos procedimientos estarán abiertos a todas las propuestas posibles que cumplan las condiciones establecidas, hayan o no estado ligadas a la Consulta Preliminar al Mercado.

19. ¿Cuál es el plazo para enviar preguntas?

El plazo para el envío de preguntas sobre la presente CPM es hasta el 13 de noviembre del 2023 (incluido).

20. ¿Cuál es el plazo para enviar propuestas?

El plazo para la presentación de propuestas comienza al día siguiente de la publicación de la convocatoria en el Perfil de contratación de Gobierno de Navarra, y en la página web de Navarrabiomed y finaliza el 20/11/2023 a las 24:00 horas.

21. ¿Cómo se avisará a las entidades participantes sobre nueva información relativa a los avances de las consultas preliminares?

Se avisará por los canales habilitados.

22. Las entrevistas con proponentes para recabar mayor información, ¿tendrán lugar antes o después del cierre del plazo de solicitudes?

Las entrevistas, en caso de realizarse, se llevarán a cabo una vez finalizado el plazo de recepción de propuestas.

23. ¿Se llamará a entrevista a todos los proponentes?

Primeramente, se analizarán las propuestas recibidas y se determinará a quienes convocar a entrevista. No será obligatorio mantener entrevista con todos, siendo posible una selección de éstas. El informe final plasmará el número de entrevistas que se hayan realizado en el transcurso de la CPM.

24. Parece que se trata de una plataforma de obtención de moléculas pequeñas, pero en las actividades aparece también un proceso de empaquetado (2d), uno de cultivos celulares (2e) y uno de producción de primeras unidades de moléculas en grado clínico (3B). Asimismo, en el apartado de validación (3A) aparecen como actividades las típicas de un desarrollo preclínico (toxicología, farmacocinética, farmacodinamia) que no tienen relación con la preparación de los compuestos y en si no serían una actividad de validación, sino una actividad que iría a continuación de la síntesis. ¿La plataforma a licitar debe cubrir todos los aspectos mencionados anteriormente o debe centrarse en la producción de productos bajo condiciones GMP?

La plataforma debe centrarse en la producción de las moléculas en las condiciones clínicas adecuadas para poder realizar con ellas los ensayos pertinentes por los grupos de investigación, que pueden ser muy diversos (por ejemplo: ensayos clínicos, bioquímos, etc.). No obstante, tal y como se indicó en la jornada informativa, también nos interesa conocer si las entidades interesadas cubrirían sólo parcialmente el reto. Por ello, agradeceríamos que en su respuesta al cuestionario hicieran constar qué parte de los aspectos mencionados cubriría su entidad

¿Por qué se incluye el apartado de cultivos celulares?

Se incluye porque lo consideramos necesario de cara a validar la viabilidad de las moléculas para su posterior uso en ensayos clínicos.

¿Dado que la producción de productos de origen natural es muy diferente de la de los productos de síntesis, la plataforma debe centrarse en la primera o debe ser capaz de dar respuesta a las dos opciones?

La plataforma debe ser capaz de dar respuesta a ambas opciones. Se ha incluido el caso de uso de la oleuropeína, porque es una molécula conocida por el grupo de investigación de Oncoinmunología de Navarrabiomed, y es con la que se probaría esta plataforma como primer caso de uso. No obstante, como hemos dicho en la respuesta anterior, también nos interesa conocer si las entidades interesadas cubrirían sólo parcialmente el reto. Por ello, agradeceríamos que en las respuestas al cuestionario hicieran constar qué tipos de moléculas purificaría y produciría cada entidad: productos naturales, productos de síntesis o productos biológicos.

25. Se plantea la fabricación en condiciones GMP (indicado como “grado clínico” en la propuesta) pero para varios de los estudios citados en el apartado 3A no es necesario que los productos se hayan fabricado bajo GMP. ¿Los productos a sintetizar bajo condiciones GMP en qué fase de desarrollo se espera que estén?

La plataforma debe permitir que las preparaciones reúnan las características adecuadas de pureza, calidad y seguridad requeridas para su aprobación por la EMA como medicamento.

El apartado 2d (empaquetado) y 3B (producción de primeras unidades de moléculas en grado clínico), ¿se refieren los dos apartados a la misma actividad de elaboración de la medicación para los ensayos clínicos, bajo GMP?

El protocolo de producción debería incluir el trabajo en condiciones GLP (Good Laboratory Practices) y GMP (Good Manufacturing Practices), detallando un sistema de seguimiento y calidad de los lotes de producción. Estos apartados incluirían la implementación de técnicas y sistemas analíticos adecuados para garantizar la calidad del producto.

26. Respecto a la oleuropeína: ¿Qué cantidad de producto se pretende obtener?

A determinar durante el desarrollo del proyecto

¿con qué pureza?

A determinar durante el desarrollo del proyecto

¿qué antecedentes son más relevantes, existe un proceso viable a escala de laboratorio propietario de NavarraBiomed? ¿Se pretende escalar este proceso?

A determinar durante el desarrollo del proyecto.

¿Puede plantearse la obtención de oleuropeína por vía sintética?

Puede formar parte de la propuesta, pero en todo caso la plataforma debe ser capaz de purificar y producir moléculas generadas a partir de sustancias naturales.

27. El presupuesto orientativo de 5M€ a qué va dedicado: ¿Construir la plataforma de síntesis en condiciones GMP para cualquier tipo de compuesto? ¿Para todas las actividades previstas en la convocatoria o para una solución parcial?

En la propuesta inicial tentativa, a valorar con el mercado, el presupuesto estaría destinado a incluir la plataforma de síntesis en grado clínico para cualquier tipo de compuesto se destinarían 4 millones de euros. El otro millón se destinaría a actuaciones complementarias previstas en la convocatoria, entre las que se encontrarían, entre otras, la supervisión, gestión, difusión. No obstante, como se indica previamente, el objetivo de la CPM es contrastar esta cifra con el mercado. Por eso nos interesaría contrastar esta cifra con el mercado, y en el cuestionario se pregunta específicamente sobre esta cuestión.

¿Para proveer el servicio únicamente relacionado con la oleuropeína o para todas las actividades descritas en la convocatoria?

Para todas las actividades descritas en la convocatoria.

ANEXO IV: INFORME TECNOLÓGICO DE PATENTES POR PARTE DE LA OFICINA ESPAÑOLA DE PATENTES Y MARCAS

ANEXO V: INFORME DE VIGILANCIA TECNOLÓGICA: "*INNOVATIVE PLATFORM FOR THE PURIFICATION AND PRODUCTION OF SMALL MOLECULES*"

ITP

Informe Tecnológico de Patentes

N/Ref.: 101839/P9709

Título

PLATAFORMA INNOVADORA DE PURIFICACIÓN Y PRODUCCIÓN DE MOLÉCULAS PEQUEÑAS EN ENTORNOS DE INVESTIGACIÓN

Realizado para

FUNDACIÓN MIGUEL SERVET-NAVARRABIOMED

Fecha:

12/12/2023

Elaborado por:

Ana Ugidos Valladares

Técnico superior examinador de patentes

MINISTERIO DE INDUSTRIA, COMERCIO Y TURISMO

Oficina Española de Patentes y Marcas

OEPM

Unidad de Información Tecnológica

»

Sumario

Objeto del informe

Finalidad

Este informe se ha realizado para identificar los documentos más próximos al objeto o tecnología descrito por el cliente, con el fin de tener una visión amplia del estado de la técnica en relación con dicho objeto.

En particular, el cliente ha solicitado un informe tecnológico de patentes para la presentación de una candidatura a la línea de fomento de la innovación desde la demanda (FID) encuadrada dentro de la Compra Pública de Innovación (CPI) cuyo organismo gestor es el Ministerio de Ciencia e Innovación.

El objetivo del presente informe es proporcionar un análisis exhaustivo de documentos tanto de literatura patente como de literatura no patente a nivel mundial en relación con "Plataforma innovadora de purificación y producción de moléculas pequeñas en entornos de investigación".

Documentación de partida

El cliente ha aportado como base para el análisis el documento "20231027_AnexoI" que contiene la información esencial en la cual se basa el proyecto. No incluye un conjunto preliminar de reivindicaciones formales.

En adelante nos referiremos a esta documentación como "documentación de partida".

De acuerdo con dicha documentación, el proyecto pretende desarrollar una plataforma que permita la producción de diferentes moléculas pequeñas en grado clínico, en cantidad suficiente y a un bajo coste. La finalidad es poder llevar a cabo investigaciones clínicas de interés. Como prueba de desarrollo de la idea aportan resultados respecto a la purificación de la oleuropeína por medio de calentamiento dirigido por microondas en solventes de mínimo impacto medioambiental, objeto ya de una solicitud de patente europea (EP Application No. 23 382 523.1, motivo por el cual el método de obtención de la oleuropeína por medio de microondas no se ha valorado en el presente informe). El uso

(Volver al Sumario)

específico de la oleuropeína obtenida es el tratamiento de neoplasias. No obstante, en la estrategia de búsqueda se ha tenido en cuenta que las moléculas purificadas pueden tener diferentes orígenes o usos médicos, considerando en todo caso que la materia prima de interés son plantas. De acuerdo con los resultados mostrados, se ha tenido además en cuenta que las moléculas de interés se obtienen por métodos de extracción que requieren microondas.

(Volver al Sumario)

Estrategia de búsqueda

Características técnicas en las que se ha centrado la búsqueda

La búsqueda se ha centrado en la localización de documentos que incluyan el siguiente conjunto de características técnicas:

- Extracción de moléculas pequeñas de plantas por medio de calentamiento dirigido por microondas en solventes de mínimo impacto medioambiental.
- Purificación de las moléculas extraídas o determinación de la pureza.
- Posibles usos médicos de las moléculas extraídas.

Bases de Datos utilizadas

En función del objeto de la invención, se ha realizado la búsqueda en las siguientes bases de datos:

Bases de datos de patentes

EMBL, EPODOC, INVENES, WPI

Bases de datos de literatura no patente

BIOSIS, COMPENDEX, EMBASE, INSPEC, MEDLINE, NPL, PUBCHEM

Otras fuentes

Internet

Clasificaciones y palabras clave empleadas en la búsqueda

Para consultar las mencionadas bases de datos, se han empleado los siguientes criterios de búsqueda:

Códigos de la CIP

C07K 1/14, A61P 35/00

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Códigos de la CPC

C07K 1/14, A61P 35/00

Palabras clave

En español

Extracción asistida por microondas, moléculas o compuestos bioactivos, solvente, cáncer, inmunomodulador

Otros idiomas

Microwave assisted extraction, bioactive compounds or molecules, solvent, cancer, inmunomodulate

Vea nuestro apartado de Información Tecnológica en la web de la OEPM para más detalles sobre la metodología seguida para la realización del informe, las bases de datos, la estrategia de búsqueda y la terminología de patentes

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Análisis de los resultados

Documentos representativos

De entre todos los documentos referenciados e incluidos en la sección final "Listados de referencias" , se han seleccionado los más representativos en relación con la tecnología u objeto técnico descrito por el cliente.

A continuación, se identifican dichos documentos más representativos:

Literatura Patente

Nº Publicación	Fecha Publicación	Solicitante	Relevancia
CN102210786A		(CLYK) CHINESE ACAD FORESTRY INST CHEM IND FORE	**
CN209081783U		(GUAN-N) GUANGXI TAIWANG BIOTECHNOLOGY CO LTD	**

Literatura no Patente

Fecha Publicación	Autor	Título	Relevancia
04/12/2015	Bala Manju; Pratap Kunal; Verma Praveen Kumar; Singh Bikram; Padwad Yogendra	Validation of ethnomedicinal potential of Tinospora cordifolia for anticancer and immunomodulatory activities and quantification of bioactive molecules by HPTLC	***
15/12/2020	Montenegro Julia; dos Santos Lauriza Silva; de Souza Rodrigo Goncalves Gusmao; Lima Larissa Gabrielly Barbosa; Mattos Daniella Santos; Viana Bruna Prunes Pena Baroni; Bastos Ana Clara Santos da Fonseca; Muzzi Leda; Conte-Junior Carlos Adam; Gimba Etel Rodrigues Pereira; Freitas-Silva Otniel; Teodoro Anderson Junger	Bioactive compounds, antioxidant activity and antiproliferative effects in prostate cancer cells of green and roasted coffee extracts obtained by microwave-assisted extraction (MAE)	***
28/09/2023	Chew See Khai; Teoh Wen Hui; Hong Sok Lai; Yusoff Rozita	Rutin extraction from female Carica papayaLinn. using ultrasound and microwave-assisted extractive methods: Optimization and extraction efficiencies.	***

(Volver al Sumario)

06/11/2020	Fratelli Camilly; Burck Monize; Amarante Marina Campos Assumpção; Braga Anna Rafaela Cavalcante	Antioxidant potential of nature's “something blue”: Something new in the marriage of biological activity and extraction methods applied to C-phycocyanin	***

Análisis del contenido de los documentos representativos en relación con el objeto técnico descrito por el cliente

El documento “Bioactive compounds, antioxidant activity and antiproliferative effects in prostate cancer cells of green and roasted coffee extracts obtained by microwave-assisted extraction (MAE)” divulga un método que permite obtener compuestos bioactivos a partir de extractos de café por medio de MAE para probar su actividad frente al cáncer de próstata. La pureza de los compuestos obtenidos se analiza por HPLC. Divulga además el efecto de determinados compuestos en dos líneas celulares metastáticas: PC-3 y DU-145. El proceso de extracción emplea como solvente un 50% de agua y un 50% de etanol, con el fin de evitar solventes citotóxicos.

El documento “Rutin extraction from female Carica papaya Linn. using ultrasound and microwave-assisted extractive methods: Optimization and extraction efficiencies” divulga diversos métodos para obtener extractos de papaya, entre los cuales se encuentra MAE (microwave-assisted extraction). Se sabe que los flavonoides que contiene tienen efectos antimicrobianos, preventivos del cáncer de piel, de enfermedades cardiovasculares... Emplea etanol como solvente. El análisis del extracto se realiza por medio de HPLC. Muestra también la eficiencia combinada de varias técnicas: MAE, UMAE (sequential ultrasound microwave-assisted extraction), MUAE (sequential microwave ultrasound-assisted extraction) and UAE (ultrasound-assisted extraction).

El documento “Validation of ethnomedicinal potentialof Tinospora cordifolia for anticancer andimmunomodulatory activities and quantification of bioactivemolecules by HPTLC” divulga un estudio comparativo de distintos procedimientos de extracción de moléculas bioactivas de la planta *Tinospora cordifolia*, entre los cuales se encuentra microwave assisted extraction(MWE). Las

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moléculas bioactivas se cuantifican por medio de HPTLC. Divulga el uso de líneas celulares humanas para valorar la capacidad antineoplásica e inmunomodulatoria de las moléculas obtenidas.

El documento "Antioxidant potential of nature' s "something blue" : Something new in the marriage of biological activity and extraction methods applied to C-phycocyanin" divulga procedimientos para la extracción de moléculas bioactivas de la cianobacteria *Spirulina* por sus propiedades antiinflamatorias, anticarcinogéncias e inmunomoduladoras. Entre los procedimientos de extracción se encuentra MAE (microwave-assisted extraction) empleando agua como solvente.

El documento CN102210786A divulga un método para extraer compuestos de *Camellia oleífera* por microondas, una planta conocida por sus cualidades anticancerígenas, antioxidantes, inmunomoduladoras, etc... Divulga el uso de agua como solvente.

El documento CN209081783U divulga un modelo de utilidad de un aparato que permite extraer polipéptidos por medio de una extracción con microondas y con una hidrólisis enzimática. El modelo se puede emplear con plantas.

(Volver al Sumario)

Conclusión

Para proporcionar al solicitante de este informe una visión lo más amplia posible sobre el estado de la técnica existente en la literatura patente y no patente con respecto a la purificación y producción de moléculas pequeñas en entornos de investigación, se ha realizado una búsqueda de carácter general que ha dado como resultado un número importante de referencias que pueden ser consultadas en la sección final "Listado de Referencias".

En el listado de referencias se pueden encontrar documentos de patentes que describen invenciones técnicas de tipo muy general, en los que solamente se enumeran diferentes procedimientos empleados en la obtención de las moléculas bioactivas, y otros documentos con modos de realización más detallados, especificando el uso que estas pueden tener.

Dentro de los documentos representativos seleccionados, "Bioactive compounds, antioxidant activity and antiproliferative effects in prostate cancer cells of green and roasted coffee extracts obtained by microwave-assisted extraction (MAE)" describe un método que permite obtener compuestos bioactivos a partir de extractos de café por medio de MAE para probar su actividad frente al cáncer de próstata. "Rutin extraction from female Carica papaya Linn. using ultrasound and microwave-assisted extractive methods: Optimization and extraction efficiencies" muestra diversos métodos para obtener extractos de papaya, entre los cuales se encuentra MAE. El documento "Validation of ethnomedicinal potentialof *Tinospora cordifolia* for anticancer andimmunomodulatory activities and quantification of bioactivemolecules by HPTLC" divulga un estudio comparativo de distintos procedimientos de extracción de moléculas bioactivas de la planta *Tinospora cordifolia*, entre los cuales se encuentra MAE. El documento "Antioxidant potential of nature' s "something blue" : Something new in the marriage of biological activity and extraction methods applied to C-phycocyanin" divulga procedimientos para la extracción de moléculas bioactivas de la cianobacteria Spirulina. Entre ellos también se encuentra MAE.

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En cuanto a la literatura patente el documento CN102210786B divulga un método para extraer compuestos de *Camellia oleifera* por microondas. El documento CN209081783U divulga un aparato que se puede emplear para obtener extractos de plantas por medio de una extracción con microondas. Permite extraer polipéptidos.

De este modo, puede inferirse que la extracción de diferentes compuestos de interés procedentes de diversos tipos de plantas por medio de microondas en solventes de mínimo impacto medioambiental ya ha sido abordada anteriormente. Dichos compuestos tienen además diferentes aplicaciones médicas.

No obstante, el desarrollo de una plataforma que permita la obtención de moléculas en grado clínico es amplio y complejo, y requiere de un "know how" muy específico. Por lo tanto, a la luz de los documentos recuperados, y dependiendo de parámetros tales como la materia prima de origen, la pureza y concentración de la molécula de interés o su aplicación final, las soluciones propuestas podrían presentar carácter innovador. En aquellos casos en los que ya se conozca en el estado de la técnica la utilización de las microondas para obtener una determinada molécula, podría mostrar carácter innovador la utilización de un procedimiento similar con variaciones no divulgadas que justifiquen al final una mayor pureza y concentración de la molécula de interés, o bien un uso médico no divulgado previamente.

Los documentos comentados anteriormente constituyen una selección de entre todos los recuperados que, en opinión de la examinadora que suscribe este Informe, más se aproximan al objeto de búsqueda. Sin embargo, se recomienda la lectura atenta de éstos y también del resto de los documentos incluidos en el apartado "Listado de referencias", cuyo contenido puede ser de interés para el solicitante.

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Observaciones generales

Desde la realización de este informe hasta la presentación oficial de una posible solicitud de patente o de modelo de utilidad pueden aparecer nuevas publicaciones relevantes, por lo que, en caso de demorarse la presentación de la solicitud, puede ser conveniente realizar una vigilancia tecnológica periódica en bases de datos nacionales e internacionales, utilizando, entre otras, las clasificaciones y palabras claves propuestas en la sección "Estrategia de búsqueda" de este informe.

También es importante recordar que no sólo las publicaciones de terceros anteriores a la fecha de solicitud destruyen su novedad, sino que también las propias acciones de divulgación y/o publicación anterior (artículos en revistas, exposición en ferias no oficiales, documentos técnicos departamentales de acceso general, etc.) de los mismos solicitantes de este informe pueden afectar al cumplimiento de los *requisitos de patentabilidad -novedad y actividad inventiva-* por la invención propuesta.

Por todo lo anterior, una vez redactada la posible solicitud de patente o modelo de utilidad y antes de presentarla al registro, sería recomendable un nuevo estudio para evaluar el cumplimiento de los requisitos de novedad y actividad inventiva en función del juego de reivindicaciones que se proponga.

NOTA: *El presente Informe se ha realizado con el máximo rigor, de acuerdo con una metodología consolidada y tratando de ceñirse estrechamente a las necesidades del cliente. Este Informe* ***no vincula*** *a la OEPM en lo que se refiere a los resultados que puedan obtenerse de una subsiguiente solicitud formal de registro en alguna de las modalidades de propiedad industrial.*

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Listados de referencias

Literatura Patente

1/14	@ WPI / 2017 Clarivate Analytics.
PN	CN102210786A 2011-10-12 DW201206 CN102210786B 2012-09-05 DW201277
TI	Extraction of natural antioxidative substance from Camellia shell involves using crushed Camellia shell and water and using microwave auxiliary extracting method to leach and obtain extracting liquid
PA	(CLYK) CHINESE ACAD FORESTRY INST CHEM IND FORE
ICAI	A61K36/82; A61P39/06;
AB	- NOVELTY : A natural antioxidative substance is extracted from Camelliashell by using crushed Camelliashell as raw materials and water as solvent; and using microwave auxiliary extracting method to leach and obtain extracting liquid. The supernatant obtained after centrifugal separation on extracting liquid using non-polar or low polar macroporous adsorption resin to separate and eluting with ethanol aqueous solution. Main component of ethanol after elution and distillation is liquid natural anti-oxidative substance of oil tea shell original anthocyanidin. - USE : Method for extracting natural antioxidative substance from Camelliashell (claimed). - ADVANTAGE : The prepared natural antioxidative substance has stronger oxidation resistance bioactive function. ORGANIC CHEMISTRY : Preferred Method: The granularity of crushed Camelliashell is 2-4 mm. The microwave irradiation temperature is 60-80° C. Irradiation time is 15-35 minutes. The mass volume ratio of Camellia shell to water is 1:5-25 g/mL. The ethanol water solution is solution in which volume ratio of ethanol to water is 60-70%. The liquid-shaped natural anti-oxidative substance is prepared into aqueous solution. The aqueous solution is subjected to vacuum freezing and drying to obtain powdered natural antioxidative substance. The vacuum degree is not more than 0. 01 MPa. POLYMERS : Preferred Components: The non-polar or low polar macroporous adsorption resin is AB-8, D101, D4006, and H103. Upper column liquid and eluting liquid flow speed controlled by macroporous absorption resin is 1.4-1.7 bed volume/hour.

2/14	@ WPI / 2017 Clarivate Analytics.
PN	WO2023049970A1 2023-04-06 DW2023035
TI	Treating or preventing cancer in a subject comprises administering a composition comprising a polar solvent-extract from a plant of the genus Leptospermum
PA	(NATI-N) NATIVE INGREDIENTS & HEALTH RES ORG PTY LTD
ICAI	A23L21/25; A23L33/105; A61K35/644; A61K36/61; A61K9/14; A61P3/00; A61P3/04; A61P3/06; A61P3/10; A61P35/00;
AB	- NOVELTY : Treating or preventing (M1) cancer in a subject comprises administering a composition comprising a polar solvent-extract from a plant of the genus Leptospermum. - DETAILED DESCRIPTION : INDEPENDENT CLAIMs are also included for: (1) use (U1) of a polar solvent-extract from a plant of the genus Leptospermumin manufacturing medicine for treating or preventing cancer in a subject; (2) treating (M2) mesothelioma in a subject comprising administering the composition comprising a polar solvent-extract from a plant of the genus Leptospermum; (3) use (U2) of a polar solvent-extract from a plant of the genus Leptospermumin manufacturing medicine for treating or preventing mesothelioma in a subject; (4) treating (M3) a metabolic syndrome in a

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subject comprising administering the polar solvent-extract from a plant of the genus Leptospermum; (5) use (U3) of a polar solvent-extract from a plant of the genus Leptospermumin the manufacture of medicine for treating a metabolic syndrome in a subject; (6) maintaining (M4) healthy glucose levels in a subject comprising administering the polar solvent extract from a plant of the genus Leptospermum; (7) use (U4) of the polar solvent extract from a plant of the genus Leptospermumin manufacturing medicine for maintaining healthy glucose levels in a subject; (8) treating or preventing (M5) a disease or condition associated with oxidative stress comprising administering an extract from a plant of the genus Leptospermumto a subject; (9) use (U5) of extract from a plant of the genus Leptospermumin manufacturing medicine for treating or preventing a disease or condition associated with oxidative stress; (9) producing (M6) an extract, comprises contacting fragmented plant material from a plant of the genus Leptospermumwith a polar solvent at least 50-120° C for at least 10 minutes to 2 hours, and separating remaining solids from the polar solvent to obtain extract; (10) extract is produced by the method (M6); composition comprising a polar solvent-extract from a plant of the genus Leptospermum;. ACTIVITY : Cytostatic; Analgesic; Antianginal; Antidiabetic; Antilipemic; Anorectic. MECHANISM OF ACTION : None given.

- USE : The method is useful for: treating or preventing cancer in a subject; and treating metabolic syndrome, where the cancer is lung cancer or mesothelioma, the mesothelioma is a mesothelioma of the lung, abdomen or heart, the metabolic syndrome is hyperglycemia, dyslipidemia, obesity and/or adiposity, and the mesothelioma is a mesothelioma of the lung, abdomen or heart (all claimed). No biological data given.

- ADVANTAGE : The method: minimizes costs for storage and transportation; increases extraction efficiency; and shortens extraction time. PHARMACEUTICALS : Preferred Method: The methods (M1)-(M5) further comprise administering an additional agent comprising a agent, an antiinflammatory agent, an immunomodulatory agent, a neurotropic factor, agent for treating a cardiovascular disease, agent for treating liver disease, antiviral agent, agent for treating hyperglycemia, and an agent for treating immunodeficiency disorders. The methods (M1)-(M5), and uses (U1)-(U5) comprise: administering the extract once daily; and administering the extract at least once daily for a period of 1 month. The method (M6) comprises drying the fragmented plant material to a moisture content of ≯ 10% prior to contacting with the polar solvent. The method (M6) comprises: removing or reducing the amount of polar solvent following separation of the solids, to yield a concentrated extract; removing the polar solvent following separation of the solids to yield a dry extract; and encapsulating the extract. In the method (M6): the polar solvent is removed under vacuum at 20-60° C; and the aqueous extraction is performed under vacuum. Preferred Components: In the methods (M1)-(M5), and uses (U1)-(U5): the plant material or extract is Leptospermum scoparium, Leptospermum liversidgei, Leptospermum polygalifolium, Leptospermum laevigatum, Leptospermum continentale, Leptospermum amboinense, Leptospermum arachnoides, Leptospermum brachyandrum, Leptospermum brevipes, Leptospermum coriaceum, Leptospermum deuense, Leptospermum epacridoideum, Leptospermum juniperinum, Leptospermum lanigerum, Leptospermum luehmannii, Leptospermum macrocarpum, Leptospermum minutifolium, Leptospermum multicaule, Leptospermum myrsinoides, Leptospermum nitidum, Leptospermum obovatum, Leptospermum oligandrum, Leptospermum parvifolium, Leptospermum petersonii, Leptospermum polygalifoliumpacific beauty, Leptospermum purpurascens, Leptospermum rotundifolium, Leptospermum rotundifolium'Julie Ann', Leptospermum sericeum, Leptospermum speciosum, Leptospermum spectabile, Leptospermum spinescens, Leptospermum squarrosum, Leptospermum trinervium, Leptospermum turbinatum, Leptospermum variabile, and Leptospermum wooroonooran; the extract comprises actives comprising aromadendrin glucoside, kaempferol rhamnoside, quercetin rhamnoside, vindoline, 5-dihydroxy-6-methyl-7-methoxyflavanone, and methylglyoxal; the polar solvent extract is an aqueous extract; the composition or medicament is in a

(Volver al Sumario)

form for oral administration; the extract is in powder form or encapsulated form. In uses (U1)-(U5), the polar solvent extract is formulated for administration with an additional agent comprising agent, antiinflammatory agent, immunomodulatory agent, a neurotropic factor, an agent for treating a cardiovascular disease, an agent for treating liver disease, an antiviral agent, an agent for treating hyperglycemia, and an agent for treating immunodeficiency disorders. In the methods (M1)-(M5): the composition and medicament is a food composition; the food composition comprises a honey product; the honey product is Leptospermum scoparum; the amount of honey product is 10-99 wt.%, based on the total weight of the composition or medicament; and the composition or medicine further comprises suspending agents, emulsifying agents, gelling agents, wetting agents, fillers, binders, preservatives, flavoring, humectant, coloring and/or sweetening agents. In the method (M6): the polar solvent is water; the plant material comprises at least 50% leaves and/or stems; and the plant material-to-solvent ratio is 1-20 kg/100 L. The composition comprises: actives comprising aromadendrin glucoside, kaempferol rhamnoside, quercetin rhamnoside, vindoline, 5-dihydroxy-6-methyl-7-methoxyflavanone, and methylglyoxal; a polar solvent extract of dried Leptospermumplant material; less than 10 wt.% polar solvent; and honey product. In the composition: the polar solvent extract is an aqueous extract; and the honey product is a dried honey product or a honey powder. ADMINISTRATION : Administration of the composition is 0.001-100 mg/day, preferably 15 mg/day by oral route. EXAMPLE : The examples provide details of methods and materials, and production of Leptospermumextract that do not support the claims.

3/14	@ WPI / 2017 Clarivate Analytics.
PN	WO2022195468A1 2022-09-22 DW2022081 EP4059508A1 2022-09-21 DW2022082 CA3213826A1 2022-09-22 DW2023080 AU2022236886A1 2023-11-02 DW2023091 CN116997348A 2023-11-03 DW2023093
TI	Composition useful in reducing pain or itch, comprises dose of non-polar extract of iceland moss
PA	(JOHJ) JOHNSON & JOHNSON CONSUMER CO INC (JOHJ) JOHNSON & JOHNSON CONSUMER INC
ICAI	A61K36/09; A61K9/00; A61P1/00; A61P17/00; A61P27/02;
AB	- NOVELTY : Composition comprises a dose of non-polar extract of iceland moss. - DETAILED DESCRIPTION : An INDEPENDENT CLAIM is also included for composition comprising a dose of 0.001-0.005 wt.% non-polar extract of iceland moss, and the non-polar extract was extracted with dichloromethane. ACTIVITY : Analgesic; Antipruritic; Dermatological; Antiallergic; Antiinflammatory; Antiarthritic; Osteopathic. MECHANISM OF ACTION : None given. - USE : The composition is useful in reducing pain or itch to a patient, where pain is transient receptor potential ankyrin 1 or type I receptor tyrosine kinases receptor-mediated pain and/or itch, where the pain or itch is associated with digestive health, ocular itch, osteoarthritis, allergy, or atopic dermatitis (all claimed). Test details are described but no results given. - ADVANTAGE : The composition composition exhibits anti-irritant and an antioxidant properties. PHARMACEUTICALS : Preferred Composition: The composition is administered enterally, applied to a surface of skin of the patient, or is administered to the eye of the patient. The composition further comprises a carrier comprising surfactants, chelating agents, emollients, humectants, conditioners, preservatives, opacifiers, and/or fragrances. The composition is administered in the form of a solution, suspension, lotion, cream, serum, gel, stick, spray, ointment, liquid wash, soap bar, shampoo, hair conditioner, paste, foam, powder, mousse, shaving cream, hydrogel, or film-forming product. Preferred Components: The non-polar extract was extracted with at least one solvent comprising 1-8C alkanes, 1-8C cycloalkanes, 1-8C alkyl ethers,

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petroleum ethers, 1-8C ketones, methylene chloride, ethyl acetate, xylene, toluene, chloroform, vegetable oil, and/or mineral oil, preferably the non-polar extract was extracted with dichloromethane. The non-polar extract is present in the composition at a concentration of 0.00001-about 2 wt.%, preferably 0.001-0.005 wt.%. EXAMPLE : The examples provide details of polar versus non-polar extract, and non-polar iceland moss extract cytotoxicity on chinese hamster ovary cell line that do not support the claims.

4/14	@ WPI / 2017 Clarivate Analytics.
PN	CN107467665A 2017-12-15 DW201806
TI	Extracting bioactive substances from olive leaf involves picking fresh and healthy olive leaves, and drying followed by crushing to obtain powder, and sterilizing resulting powder, mixing with carbon source, and nitrogen source
PA	(ANHU-N) ANHUI HUAJIAN BIOTECHNOLOGY CO LTD
ICAI	A23F3/34; A23L33/105; A23L33/135; A23L33/14;
AB	- NOVELTY : Extracting bioactive substances from olive leaf involves picking fresh and healthy olive leaves, and drying to moisture content of less than or equal to 10 wt.%, followed by crushing, over 50 meshes sieve to obtain powder, and sterilizing resulting powder, mixing with carbon source, nitrogen source, wort and cellulase enzyme, fermenting at 30-35° C for 10-15 days, then filtering seed liquid to obtain supernatant. The obtained supernatant is concentrated under vacuum, dried and inactivated at 60-65° C to obtain final product. - USE : Method extracting bioactive substances from olive leaf (claimed). - ADVANTAGE : The method enables to extract bioactive substances from olive leaf is more easy to be absorbed by human body, has simple process, high efficiency, low energy consumption, high extracting efficiency, high active ingredient content, stronger health care function under effect of microorganism, and has high value use. BIOLOGY : Preferred Conditions: The weight ratio of carbon source, nitrogen source, wort and cellulase in seed liquid is 1:0.1:0.2:0.01:0.001:0.1. The seed liquid is Bacillus subtilisspore suspension or yeast spore suspension and is inoculated to seed culture medium. The volume fraction of solids in seed liquid is 20-30 wt.%. Preferred Compositions: The seed culture medium comprises 0.5-1 wt.% tryptone, 2-3 wt.% glucose, 0.1-0.2 wt.% sodium chloride, 0.1-0.35 wt.% ammonium sulfate, 0.01-0.02 wt.% beef extract, 3-5 wt.% agar, 0.01-0.02 wt.% olive leaf extract, and amount of water. The pH value of the culture medium is 7.0-7.5.

5/14	@ WPI / 2017 Clarivate Analytics.
PN	CN110845557A 2020-02-28 DW2020025
TI	Extracting anthocyanins from three small berry compound pulps by microwave-assisted method comprises e.g. choosing three kinds of small berry with uniform size and color without rotten fruits and immature green fruits and uniformly mixing
PA	(UNEA) UNIV NORTHEAST AGRIC
ICAI	C07H1/08; C07H17/065; C09B61/00; C09B67/54;
AB	- NOVELTY : Extracting anthocyanins from three small berry compound pulps by microwave-assisted method comprises choosing three kinds of small berry with uniform size and color without rotten fruits and immature green fruits, uniformly mixing Lonicera edulispulp, raspberry pulp and wild blueberry pulp, placing the composition fruit pulp in a freeze dryer, freeze-drying, pulverizing into powder by a pulverizer, passing through sieving sieve, and storing in a desiccator in a sealed bag, mixing the obtained composition pulp powder and ethanol, placing in a triangle flask, soaking, and then processing, then centrifuging in an ice bath, and filtering through membrane, concentrating filtrate on rotary evaporator, and then freeze-drying under vacuum to obtain a crude anthocyanin powder, reconstituting the obtained crude anthocyanin with 3 times the volume of water, purifying by using activated D101 macroporous resin, and eluting with ethanol, collecting eluant, and freeze-drying.

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- DETAILED DESCRIPTION : Extracting anthocyanins from three small berry compound pulps by microwave-assisted method comprises choosing three kinds of small berry with uniform size and color without rotten fruits and immature green fruits, uniformly mixing Lonicera edulispulp, raspberry pulp and wild blueberry pulp according to a ratio of 2:4:1, placing the composition fruit pulp in a freeze dryer, freeze-drying, pulverizing into powder by a pulverizer, passing through a 60-mesh sieving sieve, and storing in a desiccator in a sealed bag, mixing the obtained composition pulp powder and 60% ethanol (acidified 0.1% hydrochloric acid) according to the solid-liquid ratio of 1:45, placing in a triangle flask, soaking for 30 minutes, and then processing for 77 seconds under the condition of microwave power of 250 W, then centrifuging in an ice bath for 5 minutes in a speed of 7000 revolutions /minute (rpm) at 4° C for 10 minutes, and filtering through 0.45 μ m membrane, concentrating the filtrate on rotary evaporator, and then freeze-drying under vacuum to obtain a crude anthocyanin powder, reconstituting the obtained crude anthocyanin with 3 times the volume of water, purifying by using activated D101 macroporous resin, and eluting with 60% ethanol, collecting the eluant, and freeze-drying.
- USE : The method is useful for extracting anthocyanins from three small berry compound pulps by microwave-assisted method.
- ADVANTAGE : The method: can applied to a variety of small berries, which increases the utilization rate of small berries; utilizes simple requirements for equipment when compared with the traditional method, has short extraction time, high extraction rate, good quality; is safe, environmentally-friendly and free of pollution; can extract anthocyanins, which increase the utilization rate of small berries, reduces processing costs with high extracting efficiency, and utilizes berries, which can be fully extracted.
BIOLOGY : Preferred Method: The method is specifically comprises (i) respectively chooisng the size uniform color, no and rot, no three small-berry immature fruit, i.e. pulp of Lonicera edulisfruit, raspberry and wild blueberry and mixing uniformly at a ratio of 2:4:1, placing the composition pulp in the freezing dryer, freezing and drying, then crushing into powder by a crusher, sieving with 60-mesh sieve, storing in the dryer in the sealed bag; (ii) mixing the composition fruit pulp powder obtained in step (i) with 60% ethanol ((acidified 0.1% hydrochloric acid) in a volume ratio of 1:45 in a solid-liquid ratio, placing in a triangular flask, and soaking for 30 minutes, and then processing for 77 seconds under the condition of microwave power of 250 W; (iii) centrifuging for 5 minutes in an ice bath at 7000 rpm at 4° C for 10 minutes using 0.45 μ m membrane filtration, concentrating the filtrate by a rotary evaporator, and freeze-drying in vacuum to obtain a crude anthocyanin powder; (iv) adding crude anthocyanin obtained in step (ii) to 3 times volume of water, re-dissolving with an activated D101 after purifying by macroporous resin, eluting by 60% ethanol, collecting the eluent, freezing and drying to obtain pure anthocyanin product; and (iv) reconstituting the crude anthocyanin obtained in step (iii) with 3 times the volume of water, purifying using activated D101 macroporous resin, and eluting with 60% ethanol, collecting the eluate and freeze-drying. In the step (i), the three small berry pulps should be gradually mixed and needs to be freeze-dried, which reduces the loss of anthocyanins in the raw materials through the sieve and ensuring uniform raw materials. In the step (ii), the extraction is performed in strict accordance with the conditions of microwave-assisted extraction and ensuring maximum extraction, and highest extraction rate. In the step (iii), the filtrate is concentrated by evaporation and then freeze-drying. In the step (iv), fully reconstituted and eluted with 60% ethanol.

6/14	@ WPI / 2017 Clarivate Analytics.
PN	AU2021107001A4 2021-12-16 DW2021104
TI	Making, formulating and evaluating in-situ gel for treating fungal skin infections involves e.g. extracting plant materials comprising collecting, authenticating Silymarin seeds and grounding into fine powder with predefined particle size

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PA (ALAM-I) ALAM M (BHAT-I) BHATI P (KAUS-I) KAUSHIK N (KHAT-I) KHATOON R (KUMA-I) KUMAR A (RAHA-I) RAHATE K (SHAR-I) SHARMA A (SHAR-I) SHARMA S (SING-I) SINGH V (SUDH-I) SUDHA A

ICAI A61K36/28; A61K47/18; A61K47/36; A61K9/06; A61K9/51; A61P31/10;

AB - NOVELTY : Preparing, formulating and evaluating in-situ gel for treating fungal skin infections comprises: e.g. extracting plant materials, where the extraction of plant material comprises collecting and authenticating Silymarin seeds, grounding the seeds into fine powder with a predefined particle size, extracting a predefined amount of ground SM seeds for predefined time intervals by employing 200 ml water solution with 80% methanol using a Microwave assisted Extraction (MAE) at predefined powers, filtering each time through a filtering means after extraction occurs at one of the predefined time intervals to obtain nanoparticles, and evaporating supernatant to dryness under reduced pressure at 45° C and stored at 18° C for subsequent HPLC analysis; performing organoleptic screening techniques and phytochemical screening techniques; and formulating nanoparticles and nanoparticulate in-situ gel when the organoleptic screening techniques and the phytochemical screening techniques are completed.

- DETAILED DESCRIPTION : Preparing, formulating and evaluating in-situ gel for treating fungal skin infections comprises: extracting plant materials, where the extraction of plant material comprises collecting and authenticating Silymarin seeds, grounding the seeds into fine powder with a predefined particle size, extracting a predefined amount of ground SM seeds for predefined time intervals by employing 200 ml water solution with 80% methanol using a Microwave assisted Extraction (MAE) at predefined powers, filtering each time through a filtering means after extraction occurs at one of the predefined time intervals to obtain nanoparticles, and evaporating supernatant to dryness under reduced pressure at 45° C and stored at 18° C for subsequent HPLC analysis; performing organoleptic screening techniques and phytochemical screening techniques; formulating nanoparticles and nanoparticulate in-situ gel when the organoleptic screening techniques and the phytochemical screening techniques are completed, where the formulation of the nanoparticles comprises dispersing gelrite in deionized water to a first solution and heating the first solution at 90° C with continuous stir; cooling the first solution to a room temperature; adding a predetermined quantity of drug-loaded freeze-dried nanoparticles in purified hot water to form a blend; adding Benzalkonium chloride to the blend to obtain a second solution; mixing the second solution to the first solution to attain a gel formulation and adjusting pH of the mixture by adding a predefined amount of 0.1 M sodium hydroxide with continuous stir to get the smooth gel formulation; transferring the obtained gel formulation to an amber glass vial, closed with grey butyl rubber stopper and sealed with an aluminum cap; and sterilizing by autoclaving at 121° C and 15 psi for 20 minutes; and evaluating nanoparticles and nanoparticulate in-situ gel when formulated. ACTIVITY : Fungicide; Antimicrobial; Dermatological. MECHANISM OF ACTION : None given.

- USE : The method is useful for preparing, formulating and evaluating in-situ gel for treating fungal skin infections. No biological data given.

- ADVANTAGE : The method: has lower risk of side effects, widespread availability and efficacious for lifestyle diseases for prolonged period of time; prevents a patient from the side and/or adverse effects associated with the synthetic drugs; and is economic. PHARMACEUTICALS : Preferred Method: The organoleptic screening techniques comprises a microscopy and physical evaluation, a Foreign organic matter content, an ash value, a moisture content, a swelling index and/or a foaming index. The phytochemical screening techniques include screening techniques comprising a test for alkaloids, a test for flavonoids, a test for phenolics and tannins, a test for steroids, a test for glycoside, tests for carbohydrates, a test for identifying phytoconstituents by HPLC, a drug excipient compatibility studies and/or a thin layer chromatograph. The evaluation of nanoparticles techniques comprises a percentage yield, a particle size and zeta potential, a surface morphology, a drug entrapment efficiency, an in-vitro drug release,

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release kinetics and/or stability study. The evaluation of nanoparticulate techniques comprises a clarity test, a pH of gel formulation, a viscosity of gel, an in-vitro diffusion study and/or a sterility testing. The HPLC analysis technique are performed using a LC-100, a Cyberlab TM, a Salo Torrace, a Millburry, a MAO 1527 and/or a USA with LC-UV-100 UV detector. The filtering means is a Fisher brand filter paper (QL100, 150 mm). The amber glass vial is 5 ml. Preferred Composition: The gelrite is 0.75 wt/vol.%. The Benzalkonium chloride is 0.1%. EXAMPLE : None given.

7/14	@ WPI / 2017 Clarivate Analytics.
PN	CN105732831A 2016-07-06 DW201671
TI	Preparing black fungus polysaccharide using microwave extraction comprises pre-processing black fungus, extracting and removing fat, polysaccharide, concentrating, drying, purifying, to obtain the finished product
PA	(HEIL-N) HEILONGJIANG ZHONGSHENG BIOLOGICAL ENG
ICAI	C08B37/00;
AB	- NOVELTY : Preparing black fungus polysaccharide using microwave extraction comprises pre-processing black fungus, extracting and removing fat, polysaccharide, concentrating, drying, purifying, to obtain the finished product, pre-processing black fungus, selecting plump meat, mild, no residual, no etching, using dryer for drying, crushing, preparing black fungus, removing fat, using prepared black fungus, using Soxhlet extraction using ethyl acetate, acetone, removing fat, using residue, drying and extracting polysaccharide. - DETAILED DESCRIPTION : Preparing black fungus polysaccharide using microwave extraction comprises pre-processing black fungus, extracting and removing fat, polysaccharide, concentrating, drying, purifying, to obtain the finished product, (i) pre-processing black fungus, selecting plump meat, mild, no residual, no etching, using dryer for drying until the water content is 20%, crushing, preparing black fungus, removing fat, using prepared black fungus, using Soxhlet extraction for 5 hours using ethyl acetate, acetone, removing fat, using residue, drying at 40° C, (iii) extracting polysaccharide, using liquid material ratio 20:1-40:1, adding black fungus powder and removing extracting liquid and fat, extracting for 90-150 minutes, microwave extraction at 90-100° C, microwave intensity is 60-100 %, extracting, centrifuging, collecting residue, extracting for 3 times, mixing extracting liquid, concentrating, drying, using extracting liquid using rotary evaporimeter after concentration, adding ethanol where the volume ratio of concentrated liquid and alcohol is 1: 3, stirring and mixing uniformly, centrifuging at 3500 rotations/minute for 15 minutes, preparing precipitate, collecting, freeze-drying, to prepare black fungus polysaccharide, purifying, using prepared black fungus polysaccharide with petroleum ether and acetone and carrying out extraction, removing remaining fat, drying at 40° C, preparing polysaccharide solution with 6% concentration, adding chloroform and positive chlorine butyl alcohol volume ratio is 1: 4, where the ratio of reagent and polysaccharide is 8:1, removing white and milk protein liquid layer, using the clear liquid with rotary evaporimeter to obtain concentrating to volume 1/4, adding anhydrous ethanol with concentration 80%, allowing to stand for 2 hours, centrifuging for 15 minutes, precipitating, freezing and drying, refining to obtain the product. - USE : The method is useful for preparing black fungus polysaccharide (claimed). - ADVANTAGE : The method is simple.

8/14	@ WPI / 2017 Clarivate Analytics.
PN	US2018009842A1 2018-01-11 DW201810 CN107574209A 2018-01-12 DW201810 CN107574209B 2021-02-05 DW2021014

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TI	Producing arginine-rich peptide mixture, comprises collecting a supernatant comprising peptides of interest, and isolating the peptides of interest from the supernatant, where the supernatant is freeze-dried
PA	(NASC-N) NASCENT PEPTIDE BIOTECHNOLOGY LTD (CHEN-I) CHEN D
ICAI	A23L33/18; A61K36/52; A61K38/01; A61K38/16; A61K38/17; A61P35/00; B01D15/32; B01D15/36; B01D15/38; C07K1/04; C07K1/14; C07K1/18; C07K1/20; C07K1/22; C07K1/34; C07K1/36; C12P21/06;
AB	- NOVELTY : Producing an arginine-rich peptide mixture, comprises: (a) collecting a supernatant comprising peptides of interest, where de-fatted and pulverized walnut meal, egg albumin and water are mixed and stirred, pretreated with ultrahigh pressure, and subsequently enzymatic digested with ultrasonic-microwave-assisted extraction, and enzymes are inactivated by raising temperature and the supernatant is collected through plate and frame pressure filtration; and (b) isolating the peptides of interest from the supernatant, where the supernatant is freeze-dried. - DETAILED DESCRIPTION : Producing an arginine-rich peptide mixture, comprises: (a) collecting a supernatant comprising peptides of interest, where de-fatted and pulverized walnut meal, egg albumin and water are mixed and stirred, pretreated with ultrahigh pressure, and subsequently enzymatic digested with ultrasonic-microwave-assisted extraction, and enzymes are inactivated by raising temperature and the supernatant is collected through plate and frame pressure filtration; and (b) isolating the peptides of interest from the supernatant, where the supernatant is freeze-dried, and the peptides of interest in freeze-dried coarse powder are subsequently isolated by using reversed phase HPLC (RP-HPLC), Everest C18(RTM: Column) (4.6x 250 mm, 5 µ m, 238EV54) as a reversed phase column, acetonitrile-water solution as mobile phase, and trifluoroacetic acid as anionic ion pair reagent are used, detection is performed at 214 nm wavelength, the column is washed with pure acetonitrile before loading, 25 mg freeze-dried powder is dissolved in mobile phase with a total volume of 25 ml and filtered through 0.45 µ m microfiltration membrane, the loading volume is 20 µ m and column temperature is 30° C, the isolation conditions include acetonitrile concentration of 18 vol/vol.%, trifluoroacetic acid concentration of 0.09 vol/vol.%, and flow rate of 1 ml/minute, 3 eluted fractions, with retention times of 9.64 minutes, 11.36 minutes and 13.8 minutes are collected, and after freeze-dried, an arginine-rich peptide mixture in powder form is obtained. ACTIVITY : Cytostatic; Anabolic. MECHANISM OF ACTION : None given. - USE : The process is useful for producing arginine-rich peptide mixture, which is useful to prepare health foods, foods for special dietary uses, ordinary foods and drugs related to cervical cancer therapy (all claimed) The ability of arginine-rich peptide mixture to treat cervical cancer was tested in Hela cells by measuring inhibition rate of proliferation of cancer cells using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The result showed that the arginine-rich peptide mixture exhibited an inhibition rate of 72.75± 0.32%. - ADVANTAGE : The process provides the arginine-rich peptide mixture, which: has arginine content of more than 18% (claimed); and has a strong inhibitory effect on the proliferation of cervical cancer cells. BIOLOGY : Preferred Process: The process further comprises isolating and enriching the arginine-rich peptide mixture by using a surface imprinted membrane, where the isolating and enriching step comprises: (c) cleaning a cover slip and a slide by immersing the cover slip and the slide in Piranha solution (comprised of sulfuric acid and 30% hydrogen peroxide in a volume ratio of 3:1), and subjecting to ultrasonic cleaning for 1.5-2.5 hours, and cleaning the cover slip and the slide with pure water and drying with nitrogen before use, (c1) producing a peptide mixture-immobilized template by immersing the cleaned cover slip in an aqueous solution of the arginine-rich peptide mixture, (c2) producing a silanized slide by immersing cleaned slide in 0.5-1.5 vol/vol.% 3-aminopropyltriethoxysilane solution in methanol and shaking at 20-40 rpm for 15-45 minutes, and then rinsing with methanol and drying, and (c3) producing the surface imprinted membrane, where a prepolymer mixture is prepared by mixing functional monomers including acrylic acid and methyl

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acrylic acid and crosslinking agent i.e. triethylene glycol dimethacrylate and a photoinitiator i.e. isopropylthioxanthone (ITX), is added, after purged with nitrogen, the prepolymer mixture is spread on a surface of the silanized slide, subsequent to rotation, the slide is covered with the peptide mixture-immobilized template, when polymerization, induced with UV light, is completed, the glass slides are immersed in a solution of 8-12 m/vol.% sodium lauryl sulfate:8-12 vol/vol.% hydrogen acetate, the cover slip is removed, after shaken at 80-160 rpm for 4-8 hours, the slide is rinsed to neutral with pure water under agitation, and an arginine-rich peptide mixture surface imprinted membrane is obtained; and (d) isolating and enriching the arginine-rich peptide mixture from the supernatant of the step (a) by using the surface imprinted membrane prepared in the step (c), where the arginine-rich peptide mixture surface imprinted membrane is immersed in the supernatant obtained in the step (a), after shaken at 20-40 rpm for 1-6 hours, the imprinted membrane, together with the absorbed peptides of interest, is taken out and immersed in 0.5-1.6 mol/l sodium chloride solution, at the same time, 100-300 W ultrasonic wave is applied for 10-50 minutes to assist the elution, sodium chloride is removed from the collected eluted solution by using cation exchange resin, an arginine-rich peptide mixture powder is obtained after the eluate solution is low temperature spray dried, and the eluted surface imprinted membrane is immersed in the supernatant obtained in the step (a) again after being rinsed with pure water and the subsequent processes are repeated to isolate the arginine-rich peptide mixture. In the process, the defatted and pulverized walnut meal is mixed with egg albumin at a weight ratio of 3-6:1, and the resulting protein dregs mixture is mixed with water at a weight to volume ratio of 1:4-14, where after stirred for 1.5-2.5 hours at room temperature, the mixture is introduced into an ultrahigh pressure apparatus with an applied pressure of 200-600 Mpa for 10-30 minutes to obtain an ultrahigh pressure pretreated suspension, the suspension is kept at 40-60° C and pH is adjusted to 9-10, 2-6 wt.% alkaline proteinase of the suspension is added and mixed, in the meantime, ultrasonic-microwave is applied to assist the enzymatic digestion, with an ultrasonic power of 200-400 W for 10-20 minutes and a microwave power of 200-600 W for 5-15 minutes, after 1.5-2.5 hours of enzymatic digestion, pH is adjusted to 6-8, 2-6 wt.% papain of the suspension is added and mixed, and at the same time, ultrasonic-microwave is applied to assist the enzymatic digestion, with an ultrasonic power of 200-400 W for 10-20 minutes and a microwave power of 200-600 W for 5-15 minutes, and after 2-3 hours of enzymatic digestion, the temperature is raised to inactivate the enzymes and the supernatant is collected following plate and frame pressure filtration. In the step (c): the cleaned cover slip is immersed in 1.5-10 g/l arginine-rich peptide mixture solution in water and shaken at 20-40 rpm for 4-8 hours, and then it is rinsed with pure water and dried to obtain the peptide mixture-immobilized template; the prepolymer mixture is prepared by mixing the functional monomers including acrylic acid and methyl acrylic acid and crosslinking agent triethylene glycol dimethacrylate) at a volume ratio of 0.5-3.5:0.5 to 2.5:4-11 and 0.2-0.8 volume of 1-4 mmol/l isopropylthioxanthone solution in acetone is added as the photoinitiator; and after purged with nitrogen for 20-40 minutes, the prepolymer mixture is spread on the surface of the silanized slide fixed on a rotator, where after the rotator is rotated at 100-400 rpm for 2-10 seconds, the slide is covered with the peptide mixture-immobilized template and polymerization is induced by 365 nm UV light and kept for 3-6 hours. In the step (d), the absorption-elution circle of the arginine-rich peptide mixture surface imprinted membrane is repeated more than 10 times. EXAMPLE : Defatted and pulverized walnut dregs was mixed with egg albumin at a weight ratio of 4:1, and the resulting protein meal mixture was well-mixed with water at a weight to volume ratio of 1:8. After stirred for 2 hours at room temperature, the mixture was introduced into an ultrahigh pressure apparatus with an applied pressure of 400 Mpa for 20 minutes to obtain an ultrahigh pressure treated suspension. The suspension was kept at 500° C and pH was adjusted to 9. Then 3.5 wt.% alkaline proteinase was added and well mixed. In the meantime, ultrasonic-microwave was applied to assist the enzymatic digestion, with an ultrasonic power of 300 W for 12 minutes and a microwave power of 400 W for 8 minutes. After 2

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hours of enzymatic digestion, pH was adjusted to 7. Then 3.5 wt.% papain was added and well mixed. At the same time, ultrasonic-microwave was applied to assist the enzymatic digestion, with an ultrasonic power of 300 W for 15 minutes and a microwave power of 400 W for 10 minutes. After 2.5 hours of enzymatic digestion, the temperature was raised to inactivate the enzymes. Then supernatant was collected following plate and frame pressure filtration, in which protein content was 93.6% and peptide content was 88.5%. The supernatant was freeze-dried, the peptides of interest in the freeze-dried coarse powder were isolated by using reversed phase HPLC. Then 25 mg freeze-dried powder was dissolved in mobile phase with a total volume of 25 ml and filtered through 0.45 μ m microfiltration membrane, where the loading volume was 20 μ l and column temperature was 30° C, and isolation was performed at acetonitrile concentration of 18 vol/vol.%, trifluoroacetic acid concentration of 0.09 vol/vol.%, and flow rate of 1 ml/minute. Then 3 eluted fractions, with retention times of 9.64 minutes, 11.36 minutes and 13.8 minutes, were collected. After freeze-dried, an arginine-rich peptide mixture powder was obtained. Then arginine-rich peptide mixture surface imprinted membrane was prepared and immersed in the obtained supernatant. After shaken at 20 rpm for 4 hours, the imprinted membrane, together with the absorbed peptides of interest, were taken out, and immersed in 1 mol/l sodium chloride solution. At the same time, 200 W ultrasonic wave was applied for 30 minutes to assist the elution. Then sodium chloride was removed from the eluted solution by using cation exchange resin. An arginine-rich peptide mixture powder was obtained after the eluate was low temperature spray dried. The eluted surface imprinted membrane was immersed in the supernatant again after rinsed with pure water. The subsequent processes were repeated to isolate the arginine-rich peptide mixture.

9/14	@ WPI / 2017 Clarivate Analytics.
PN	CN102391385A 2012-03-28 DW201241 CN102391385B 2013-06-26 DW201370
TI	Extracting and purifying biologically active polysaccharide from Dendrobium huoshanense, comprises crushing, extracting, mixing extracted liquid, concentrating in vacuum, adding ethanol, centrifuging, dissolving precipitates, and drying
PA	(ANHU-N) ANHUI SHENGNONG BIOTECH CO LTD
ICAI	C08B37/00;
AB	- NOVELTY : Extracting and purifying biologically active polysaccharide from Dendrobium huoshanense, comprises (i) crushing the Dendrobium huoshanenseto a crude powder, and extracting; (ii) mixing the extracted liquid, and concentrating in vacuum to obtain a concentrated liquid; (iii) adding ethanol, and centrifuging to obtain precipitates; (iv) dissolving the precipitates, and passing the solution by an ultra-filtration film, and collecting an intercepted liquid; and (v) concentrating collected passed liquid, and drying to obtain Dendrobium huoshanensepolysaccharide extract. - DETAILED DESCRIPTION : Extracting and purifying biologically active polysaccharide from Dendrobium huoshanense, comprises (i) crushing the Dendrobium huoshanenseto a crude powder, then adding 10-30 times of water to the crude powder, extracting for 1-30 minutes under constant temperature of 30-100[deg] C in a microwave, and extracting for 1-4 times; (ii) mixing the extracted liquid obtained in step (i), and concentrating in vacuum with a vacuum degree of -0.06 to -0.08 MPa at not > 80[deg] C to obtain a concentrated liquid having a relative density of 1.10-1.30; (iii) adding ethanol to the concentrated liquid, allowing to stand for 12-24 hours, and then centrifuging to obtain precipitates; (iv) dissolving the precipitates obtained in step (iii) by adding 20-50 times of water at 60-80[deg] C, and passing the solution by an ultra-filtration film having a molecular weight of 100 kDalton at a pressure of 0.35 MPa, then collecting an intercepted liquid, and then passing the intercepted liquid by the ultrafiltration film having a molecular weight of 300 kDalton at pressure of 0.35 MPa, and collecting the passed liquid; and (v) concentrating

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the collected passed liquid in vacuum, and then drying in vacuum at temperature not > 60[deg] C to obtain Dendrobium huoshanensepolysaccharide extract.
- USE :
The method is useful for extracting and purifying biologically active polysaccharide from Dendrobium huoshanense.
- ADVANTAGE :
The method shortens the extraction time; increases the production rate of the crude extract by 20-35%, under similar extraction times; increases the production rate of purified Dendrobium huoshanensepolysaccharide from 5% to 10-15%; and increases the Dendrobium huoshanensepolysaccharide content by 40-60%. INSTRUMENTATION AND TESTING :
Preferred Components: The microwave for microwave extraction carried out under constant temperature in the step (i) has a frequency of 2450 MHz or 915 MHz, and power of 500-15000 W.

10/14	@ WPI / 2017 Clarivate Analytics.
PN	WO2016202155A2 2016-12-22 DW201707 CN106256250A 2016-12-28 DW201709 WO2016202155A3 2017-02-09 DW201712
TI	Preparing pressed juice or powder of Brassica oleracea useful in composition used as e.g. food or medicine for e.g. reducing blood fat, by crushing and homogenizing e.g. stems of Brassica, and incubating and squeezing homogenate
PA	(ZHJA) ZHEJIANG HISUN PHARM CO LTD (TAIZ-N) TAIZHOU TELEY BIOLOGICAL TECHNOLOGY CO (TAIZ-N) TAIZHOU TELEY BIOTECHNOLOGY CO LTD
ICAI	A23L19/00; A23L33/00; C12P11/00; C12P13/00;
AB	- NOVELTY : Method (M1) for preparing pressed juice of Brassica oleracea, involves crushing at least one stems, leaves and flowers of the B.oleracea, homogenizing the crushed B.oleracea, incubating the obtained homogenate, and squeezing the incubated homogenate. - DETAILED DESCRIPTION : An INDEPENDENT CLAIM is included for method (M2) for preparing powder of the B.oleracea, which involves performing the above-mentioned steps in the method (M1), and drying the obtained juice. ACTIVITY : Antilipemic; Hypotensive; Cytostatic; Hypoglycemic; Immunostimulant. Test details are described but no results given. MECHANISM OF ACTION : None given. - USE : The method is useful for preparing pressed juice of B.oleraceaand B.oleraceapowder which is useful in composition used as food, healthcare product or medicine for reducing blood fat, blood pressure, cancer chosen from lung cancer, prostate cancer, colon cancer and breast cancer and blood sugar, and improving immunity (all claimed). - ADVANTAGE : The method is simple and environmentally-friendly, recycles waste residues, and prepares juice and powder of B.oleraceawhich is rich in nutrients and suitable for long-term storage without deterioration, has excellent dispersibility and water-solubility and promotes body health. BIOLOGY : Preferred Method: The incubation is performed at 10-60° C for 10-240 minutes, preferably 20-40° C for 20-120 minutes, more preferably 20-30° C for 30-60 minutes. EXAMPLE : No suitable example given.

11/14	@ WPI / 2017 Clarivate Analytics.
PN	WO2010071941A1 2010-07-01 DW201045 AU2009329830A1 2011-07-14 DW201152 CA2748339A1 2010-07-01 DW201164 EP2373610A1 2011-10-12 DW201166 KR20110116018A 2011-10-24 DW201174

(Volver al Sumario)

	MX2011006913A1 2011-11-30 DW201203 US2011318439A1 2011-12-29 DW201203 CN102307842A 2012-01-04 DW201206 JP2012513415A 2012-06-14 DW201239 HK1162460A0 2012-08-31 DW201307 IN5658DELNP2011A 2013-02-01 DW201330 NZ593802A 2013-01-25 DW201332 SG172377A1 2011-07-28 DW201410 SG195552A1 2013-12-30 DW201455 SG172377B 2014-05-14 DW201501 JP2015120731A 2015-07-02 DW201544 US9220928B2 2015-12-29 DW201603 BRPI0923551A2 2016-01-26 DW201631 EP2373610A4 2013-03-13 DW201771
TI	Use of extract from Acronychia species for treating or preventing bacterial infection, helmintic infection, cell proliferative disorder, inflammatory disease or disorder related to oxidative stress
PA	(ECOB-N) ECOBIOTICS LTD
ICAI	A23L1/221; A23L1/30; A23L27/10; A23L27/12; A23L27/20; A61K31/015; A61K31/047; A61K31/122; A61K31/192; A61K31/202; A61K36/75; A61K8/30; A61K8/31; A61K8/34; A61K8/35; A61K8/36; A61K8/97; A61P29/00; A61P31/04; A61P33/10; A61P35/00; A61P39/06; A61Q1/02; A61Q13/00; A61Q17/00; A61Q19/00; A61Q19/08; A61Q19/10; C07C13/19; C07C31/20; C07C49/623; C07C50/04; C07C59/64; C11B9/00;
AB	- NOVELTY : Treating or preventing a bacterial infection, helmintic infection, a cell proliferative disorder, an inflammatory disease or disorder or a disorder related to oxidative stress involves administering an extract from Acronychiaspecies. - DETAILED DESCRIPTION : INDEPENDENT CLAIMS are included for the following: 1) treating or preventing a bacterial infection involving administering (hetero)aryl compound of formula (I) or its salt; 2) new (hetero)aryl compound of formula (II) and its salt; 3) a flavor or fragrance composition comprising the extract from Acronychiaspecies, where extract comprises at least one of: 1-ethenyl-1-methyl-2,4-bis(1-methylethenyl)cyclohexane, 2,6-di-tert-butylbenzoquinone, 2,5-di-tert-butyl-1,4-benzoquinone, tetracontane-1,40-diol, and 2,2,5,5-tetramethyl-bicyclo[6.3.0]undec-1(8)-enone; 4) a cosmetic, food or fragrance composition comprising the extract from Acronychiaspecies, where the extract is obtained by a method involving initial water or alcohol extraction and a subsequent ethyl acetate extraction; and 5) use of the extract from Acronychiaspecies as a fragrance or flavor component in a food or other composition; or as a food additive, a fragrance component or an antioxidant, an antibacterial, an anthelmintic or an antiinflammatory component of a cosmetic composition. ring A 1 : (hetero)aryl; Z 1 : -O-, -S- or -NR 4-; Y 1 : covalent bond or -(CH 2) p-; R 1 : 5-20C alkyl, 5-20C alkenyl, 5-20C alkynyl or 3-8C cycloalkyl; R 2 : H or T 1; T 1 : 1-6C alkyl, 2-6C alkenyl, 2-6C alkynyl, 3-8C cycloalkyl, hydroxy, -O-1-6C-alkyl, -O-2-6C-alkenyl, -O-2-6C-alkynyl, -O-3-8C-cycloalkyl, thiol, -S-1-6C-alkyl, -S-2-6C-alkenyl, -S-2-6C-alkynyl, -S-3-8C-cycloalkyl, -NR 4-1-6C-alkyl, -NR 4-2-6C-alkenyl, -NR 4-2-6C-alkynyl or -NR 4-3-8C-cycloalkyl; R 3 : -CO 2H or isosteric equivalent of carboxy group; R 4 : H or 1-6C alkyl; p : 1-10; R 2a : T 1. [IMAGE] ACTIVITY : Antibacterial; Cytostatic; Antiinflammatory; Antirheumatic; Antiarthritic; Gastrointestinal-Gen.; Immunosuppressive; Cardiovascular-Gen.;

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Cardiant; Cerebroprotective; Vasotropic; Anti-HIV; Hepatotropic; Virucide; Ophthalmological; Respiratory-Gen.; Neuroprotective; Nootropic; Antiparkinsonian; Anticonvulsant; Nematocide. The cytostatic efficacy of extract from Acronychiaspecies was evaluated against breast cancer cell line (MCF7), and the extract showed IC 50of 0.18 mg ml <-><1>. MECHANISM OF ACTION : None given.
- USE : For treating or preventing bacterial infection, helmintic infection, cell proliferative disorder, inflammatory disease or disorder or a disorder related to oxidative stress; useful in cosmetic, flavor, food or fragrance composition; as fragrance or flavor component in a food or other composition; and as food additive, fragrance component or antioxidant, antibacterial, anthelmintic or antiinflammatory component of a cosmetic composition. The Gram positive or Gram negative bacteria are selected from e.g. Bacillus anthracisand Staphylococcus aureus(claimed). The helminthes (worm) is nematode, trematode or cestode. The cosmetic product is e.g. soap or shampoo. The food is e.g. jams and ice creams. The cell proliferative disorder is cancer e.g. leukemia, colon cancer or lung cancer. The inflammatory disorder is rheumatoid arthritis, colitis or bacterial sepsis. Also useful for treating or preventing cardiovascular disease such as heart failure, heart attack and stroke; infectious diseases such as HIV/AIDS, and hepatitis; aging diseases such as macular degeneration and glaucoma; Lung diseases such as emphysema and chronic obstructive pulmonary disease; and neurological or neurodegenerative disorders such as Alzheimer's disease, Parkinson's disease, and Huntington's disease.
- ADVANTAGE : The extracts of Acronychiaspecies have potent antibacterial, anthelmintic, antioxidant, antiinflammatory and/or anti-cancer activity. BIOLOGY : Preferred Components: The bacterial infection is caused by a Gram positive or Gram negative bacteria (preferably bacteria are selected from the Genus Bacillus, Staphylococcus, Streptococcus, Aerococcus, Gemella, Corynebacterium, Listeria, Kurthia, Lactobacillus, Erysipelothrix, Arachnia, Actinomyces, Propionibacterium, Rothia, Bifidobacterium, Clostridium, Eubacterium, Nocardiaand Mycobacterium, especially Bacillus subtilis, B. anthracis, B. cereus, B. firmis, B. licheniformis, B. megaterium, B. pumilus, B. coagulans, B. pantothenticus, B. alvei, B. brevis, B. circulans, B. laterosporus, B. macerans, B. polymyxa, stearothermophilus, B. thuringiensis, B. sphaericus, S. aureus, S. epidermidis, S. haemolyticus, S. saprophyticus, S. pyogenes, S. pneumonia, S. agalactiae, S. pyogenes, S. agalactiae, S. dysgalactiae, S. equisimilis, S. equi, S. zooepidemicus, S. anginosus, S. salivarius, S. milleri, S. sanguis, S. mitior, S. mutans, S.faecalis, S.faecium, S. bovis, S. equinus, S. uberusand S. avium).
[IMAGE] ORGANIC CHEMISTRY : Preparation: No general method for the preparation of compound (II) is given. Preferred Compound: The compound (I) is a compound of formula (IA). The compound (II) is a compound of formula (IIA).
R 1' : 5-20C alkyl, 5-20C alkenyl or 3-8C cycloalkyl;
R 2' : H, 1-6C alkyl, 2-6C alkenyl, 2-6C alkynyl, 3-8C cycloalkyl, hydroxy, -O-1-6C-alkyl, -O-2-6C-alkenyl, -O-2-6C-alkynyl or -O-3-8C-cycloalkyl;
R 2a' : 1-6C alkyl, 2-6C alkenyl, 2-6C alkynyl, 3-8C cycloalkyl, hydroxy, -O-1-6C-alkyl, -O-2-6C-alkenyl, -O-2-6C-alkynyl or -O-3-8C-cycloalkyl. DEFINITIONS : Preferred Definitions:
R 1 : farnesyl;
R 2 : H or -O-1-3C alkyl;
R 3 : -CO 2H;
Y 1 : -(CH 2) p-;
p : 1-4;
R 2a : -O-1-3C alkyl. ADMINISTRATION : The dosage is 0.1 ng per kg of body weight to 1 g per kg of body weight, or 1 µ g to 1 g per kg of body weight or 1-500 mg per kg of body weight. Administration is by oral, rectal, parenteral, sublingual, buccal, intravenous, intraarticular, intra-muscular, intradermal, subcutaneous, intraocular, intraperitoneal, intracerebroventricular, transdermal, topical or by inhalation route. : Use of 2 compounds i.e. 3-(4-farnesyloxyphenyl)propionic acid (I') and 3-(4-

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farnesyloxy-3-methoxyphenyl)propionic acid are disclosed as the compound (I). 1 Compound i.e. 3-(4-farnesyloxy-3-methoxyphenyl)propionic acid is disclosed as the compound (II).
[IMAGE]

12/14	@ WPI / 2017 Clarivate Analytics.
PN	CN105061382A 2015-11-18 DW201631 CN105061382B 2017-04-12 DW201729
TI	Simultaneous extraction of black peanut proanthocyanidin and selenium-enriched protein, involves microwave-extracting peanut using ethanol, filtering, and obtaining proanthocyanidin from filter liquid and protein from residue
PA	(SHAN-N) SHANDONG PEANUT INST (SHAN-N) SHANDONG PEANUT RES INST (ZHAN-I) ZHANG C
ICAI	C07D311/62; C07K1/16; C07K1/30; C07K1/36;
AB	- NOVELTY : Simultaneous extraction of black peanut proanthocyanidin and selenium-enriched protein, involves micro-crushing peanut after being frozen in liquid nitrogen for 10 minutes, adding ethanol solution, microwave-extracting, filtering to obtain filter liquor as proanthocyanidin extract, vacuum-concentrating, spray-drying to obtain proanthocyanidin, and further processing filter residue to obtain selenium-enriched protein. - DETAILED DESCRIPTION : Simultaneous extraction of black peanut proanthocyanidin and selenium-enriched protein, involves micro-crushing peanut after being frozen in liquid nitrogen for 10 minutes, adding ethanol solution, microwave-extracting, filtering to obtain filter liquor as proanthocyanidin extract, vacuum-concentrating, spray-drying to obtain proanthocyanidin, adding alkali solution to filter residue, stirring, ultrasonically treating, centrifuging, adjusting pH of supernatant to isoelectric point, leaving still for 10 minutes, centrifugally separating, carrying out column chromatography, desalting, collecting protein liquid, and spray-drying to obtain selenium-enriched protein. - USE : Simultaneous extraction of black peanut proanthocyanidin and selenium-enriched protein (claimed). - ADVANTAGE : The method provides products with high product content and strong activity, is simple, reduces raw material cost, increases working efficiency, provides high extraction rate, and is suitable for industrial production. PHARMACEUTICALS : Preferred Conditions: Peanut is crushed to a granularity of 5-10 μ m. Crushed peanut powder is mixed with 50-70% ethanol in a ratio of 1:2-1:5. Microwave extraction is carried out at 350-550 W and 40-50° C for 2-6 minutes. Proanthocyanidin extract liquid is spray-dried at material feed temperature of 40° C, air inlet temperature of 160-180° C, and air inlet quantity of 22-25 m<3>/hour. The ratio of alkali solution (pH 8-9) and filter residue is 1:2-1:4. Ultrasonic processing is carried out at 50-60° C for 6-12 minutes. The pH of supernatant is adjusted to 4-5. Centrifugal separation is carried out for 10 minutes. The chromatographic column is G-25 column. Spray-drying is carried out at material temperature of 50° C, air inlet temperature of 180-190° C, and air inlet quantity of 25-27 m<3>/hour.

13/14	@ WPI / 2017 Clarivate Analytics.
PN	CN209081783U 2019-07-09 DW201957
TI	Vibration-stirring type polypeptide microwave extractor has vibrating type storage compartment and fixed storage compartment that are divided by vibration module includes moving plate, spring layer, and fixing plate
PA	(GUAN-N) GUANGXI TAIWANG BIOTECHNOLOGY CO LTD
ICAI	C07K1/14; C12P21/06;
AB	- NOVELTY : The utility model claims a vibrating mixing polypeptide microwave extractor, comprising an extracting tank (1), a control cabin (3) and the extracting tank

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(1) is provided with a vibrating module (2) divides the box body into vibratory housings (14) and fixed housings (15), the control chamber (3) is provided with upper magnetic group (31), a lower magnetic group (32), a driving motor (35), the upper waveguide (37), a lower waveguide (38). extracting machine of this utility model, the vibration module (2) can vibrate, stirring materials by vibrating stirring mode, does not need to contact the to-be-extracted material, safety and cleanness, the extracting tank (1) is provided with a extracting polypeptide observing window of pH value change in the material; the magnetron is used between packets in parallel, simple maintenance, easy to control the microwave power; the shell of the extracting tank (1) filled with granular polytetrafluoroethylene, has good heat-insulating effect.

14/14	@ WPI / 2017 Clarivate Analytics.
PN	CN115029371A 2022-09-09 DW2022090
TI	Efficient separation of e.g. natural active product involves obtaining microbial cells that efficiently produce product C, excavating genes, collecting B cells enriched in product C by nanofiltration membrane, and separating liquid
PA	(UYDP) UNIV DALIAN POLYTECHNIC
ICAI	C12N1/19; C12N1/21; C12N15/31; C12N15/54; C12N15/70; C12N15/81; C12P13/12; C12P17/10; C12P19/30; C12R1/19; C12R1/865;
AB	- NOVELTY : Efficient separation method of natural active product produced by microorganism involves obtaining microbial cells that efficiently produce product C for natural active product C, excavating genes of the transporter Pexporter, mining the specific internal transport protein Pimporter of product C, expressing the internal transport protein Pimporter, constructing ingesting cell strain B, performing liquid fermentation of strain A, performing solid-liquid separation on the culture broth of strain A, trapping the cells of strain A, performing a high-density liquid culture system for strain B, mixing the supernatant containing product C with the collected B cells, culturing, obtaining B cells that specifically took up and enriches product C under the action of the transportin P importer during process, collecting the B cells enriched in product C by nanofiltration membrane, subjecting the product to ultrasonication to release product C in the B cells, and separating the clear liquid. - DETAILED DESCRIPTION : Efficient separation method of natural active product produced by microorganism involves obtaining microbial cells that efficiently produce product C for natural active product C derived from microbial metabolism, excavating genes of the transporter Pexporter responsible for or involved in efflux of product C sequence information, based on the expression of the efflux protein Pexporter, according to the microbial cells that efficiently produce the product C and the efflux protein Pexporter to construct a synthesis-efflux cell strain A with both product synthesis and product efflux function, mining the specific internal transport protein Pimporter of product C, expressing the internal transport protein Pimporter using genetic engineering technology, constructing ingesting cell strain B that specifically take up product C, performing liquid fermentation of strain A, optimizing fermentation conditions, synthesizing large amount of product C when accumulating cells of strain A, excreting product C into fermentation broth from inside and outside the cell under action of the efflux protein Pexporter, selecting a nanofiltration membrane with suitable pore size and material, performing solid-liquid separation on the culture broth of strain A, trapping the cells of strain A, recycling back to the original fermentation of strain A, i.e. culture system I after membrane filtration, where the membrane separation permeate is the supernatant containing product C, performing a high-density liquid culture system for strain B, preferably culture system II to collect B cells, mixing the supernatant containing product C with the collected B cells, stirring and culturing in mechanical stirring fermentation device, preferably culture system III, until the product C does not detect in the fermentation broth, obtaining B cells that specifically took up and enriches product C under the action of the transportin Pimporter during process, collecting the B cells enriched in product C by nanofiltration membrane, subjecting the

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product to ultrasonication to release product C in the B cells, and separating the clear liquid by chromatography to obtain high-purity product C.
- USE : The method is useful for efficient separation of natural active product produced by microorganism, natural active product and its structural analogs, and residual components in the natural active product.
- BIOTECHNOLOGY : Preferred Component: The efflux protein Pexporter is specificity or non-specificity of natural active product transporter protein.
Preferred Method: The method involves performing mutation breeding or genetic engineering of microbial cell of high-efficiency production product C. The method involves excavating the transporter responsible for or participates in the efflux of product C, i.e. the gene of efflux protein Pexporter sequence information and the specific internal transport protein of the mining product C, preferably internal transport protein Pimporter, and applying genetic engineering technology to express the internal transport protein Pimporter of genomics, proteome and transcriptome. The method involves performing liquid fermentation of bacterial strain A, and performing high-density liquid culture of bacterial strain B, where fermentation device is a mechanically agitated fermenter. The method involves selecting nanofiltration membrane with suitable aperture and material based on molecular weight of product C, cell size and pH of fermentation broth. The time of the clear liquid containing product C and the B cell stirring culture of collection is natural according to purpose. The specificity of the active product depends on the uptake capacity of the intratransportin Pimporter.

Literatura No Patente

1/4	@ BIOSIS / 2017 Clarivate Analytics.
AN	PREV201600125836
TI	Validation of ethnomedicinal potential of Tinospora cordifolia for anticancer and immunomodulatory activities and quantification of bioactive molecules by HPTLC
AU	Bala Manju; Pratap Kunal; Verma Praveen Kumar; Singh Bikram; Padwad Yogendra
AUAF	Acad Sci and Innovat Res, New Delhi, India; bikram_npp@rediffmail.com, yogendra@ihbt.res.in
PUB	Journal of Ethnopharmacology DEC 4 2015
LNKD	http://dx.doi.org/10.1016/j.jep.2015.08.001
IRN	ISSN 0378-8741(print) ISSN 1872-7573(electronic)
VOL	175
PG	131-137
URL	https://www.journals.elsevier.com/journal-of-ethnopharmacology
AB	Ethnopharmacological relevance: Tinospora cordifolia (Willd.) Miers ex Hook. f. & Thomas. (Menispermaceae) is one of the most widely used plants in various traditional medicinal systems including "Ayurveda". The plant is used for the treatment of jaundice, rheumatism, urinary disorder, skin diseases, diabetes and anemia. The phytoconstituents present in the plant belongs to different class of compounds such as alkaloids, diterpenoids lactones, glycosides, steroids, phenol, aliphatic compounds and polysaccharides. Aim of the study: The aim of present study was the isolation, structure elucidation, quantification and pharmacological evaluation of secondary metabolites from T. cordifolia for anticancer and immunomodulatory activities.Materials and methods: Different extracts and fractions were prepared from the stem of T. cordifolia. Pure molecules were isolated using normal phase chromatography and characterized on the basis of NMR and mass spectroscopic techniques. The anti-cancer and immunomodulatory activities of different extracts, fractions and isolated compounds were evaluated against four different human cancer cell lines, KB (human oral squamous carcinoma), CHOK-1 (hamster ovary), HT-29 (human colon cancer) and SiHa (human cervical cancer) and murine primary cells

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respectively. A simple, normal phase HPTLC method was also developed for the quantification of three bioactive compounds i.e N-formylannonain (1), 11-hydroxymustakone (5) and yangambin (8) in the stem of T. cordifolia hosted on fifteen different plants.Results: Chromatographic purification of different fractions led to the isolation of eight pure molecules i.e N-formylannonain (1), magnoflorine (2), jatrorrhizine (3) palmatine (4), 11-hydroxymustakone (5), cordifolioside A (6), tinocordiside (7) and yangambin (8). All extracts and fractions were active against KB and CHOK-1 cells whereas among the pure molecules palmatine (4) was found to be active against KB and HT-29; tinocordiside (7) against KB and CHOK-1; yangambin (8) against KB cells however N-formylannonain (1) and 11-hydroxymustakone (5), was found active for immunomodulatory activity. HPTLC quantification of three active molecules i.e N-formylannonain (1), 11-hydroxymustakone (5), and yangambin (8) were found in highest quantity in the stem of T. cordifolia hosted on Mangifera indica, however, other two active molecules were not quantified due to their insufficient quantity.Conclusion: Eight compounds have been isolated and characterized belonging to different classes. The pharmacological evaluation of extract, fractions and pure molecules revealed the ethnomedicinal value of T cordifolia for anticancer and immunomodulatory activities. (C) 2015 Published by Elsevier Ireland Ltd.

2/4	@ BIOSIS / 2017 Clarivate Analytics.
AN	PREV202100369440
TI	Bioactive compounds, antioxidant activity and antiproliferative effects in prostate cancer cells of green and roasted coffee extracts obtained by microwave-assisted extraction (MAE)
AU	Montenegro Julia; dos Santos Lauriza Silva; de Souza Rodrigo Goncalves Gusmao; Lima Larissa Gabrielly Barbosa; Mattos Daniella Santos; Viana Bruna Prunes Pena Baroni; Bastos Ana Clara Santos da Fonseca; Muzzi Leda; Conte-Junior Carlos Adam; Gimba Etel Rodrigues Pereira; Freitas-Silva Otniel; Teodoro Anderson Junger
AUAF	Fed Univ State Rio De Janeiro, UNIRIO, Lab Funct Foods, Av Pasteur 296, BR-22290240 Rio De Janeiro, Brazil; atteodoro@gmail.com
PUB	Food Research International FEB 2021
LNKD	http://dx.doi.org/10.1016/j.foodres.2020.110014
IRN	ISSN 0963-9969(print) ISSN 1873-7145(electronic)
VOL	140
PG	Article No.: 110014
URL	http://www.journals.elsevier.com/food-research-international/#description
AB	Coffee consumption has been investigated as a protective factor against prostate cancer. Coffee may be related to prostate cancer risk reduction due to its phytochemical compounds, such as caffeine, chlorogenic acids, and trigonelline. The roasting process affects the content of the phytochemicals and undesired compounds can be formed. Microwave-assisted extraction is an alternative to conventional extraction techniques since it preserves more bioactive compounds. Therefore, this study aimed to evaluate the phytochemical composition and the putative preventive effects in prostate cancer development of coffee beans submitted to four different coffee-roasting degrees extracted using microwave-assisted extraction. Coffea arabica green beans (1) were roasted into light (2), medium (3) and dark (4) and these four coffee samples were submitted to microwave-assisted extraction. The antioxidant capacity of these samples was evaluated by five different methods. Caffeine, chlorogenic acid and caffeic acid were measured through HPLC. Samples were tested against PC-3 and DU-145 metastatic prostate cancer cell lines regarding their effects on cell viability, cell cycle progression and apoptotic cell death. We found that green and light roasted coffee extracts had the highest antioxidant activity. Caffeine content was not affected by roasting, chlorogenic acid was degraded due to the temperature, and caffeic acid increased in light roasted and decreased in medium and dark roasted.

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Green and light roasted coffee extracts promoted higher inhibition of cell viability, caused greater cell cycle arrest in S and G(2)/M and induced apoptosis more compared to medium and dark roasted coffee extracts and the control samples. Coffee extracts were more effective against DU-145 than in PC-3 cells. Our data provide initial evidence that among the four tested samples, the consumption of green and light coffee extracts contributes to inhibit prostate cancer tumor progression features, potentially preventing aspects related to advanced prostate cancer subtypes.

3/4	@ MEDLINE / NLM
COPY	© 2023 The Authors. Published by Elsevier Ltd.
AN	NLM37810831
TI	Rutin extraction from female Carica papayaLinn. using ultrasound and microwave-assisted extractive methods: Optimization and extraction efficiencies.
AU	Chew See Khai; Teoh Wen Hui; Hong Sok Lai; Yusoff Rozita
AUAF	Department of Chemical Engineering, Faculty of Engineering, Universiti Malaya, 50603, Kuala Lumpur, Malaysia.; Sustainable Process Engineering Centre (SPEC), Department of Chemical Engineering, Faculty of Engineering, Universiti Malaya, 50603, Kuala Lumpur, Malaysia.; Institute of Research Management and Services, Universiti Malaya, 50603, Kuala Lumpur, Malaysia.; Sustainable Process Engineering Centre (SPEC), Department of Chemical Engineering, Faculty of Engineering, Universiti Malaya, 50603, Kuala Lumpur, Malaysia.
PUB	Heliyon England Oct 2023
LNKD	http://dx.doi.org/10.1016/j.heliyon.2023.e20260
IRN	ISSN 2405-8440 (Print)
VOL	9
NR	10
PG	e20260
AB	Green extractive methods accompanied by resource conservation through process optimization are important in working towards sustainable processes. In the present paper, rutin was extracted from the leaf of female Carica papaya Linn using microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE), sequential microwave ultrasound-assisted extraction (MUAE), and sequential ultrasound microwave-assisted extraction (UMAE) methods. Subsequently, the effect of extraction parameters on rutin yield were analyzed and compared. In addition, the extraction efficiency and energy consumption of the extraction processes were measured and discussed. In the present study, solid-liquid (S/L) ratio was determined to be the most significant extraction variable. Under optimized conditions, MUAE and UMAE were determined to yield the highest amount of rutin extracted at 18.46 ± 0.64 mg/g and 18.43 ± 0.81 mg/g, respectively. However, MUAE was determined to be the least resource efficient method as it consumed the highest amount of energy due to its relatively long extraction time. UAE was determined to be the most efficient in resource utilization as it required the least amount of energy for every mg/g of yield extracted, while the yield obtained was, nonetheless, comparatively high. The optimal condition obtained for UAE was 20 min of ultrasonic extraction time (TU), 20 % of ethanol mixture concentration (C), 710 μm of particle size (S), and 1:650 wt/wt of solid-liquid (S/L) ratio (R).

4/4	@ NPL / EPO
AN	XP086420205
PD	2020-11-06
TI	Antioxidant potential of nature's “something blue”: Something new in the marriage of biological activity and extraction methods applied to C-phycocyanin

(Volver al Sumario)

AU	Fratelli Camilly; Burck Monize; Amarante Marina Campos Assumpção; Braga Anna Rafaela Cavalcante
PUB	Trends in Food Science & Technology, 20201106 ELSEVIER SCIENCE PUBLISHERS, GB
LNKD	http://dx.doi.org/10.1016/j.tifs.2020.10.043
IRN	ISSN 0924-2244
VOL	107
PG	309 - 323
ED	Anese Monica; Nicoli Maria Cristina; Pinton Roberto
AB	No hay resumen disponible

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Innovative platform for the purification and production of small molecules

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Introduction

In the scouting of this project we will go in depth to highlight some of the most recent and relevant references in the field in a totally transversal way, without the search being restricted to an academic, public-private or directly industrial field. The following is the search strategy, for which the following keywords and key-phrases have been used:

Keywords & Key-Phrases

- "Micro molecule"
- Micromolecule
- "Small molecule"
- "Bioactive compound"
- "Lead compound"
- Development
- Production
- Manufacturing
- Creation
- Fabrication
- Purification
- Distillation
- Separation
- Extraction
- Obtaining
- Processing
- "Natural origin"
- Plant
- "Natural based"
- "Vegetal origin"
- "Vegetal based"
- Polyphenol
- "Olea europaea"
- Bioreactor
- "Green chemistry"
- "New drug"
- "Drug design"
- "Drug discovery"
- "Drug development"
- "Drug research"
- "Drug industry"
- "Medical use"
- "Medical purpose"

Relevant Organizations

Corporates

Cambrex Corporation

Cambrex Corporation is a leading small molecule company providing drug substance, drug product, and analytical services across the entire drug lifecycle. With expertise in technology transfer, they offer a tried and trusted approach to quicker, simpler, and seamless tech transfer processes. Their site in Charles City, IA, USA, develops and manufactures small molecule APIs, fine chemicals, and intermediates, with multiple commercial cGMP production plants and laboratories. Cambrex has completed the installation of multiple continuous flow reactor platforms at its High Point, NC facility, reinforcing its commitment to new technologies. Additionally, they have expanded their research and development laboratory and opened a new quality control laboratory at their site in Paullo, Milan, Italy.

KEY CONCEPTS

- Small Molecule
- Drug Substance
- Technology Transfer
- Cgmp Production
- Continuous Flow Reactor

LAST FUNDING ROUND

-

TOTAL FUNDING

-

EMPLOYEES

1001-5000

Verenium / BASF

Verenium is a biotechnology company specializing in the development of polypeptides with amylase and glucoamylase activity. Their patented technology focuses on the production and use of these polypeptides to catalyze the hydrolysis of polysaccharides, oligosaccharides, and starch into sugars. Additionally, they have developed delayed release compositions containing desired ingredients. The company's innovative approach aims to revolutionize the field of industrial enzymes and biocatalysts.

KEY CONCEPTS

- Biotechnology
- Polypeptides
- Amylase
- Glucoamylase
- Industrial Enzymes

LAST FUNDING ROUND

$7.3M

TOTAL FUNDING

$97.3M

EMPLOYEES

+10001

Thermo Fisher Scientific

Thermo Fisher Scientific is a global leader in providing biomanufacturing solutions, chromatographic separation resins, microbial fermentation technology, immunoassays, and bioprocess technology. The company is committed to long-term environmental sustainability and is at the forefront of developing innovative technologies to meet the growing demand for biopharmaceutical products. With a focus on the healthcare landscape, Thermo Fisher Scientific plays a crucial role in the pharmaceutical, biotechnology, food and beverages, and research industries. The company's dedication to advancing biologic modalities and developing specific antibodies for immunoassays demonstrates its commitment to driving progress in the industry.

KEY CONCEPTS

- Biomanufacturing Solutions
- Chromatographic Separation Resins
- Microbial Fermentation Technology
- Immunoassays
- Bioprocess Technology

LAST FUNDING ROUND

$5.7B

TOTAL FUNDING

$5.7B

EMPLOYEES

+10001

Novasep

Novasep is a leading provider of services in the field of molecule production and purification for the life science industries. Their specialized and differentiating technologies, and fully committed teams, enable them to offer small molecule APIs & intermediates for Pharmaceutical Innovators, natural based products and biomolecules for Pharmaceuticals and Cosmetic Ingredients, and small molecule active ingredients and advanced intermediates for Agrochemicals & Fine Chemicals. They are recognized for their Prochrom® technology, which is the reference in preparative and process-scale HPLC solutions for the purification of APIs, HPAPIs, peptides, oligonucleotides, recombinant proteins, cannabinoids, and other small molecules for the fine chemicals industry obtained by fermentation, extraction, semi-synthesis, or organic synthesis. Novasep's expertise lies in small molecule API manufacturing, requiring chemistry expertise, specialized facilities, regulatory experience, and supply chain management.

KEY CONCEPTS

- Molecule Production
- Purification
- Small Molecule Apis
- Prochrom® Technology
- Cdmos

EMPLOYEES

1001-5000

Asymchem Laboratories (Tianjin)

Asymchem Laboratories (Tianjin) is a leading global contract development and manufacturing organization (CDMO) specializing in the development and manufacturing of small molecule active pharmaceutical ingredients (APIs) and intermediates. With two production bases, the company has recently expanded its manufacturing capacity, enabling it to support heavy weight commercial projects and ensure readiness for upcoming projects. Asymchem has demonstrated solid growth, achieving significant year-over-year increases in total revenue, single-quarter revenue, and net profit. The company's success is driven by its commitment to technology-driven solutions and market-oriented strategies, positioning it as a key player in the pharmaceutical manufacturing industry.

KEY CONCEPTS

- Contract Development And Manufacturing Organization
- Cdmo
- Small Molecule Active Pharmaceutical Ingredients
- Apis
- Manufacturing Capacity Expansion

LAST FUNDING ROUND

-

TOTAL FUNDING

-

EMPLOYEES

5001-10000

Merck KGaA is a global company that operates in the fine chemical, pharmaceutical, and biotechnology sectors. The company is involved in the production of chromatographic separation resins, liquid sodium silicate, and bioreactors for cell culture and growth. Merck KGaA is also active in the market for biologics, focusing on the development and production of products derived from living organisms through genetic engineering. The company's activities align with the growing demand for single-use systems in pharmaceutical manufacturing and the increasing emphasis on improved waste management and prevention of marine litter in the plastics industry.

KEY CONCEPTS

- Chromatographic Separation Resins
- Liquid Sodium Silicate
- Bioreactors
- Biologics
- Single-Use Systems

EMPLOYEES

+10001

Evonik Industries

Evonik Industries is a global specialty chemicals company that focuses on manufacturing liquid sodium silicate and precipitated silica. The company is involved in contract manufacturing outsourcing of sterile injectable drugs and high-potency active pharmaceutical ingredients (HPAPIs). Evonik Industries is committed to initiatives for improved waste management and the prevention of marine litter, as part of the World Plastics Council. The company operates in the Charleston International Manufacturing Center in South Carolina and is a key player in the resin makers forum alongside BASF, Americas Styrenics, Trinseo, Chevron Phillips Chemical, LyondellBasell, Covestro, and SABIC.

KEY CONCEPTS

- Specialty Chemicals
- Liquid Sodium Silicate
- Precipitated Silica
- Contract Manufacturing Outsourcing
- High-Potency Active Pharmaceutical Ingredients

LAST FUNDING ROUND

-

TOTAL FUNDING

$3.72B

EMPLOYEES

+10001

Charles River Laboratories International

Charles River Laboratories International is a leading contract research organization providing preclinical and clinical laboratory services to pharmaceutical and biotechnology companies. The company specializes in conducting inhalation studies, non-inhalation studies, incurred sample reanalysis (ISR), and regulatory general toxicology studies. With a focus on small molecule pharmaceuticals, chemicals, monoclonal antibodies, recombinant proteins, synthetic peptides, and antibody-drug conjugates, Charles River Laboratories International offers expertise in evaluating background pathology findings in the respiratory tract of cynomolgus monkeys and rats, as well as data sharing exercises to assess the utility of different species within toxicology studies. The company's 10-year application of ISR and routine use of capillary microsampling demonstrate a commitment to advancing bioanalysis and ensuring confidence in preclinical and clinical research outcomes.

KEY CONCEPTS

- Contract Research Organization
- Inhalation Studies
- Incurred Sample Reanalysis
- Regulatory Toxicology
- Pharmaceutical And Biotechnology

LAST FUNDING ROUND

$1B

TOTAL FUNDING

$1.53B

EMPLOYEES

+10001

Wuxi Biologics

Wuxi Biologics is a leading global biologics contract manufacturing organization, specializing in the production of recombinant therapeutic proteins using Chinese hamster ovary (CHO) cells. The company operates in the aseptic fill finish services market, with a focus on small-molecule organic acids and biopharmaceutical CDMO/CMO services. Wuxi Biologics is positioned to capitalize on the growing demand for biologics contract manufacturing, particularly in Europe, and is committed to providing specialized equipment, expertise, and controlled cleanroom environments to ensure the sterility and safety of pharmaceutical products. Despite industry challenges, Wuxi Biologics continues to innovate and contribute to the advancement of biotechnology through its cutting-edge solutions and services.

WuXia Plus ADCC™

KEY CONCEPTS

- Biologics Contract Manufacturing
- Cho Cells
- Aseptic Fill Finish Services
- Biopharmaceutical Cdmo/Cmo
- Global Biotechnology Industry

LAST FUNDING ROUND

-

TOTAL FUNDING

-

EMPLOYEES

5001-10000

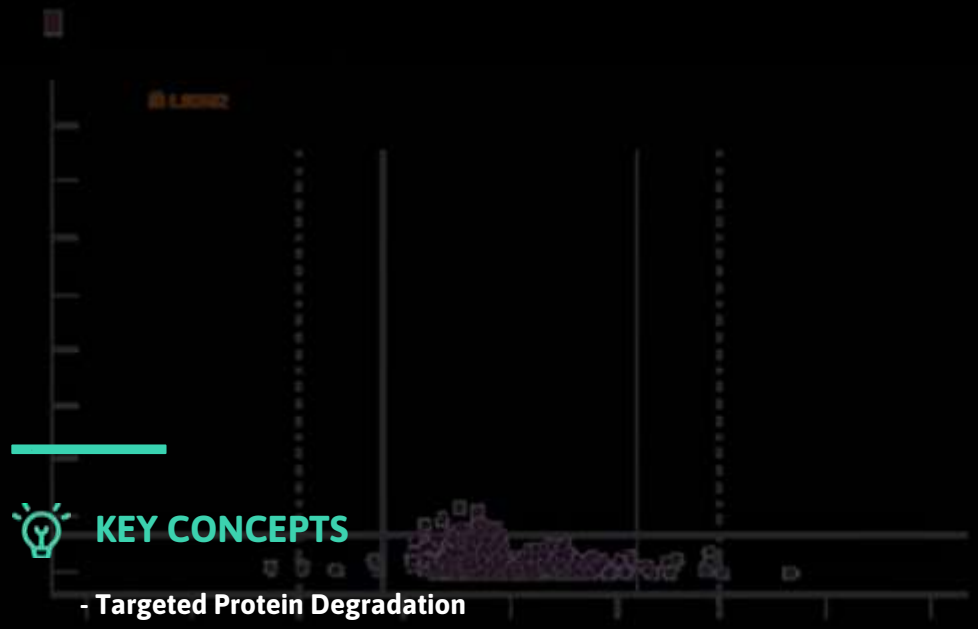
Genentech

Genentech is a leading biotechnology company specializing in the development of antibody-drug conjugates (ADCs) and targeted protein degradation for cancer treatment. Their innovative molecules link potent cytotoxic small molecule drugs to monoclonal antibodies, presenting unique developmental challenges due to their structural complexity. The company focuses on ensuring the stability of the small molecule payload on the ADC, directly impacting product efficacy and patient safety. Additionally, Genentech is involved in the origin and development of small-molecule leads through various lead-finding methods, including high-throughput screening, fragment-based design, and DNA-encoded library technology. Their commitment to quantitative measurement of small molecules' interactions with protein targets is evident in their development of HIPStA, a high-throughput method for assessing small molecule binding to endogenous proteins.

KEY CONCEPTS

- Antibody-Drug Conjugates
- Targeted Protein Degradation
- Cancer Treatment
- Small-Molecule Leads
- High-Throughput Screening

Arvinas Inc.



KEY CONCEPTS

- Targeted Protein Degradation
- Protac
- Molecular Glue Small Molecules
- E3 Ligases
- High-Throughput Screening

Arvinas Inc. is a biopharmaceutical company focused on targeted protein degradation (TPD) by PROTAC (proteolysis-targeting chimera) and molecular glue small molecules as an emerging therapeutic strategy. The company is dedicated to expanding the roster of E3 ligases that can be utilized for TPD and has made significant progress in the discovery and biochemical characterization of small-molecule ligands targeting the E3 ligase KLHDC2. Arvinas Inc. is also actively involved in the development of small-molecule inhibitors targeting c-MYC for anticancer therapy, utilizing high-throughput screening (HTS) strategies and cellular assays. The company's innovative approach to small molecule probes of biological systems has led to the emergence of new classes of small molecules that can target undruggable proteins, opening up new possibilities for drug development.

LAST FUNDING ROUND

$120M

TOTAL FUNDING

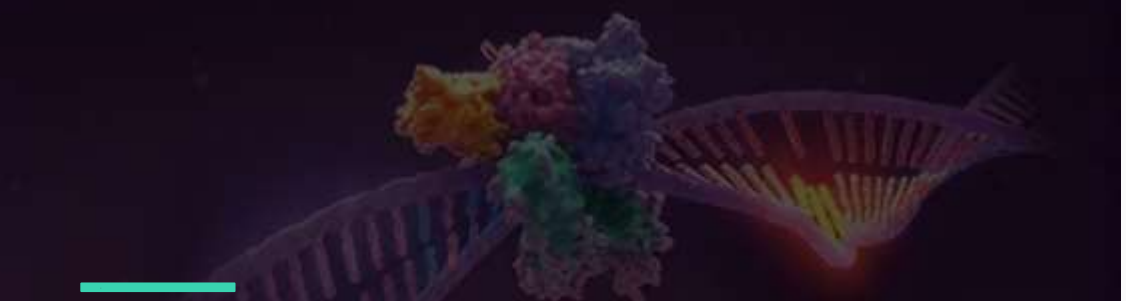
$235.85M

EMPLOYEES

251-500

Promega Corporation

Promega Corporation is a biotechnology company specializing in the development and commercialization of small-molecule tools for mechanistic investigations and therapeutic targeting of protein kinase-like (PKL) superfamily, including the UbiB family. Their focus includes the development and characterization of inhibitors for essential proteins such as COQ8, involved in coenzyme Q (CoQ) biosynthesis, and the creation of small-molecule enzyme pairs for optical voltage sensing via quenching of bioluminescence. Additionally, the company is involved in the development of trifunctional PROTACs that bind to proteins within the Bromo- and Extra-Terminal (BET) family, inducing preferential degradation of specific proteins within the bromodomain of the BET family.



KEY CONCEPTS

- Biotechnology
- Small-Molecule Tools
- Protein Kinase-Like Superfamily
- Enzyme Pairs
- Optical Voltage Sensing

LAST FUNDING ROUND

-

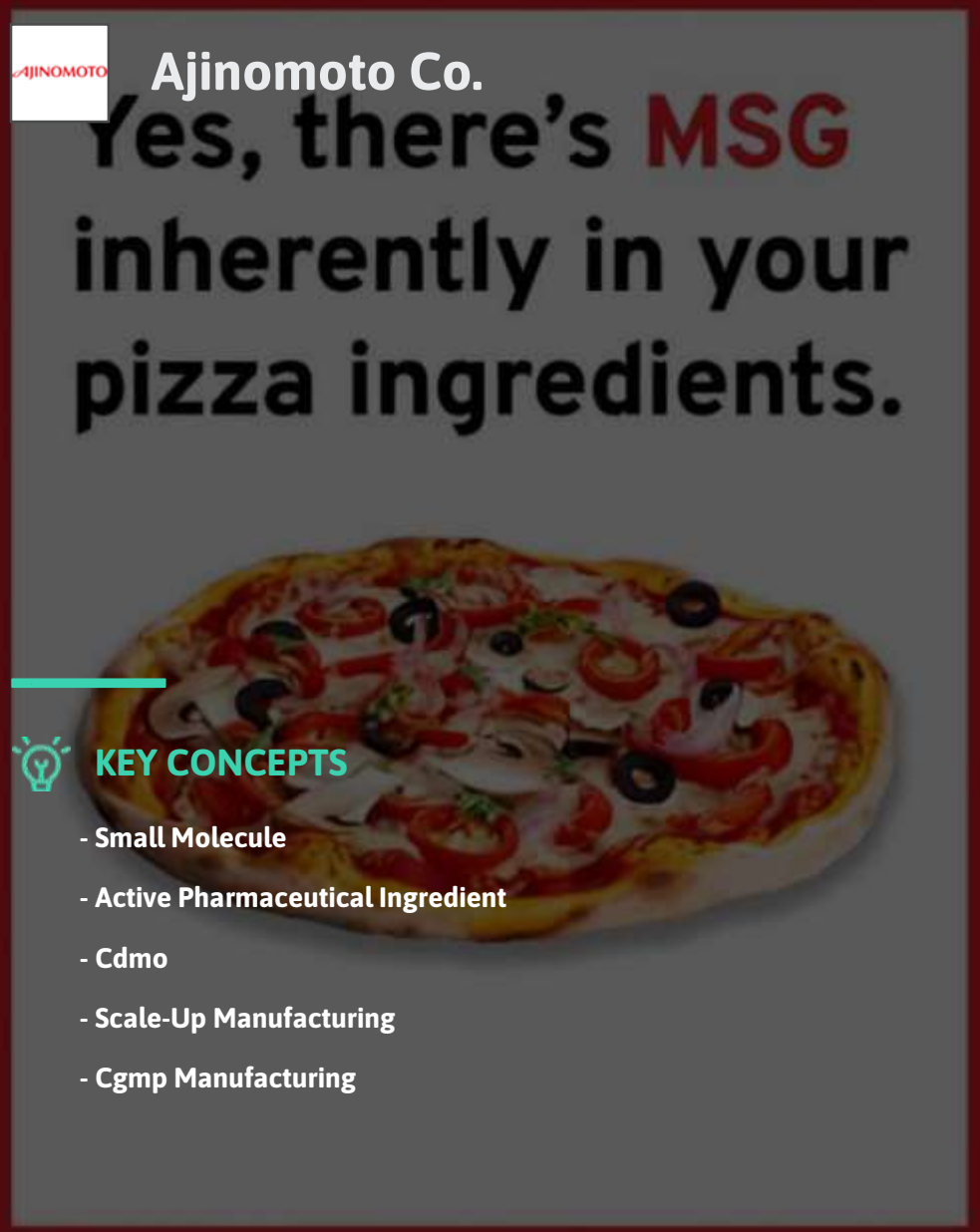
TOTAL FUNDING

-

EMPLOYEES

5001-10000

Ajinomoto Co.



KEY CONCEPTS

- Small Molecule
- Active Pharmaceutical Ingredient
- Cdmo
- Scale-Up Manufacturing
- Cgmp Manufacturing

Ajinomoto Co. is a global company specializing in small molecule active pharmaceutical ingredient (API) contract manufacturing. The company, through its CDMO partner, Ajinomoto Bio-Pharma Services, focuses on scale-up and cGMP manufacturing of small molecules and high-value fine chemicals. Ajinomoto Co. is involved in the production of sustainable products and processes for various industries, including the synthesis of pseudouridine, a key ingredient in mRNA COVID-19 vaccines. The company's expertise lies in the chemically synthesized, low-molecular-weight compounds, and it plays a significant role in the global small molecule CMO/CDMO market, which is anticipated to exhibit substantial growth over the forecast period.

EMPLOYEES

+10001

Pharmaron

Pharmaron is a premier R&D service provider for the life sciences industry, offering diverse drug R&D services including synthetic, medicinal and analytical chemistry, biology, DMPK, pharmacology, drug safety assessment, radiochemistry, isotopically labelled metabolism, chemical and pharmaceutical development, and clinical development. The company has invested in its people and facilities, establishing a broad spectrum of research, development, and manufacturing service capabilities throughout the entire drug discovery, preclinical, and clinical development process across multiple therapeutic modalities, including small molecules. Pharmaron's activities are focused on supporting medicinal chemistry programs, developing novel HIF-2 inhibitors, and creating potent and selective KMT9 inhibitors for cancer treatment.

KEY CONCEPTS

- R&D Service Provider
- Drug Discovery
- Medicinal Chemistry
- Hif-2 Inhibitors
- Kmt9 Inhibitors

LAST FUNDING ROUND

$587.82M

TOTAL FUNDING

$907.82M

EMPLOYEES

1001-5000

Beckman Coulter

Beckman Coulter is a leading company in life sciences, specializing in the development of innovative technologies for the detection and analysis of small molecules, biomarkers, and biological processes. Their focus on plasmonic immunoassays based on surface-enhanced Raman scattering (SERS) and laser diffraction particle analysis demonstrates their commitment to delivering extraordinary sensitivity and accuracy in detecting and analyzing small molecules and biological materials. Additionally, their research in controlling the GH/IGF1 axis showcases their dedication to addressing critical physiological processes and pathological conditions. Beckman Coulter's LS 13 320 XR laser diffraction particle analyzer is a testament to their expertise in providing fast, accurate, and reproducible high-resolution measurement and analysis for liquid or dry samples, utilizing advanced polarization intensity differential scattering (PIDS) technology.

KEY CONCEPTS

- Plasmonic Immunoassays
- Surface-Enhanced Raman Scattering
- Small Molecules
- Biomarkers
- Laser Diffraction Particle Analyzer

LAST FUNDING ROUND

$694K

TOTAL FUNDING

$2.96M

EMPLOYEES

+10001

Sterling Pharma Solutions Ltd

Sterling Pharma Solutions Ltd is a global contract development and manufacturing organization (CDMO) specializing in the early-stage development of antibody drug conjugates (ADCs) and the manufacturing of active pharmaceutical ingredients (APIs). The company has recently acquired a former Novartis facility in Ringaskiddy, Ireland, expanding its capabilities in API manufacturing. Sterling Pharma Solutions offers a full range of CDMO services across the lifecycle of new APIs and is known for its expertise in improving the potency and ADME properties of pyrazole-based agonists for the apelin receptor, targeting cardiovascular indications and metabolic syndrome.

KEY CONCEPTS

- Contract Development And Manufacturing Organization
- Active Pharmaceutical Ingredients
- Antibody Drug Conjugates
- Pyrazole-Based Agonists
- Cardiovascular And Metabolic Syndrome

EMPLOYEES

251-500

Bristol Myers Squibb

Bristol Myers Squibb is a global biopharmaceutical company that focuses on discovering, developing, and delivering innovative medicines to help patients prevail over serious diseases. The company is committed to advancing the science of immuno-oncology, cardiovascular diseases, and immunoscience, with a strong emphasis on research and development. Bristol Myers Squibb is dedicated to improving patient outcomes and has a diverse portfolio of products and pipeline of potential therapies. The company's mission is to transform patients' lives through science and innovation, and it strives to make a meaningful difference in the lives of patients around the world.

KEY CONCEPTS

- Biopharmaceutical
- Immuno-Oncology
- Cardiovascular Diseases
- Immunoscience
- Research And Development

EMPLOYEES

+10001

Sanofi S.A.

Sanofi S.A. is a global pharmaceutical company at the forefront of innovation in drug discovery and development. The company is focused on leveraging RNA molecules to address a wide range of human pathologies, including cancer, neurodegenerative disorders, muscular diseases, and bacterial infections. Sanofi is actively involved in the development of small molecule therapeutics that directly target RNA, with the goal of modulating the mode of action of disease-implicated RNA molecules. Additionally, the company is exploring the use of machine learning (ML) in preclinical drug discovery, particularly in the context of small-molecule drug candidates and pharmacokinetic/pharmacodynamic (PK/PD) applications. Sanofi's commitment to innovation is evident in its significant patent activity and its exploration of cutting-edge technologies such as pharmacogenomics, digital therapeutics, and artificial intelligence.

KEY CONCEPTS

- Pharmaceutical Industry
- Rna Molecules
- Small Molecule Therapeutics
- Machine Learning
- Innovation In Drug Discovery

LAST FUNDING ROUND

$310M

TOTAL FUNDING

$310M

EMPLOYEES

+10001

Novartis

Novartis is a global healthcare company that focuses on the development and commercialization of innovative medicines, vaccines, and consumer health products. The company is actively involved in research and development to address global health threats such as the SARS-CoV-2 pandemic, with a focus on therapeutic intervention targeting disease-relevant RNAs using small molecules. Novartis is also engaged in the study of extracellular vesicles (EVs) as biological drug delivery vehicles and the potential use of small molecules for turning mature somatic cells back into flexible stem cells for medical applications. The company is dedicated to revolutionizing medicine through its cutting-edge research and development efforts.

KEY CONCEPTS

- Healthcare
- Innovative Medicines
- Vaccines
- Therapeutic Intervention
- Research And Development

EMPLOYEES

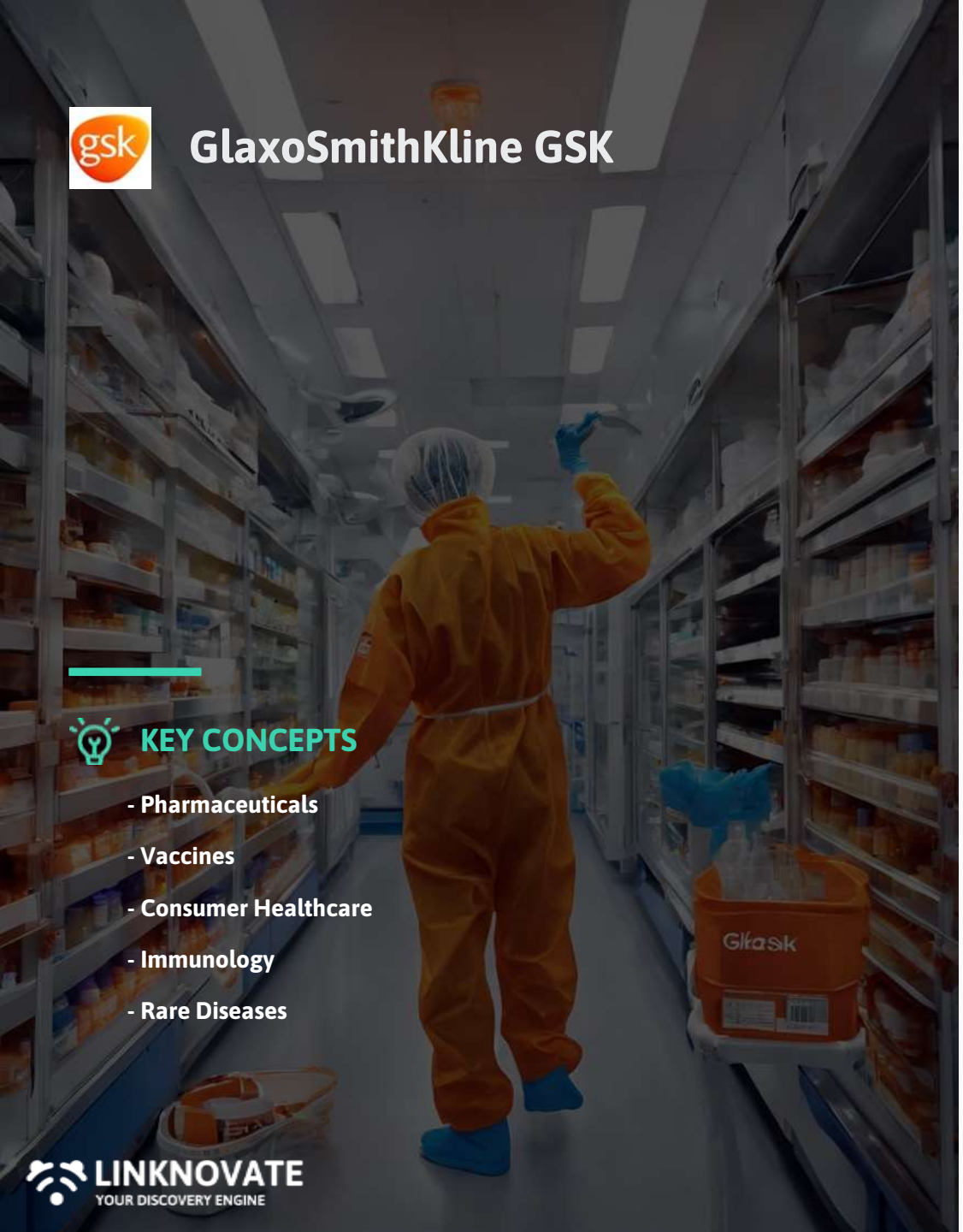
+10001

Esteve Pharmaceuticals S.A.

Esteve Pharmaceuticals S.A. is a pharmaceutical company based in Spain, with a focus on drug manufacturing and research. The company has been involved in the development and production of pharmaceutical products, particularly in the areas of small molecules and biologics. Esteve Pharmaceuticals S.A. has been active in addressing public health challenges, such as the Covid-19 outbreak in Europe, and has contributed to the development of therapies and medications to combat the disease. The company has also engaged in partnerships and collaborations with other organizations, such as Taros Chemicals and Welab, to enhance its research and development capabilities. Esteve Pharmaceuticals S.A. has a strong presence in the global pharmaceutical market and has been impacted by regulatory and reimbursement decisions in different countries, as well as the approval of new molecular entities (NMEs) by regulatory authorities.

KEY CONCEPTS

- Pharmaceutical
- Drug Manufacturing
- Small Molecules
- Biologics
- Research And Development



GlaxoSmithKline GSK

GlaxoSmithKline (GSK) is a global pharmaceutical company that focuses on developing and manufacturing innovative medicines, vaccines, and consumer healthcare products. The company is dedicated to improving the quality of human life by enabling people to do more, feel better, and live longer. GSK's research and development efforts are centered around areas such as immunology, respiratory, and infectious diseases. The company also has a strong focus on addressing rare diseases and developing treatments for conditions like severe α1-antitrypsin deficiency and schistosomiasis. GSK is committed to leveraging scientific advancements to create impactful solutions for global health challenges.

KEY CONCEPTS

- Pharmaceuticals
- Vaccines
- Consumer Healthcare
- Immunology
- Rare Diseases

EMPLOYEES

1001-5000

Eurofins Scientific Inc.

Eurofins Scientific Inc. is a leading global provider of bioanalytical testing services, drug discovery services, and clinical trial supplies. The company offers a wide range of services including manufacturing, packaging, logistics, target selection, validation, lead optimization, and bioanalytical testing. With a focus on small molecules and biologics, Eurofins Scientific Inc. serves various therapeutic areas such as oncology, cardiovascular diseases, infectious diseases, and immunology. The company's expertise and capabilities support pharmaceutical, biotech, and contract research organizations (CROs) in their research and development activities. Eurofins Scientific Inc. is committed to delivering high-quality solutions to meet the growing demand for innovative drug discovery and development, as well as the increasing need for bioanalytical testing services in the global market.

KEY CONCEPTS

- Bioanalytical Testing Services
- Drug Discovery Services
- Clinical Trial Supplies
- Small Molecules
- Biologics

LAST FUNDING ROUND

$30M

TOTAL FUNDING

$30M

EMPLOYEES

+10001

PharmaLex GmbH

PharmaLex GmbH is a global leader in providing analytical support for the development of medical products, from early research through pre-clinical to late phase studies, manufacturing, and health economics. The company offers comprehensive toxicology services to assess the risk of chemical exposure on patient safety and regulatory acceptance. Additionally, PharmaLex is involved in supporting the development of new antibiotics to combat drug-resistant pathogens, including ESKAPE pathogens. The company's expertise spans scientific and statistical analysis, strategic planning, clinical development, CMC development, regulatory submissions, and post-approval/post-launch maintenance.

KEY CONCEPTS

- Analytical Support
- Toxicology Services
- Medical Product Development
- Drug-Resistant Pathogens
- Eskape Pathogens

EMPLOYEES

1001-5000

Aurigene Pvt. Ltd.

Aurigene Pvt. Ltd. is a clinical stage biotech company based in Bangalore and Kuala Lumpur, committed to bringing novel therapeutics for the treatment of cancer and inflammation. With a track-record of executing over 75 discovery programs using small molecule, peptide, and peptidomimetic approaches, Aurigene has delivered fifteen clinical programs, currently in Phase I/II global clinical trials. The company's 250+ scientific team possesses a strong scientific and academic background with rich drug discovery experience, providing leadership and strategic oversight to the discovery collaborations. Aurigene has pioneered customized models of Drug Discovery & Development collaborations with large-pharmaceutical, mid-pharmaceutical companies, and Biotechs, and is in the process of separating its Discovery Business. The proprietary pipeline comprises programs including small molecule I/O, Transcription Inhibitors, and Protein degraders.

KEY CONCEPTS

- Biotech
- Drug Discovery
- Clinical Development
- Cancer Therapeutics
- Inflammation Treatment

EMPLOYEES

501-1000

Startups

Evox Therapeutics

Evox Therapeutics is a biotechnology company focused on the development of novel biotherapeutics using extracellular vesicles (EVs) as a delivery mechanism. Their technology is centered around exploiting exosomes, a type of EV, for the transportation of various biomacromolecules, including protein and nucleic acid-based therapeutics, as well as small molecule drugs. The company's patented inventions include modified EVs with albumin binding domains to improve circulation time and stability, as well as compositions and buffers for optimized long-term storage of engineered EVs. Evox Therapeutics aims to leverage the natural communication machinery of exosomes to create innovative therapeutics with improved pharmacokinetics and enhanced uptake of molecules.

KEY CONCEPTS

- Evox Therapeutics
- Extracellular Vesicles
- Exosomes
- Biotherapeutics
- Pharmacokinetics

LAST FUNDING ROUND

$94.81M

TOTAL FUNDING

$169.32M

EMPLOYEES

101-250

Orna Therapeutics Inc.

Orna Therapeutics Inc. is a biotechnology company focused on developing circular RNAs and transfer vehicles for innovative therapeutic applications. Their patented technology enables the creation of circular RNAs comprising group I intron fragments, spacers, an IRES, duplex forming regions, and expression sequences, resulting in improved expression, functional stability, low immunogenicity, ease of manufacturing, and extended half-life compared to linear RNA. This breakthrough technology has the potential to revolutionize the treatment of various diseases by addressing the challenges associated with traditional protein therapeutics and antibodies. Orna Therapeutics is at the forefront of leveraging RNA-based solutions to overcome the limitations of current treatments, offering new hope for patients and healthcare providers.

KEY CONCEPTS

- Circular Rnas
- Transfer Vehicles
- Rna-Based Therapeutics
- Biotechnology
- Innovative Treatments

LAST FUNDING ROUND

$80M

TOTAL FUNDING

$100M

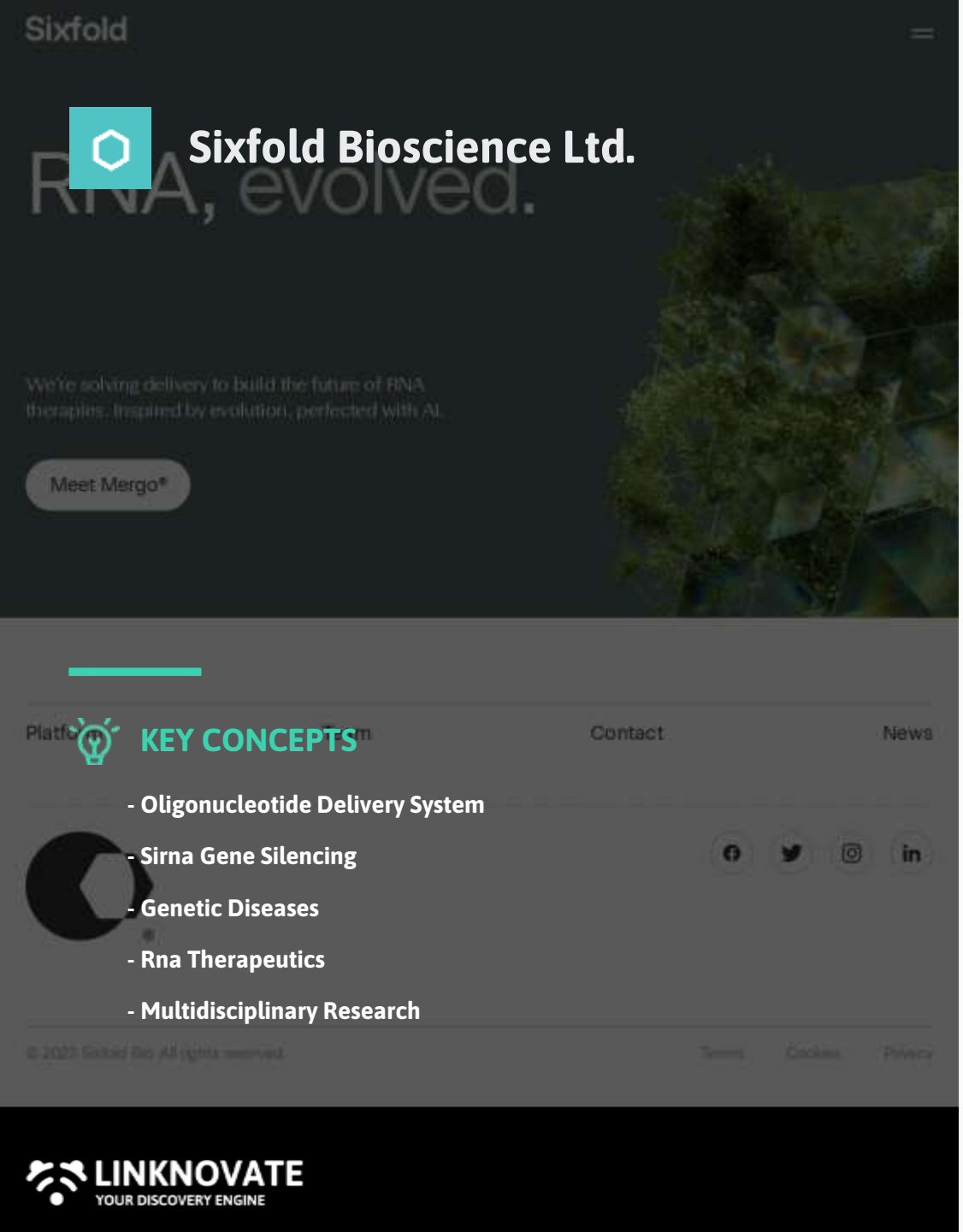
EMPLOYEES

11-50

Dorian Therapeutics offers treatment and solutions for age-associated diseases such as diabetes, alzheimer's, arthritis, sarcopenia, osteoarthritis, osteoporosis, and more. They also offer cellular and immunotherapy services.

EMPLOYEES

11-50



Sixfold Bioscience Ltd.

Sixfold Bioscience Ltd. is a leading biotechnology company focused on the development and validation of oligonucleotide delivery systems for the treatment of genetic diseases. The company's innovative approach utilizes synthetic oligonucleotides (ONs) to deliver short-interfering RNA (siRNA) gene silencing cargo to specific tissue types and cells, addressing a currently unmet need in the pharmaceutical industry. With a multidisciplinary team and strategic partnerships, Sixfold is at the forefront of advancing RNA therapeutics beyond vaccines, aiming to tackle over 4,000 diseases caused by genetic code errors. The company's research and development efforts are directed towards rapid scientific and commercial progress, positioning them as a key player in the field of RNA-based therapies.

KEY CONCEPTS

- Oligonucleotide Delivery System
- Sirna Gene Silencing
- Genetic Diseases
- Rna Therapeutics
- Multidisciplinary Research

LAST FUNDING ROUND

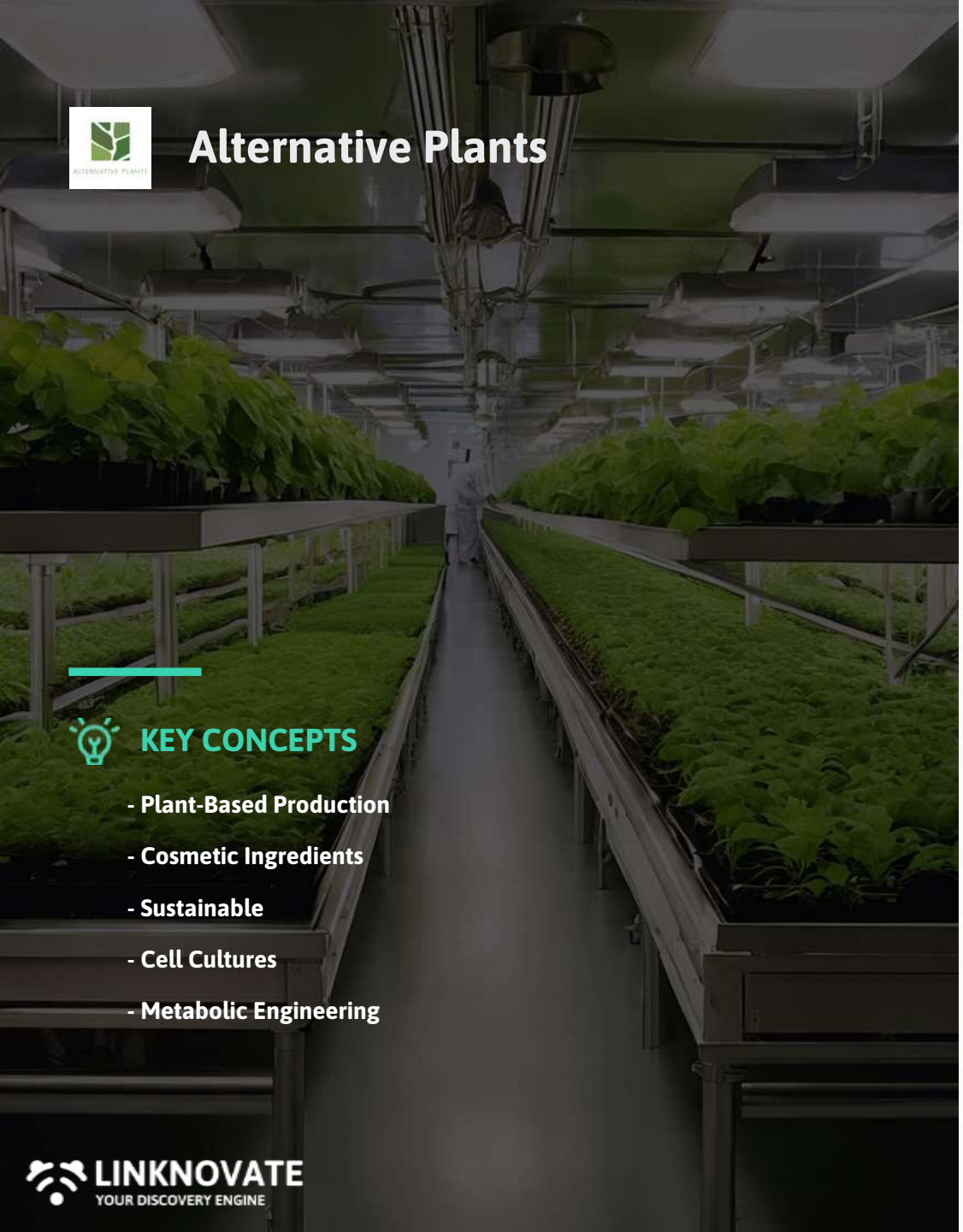
$2.2M

TOTAL FUNDING

$2.32M

EMPLOYEES

11-50



Alternative Plants

KEY CONCEPTS

- Plant-Based Production
- Cosmetic Ingredients
- Sustainable
- Cell Cultures
- Metabolic Engineering

LINKNOVATE
YOUR DISCOVERY ENGINE

Alternative Plants is a pioneering company focused on developing innovative and sustainable plant-based production processes for the commercial exploitation of scientifically validated cosmetic ingredients. The company utilizes underutilized plant resources and employs cutting-edge techniques such as cell cultures, aeroponics, and greenhouse/field cultivation to optimize resource utilization for profitable and sustainable production. Additionally, Alternative Plants applies systematic approaches, including metabolic engineering tools, to enhance growth conditions and increase the yields of valuable bioactive compounds. Through the InnCoCells project, the company is committed to revolutionizing the cosmetic industry by harnessing the potential of alternative plants and driving forward environmentally conscious and economically viable solutions.

LAST FUNDING ROUND

$57.01K

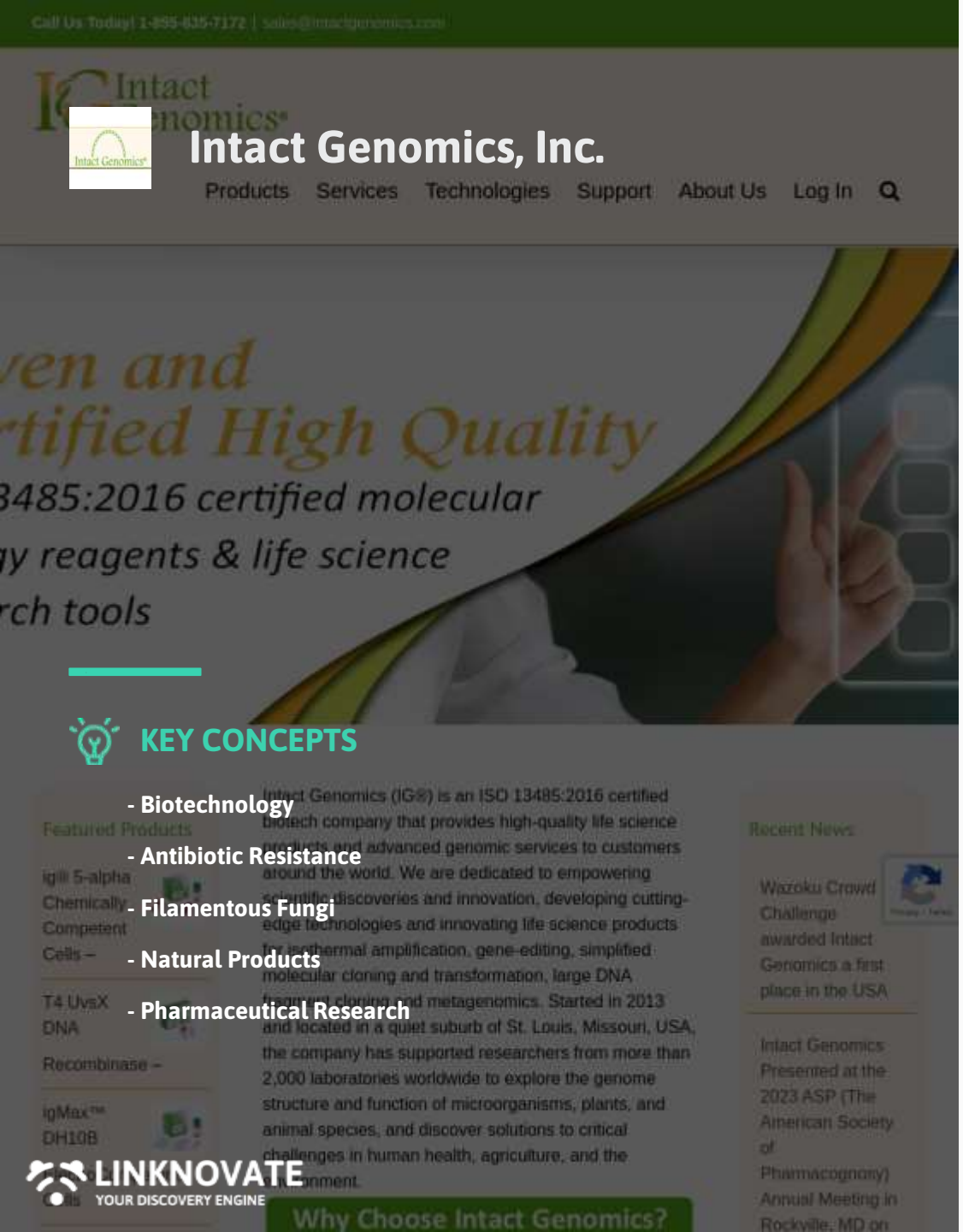
TOTAL FUNDING

$57.01K

EMPLOYEES

1-10

Intact Genomics, Inc.



Intact Genomics, Inc. is a biotechnology company focused on addressing the societal need for new therapeutic agents to combat bacterial and fungal pathogens, including antibiotic-resistant superbugs. The company specializes in developing novel bioactive compounds from filamentous fungi, leveraging proprietary technologies such as the Fungal Artificial Chromosome (FAC) and 100kb Large DNA Fragment. Intact Genomics offers pharmaceutical research and development services through its igTherapeutics platform, aiming to contribute to the discovery and production of antimicrobial secondary metabolites. With a focus on combating hospital-acquired microbial infections and the emergence of drug-resistant microbes, the company aims to advance the field of antibiotic discovery and production in fungi.

KEY CONCEPTS

- Biotechnology
- Antibiotic Resistance
- Filamentous Fungi
- Natural Products
- Pharmaceutical Research

LAST FUNDING ROUND

$1.5M

TOTAL FUNDING

$1.5M

EMPLOYEES

1-10

Verdant Biosciences Corporation

Verdant Biosciences Corporation is a leading biotechnology company specializing in the development of innovative plant biochemical regulators. Their proprietary small molecule chemistries have demonstrated the ability to significantly increase root mass, accelerate maturity, induce selective systemic insect resistance, and substantially increase yield while maintaining balanced plant growth. With a focus on addressing the challenges of a growing world population, shrinking agricultural land base, declining freshwater resources, and environmental concerns, Verdant Biosciences is committed to delivering cost-effective, environmentally friendly, widely accessible, and sustainable solutions for plant production.

KEY CONCEPTS

- Biotechnology
- Plant Biochemical Regulators
- Small Molecule Chemistries
- Sustainable Agriculture
- Yield Enhancement

EMPLOYEES

1-10

Epicentrx Inc. is a pharmaceutical company specializing in the development and production of innovative products for the prevention and treatment of a wide range of diseases and disorders, including cancer, infectious diseases, allergies, mental illnesses, chemotherapy side effects, radiation side effects, transplantation side effects, and various other conditions affecting the cardiovascular, pulmonary, dermatologic, autoimmune, inflammatory, and neurodegenerative systems. The company also focuses on immunotherapies and biological products to address a diverse array of health issues. With a strong emphasis on research and development, Epicentrx Inc. is dedicated to advancing medical solutions to improve patient outcomes and quality of life.

Codiak BioSciences Inc.

Codiak BioSciences Inc. specializes in the production of extracellular vesicles through innovative methods, including culturing producer cells in chemically-defined culture medium without animal-derived serum and components. Their patented methods involve quantifying extracellular vesicle concentration by measuring cholesterol content and processing to remove non-exosomal species. The company's focus on developing new treatment options and diversifying revenues demonstrates their commitment to advancing healthcare solutions.

KEY CONCEPTS

- Extracellular Vesicles
- Chemically-Defined Culture Medium
- Quantifying Concentration
- Cholesterol Content
- Healthcare Solutions

LAST FUNDING ROUND

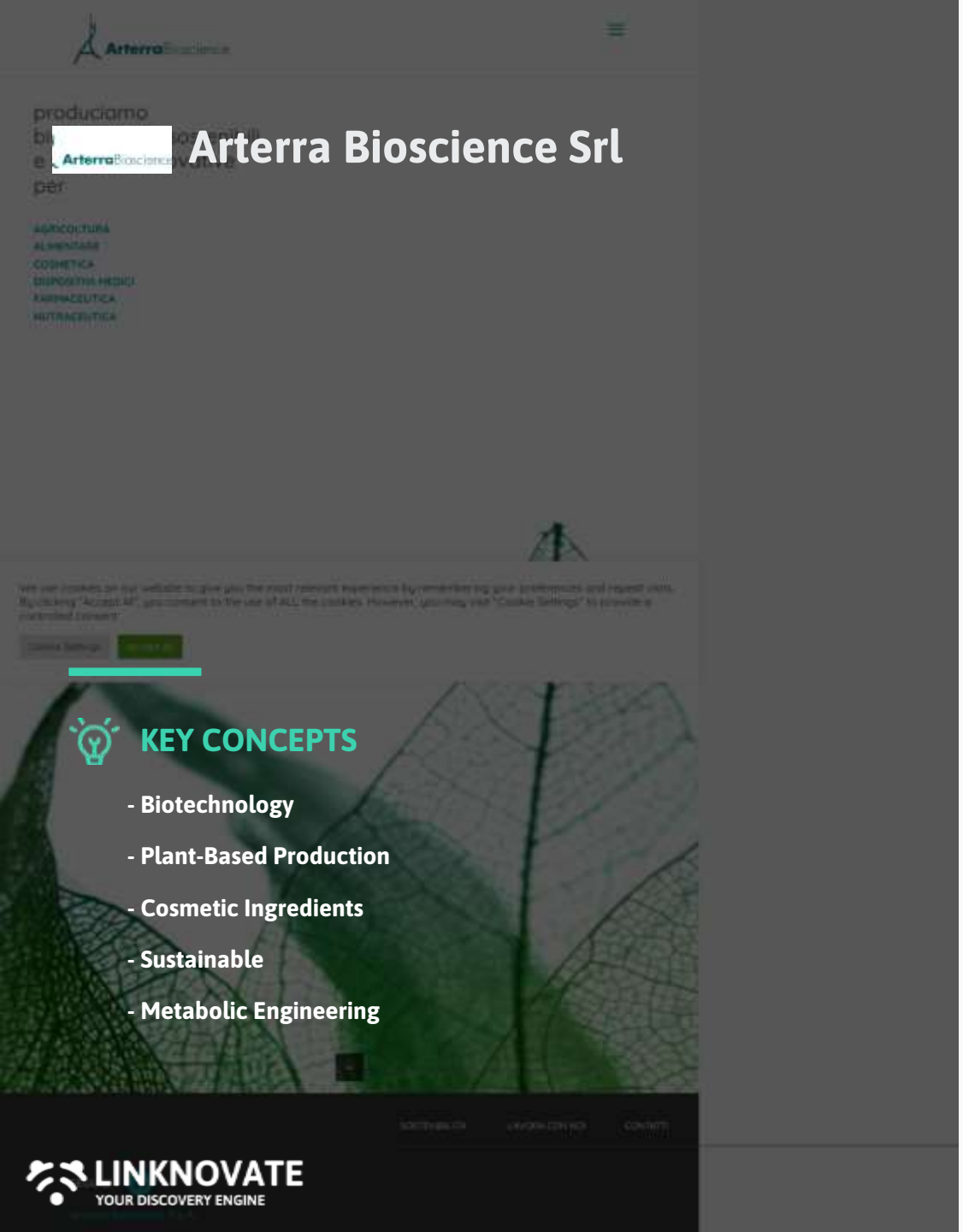
$66.4M

TOTAL FUNDING

$317.4M

EMPLOYEES

101-250



Arterra Bioscience Srl

Arterra Bioscience Srl is a biotechnology company focused on developing innovative and sustainable plant-based production processes for the commercial exploitation of scientifically validated cosmetic ingredients. The company utilizes underutilized plant resources and applies cell cultures, aeroponics, and greenhouse/field cultivation to optimize resource utilization for profitable and sustainable production. Arterra Bioscience Srl also employs metabolic engineering tools to enhance growth conditions and improve the yields of valuable bioactive compounds.

KEY CONCEPTS

- Biotechnology
- Plant-Based Production
- Cosmetic Ingredients
- Sustainable
- Metabolic Engineering

LAST FUNDING ROUND

-

TOTAL FUNDING

-

EMPLOYEES

11-50

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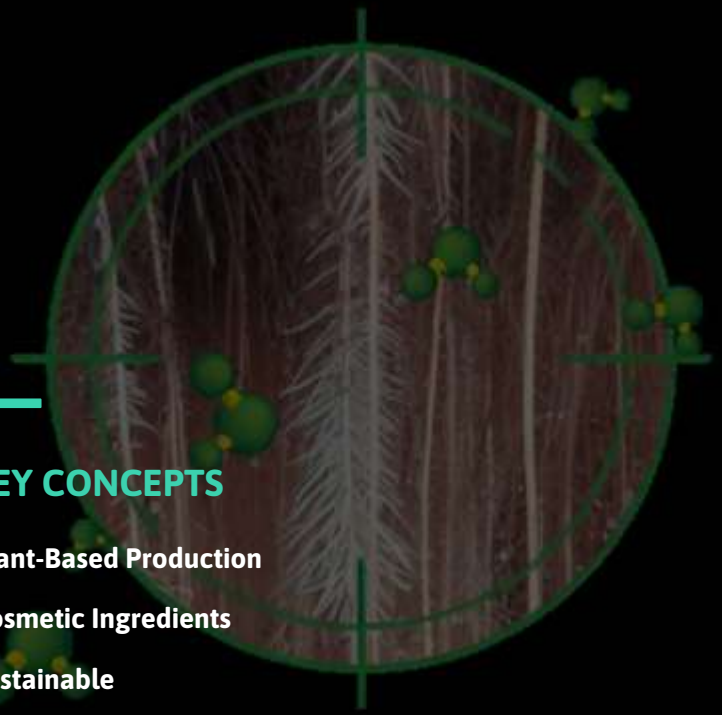
Plant Advanced Technologies Sa

Plant Advanced Technologies Sa is a company focused on developing innovative and sustainable plant-based production processes for the commercial exploitation of scientifically validated cosmetic ingredients based on underutilised plant resources. The company utilizes cell cultures, aeroponics, and greenhouse/field cultivation to optimize resources for profitable and sustainable production. Additionally, they apply metabolic engineering tools to optimize growth conditions and the yields of valuable bioactive compounds. Plant Advanced Technologies Sa is committed to leveraging plant resources to create high-quality cosmetic ingredients while promoting environmental sustainability.



KEY CONCEPTS

- Plant-Based Production
- Cosmetic Ingredients
- Sustainable
- Cell Cultures
- Metabolic Engineering

LAST FUNDING ROUND

$7.42M

TOTAL FUNDING

$7.42M

EMPLOYEES

101-250

Therapeutic Solutions International

Therapeutic Solutions International is a company specializing in the development of innovative treatments for major depressive disorder. Their patented methods and compositions of matter involve the administration of low dose interleukin-2 to increase T regulatory cell numbers and enhance their activity. This approach aims to improve the efficacy of standard antidepressant therapies, offering new hope for patients suffering from major depressive disorder.

KEY CONCEPTS

- Therapeutic Solutions International
- Major Depressive Disorder
- Interleukin-2
- T Regulatory Cells
- Antidepressant Therapies

LAST FUNDING ROUND

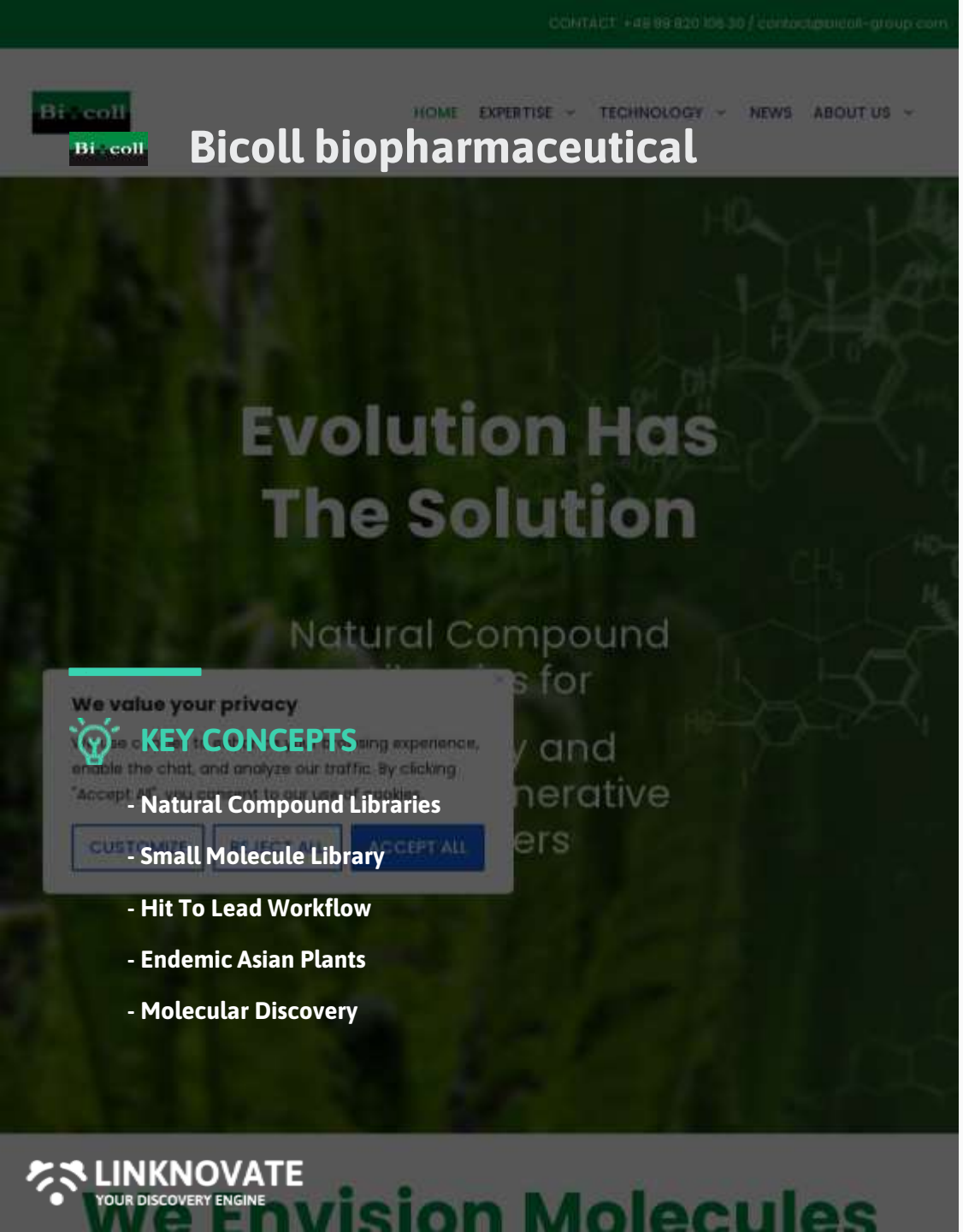
$100K

TOTAL FUNDING

$100K

EMPLOYEES

1-10



Bicoll biopharmaceutical

Bicoll Biopharmaceutical is a leading organization specializing in the discovery and development of novel potent molecules for the pharmaceutical, nutraceutical, and agricultural industries. With a focus on natural compound libraries derived from rare endemic Asian plants, Bicoll utilizes proprietary small molecule property-based isolation technology to enable an efficient Hit to Lead workflow. The company's expertise lies in providing a multi-disciplinary approach to molecular discovery, ensuring high-quality and evolutionary optimized small molecule libraries. Bicoll's commitment to sustainable and scientifically respected methods is evident in the legal collection and reproducible scientific survey of each plant, guaranteeing the reliability and relevance of their natural compound libraries. Celebrating 20 years of delivering research services and natural compound libraries, Bicoll continues to envision and create the molecules of the future, driving innovation in drug discovery.

LAST FUNDING ROUND

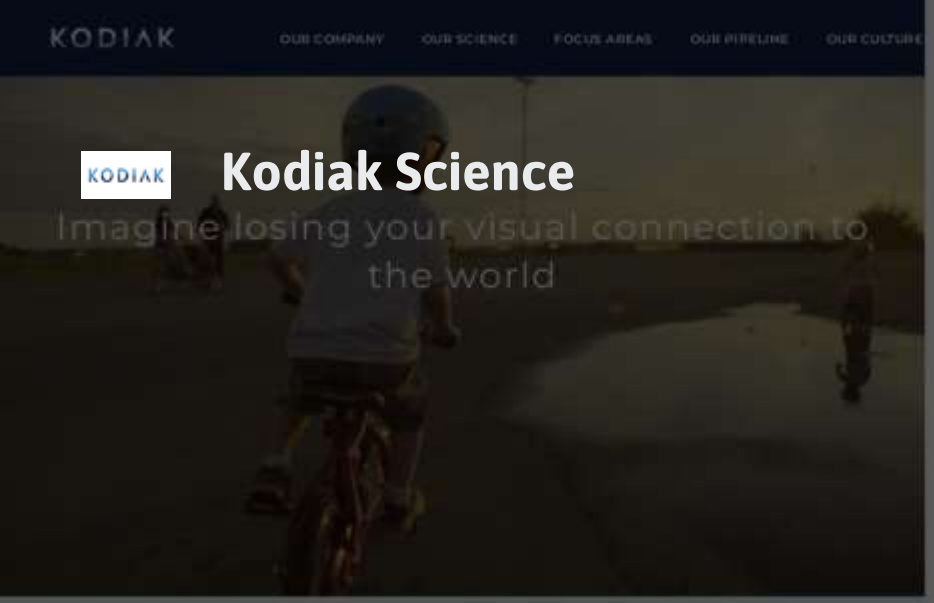
-

TOTAL FUNDING

-

EMPLOYEES

11-50



Kodiak Science

Kodiak Science is a leading organization specializing in affinity chromatography purification and separation of contaminant species, including Host Cell Proteins (HCPs), from desired molecular and chemical species. Their patented method involves loading an eluent into an affinity chromatography matrix that binds to the protein of interest and washing the matrix with a buffer solution. This innovative approach ensures the efficient purification of products, making Kodiak Science a key player in the field of molecular and chemical separation technologies.

LAST FUNDING ROUND

$645M

TOTAL FUNDING

$1.03B

EMPLOYEES

101-250

LATEST NEWS

KEY CONCEPTS

- Affinity Chromatography
- Purification
- Separation
- Contaminant Species
- Host Cell Proteins

THE OPHTHALMOLOGY MEDICINES COMPANY

Botaneco Inc.

Botaneco Inc. specializes in the development and production of specialty natural ingredients for personal care products, cosmetics, nutraceuticals, perfumes, toiletries, pharmaceuticals, skin care preparations, and food applications. Their focus is on utilizing oil bodies, oleosomes, oil body proteins, lipids, and extracts from plants, plant seeds, yeast, and bacteria. They also work with small molecule actives and proteins not produced in the oil body. Their ingredients are derived from living organisms and are used in a wide range of applications, including skincare, food products, and supplements.

KEY CONCEPTS

- Specialty Natural Ingredients
- Oil Bodies
- Oleosomes
- Plant Extracts
- Nutraceuticals

EMPLOYEES

11-50

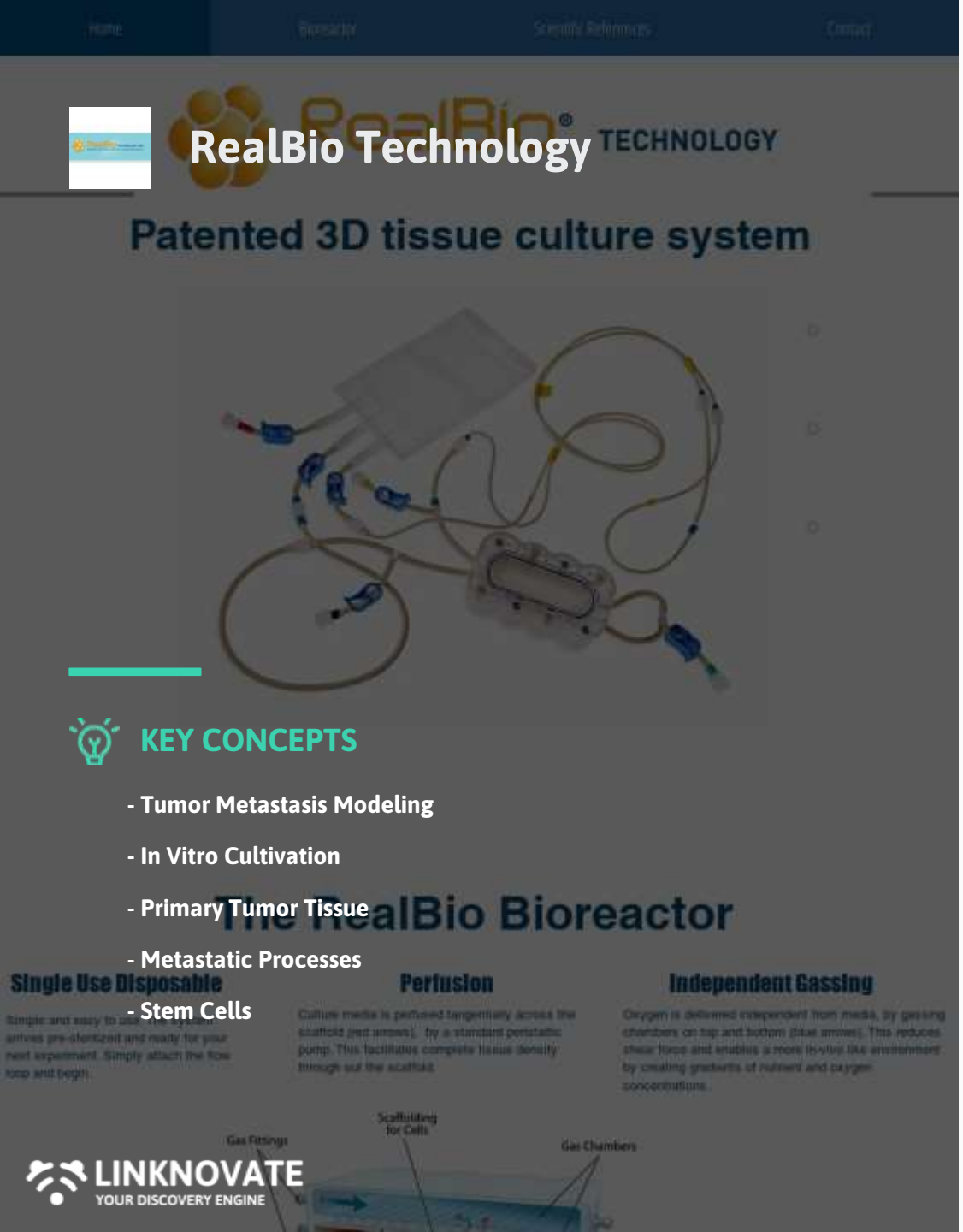
Phyton Biotech GmbH

Phyton Biotech GmbH is a biotechnology company based in FORT WORTH, Texas, specializing in the development of alternative manufacturing processes for key vaccine ingredients. The company has announced an exclusive partnership with Agenus Inc. to develop a sustainable supply of QS-21, a crucial vaccine component. Phyton Biotech's unique Plant Cell Fermentation (PCF) technology will be utilized to manufacture QS-21 directly from plant cell cultures, aiming to ensure a consistent and environmentally friendly production process.

KEY CONCEPTS

- Biotechnology
- Vaccine
- Manufacturing Process
- Plant Cell Fermentation
- Sustainable Supply

RealBio Technology



RealBio Technology is a pioneering organization in the field of tumor metastasis modeling, offering innovative systems and methods for cultivating primary tumor tissue in vitro. Their patented technology allows for the adjustment of natural composition, three-dimensional organization, and environmental conditions of the tumor, enabling the induction of metastatic processes and the production of tumor progenitor or stem cells. This breakthrough approach provides valuable insights into tumor behavior and offers potential applications in cancer research and therapy development.

KEY CONCEPTS

- Tumor Metastasis Modeling
- In Vitro Cultivation
- Primary Tumor Tissue
- Metastatic Processes
- Stem Cells

LAST FUNDING ROUND

-

TOTAL FUNDING

$1.58M

EMPLOYEES

1-10

Ardena

Ardena is a scientific expertise-driven organization that guides and supports molecules through early and late phase development. With comprehensive, integrated development and manufacturing services, they craft the foundation for successful drug substance availability for trials and market authorization. Ardena's specialist facilities and expertise cater to pre-clinical to small-scale commercial manufacturing, with a focus on handling highly potent compounds and controlled substances. Their dedicated suites and specialized GMP manufacturing plant are designed as high containment areas, ensuring the safe handling of HPAPIs. The organization's science-led team creates the best route to the clinic, overcoming challenges and providing tailored solutions for their clients.

KEY CONCEPTS

- Scientific Expertise
- Integrated Development
- Manufacturing Services
- Highly Potent Compounds
- Hpapis Handling

LAST FUNDING ROUND

$30K

TOTAL FUNDING

$706.65K

EMPLOYEES

251-500

Selected documents summarized

AI Powered

Patents

Revolutionary Magnetic Bead Purification Process

PURIFICATION PROCESS BASED ON MAGNETIC BEADS

View original PATENT at Linknovate - 2021

Novel process utilizing magnetic particles to separate molecules from high-concentration cell suspensions, providing a concentrated fraction of molecules and removing impurities and cells. The process offers increased yield, reduced equipment volume, and enhanced economic viability.

Organizations:

- Laboratory On A Bead Ab

Purification Process Based On Magnetic Beads

Sectors:

- NACE: C.21.10, C.21.20, C.21.30
- Biotechnology
- Pharmaceuticals
- Bioprocessing

Benefits:

- Increased yield of molecules
- Reduced equipment volume and costs
- Enhanced economic viability of bioprocessing

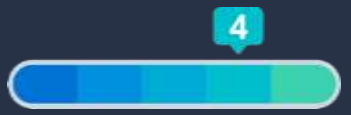
Scores:

Feasibility 4

The process can be feasibly implemented in biotechnology and pharmaceutical sectors for efficient molecule separation from high-concentration cell suspensions.

4 Innovation

The process introduces a disruptive approach to molecule separation, offering improved efficiency and economic benefits.



Technology 4

The use of magnetic particles for molecule separation represents a novel and disruptive technology in the field of bioprocessing.

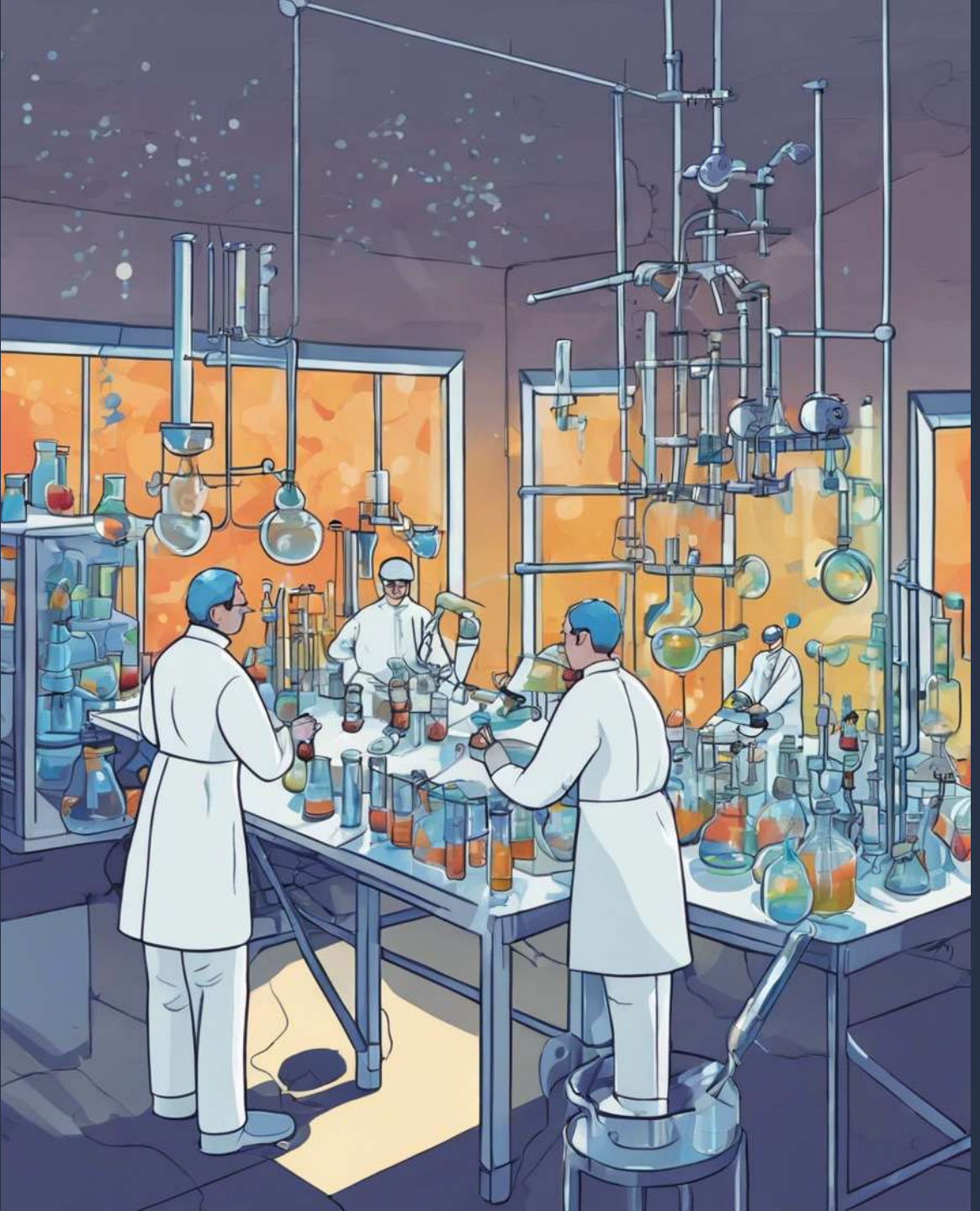
3 Maturity

While the technology is mature, its application in high-concentration cell suspensions is relatively novel and may require further validation.

Records Summary

Type	Year	Title	Abstract	Organizations
PATENT	**2021**	**Purification Process Based On Magnetic Beads**	The process involves separating molecules from a cell suspension using magnetic particles with specific interactions, enabling concentrated molecule fractions and removal of impurities. The method allows for increased yield, smaller equipment, and economical processes, with potential applications in bioreactors and natural origin-based molecules.	- Laboratory On A Bead Ab

Grants



Renata Lab Revolutionizes Terpenoid Synthesis with Biocatalytic Innovations

CAREER: CHEMOENZYMATIC TOTAL SYNTHESIS OF TERPENOIDS VIA P450 CATALYSIS

View original GRANT at Linknovate - 2023

Professor Hans Renata's research at The Scripps Research Institute focuses on developing chemoenzymatic strategies for the synthesis of terpenoids, addressing the challenge of efficiently producing these biologically significant molecules. The project aims to leverage nature's catalysts, enzymes, to modify starting materials and produce diverse terpenoid building blocks, enabling streamlined access to terpenoids with unique structural motifs. The research not only supports further studies on the physiological functions of terpenoids but also provides important training for students in chemical and biological sciences. Additionally, outreach efforts aim to cultivate interest in science among young students and the local community.

Organizations:

- William Marsh Rice University

CAREER: Chemoenzymatic Total Synthesis of Terpenoids via P450 Catalysis

Sectors:

- NACE: C.20.1, C.21.1, C.21.2
- Chemical synthesis
- Pharmaceuticals
- Biotechnology

Benefits:

- Efficient production of biologically significant terpenoids
- Training for students in chemical and biological sciences
- Cultivation of interest in science among young students and the local community

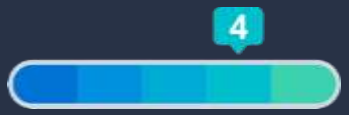
Scores:

Feasibility 4

The innovative chemoenzymatic approach to terpenoid synthesis has the potential for broad applicability in the chemical and pharmaceutical industries.

4 Innovation

The use of biocatalytic transformations and chemoenzymatic logic represents a significant innovation in the field of terpenoid synthesis, offering new pathways for accessing complex molecules.

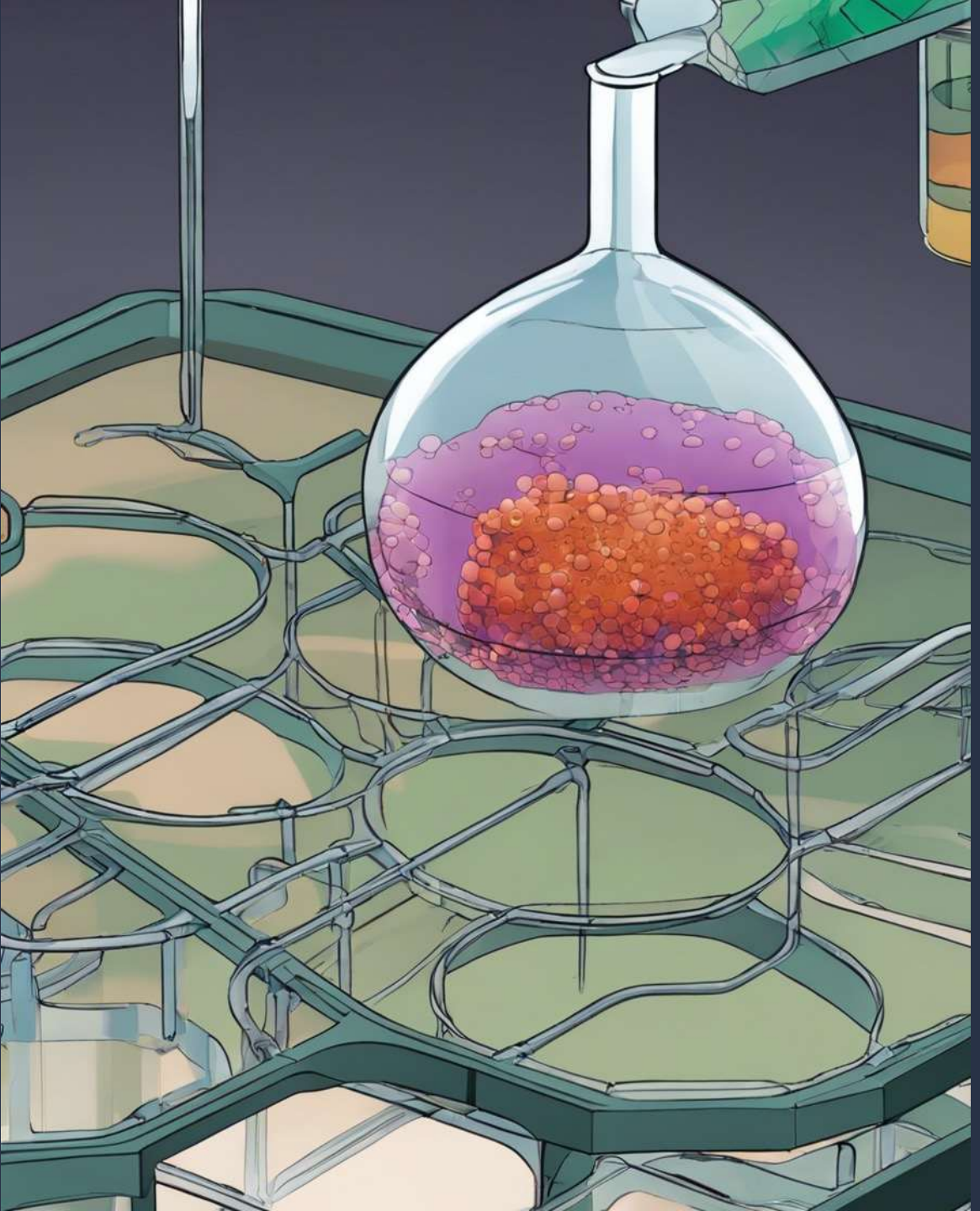


Technology 3

While the use of enzymes in synthesis is not entirely novel, the specific application of chemoenzymatic logic for terpenoid synthesis presents a novel and impactful approach.

4 Maturity

The use of biocatalytic transformations and chemoenzymatic logic is well-established in the field of organic synthesis, indicating a mature and ready-to-implement technology.



Revolutionizing Biocatalytic Production with Synthetic Cells

I-CORPS: CATALYTIC ARTIFICIAL SELF-ASSEMBLIES FOR THE BIOCATALYTIC PRODUCTION OF SMALL MOLECULES

View original GRANT at Linknovate - 2023

The project aims to develop catalytic artificial self-assemblies (CASA) as synthetic cells for biocatalytic production of small molecules, offering an innovative approach to overcome challenges in conventional biocatalytic processes. The technology has the potential to produce small molecules used in food additives, fragrances, drug precursors, and biofuels, with specific focus on isobutanol from lignocellulose. CASA demonstrates improved enzymatic reaction rates, long-term stability, and environmental robustness, offering a promising alternative for chemical production.

Organizations:

- University of California at Los Angeles

I-Corps: Catalytic Artificial Self-Assemblies for the Biocatalytic Production of Small Molecules

Sectors:

- NACE: C.20.1, C.21.1, C.20.5
- Biotechnology
- Pharmaceuticals
- Biofuels

Benefits:

- Improved enzymatic reaction rates and stability
- Reduced environmental impact and greenhouse gas emissions
- Potential for cost-effective and flexible bioreactor design

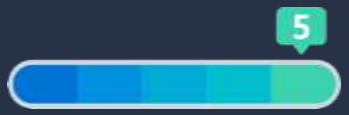
Scores:

Feasibility 5

The technology presents a feasible alternative for biocatalytic production of small molecules, with potential applications in various industries including biotechnology, pharmaceuticals, and biofuels.

5 Innovation

CASA introduces a highly disruptive approach to biocatalytic production, addressing limitations of whole-cell and cell-free catalysis methods and offering improved reaction metrics, stability, and environmental robustness.

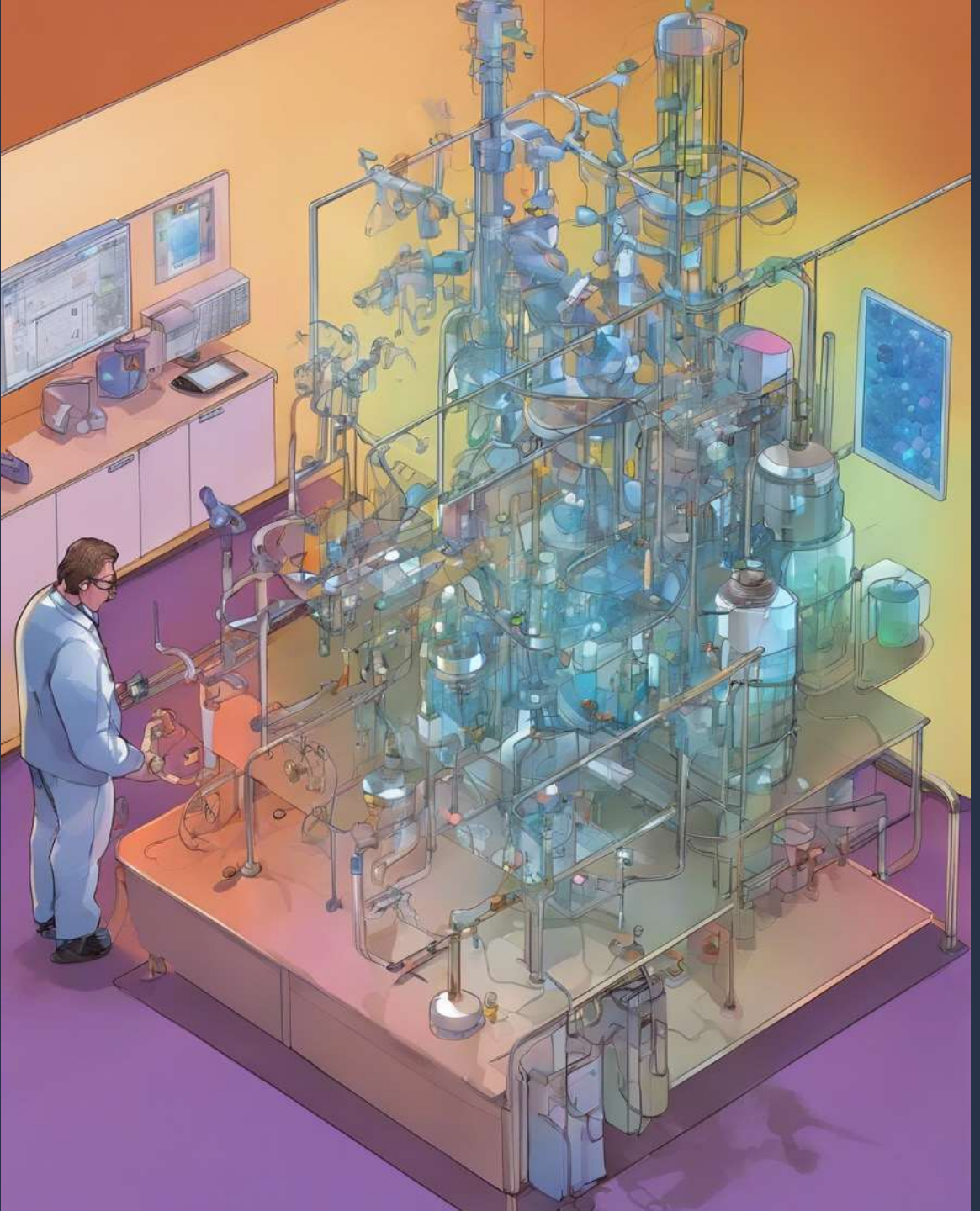


Technology 5

The use of CASA as synthetic cells for biocatalytic production represents a novel and disruptive technology, leveraging complex coacervate protocells to enhance enzymatic reaction rates, stability, and processing flexibility.

4 Maturity

The technology has demonstrated promising results in terms of enzymatic reaction rates, stability, and environmental robustness, indicating a relatively mature stage with potential for further development and commercialization.



Revolutionizing Small Molecule Analysis with Cutting-Edge LC-MS System

ANALYSIS OF BIOLOGICAL SMALL MOLECULE MIXTURES USING MULTIPLE MODES OF MASS SPECTROMETRIC FRAGMENTATION COUPLED WITH NEW BIOINFORMATICS WORKFLOWS

View original GRANT at Linknovate - 2023

Proposed LC-MS system aims to revolutionize the analysis of small molecule mixtures in complex biological samples. The system will enable fast and efficient separation, accurate determination of molecular formulas, and fragmentation of molecules at different energy levels, enhancing confidence in molecular identification. The system's applications span across various fields including natural product discovery, understanding of biological synthesis, microbial processes, chemical communication, disease causation, and pharmaceutical discovery.

Organizations:

- University of Aberdeen

Analysis of biological small molecule mixtures using multiple modes of mass spectrometric fragmentation coupled with new bioinformatics workflows

Sectors:

- NACE: C.20.59, C.21.20, C.21.10
- Biotechnology
- Pharmaceuticals
- Biomedical Research

Benefits:

- Enhanced capability for discovery of bioactive compounds
- Improved understanding of biological synthesis and microbial processes
- Accelerated drug discovery and development processes

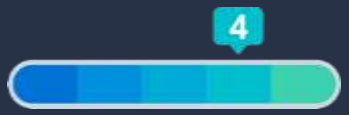
Scores:

Feasibility 4

The proposed LC-MS system is highly feasible for the analysis of small molecule mixtures in the chemical, biological, and biomedical sciences, offering advanced capabilities for molecular identification and fragmentation.

4 Innovation

The proposed LC-MS system represents a significant innovation in small molecule analysis, offering advanced separation, accurate molecular formula determination, and enhanced confidence in molecular identification, which can significantly impact research in various fields.



Technology 4

The use of advanced LC-MS technology with high mass accuracy, multiple separation and fragmentation modes, and high dynamic range represents a disruptive advancement in small molecule analysis, enabling comprehensive profiling and identification of complex biological mixtures.

4 Maturity

The selected LC-MS system, Thermo Scientific Orbitrap IQ-X Tribrid Mass Spectrometer, is a mature and reliable technology with proven capabilities in small molecule analysis, offering high dynamic range, robustness, and excellent service support.

Revolutionizing Biopharmaceutical Production with Advanced Analytical Solutions

EPSRC-SFI: CUTTING EDGE ANALYTICAL SOLUTIONS FOR SMART, INTEGRATED, EFFICIENT BIOPHARMACEUTICAL PRODUCTION

View original GRANT at Linknovate - 2022

Biopharmaceuticals have transformed disease treatment, with a significant portion of current R&D focused on these molecules. However, limitations in analytical technology hinder the development and optimization of biopharmaceutical production. This grant aims to address this gap by leveraging cutting-edge analytical techniques, including Raman spectroscopy and mass spectrometry, combined with machine learning for data processing. The project will focus on developing an integrated technology platform for antibody production by CHO cells, with the potential to revolutionize biopharmaceutical production.

Organizations:

- University of Edinburgh

EPSRC-SFI: Cutting Edge Analytical Solutions for Smart, Integrated, Efficient Biopharmaceutical Production

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Biotechnology
- Pharmaceuticals
- Analytical Instrumentation

Benefits:

- Enhanced monitoring and optimization of biopharmaceutical production processes
- Improved product quality and safety through advanced analytical techniques
- Potential for personalized and targeted biopharmaceutical treatments

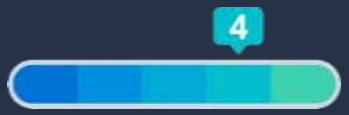
Scores:

Feasibility 4

The proposed analytical solutions have the potential to significantly impact the biopharmaceutical production sector, addressing critical limitations in current technology.

4 Innovation

The use of advanced analytical techniques and machine learning in biopharmaceutical production represents a significant innovation, with the potential to revolutionize the industry.



Technology 4

The integration of Raman spectroscopy, mass spectrometry, and machine learning in biopharmaceutical production is highly disruptive, offering novel approaches to process monitoring and optimization.

3 Maturity

While the proposed technologies are cutting-edge, they may require further development and validation for widespread adoption in biopharmaceutical production.

Unleashing Inorganic Systems for Catalytic Conversion

INORGANIC SYSTEMS FOR CATALYTIC CONVERSION OF SMALL MOLECULES TO USEFUL CHEMICALS

View original GRANT at Linknovate - 2022

This project focuses on developing molecular catalytic species for energy applications, emphasizing fine structural control and stabilization of intermediates. It aims to create general protocols for modulated self-assembly and explore potential applications for small molecule activation and specific heterogeneous catalysis.

Organizations:

- University of Glasgow

Inorganic systems for catalytic conversion of small molecules to useful chemicals

Sectors:

- NACE: C.20.1, D.24.1, E.38.2
- Chemical manufacturing
- Renewable energy
- Catalyst production

Benefits:

- Development of highly specific heterogeneous catalysis methods
- Advancements in small molecule activation for energy applications
- Refinement of molecular catalytic species for improved functionality

Scores:

Feasibility 3

The project's findings could be implemented in the chemical and energy sectors, leveraging established principles of inorganic chemistry and catalysis.

3 Innovation

The project introduces novel approaches to molecular catalysis, potentially impacting the efficiency and specificity of catalytic processes in energy applications.

Technology 3

The use of self-assembly and polyoxometalate in catalytic conversion presents a moderately disruptive approach, offering potential advancements in small molecule activation.

3 Maturity

The project involves mature techniques in inorganic chemistry and catalysis, with a focus on refining and applying established principles.

Unraveling the Potential of DNA and RNA Condensates for Advanced Biomolecule Manufacturing

FMRG: BIO: DNA & RNA CONDENSATE DROPLETS FOR PROGRAMMABLE SEPARATION AND MANUFACTURE OF BIOMOLECULES

View original GRANT at Linknovate - 2021

This project aims to develop microscopic liquid reactors using DNA and RNA condensates to spatially organize and separate biomolecules at the micro- and nano-scale. By leveraging the thermodynamic and kinetic properties of nucleic acids, the research seeks to establish a technological blueprint for future manufacturing processes, engage undergraduates in the emerging technology, and expand domestic capabilities for high-value biomolecule production. The project will contribute to biotechnology, pharmaceutics, and chemical engineering, and will be integrated into educational modules at various institutions.

Organizations:

- University of California at Los Angeles

FMRG: Bio: DNA & RNA Condensate Droplets for Programmable Separation and Manufacture of Biomolecules

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Biotechnology
- Pharmaceuticals
- Chemical engineering

Benefits:

- Spatial organization and separation of biomolecules at micro- and nano-scale
- Engagement of undergraduates in emerging technology
- Expansion of domestic capabilities for high-value biomolecule production

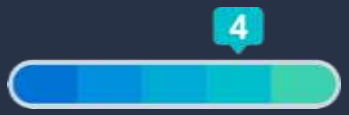
Scores:

Feasibility 4

The project is feasible as it leverages well-understood properties of nucleic acids and aims to contribute to advanced manufacturing processes in biotechnology, pharmaceutics, and chemical engineering.

5 Innovation

The project is highly disruptive as it introduces a novel approach to biomolecule manufacturing, potentially revolutionizing the field with its innovative use of DNA and RNA condensates.

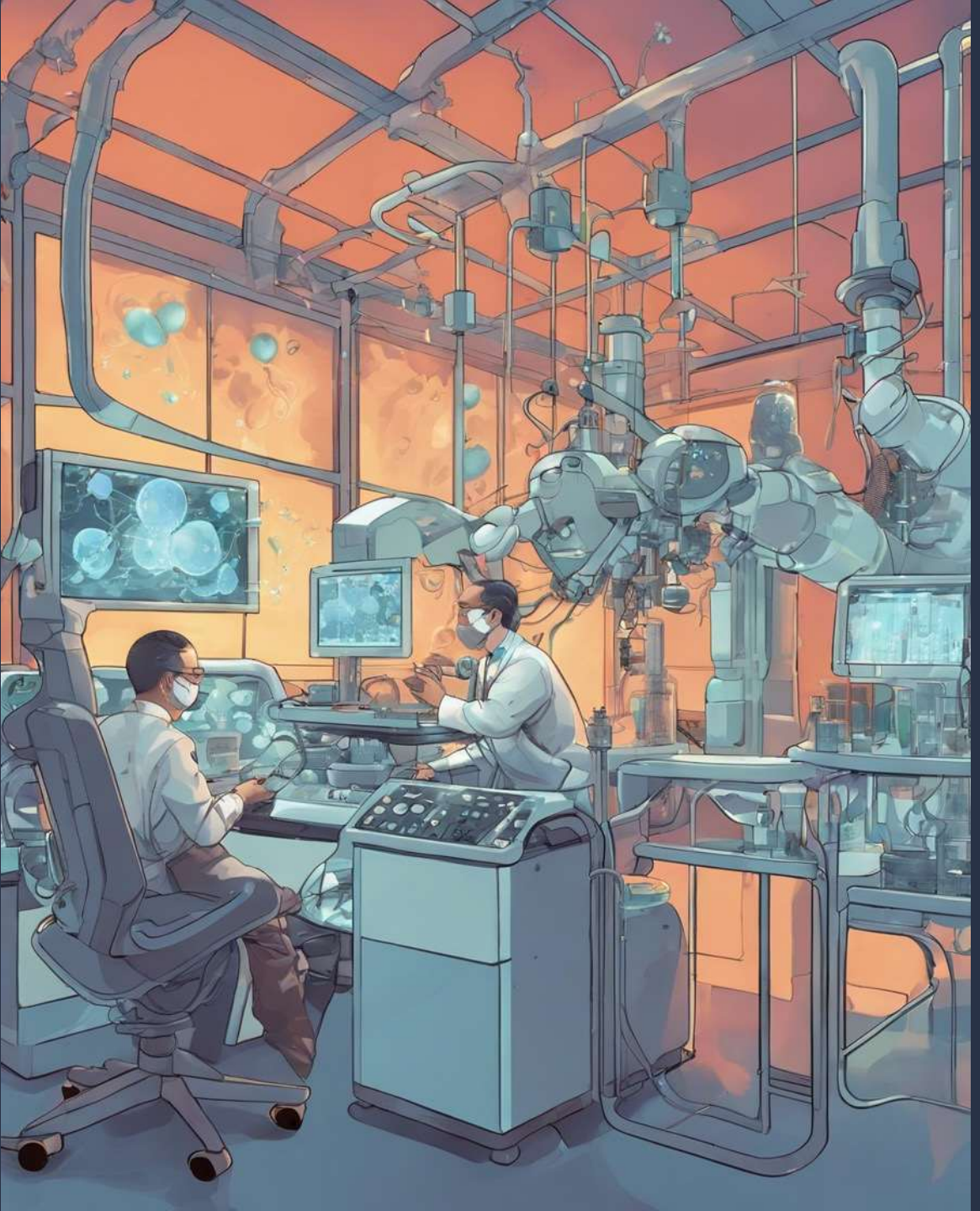


Technology 4

The use of DNA and RNA condensates in manufacturing processes is relatively novel and has the potential to significantly advance the capabilities of biomolecule production.

3 Maturity

While the concept of DNA and RNA condensates is innovative, it may require further development and validation before widespread adoption in manufacturing processes.



Unraveling the Mystery of PROTAC Design

SBPD IN-SILICO - STRUCTURE-BASED PROTAC DESIGN IN-SILICO

View original GRANT at Linknovate - 2021

This grant aims to develop novel methodologies for in-silico structure-based PROTAC design, addressing challenges in understanding the molecular basis for productive recruitment of target and E3 ligase into a ternary complex. The long-term goal is to establish structure-based PROTAC design as an efficient platform for predicting, designing, and screening effective PROTAC degraders, potentially enabling the degradation of 'undruggable' targets.

Organizations:

- University of Dundee

SBPD In-Silico - Structure-Based PROTAC Design In-Silico

Sectors:

- NACE: C.21.10, C.21.20, C.21.30
- Pharmaceuticals
- Biotechnology
- Drug discovery

Benefits:

- Potential to design novel therapeutic agents targeting 'undruggable' proteins
- Efficient platform for predicting and screening effective PROTAC degraders
- Revolutionizing the field of drug design and intervention

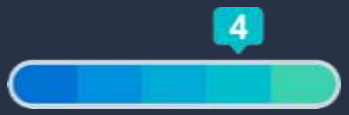
Scores:

Feasibility 4

The proposal has the potential to significantly impact the pharmaceutical and biotechnology sectors by enabling the design of novel therapeutic agents.

5 Innovation

The proposal is highly disruptive as it aims to revolutionize the design of PROTACs, potentially unlocking the ability to target 'undruggable' proteins.



Technology 4

The use of in-silico methods for structure-based PROTAC design is relatively novel and has the potential to bring significant advancements to the field of drug design.

3 Maturity

The use of in-silico methods for PROTAC design is still in its infancy, but the proposal aims to contribute to the development of more mature methodologies in this area.

Professors Revolutionize Catalytic Material Design

COLLABORATIVE RESEARCH: STRUCTURE SENSITIVE SURFACE CHEMISTRY - SMALL MOLECULE ACTIVATION AND SPILLOVER

View original GRANT at Linknovate - 2021

Professors Gellman and Sykes are pioneering a research project to investigate the influence of metal surface structures on catalytic reactions. Their innovative methods involve measuring surface reaction kinetics and imaging atomistic surface structures across various orientations, providing valuable datasets for catalyst development. The project aims to advance our understanding of catalysis science and improve the design of catalytic materials.

Organizations:

- Carnegie Mellon University

Collaborative Research: Structure Sensitive Surface Chemistry - Small Molecule Activation and Spillover

Sectors:

- NACE: C.20.4, C.20.5, C.20.6
- Chemical engineering
- Materials science
- Renewable energy

Benefits:

- Advancement of catalysis science and understanding of catalytic surface chemistry
- Development of new and improved catalytic materials
- Skill development for students in surface chemistry, x-ray spectroscopy, and scanning probe microscopy

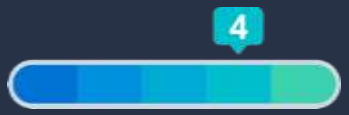
Scores:

Feasibility 4

The research has the potential to significantly impact the field of catalysis and could lead to the development of new and improved catalytic materials.

4 Innovation

The project introduces novel methods for measuring surface reaction kinetics and imaging atomistic surface structures, which could revolutionize the design of catalytic materials.



Technology 4

The use of spatially resolved x-ray photoemission spectroscopy and scanning tunneling microscopy in this context represents a significant technological advancement in the study of catalytic surface chemistry.

3 Maturity

While the methods are innovative, they may require further development and validation before widespread adoption.

InnCoCells Revolutionizes Cosmetic Industry with Plant-Based Innovations

INNCOCELLS - INNOVATIVE HIGH-VALUE COSMETIC PRODUCTS FROM PLANTS AND PLANT CELLS

View original GRANT at Linknovate - 2021

InnCoCells aims to revolutionize the cosmetic industry by developing sustainable and profitable plant-based production processes for high-value cosmetic ingredients. The project will utilize underutilized plant resources and apply innovative techniques such as cell cultures, aeroponics, and greenhouse/field cultivation to optimize growth conditions and yields of bioactive compounds. It will also implement a cascade biorefinery concept to extract additional bioactive molecules from by-products and biowaste. The project will bring at least ten cosmetic ingredients to the pre-commercial stage and ensure safety and efficacy through innovative enzyme-based and cell-based assays without animal testing.

Organizations:

- Agenzia Nazionale Per Le Nuove Tecnologie, L'Energia E Lo Sviluppo Economico Sostenibile
- Straticell Screening Technologies
- Evologic Technologies GmbH
- +15 more

InnCoCells - Innovative high-value cosmetic products from plants and plant cells

Sectors:

- NACE: C.20.42, C.20.52, C.20.59
- Biotechnology
- Agriculture
- Environmental Sustainability

Benefits:

- Revolutionizing cosmetic ingredient production with sustainable and profitable plant-based processes
- Utilizing underutilized plant resources for high-value cosmetic ingredients
- Reducing environmental footprint through the utilization of by-products and biowaste for bioactive molecule extraction

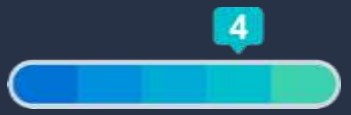
Scores:

Feasibility 4

The project's innovative plant-based production processes can be feasibly implemented in the cosmetic industry, offering sustainable and profitable alternatives to traditional ingredient sourcing.

5 Innovation

The project's use of underutilized plant resources and innovative production techniques presents a highly disruptive approach to cosmetic ingredient production, potentially reshaping industry practices.



Technology 4

The utilization of cell cultures, aeroponics, and greenhouse/field cultivation for cosmetic ingredient production represents a novel and disruptive application of these technologies in the cosmetic sector.

3 Maturity

While the project involves innovative approaches, the maturity of some techniques and processes may require further development and validation at the pilot scale.

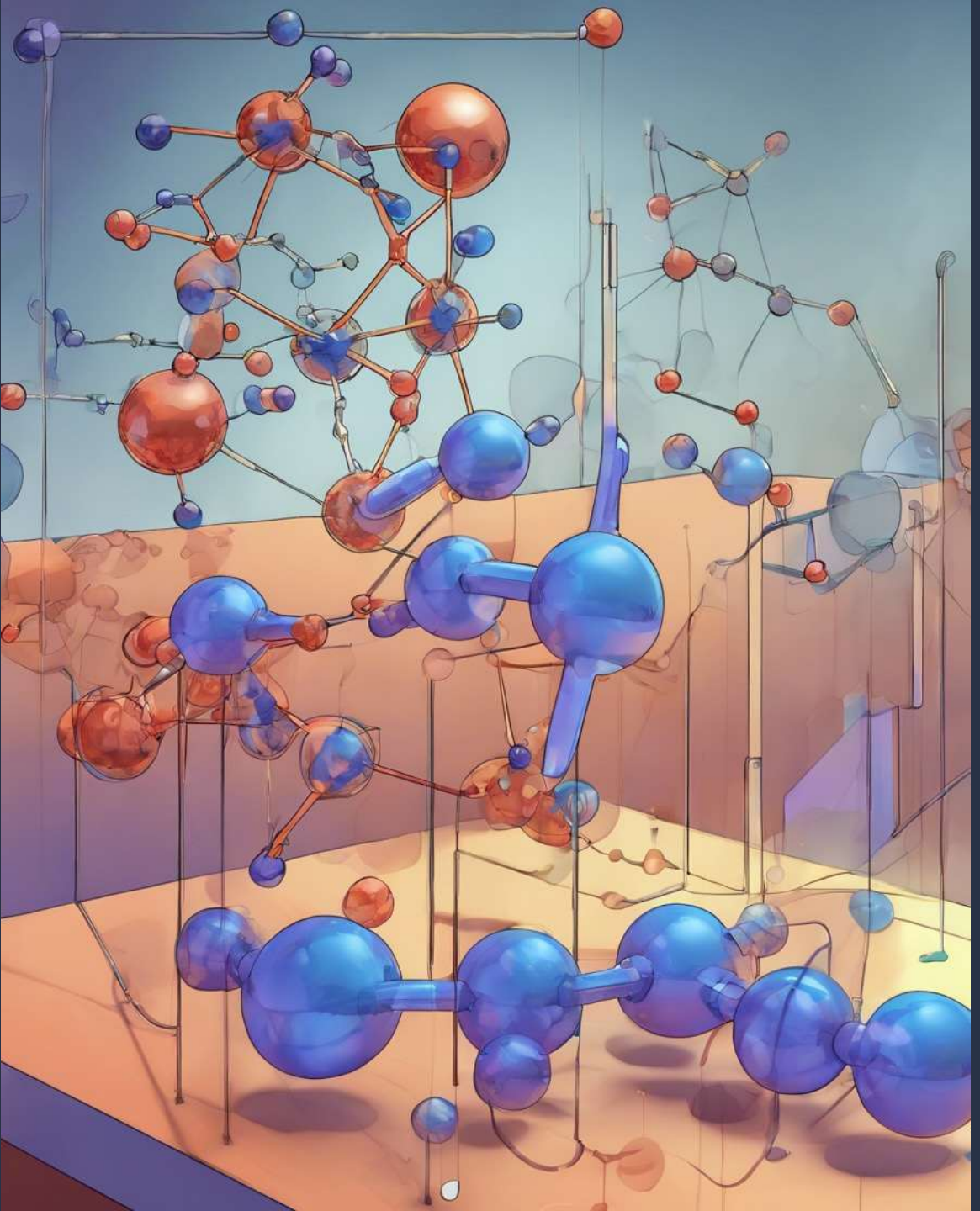
Records Summary

Type	Year	Title	Abstract	Organizations
GRANT	2023	CAREER: Chemoenzymatic Total Synthesis of Terpenoids via P450 Catalysis	Professor Hans Renata's research, supported by the NSF, focuses on developing novel strategies for synthesizing terpenoids, naturally occurring small molecules, using nature's catalysts and biocatalytic transformations. The streamlined access to terpenoids enables further studies on their physiological functions and provides important training for students.	- William Marsh Rice University
GRANT	2023	I-Corps: Catalytic Artificial Self-Assemblies for the Biocatalytic Production of Small Molecules	The I-Corps project aims to develop synthetic cells, called catalytic artificial self-assemblies (CASA), for biocatalytic production of small molecules. CASA offers an intermediate route between whole-cell and cell-free catalysis, potentially revolutionizing chemical production, including biofuels, drug precursors, and food additives.	- University of California at Los Angeles
GRANT	2023	Analysis of biological small molecule mixtures using multiple modes of mass spectrometric fragmentation coupled with new bioinformatics workflows	The text discusses the importance of liquid chromatography-mass spectrometry (LC-MS) in analyzing small molecules in complex biological mixtures. It highlights the need for a high-performance LC-MS system to enable efficient separation and accurate identification of small molecule components for various applications in biology and pharmaceutical discovery. The proposed Thermo Scientific Orbitrap IQ-X Tribrid Mass Spectrometer is selected for its high mass accuracy, dynamic range, and robustness, with the aim of advancing research and training the next generation of scientists.	- University of Aberdeen
GRANT	2022	EPSRC-SFI: Cutting Edge Analytical Solutions for Smart, Integrated, Efficient Biopharmaceutical Production	The text discusses the shift from small molecule pharmaceuticals to biopharmaceuticals and the challenges in biopharmaceutical production. It highlights the need for advanced analytical technology to monitor product quality and safety during fermentation, and proposes a unique team and technology platform to address this need.	- University of Edinburgh

Records Summary (2)

Type	Year	Title	Abstract	Organizations
GRANT	2022	Inorganic systems for catalytic conversion of small molecules to useful chemicals	The project focuses on developing molecular catalytic species for small molecule activation in energy applications. It involves self-assembly, polyoxometalate, coordination chemistry, and aims to create protocols for modulated self-assembly and specific heterogeneous catalysis.	- University of Glasgow
GRANT	2021	FMRG: Bio: DNA & RNA Condensate Droplets for Programmable Separation and Manufacture of Biomolecules	This project aims to develop microscopic liquid reactors using DNA and RNA condensates to organize and separate small molecules, nucleic acids, and proteins. It also involves engaging undergraduates and creating educational tools to promote this technology in biotechnology and chemical engineering.	- University of California at Los Angeles
GRANT	2021	SBPD In-Silico - Structure-Based PROTAC Design In-Silico	The text discusses the potential of Proteolysis Targeting Chimeras (PROTACs) as therapeutic agents. It highlights the challenges in designing small-molecule ligands for E3 ligases and the need to develop novel methodologies for structure-based PROTAC design.	- University of Dundee
GRANT	2021	Collaborative Research: Structure Sensitive Surface Chemistry - Small Molecule Activation and Spillover	Professors Gellman and Sykes are researching the influence of metal surface structures on catalytic reactions. They use curved Cu and Ag single crystals to study small molecule adsorption and activation, aiming to design new catalytic materials for solar applications.	- Carnegie Mellon University
GRANT	2021	InnCoCells - Innovative high-value cosmetic products from plants and plant cells	The InnCoCells project aims to develop sustainable plant-based production processes for cosmetic ingredients, utilizing cell cultures and metabolic engineering to optimize small-molecule compound yields. The project includes a biorefinery concept, purification processes, and techno-economic assessments to ensure economic feasibility and reduced environmental impact.	- Agenzia Nazionale Per Le Nuove Tecnologie, L'Energia E Lo Sviluppo Economico Sostenibile - Straticell Screening Technologies - Evologic Technologies GmbH - Arterra Bioscience Srl - Ecomaat Ood +13 more

Conference Proceedings



Unraveling Natural Product Synthesis with Transition State Calculations

APPLICATIONS OF TRANSITION STATE CALCULATIONS IN THE KEY CYCLIZATION OF SMALL MOLECULE NATURAL PRODUCT SYNTHESIS

View original CONF at Linknovate - 2021

Utilizing computational chemistry for transition state calculations in cyclization synthesis of natural products offers insights into reaction mechanisms, thermodynamic parameters, and enantioselectivity, aiding in synthesis design and performance prediction. This approach enhances understanding of molecular phenomena and contributes to the diversification and complexity of natural product structures.

Organizations:

- Tianjin University of Science and Technology

Applications of transition state calculations in the key cyclization of small molecule natural product synthesis

Sectors:

- NACE: C.21.10, C.21.20
- Chemical synthesis
- Pharmaceuticals

Benefits:

- Enhanced understanding of natural product synthesis mechanisms
- Improved prediction of synthesis performance and enantioselectivity
- Basis for comprehensive synthesis design

Scores:

Feasibility 3

The application of transition state calculations in natural product synthesis is feasible, but may require specialized expertise and computational resources.

3 Innovation

The use of computational chemistry for transition state calculations is moderately disruptive, offering enhanced insights into natural product synthesis but not fundamentally altering the field.

Technology 3

The technology of transition state calculations in computational chemistry is relatively novel in the context of natural product synthesis, providing valuable insights and predictions.

3 Maturity

The use of computational chemistry for transition state calculations is mature and well-established, with a growing adoption in natural product synthesis research.

Unveiling the Depths of Deep Filtration Technology in Biopharmaceutical Processes

RESEARCH ANALYSIS AND CONSTRUCTION OF APPLICATION OF DEEP FILTRATION TECHNOLOGY IN BIOPHARMACEUTICAL PROCESS

View original CONF at Linknovate - 2021

This research delves into the application of deep filtration technology in biopharmaceutical processes, highlighting its specific uses in fermentation broth clarification, pyrogen removal, and purification of molecules. It also addresses common challenges and proposes strategies for resource sharing, institutional management, technology research, and personnel training. The aim is to enhance understanding of deep filtration technology and bolster the economic growth of the biopharmaceutical industry.

Organizations:

- De Zhou Vocational and Technical College

Research Analysis and Construction of Application of Deep Filtration Technology in Biopharmaceutical Process

Sectors:

- NACE: C.21.10, C.21.20, C.21.30
- Biotechnology
- Pharmaceuticals
- Chemical Engineering

Benefits:

- Enhanced purification and separation processes in biopharmaceuticals
- Potential for improved resource sharing and institutional management
- Contribution to economic growth in the biopharmaceutical industry

Scores:

Feasibility 3

The implementation of deep filtration technology in the biopharmaceutical sector may require adaptation and specialized training, but it is feasible with the right resources and support.

4 Innovation

The application of deep filtration technology presents moderate disruption in the biopharmaceutical industry, offering advancements in purification processes and addressing common challenges.

Technology 4

Deep filtration technology introduces novel approaches to purification and separation processes in biopharmaceuticals, contributing to technological advancements.

4 Maturity

The technology is relatively mature, with established applications in biopharmaceutical processes and ongoing research to enhance its effectiveness.

Records Summary

Type	Year	Title	Abstract	Organizations
CONF	2021	Applications of transition state calculations in the key cyclization of small molecule natural product synthesis	The text discusses the importance of carbocyclic skeleton diversity in natural products and the use of computational chemistry for cyclization synthesis. It emphasizes the role of reaction mechanisms and thermodynamic parameters in determining cyclization feasibility and enantioselectivity.	- Tianjin University of Science and Technology
CONF	2021	Research Analysis and Construction of Application of Deep Filtration Technology in Biopharmaceutical Process	The article discusses deep filtration technology's application in small molecule purification and product purification for biopharmaceutical industry, addressing common problems and proposing improvements for resource sharing and personnel training to promote economic development.	- De Zhou Vocational and Technical College

Scientific Publications

PUB - 2024

WALNUT BY-PRODUCTS AND ELDERBERRY EXTRACTS-SUSTAINABLE ALTERNATIVES FOR HUMAN AND PLANT HEALTH

Walnut and Elderberry: Nature's Sustainable Health Allies

Vasile Alecsandri University of Bacu

Walnut and elderberry extracts offer a sustainable alternative for human health and plant protection due to their rich phytochemical profile. These natural compounds exhibit diverse biological activities, including antibacterial, antioxidant, anti-inflammatory, and insecticidal properties, making them valuable for human health and environmentally safe biopesticides. The review highlights the common bioactive compounds in walnuts and elderberries, emphasizing their potential for sustainable development in agriculture and human health.

Walnut By-Products and Elderberry Extracts- Sustainable Alternatives for Human and Plant Health

Sectors:

- NACE: A.01.11, A.01.26, A.01.27
- Pharmaceuticals
- Food and Beverage
- Agriculture

Benefits:

- Diverse biological activities beneficial for human health and plant protection
- Sustainable alternative to synthetic compounds in agriculture and human health
- Potential for environmentally safe biopesticides and natural health remedies

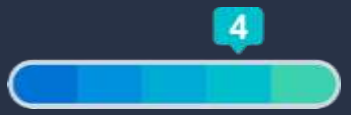
Scores:

Feasibility 4

The use of walnut and elderberry extracts in agriculture and human health is feasible due to their natural origin and diverse biological activities, offering sustainable alternatives to synthetic compounds.

4 Innovation

The utilization of walnut and elderberry extracts as sustainable alternatives for human and plant health is moderately disruptive, offering novel approaches to biopesticides and natural health remedies.



Technology 3

While the technology of utilizing natural extracts is not entirely novel, the specific application of walnut and elderberry extracts in sustainable agriculture and human health presents a valuable and innovative approach.

4 Maturity

The use of walnut and elderberry extracts is mature and well-documented, with extensive research highlighting their diverse biological activities and potential applications in sustainable agriculture and human health.

PUB - 2023

POLYPHENOL EXTRACTION FROM FOOD (BY) PRODUCTS BY PULSED ELECTRIC FIELD: A REVIEW

Zapping for Good: Pulsed Electric Field for Polyphenol Extraction

University of Thessaly

The review explores the burgeoning field of using pulsed electric field (PEF) technology for extracting bioactive compounds from natural sources, particularly focusing on polyphenols. PEF offers advantages over traditional methods, leading to enhanced concentrations of bioactive compounds in extracts. The review aims to provide a comprehensive understanding of PEF applications for polyphenol extraction, addressing current limitations and future prospects.

Polyphenol Extraction from Food (by) Products by Pulsed Electric Field: A Review

Sectors:

- NACE: C.10.8, C.11.0, C.10.3
- Food and beverage
- Pharmaceuticals
- Natural products

Benefits:

- Enhanced extraction yields of bioactive compounds
- Adherence to green chemistry principles
- Potential for developing advanced concepts in bioactive compound extraction

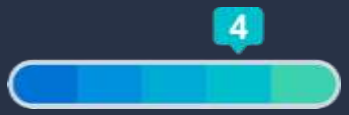
Scores:

Feasibility 4

The use of PEF technology for polyphenol extraction is feasible and can be adopted by food and beverage industries.

4 Innovation

PEF technology presents a moderately disruptive innovation in the field of bioactive compound extraction, offering enhanced extraction yields and adhering to green chemistry principles.



Technology 4

PEF technology is relatively novel in the context of polyphenol extraction, offering advantages over traditional methods and contributing to advancements in the field.

3 Maturity

While PEF technology is relatively mature, its specific applications for polyphenol extraction may require further development and optimization.

PUB - 2023

IDENTIFICATION OF A Β-CARBOLINE ALKALOID FROM CHEMOSELECTIVELY DERIVED VANILLA BEAN EXTRACT AND ITS PREVENTION OF LIPID DROPLET ACCUMULATION IN HUMAN HEPATOCYTES (HEPG2)

Vanilla Bean Extract Yields Novel Compound for Liver Health

Hokkaido University

Health Sciences University

Chemoselective derivatization of vanilla bean extract led to the discovery of a novel β-carboline alkaloid (compound 34) with significant inhibitory activity against lipid droplet accumulation in hepatocellular carcinoma cells. The compound exhibited dual action by activating lipolysis and suppressing lipogenesis, offering potential for preventing hepatosteatosis. This approach highlights the potential of natural product mixtures for drug development and liver health.

Identification of a β-Carboline Alkaloid from Chemoselectively Derived Vanilla Bean Extract and Its Prevention of Lipid Droplet Accumulation in Human Hepatocytes (HepG2)

Sectors:

- NACE: C.10.20, C.10.39, C.10.84
- Pharmaceuticals
- Nutraceuticals
- Natural product research

Benefits:

- Potential for preventing hepatosteatosis
- Source of lead compounds for drug development
- Highlighting the potential of natural product mixtures for liver health

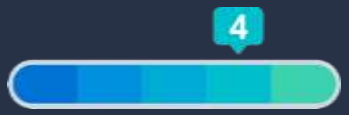
Scores:

Feasibility 3

The application of the discovered compound in preventing lipid droplet accumulation in the liver may require further research and development for practical implementation in the pharmaceutical or nutraceutical sector.

4 Innovation

The discovery of a novel β-carboline alkaloid with dual action against lipid droplet accumulation presents a disruptive approach in the field of liver health and potential drug development.



Technology 3

The use of chemoselective derivatization to identify bioactive compounds from natural extracts demonstrates a moderately disruptive technology in the field of natural product discovery and drug development.

4 Maturity

The identified compound and the approach of chemoselective derivatization demonstrate maturity in terms of potential application in drug development and natural product research.

PUB - 2023

ADVANCES AND PROSPECTS OF NATURAL DIETARY POLYPHENOLS AS G-QUADRUPLEX STABILIZERS IN BIOMEDICAL APPLICATIONS

Unveiling the Potential of Dietary Polyphenols in Cancer Therapy

CAS Beijing National Laboratory for Molecular

University of Chinese Academy of Sciences

Institute Of Chemistry Chinese Academy Of Sciences

+1 more

Natural dietary polyphenols, known for their anti-cancer effects, have emerged as promising G-quadruplex (G4) stabilizers. By binding to G4 structures, polyphenols can downregulate proto-oncogenes, offering potential in anti-cancer drug development. This review highlights the structural and antioxidant interactions of polyphenols with G4s, underscoring their potential for the next generation of anti-cancer drugs targeting nucleic acids.

Advances and prospects of natural dietary polyphenols as G-quadruplex stabilizers in biomedical applications

Sectors:

- NACE: C.21.20, Q.86.90, C.10.84
- Pharmaceuticals
- Biotechnology
- Nutraceuticals

Benefits:

- Potential for developing novel anti-cancer drugs targeting nucleic acids
- Utilization of natural compounds for cancer therapy
- Exploration of alternative drug development strategies

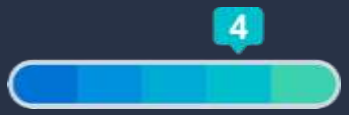
Scores:

Feasibility 3

The application of natural dietary polyphenols as G4 stabilizers in biomedical research requires further exploration and validation in cancer therapy.

4 Innovation

The use of dietary polyphenols as G4 stabilizers presents a novel approach in cancer therapy, potentially disrupting traditional drug development strategies.



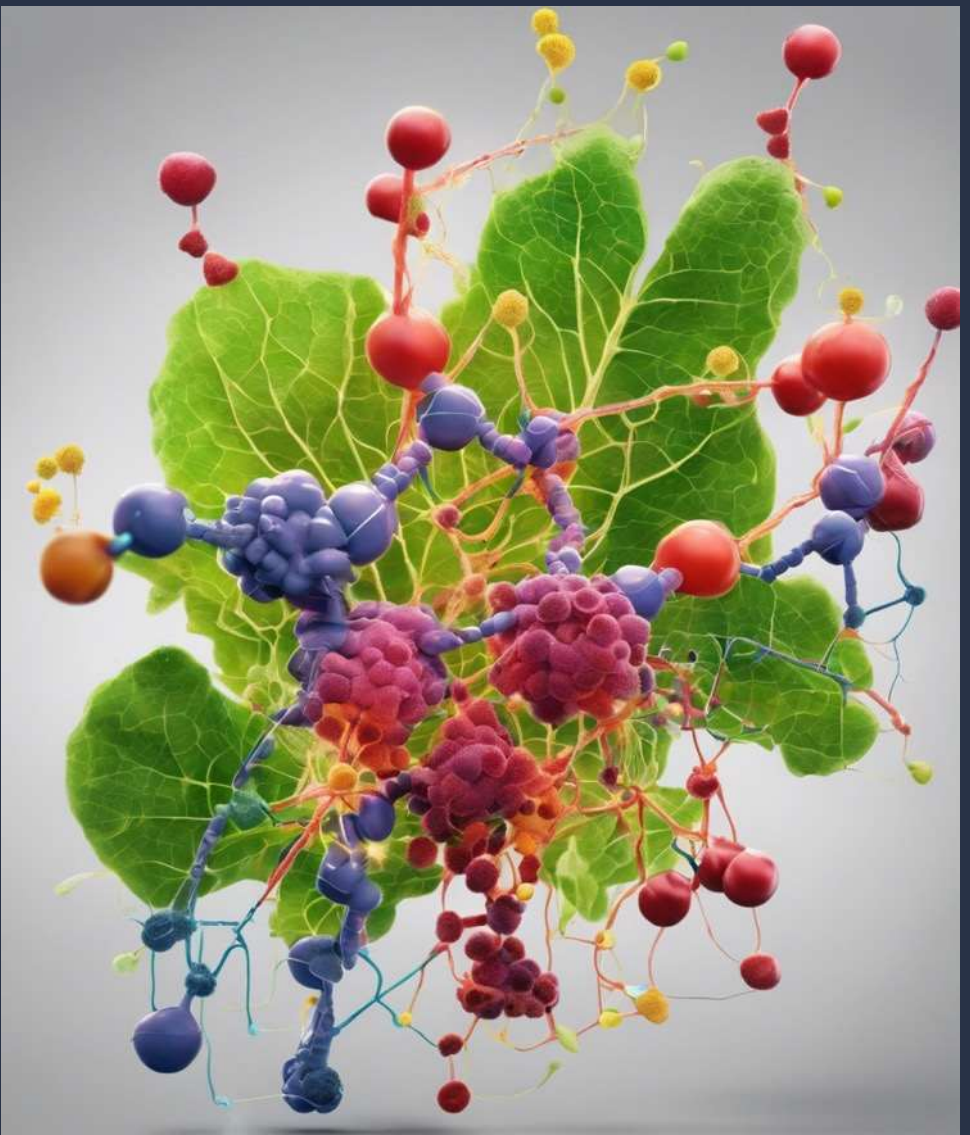
Technology 3

The utilization of natural dietary polyphenols as G4 stabilizers represents a moderately disruptive innovation in the biomedical field, leveraging existing knowledge of polyphenol bioactivity.

3 Maturity

While the concept of using polyphenols as G4 stabilizers is innovative, further research is needed to validate their efficacy and safety for clinical applications.

PUB - 2023



IDENTIFICATION OF MEDICINAL PLANT-BASED PHYTOCHEMICALS AS A POTENTIAL INHIBITOR FOR SARS-COV-2 MAIN PROTEASE (M^(PRO)) USING MOLECULAR DOCKING AND DEEP LEARNING METHODS

Phytochemicals as Potential Inhibitors for SARS-CoV-2 Main Protease

University of Rajshahi

Yeungnam University

Study identifies phytochemicals from Korean medicinal plants as potential inhibitors for SARS-CoV-2 main protease (M^(pro)) using molecular docking and deep learning methods. Lead compounds, Catechin gallate and Quercetin 3-O-malonylglucoside, exhibit inhibitory potency against M^(pro) and interactions with key active sites. Molecular dynamics simulation confirms the stability of the docked complexes. ADMET and bioactivity prediction support pharmaceutical activities of the lead compounds, offering potential for drug development against COVID-19.

Identification of medicinal plant-based phytochemicals as a potential inhibitor for SARS-CoV-2 main protease (M^(pro)) using molecular docking and deep learning methods

Sectors:

- NACE: C.21.20, C.21.30, C.21.10
- Pharmaceuticals
- Biotechnology
- Drug Discovery

Benefits:

- Identification of potential inhibitors for SARS-CoV-2 M^(pro)
- Advancement in drug development for COVID-19 treatment
- Utilization of natural compounds for pharmaceutical activities

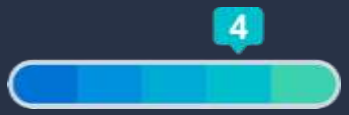
Scores:

Feasibility 4

The findings can be applied in pharmaceutical and biotechnology sectors for drug development targeting SARS-CoV-2.

4 Innovation

The use of phytochemicals as potential inhibitors for SARS-CoV-2 M^(pro) presents a novel approach in drug development for COVID-19 treatment.



Technology 4

The integration of molecular docking, deep learning methods, and molecular dynamics simulation showcases technological advancements in drug discovery.

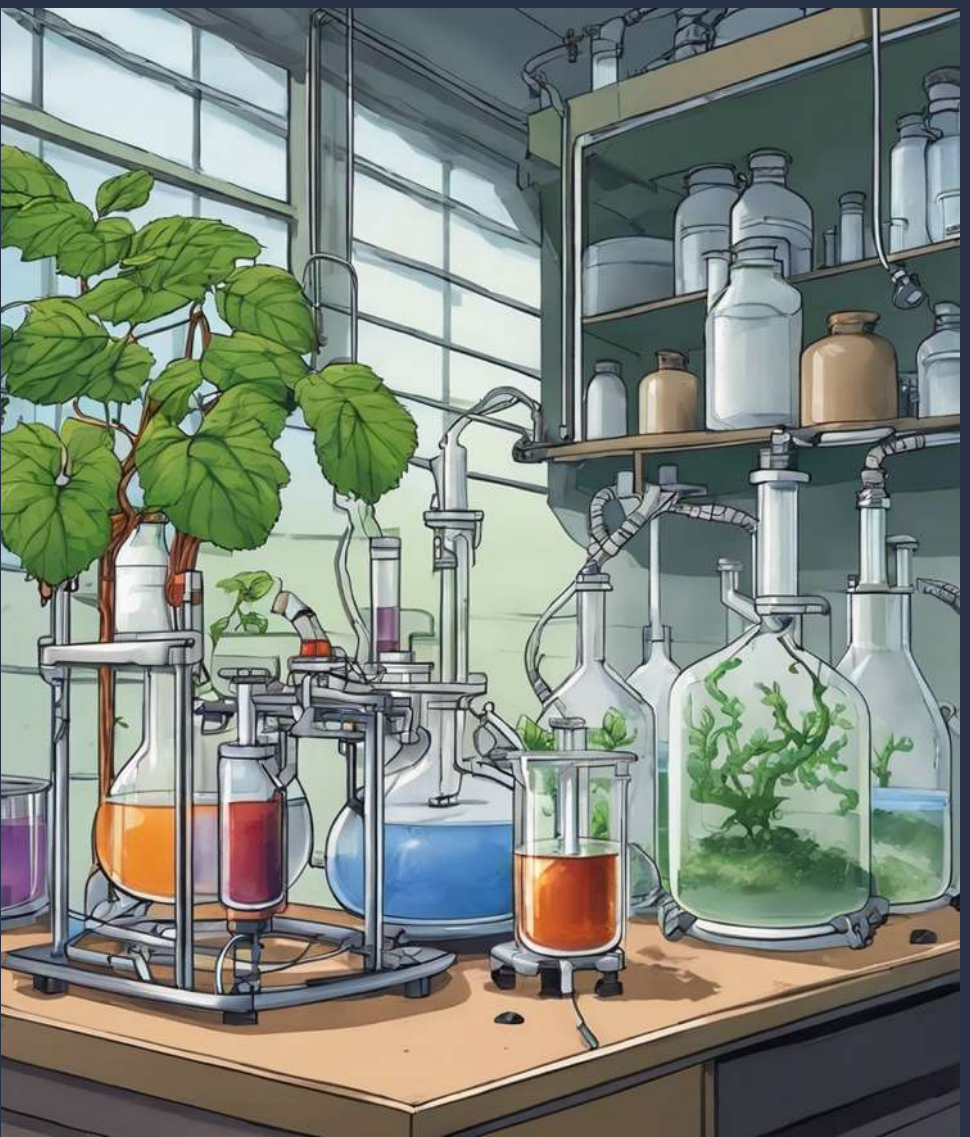
3 Maturity

The use of phytochemicals as potential inhibitors is a relatively novel concept, but the methods employed demonstrate a mature approach in drug discovery.

Records Summary

Type	Year	Title	Abstract	Organizations
PUB	2024	Walnut By-Products and Elderberry Extracts-Sustainable Alternatives for Human and Plant Health	The text discusses the potential of natural compounds from walnuts and elderberries for sustainable development and green chemistry. It highlights their bioactive properties, including antibacterial, antioxidant, and insecticidal effects,	- Vasile Alecsandri University of Bacu
PUB	2023	Polyphenol Extraction from Food (by) Products by Pulsed Electric Field: A Review	Researchers are increasingly focusing on extracting bioactive compounds from natural sources, with a growing interest in maximizing extraction yield using green chemistry principles. Pulsed electric field (PEF) technology has emerged as a	- University of Thessaly
PUB	2023	Review of the recent developments in metabolomics-based phytochemical research	The text discusses the importance of phytochemicals in human health and the advancements in metabolomics for identifying bioactive compounds in natural products. It highlights the use of untargeted metabolomics, particularly	- University of Mauritius - Shoolini University - Curtin University - BNU HKBU United International College - CSIRFood Research Institute
PUB	2023	Identification of a β-Carboline Alkaloid from Chemoselectively Derived Vanilla Bean Extract and Its Prevention of Lipid Droplet Accumulation in Human Hepatocytes (HepG2)	The text discusses the development of bioactive compounds from vanilla bean extract to prevent lipid droplet accumulation in the liver. Through chemical analysis and derivatization, a -carboline alkaloid was identified	- Hokkaido University - Health Sciences University
PUB	2023	Advances and prospects of natural dietary polyphenols as G-quadruplex stabilizers in biomedical applications	This review highlights the potential of plant-based polyphenols in targeting G-quadruplexes (G4s) for anti-cancer drug development. It summarizes their ability to stabilize G4 structures	- Institute Of Chemistry Chinese Academy Of Sciences - CAS Beijing National Laboratory for Molecular - University of Chinese Academy of Sciences - China Academy of Chinese Medical Scinces
PUB	2023	Identification of medicinal plant-based phytochemicals as a potential inhibitor for SARS-CoV-2 main protease (M^(pro)) using molecular docking and deep learning methods	Researchers developed a phytochemical library from Korean medicinal plants to screen for potential inhibitors of the SARS-CoV-2 main protease. Using molecular docking and deep learning methods, they identified two lead	- University of Rajshahi - Yeungnam University

PUB - 2023



IDENTIFICATION AND ISOLATION OF A-GLUCOSIDASE INHIBITORS FROM SIRAITIA GROSVENORII ROOTS USING BIO-AFFINITY ULTRAFILTRATION AND COMPREHENSIVE CHROMATOGRAPHY

Novel Method for Identifying α-Glucosidase Inhibitors from Siraitia grosvenorii Roots

Guangxi Institute of Botany

A novel method combining affinity-based ultrafiltration and high-performance liquid chromatography was developed to identify and isolate α-glucosidase inhibitors from Siraitia grosvenorii roots. Sixteen compounds, including two lignans and fourteen cucurbitane-type triterpenoids, were successfully isolated and characterized. The compounds exhibited inhibitory activity against α-glucosidase, with compound 14 showing the strongest activity. Molecular docking analysis revealed the interaction mechanisms between the inhibitors and the enzyme.

Identification and Isolation of α-Glucosidase Inhibitors from Siraitia grosvenorii Roots Using Bio-Affinity Ultrafiltration and Comprehensive Chromatography

Sectors:

- NACE: C.21.20, C.21.30, C.21.10
- Pharmaceuticals
- Natural products
- Biotechnology

Benefits:

- Efficient identification and isolation of bioactive compounds
- Contribution to drug discovery and natural product research
- Insight into the inhibitory mechanisms of α-glucosidase inhibitors

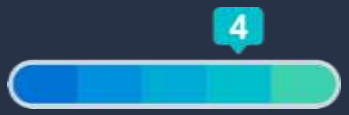
Scores:

Feasibility 4

The method can be feasibly applied in the pharmaceutical and natural product industries for the discovery of bioactive compounds.

4 Innovation

The method presents a novel approach to efficiently identify and isolate bioactive compounds, contributing to drug discovery and natural product research.



Technology 3

The technology leverages established chromatography and spectroscopic methods, but the combination with affinity-based ultrafiltration represents a novel approach in compound screening and isolation.

4 Maturity

The method utilizes mature technologies such as HPLC and spectroscopic analysis, ensuring its readiness for practical implementation.

PUB - 2023

NOVEL CHITOSAN/ALGINATE HYDROGELS AS CARRIERS OF PHENOLIC-ENRICHED EXTRACTS FROM SAFFRON FLORAL BY-PRODUCTS USING NATURAL DEEP EUTECTIC SOLVENTS AS GREEN EXTRACTION MEDIA

Revolutionary Green Extraction of Saffron Floral By-Products

National Technical University of Athens

Miguel HernandezUniversity

Innovative use of Natural Deep Eutectic Solvents (NaDES) and ultrasound-assisted extraction (UAE) to extract high-value compounds from saffron floral by-products. The resulting chitosan/alginate hydrogels exhibit stable functional ingredients with potent antioxidant activity, offering potential applications in food and cosmetic industries.

Novel chitosan/alginate hydrogels as carriers of phenolic-enriched extracts from saffron floral by-products using natural deep eutectic solvents as green extraction media

Sectors:

- NACE: C.10.8, C.20.5, C.21.2
- Cosmetics
- Pharmaceuticals
- Natural products

Benefits:

- Valorization of saffron floral by-products
- Eco-friendly extraction process
- Stable functional ingredients with potent antioxidant activity

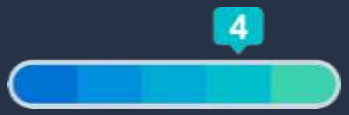
Scores:

Feasibility 4

The use of NaDES and UAE for extraction presents a feasible and eco-friendly approach for valorizing saffron floral by-products, aligning with sustainable practices in the food and cosmetic industries.

4 Innovation

The novel use of NaDES and UAE for extracting high added-value compounds from saffron floral by-products presents a disruptive approach in the field of natural extraction methods.



Technology 3

While NaDES and UAE are not entirely novel, their application in extracting compounds from saffron floral by-products represents a significant advancement in the field.

3 Maturity

The use of NaDES and UAE in extraction processes is relatively mature, with established methodologies and equipment available for implementation.

PUB - 2023

MS/MS-BASED MOLECULAR NETWORKING: AN EFFICIENT APPROACH FOR NATURAL PRODUCTS DEREPLICATION

Revolutionizing Natural Product Dereplication with MS/MS-Based Molecular Networking

Lunan Pharmaceutical Group Corporation

Jining Medical University

Shandong University of Traditional Chinese Medicine

MS/MS-based molecular networking (MN) offers a breakthrough in dereplication of natural products, addressing the time-consuming process of identifying bioactive compounds from complex mixtures. The approach leverages omics, analytical instrumentation, and artificial intelligence, presenting various methods such as classical MN, feature-based MN, ion identity MN, building blocks-based MN, substructure-based MN, and bioactivity-based MN. These methods streamline NP-based drug discovery, preventing the rediscovery of known compounds and accelerating the identification of new bioactive NPs.

MS/MS-Based Molecular Networking: An Efficient Approach for Natural Products Dereplication

Sectors:

- NACE: C.21.10, C.21.20, C.21.30
- Pharmaceuticals
- Biotechnology
- Chemical Analysis

Benefits:

- Accelerated identification of bioactive natural products
- Prevention of rediscovery of known compounds
- Streamlined natural product-based drug discovery

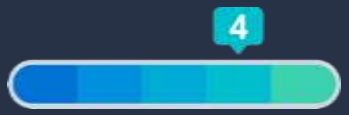
Scores:

Feasibility 3

The implementation of MS/MS-based molecular networking in natural product dereplication may require specialized expertise and equipment, potentially limiting widespread adoption.

5 Innovation

The approach is highly disruptive, revolutionizing the dereplication process and significantly impacting the efficiency of NP-based drug discovery.



Technology 4

Leveraging advanced omics, analytical instrumentation, and artificial intelligence, the technology presents a novel and efficient approach to dereplication.

4 Maturity

The technology is mature and ready for use, with established methods and applications in the field of natural product dereplication.

PUB - 2023

NOVEL INSIGHTS ON EXTRACTION AND ENCAPSULATION TECHNIQUES OF ELDERBERRY BIOACTIVE COMPOUNDS

Unlocking the Power of Elderberry Bioactives

Loughborough University

Islamic Azad University

Univ.of Mohaghegh Ardabili

+1 more

This review delves into the latest extraction and encapsulation techniques for elderberry bioactive compounds, emphasizing the importance of green chemistry elements and the potential of micro/nanoencapsulation technologies to enhance bioavailability and stability. The findings highlight the diverse applications of elderberry in food and pharmaceutical industries, attributing to its health-promoting and sensory characteristics.

Novel insights on extraction and encapsulation techniques of elderberry bioactive compounds

Sectors:

- NACE: C.10.8, C.10.3, C.21.1
- Pharmaceuticals
- Nutraceuticals
- Natural Health Products

Benefits:

- Enhanced bioavailability and stability of elderberry bioactives
- Potential for developing novel elderberry-based products with improved health benefits
- Contribution to the advancement of green and sustainable extraction and encapsulation techniques

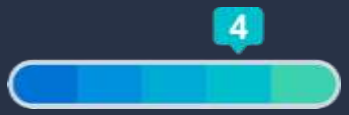
Scores:

Feasibility 3

The techniques described can be implemented in the food and pharmaceutical industries, but may require adaptation to specific elderberry processing facilities in Europe.

4 Innovation

The review presents novel insights into elderberry extraction and encapsulation, offering potential improvements in bioactive compound extraction efficiency and stability.



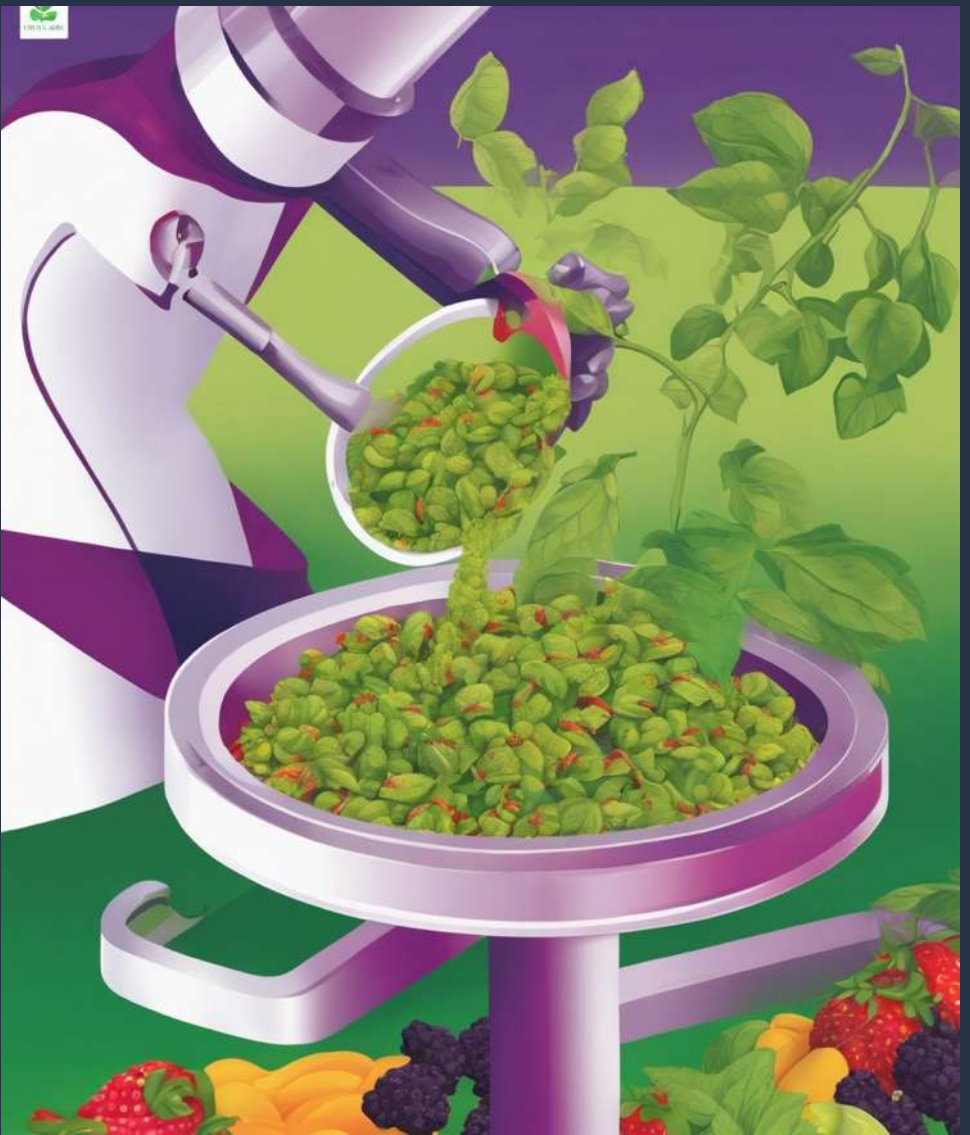
Technology 4

The micro/nanoencapsulation technologies discussed represent a relatively novel approach to enhancing bioavailability and stability of elderberry bioactives.

3 Maturity

While some of the extraction and encapsulation techniques are well-established, the use of micro/nanoencapsulation technologies in the context of elderberry bioactives is still evolving.

PUB - 2023



POLYPHENOL EXTRACTION FROM FOOD (BY) PRODUCTS BY PULSED ELECTRIC FIELD: A REVIEW

Zapping Polyphenols: Pulsed Electric Field Extraction Unleashes Bioactive Bounty

University of Thessaly

Pulsed electric field (PEF) technology is revolutionizing the extraction of polyphenols from food by-products, offering enhanced yields while aligning with green chemistry principles. This review explores the burgeoning field, highlighting the potential of PEF to boost bioactive compound concentrations and discussing current limitations and future prospects.

Polyphenol Extraction from Food (by) Products by Pulsed Electric Field: A Review

Sectors:

- NACE: C.10.3, C.10.4, C.10.8
- Food processing
- Nutraceuticals
- Green chemistry

Benefits:

- Enhanced extraction yields of polyphenols from food by-products
- Adherence to green chemistry principles
- Potential for development of advanced extraction concepts

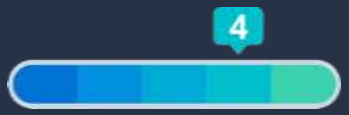
Scores:

Feasibility 4

The implementation of PEF technology for polyphenol extraction is feasible in the food processing sector, offering potential for enhanced yields and sustainable practices.

4 Innovation

PEF technology presents a moderately disruptive innovation in the extraction of bioactive compounds, offering advantages over traditional methods and potential for significant improvements in extraction efficiency.



Technology 4

The utilization of PEF technology for polyphenol extraction represents a novel approach, offering distinct advantages over conventional extraction methods.

3 Maturity

While PEF technology is relatively mature, its specific application for polyphenol extraction from food by-products may require further development and optimization.

PUB - 2023

ANALYSIS OF BIOACTIVE COMPOUNDS OF OLEA EUROPAEA AS POTENTIAL INHIBITORS OF SARS-COV-2 MAIN PROTEASE: A PHARMACOKINETICS, MOLECULAR DOCKING AND MOLECULAR DYNAMICS SIMULATION STUDIES

Olive Leaf Compounds: Potential Inhibitors of SARS-CoV-2 Mpro

Qassim University

In-silico study explores bioactive compounds from olive leaf extract as potential inhibitors of SARS-CoV-2 main protease (Mpro). Apigenin, luteolin-7-O-glucoside, and rutin exhibit favorable drug-like properties and strong binding affinities to Mpro, suggesting their potential as natural drug candidates for combating COVID-19. Molecular dynamics simulations demonstrate the stability of Mpro in conjunction with these compounds, indicating their promising inhibitory effect.

Analysis of bioactive compounds of Olea europaea as potential inhibitors of SARS-CoV-2 main protease: a pharmacokinetics, molecular docking and molecular dynamics simulation studies

Sectors:

- NACE: C.21.20, Q.86.90, C.10.83
- Pharmaceuticals
- Biotechnology
- Natural Products

Benefits:

- Potential natural drug candidates for combating COVID-19
- Exploration of natural bioactive compounds as antiviral agents
- Insights into the inhibitory potential of olive leaf compounds on SARS-CoV-2 Mpro

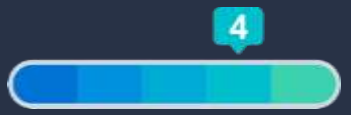
Scores:

Feasibility 4

The potential inhibitors could be developed into antiviral drugs for combating COVID-19, presenting a feasible avenue for pharmaceutical research and development.

4 Innovation

The study presents an innovative approach by exploring natural bioactive compounds as potential inhibitors of SARS-CoV-2 Mpro, offering a novel direction for antiviral drug development.



Technology 3

The use of bioactive compounds from olive leaf extract for antiviral drug development is relatively novel, potentially disrupting traditional pharmaceutical approaches.

3 Maturity

The use of bioactive compounds for drug development is a mature concept, but the specific application for targeting SARS-CoV-2 Mpro is relatively new and requires further validation.

Records Summary (2)

Type	Year	Title	Abstract	Organizations
PUB	2023	Identification and Isolation of α-Glucosidase Inhibitors from Siraitia grosvenorii Roots Using Bio-Affinity Ultrafiltration and Comprehensive Chromatography	This study developed an efficient method for screening and isolating -glucosidase inhibitors from Siraitia grosvenorii roots using affinity-based ultrafiltration and chromatography. Sixteen compounds	- Guangxi Institute of Botany
PUB	2023	Novel chitosan/alginate hydrogels as carriers of phenolic-enriched extracts from saffron floral by-products using natural deep eutectic solvents as green extraction media	This study focuses on developing green extraction processes using Natural Deep Eutectic Solvents (NaDES) and ultrasound-assisted extraction (UAE) to obtain bioactive compounds from saffron floral	- Miguel Hernandez University - National Technical University of Athens
PUB	2023	MS/MS-Based Molecular Networking: An Efficient Approach for Natural Products Dereplication	The pharmaceutical industry's interest in screening new drugs from natural products has declined, but new technologies like tandem mass spectrometry-based molecular networking analysis offer efficient approaches to overcome technical bottlenecks in obtaining bio	- Lunan Pharmaceutical Group Corporation - Jining Medical University - Shandong University of Traditional Chinese Medicine
PUB	2023	Novel insights on extraction and encapsulation techniques of elderberry bioactive compounds	This review discusses the extraction and encapsulation of bioactive compounds from elderberry, a natural source of flavonoids and phenolic compounds. It emphasizes the importance of green chemistry in extraction techniques and highlights	- Univ.of Mohaghegh Ardabili - Loughborough University - Islamic Azad University - Technical University of Munich Campus Straubing for Biotechnology and Sustainability
PUB	2023	Polyphenol Extraction from Food (by) Products by Pulsed Electric Field: A Review	Researchers are increasingly focusing on extracting bioactive compounds from natural sources, with a growing interest in maximizing extraction yield while adhering to green chemistry principles. Pulsed electric field (PEF) technology has	- University of Thessaly
PUB	2023	Analysis of bioactive compounds of Olea europaea as potential inhibitors of SARS-CoV-2 main protease: a pharmacokinetics, molecular docking and molecular dynamics simulation studies	Researchers have explored the potential of bioactive compounds from olive leaf extract (OLE) to inhibit SARS-CoV-2 Mpro, a key enzyme in the replication of the virus. In-sil	- Qassim University

PUB - 2023

POLYPRENOLS IN GINKGO BILOBA; A REVIEW OF THEIR CHEMISTRY (SYNTHESIS OF POLYPRENOLS AND THEIR DERIVATIVES), EXTRACTION, PURIFICATION, AND BIOACTIVITIES

Unveiling the Hidden Potential of Ginkgo Biloba Polyprenols

University of Missouri

This review sheds light on the underexplored polyprenols in Ginkgo biloba, highlighting their synthesis, extraction, purification, and diverse bioactivities. The study emphasizes the potential applications of Ginkgo biloba polyprenols in food, cosmetics, and pharmaceutical industries, showcasing their safety and bioactive properties.

Polyprenols in Ginkgo biloba; a review of their chemistry (synthesis of polyprenols and their derivatives), extraction, purification, and bioactivities

Sectors:

- NACE: C.10.3, C.21.2, C.21.3
- Cosmetics
- Pharmaceuticals
- Biotechnology

Benefits:

- Diverse bioactivities such as anti-bacterial, anti-cancer, and anti-viral properties
- Potential applications in food, cosmetics, and pharmaceutical industries
- Theoretical justification for using Ginkgo biloba polyprenols as raw material for functional foods

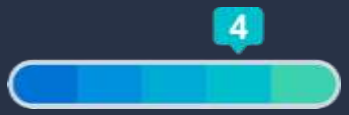
Scores:

Feasibility 3

The implementation of Ginkgo biloba polyprenols in the food and pharmaceutical industries may require further research and development due to their underexplored nature.

4 Innovation

The review highlights the novel aspects of Ginkgo biloba polyprenols and their potential applications, presenting an opportunity for disruptive advancements in the industries.



Technology 3

The use of Ginkgo biloba polyprenols in various industries represents a moderately disruptive innovation due to their underexplored nature and potential for diverse applications.

4 Maturity

The review indicates that Ginkgo biloba polyprenols have demonstrated bioactivities and safety, suggesting a certain level of maturity for potential applications.

PUB - 2023

COMBINING DOE AND MASE: A WINNING STRATEGY FOR THE ISOLATION OF NATURAL BIOACTIVE COMPOUNDS FROM PLANT MATERIALS

Microwave Assisted Solvent Extraction (MASE) Revolutionizes Natural Bioactive Compound Isolation

University of Pavia

The integration of Design of Experiments (DoE) with MASE presents a groundbreaking approach to optimize natural bioactive compound extraction from plant materials. This innovative strategy not only enhances the efficiency of the extraction process but also promotes eco-friendly practices by reducing solvent usage and waste generation. The study critically evaluates the application of DoE in setting up MASE protocols for extracting metabolites and essential oils, offering valuable insights for nature-aided drug discovery programs.

Combining DoE and MASE: a winning strategy for the isolation of natural bioactive compounds from plant materials

Sectors:

- NACE: C.10.3, C.20.5
- Pharmaceuticals
- Biotechnology

Benefits:

- Enhanced efficiency in natural bioactive compound extraction
- Reduction in solvent usage and waste generation
- Cost savings and improved sustainability in nature-aided drug discovery programs

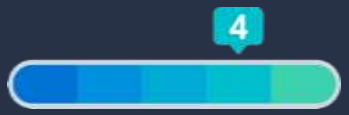
Scores:

Feasibility 4

The integration of DoE and MASE can be feasibly implemented in the natural bioactive compound extraction sector, offering potential cost reductions and environmental benefits.

4 Innovation

The innovative approach of combining DoE with MASE presents a moderately disruptive advancement in the field of natural bioactive compound isolation, offering improved efficiency and sustainability.



Technology 3

While MASE is a well-established technology, the integration with DoE introduces a novel approach, enhancing its applicability and impact in the field of natural bioactive compound extraction.

4 Maturity

Both DoE and MASE are mature technologies, and their integration presents a mature and ready-to-implement approach for optimizing natural bioactive compound extraction processes.

PUB - 2023

FROM WASTE TO GREEN: WATER-BASED EXTRACTION OF POLYPHENOLS FROM ONION PEEL AND THEIR ADSORPTION ON BIOCHAR FROM GRAPEVINE PRUNING RESIDUES

Unlocking the Treasure Trove of Onion Peels and Grapevine Pruning Residues

University of Zagreb

Institute of Agriculture and Tourism

This study explores the potential of biochar derived from grapevine pruning residues to adsorb polyphenolic compounds extracted from onion peels, offering a sustainable solution for utilizing agricultural waste. The water-based extraction methods and adsorption capacity of biochar for polyphenols are investigated, demonstrating the feasibility of green and efficient extraction and adsorption processes.

From Waste to Green: Water-Based Extraction of Polyphenols from Onion Peel and Their Adsorption on Biochar from Grapevine Pruning Residues

Sectors:

- NACE: A.01.11, A.01.19, E.38.32
- Food and beverage industry
- Waste management
- Sustainable agriculture

Benefits:

- Utilization of agricultural waste for valuable compound extraction
- Sustainable and green extraction and adsorption processes
- Potential for commercial applications in food and beverage industries

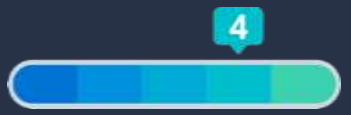
Scores:

Feasibility 4

The water-based extraction and adsorption processes using biochar can be feasibly implemented in the agricultural and waste management sectors, offering a sustainable approach to utilize agricultural by-products.

3 Innovation

The study presents a novel approach to utilizing agricultural waste for extracting and adsorbing valuable polyphenolic compounds, contributing to sustainable practices in the agricultural and environmental sectors.



Technology 3

The use of biochar for adsorption of polyphenols and the water-based extraction methods represent moderately disruptive innovations in the context of sustainable agriculture and waste management.

4 Maturity

The technologies and methods described, such as water-based extraction and biochar adsorption, are mature and ready for practical application, offering a sustainable and efficient approach to utilize agricultural waste.

PUB - 2023

EXPLORING THE POTENTIAL OF FUROFURAN LIGNANS ISOLATED FROM BEILSCHMIEDIA PULVERULENTA FOR DRUG DEVELOPMENT: A COMPUTATIONAL APPROACH

Unveiling the Drug Potential of Furofuran Lignans

Umaru Musa Yar'Adua University

Sultan Idris University of Education

In silico exploration of furofuran lignans from Beilschmiedia pulverulenta reveals promising pharmacological activities, with epiexcelsin showing strong binding affinity and inhibitory activity against estrogen receptor-α. The study highlights the potential of traditional medicinal plants in modern drug discovery, offering valuable insights into the development of effective drugs.

Exploring the Potential of Furofuran Lignans Isolated from Beilschmiedia pulverulenta for Drug Development: A Computational Approach

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Pharmaceuticals
- Natural Products
- Biotechnology

Benefits:

- Identification of potential lead compounds for drug development
- Integration of traditional medicinal knowledge with modern scientific approaches
- Insights into the therapeutic uses of natural medicinal plants

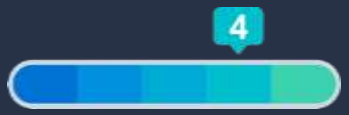
Scores:

Feasibility 3

The computational approach for drug discovery can be applied in the pharmaceutical sector, but further experimental validation is required for practical implementation.

4 Innovation

The study demonstrates the potential of furofuran lignans from Beilschmiedia pulverulenta as a novel source of lead compounds for drug development, showcasing the integration of traditional medicinal knowledge with modern scientific approaches.



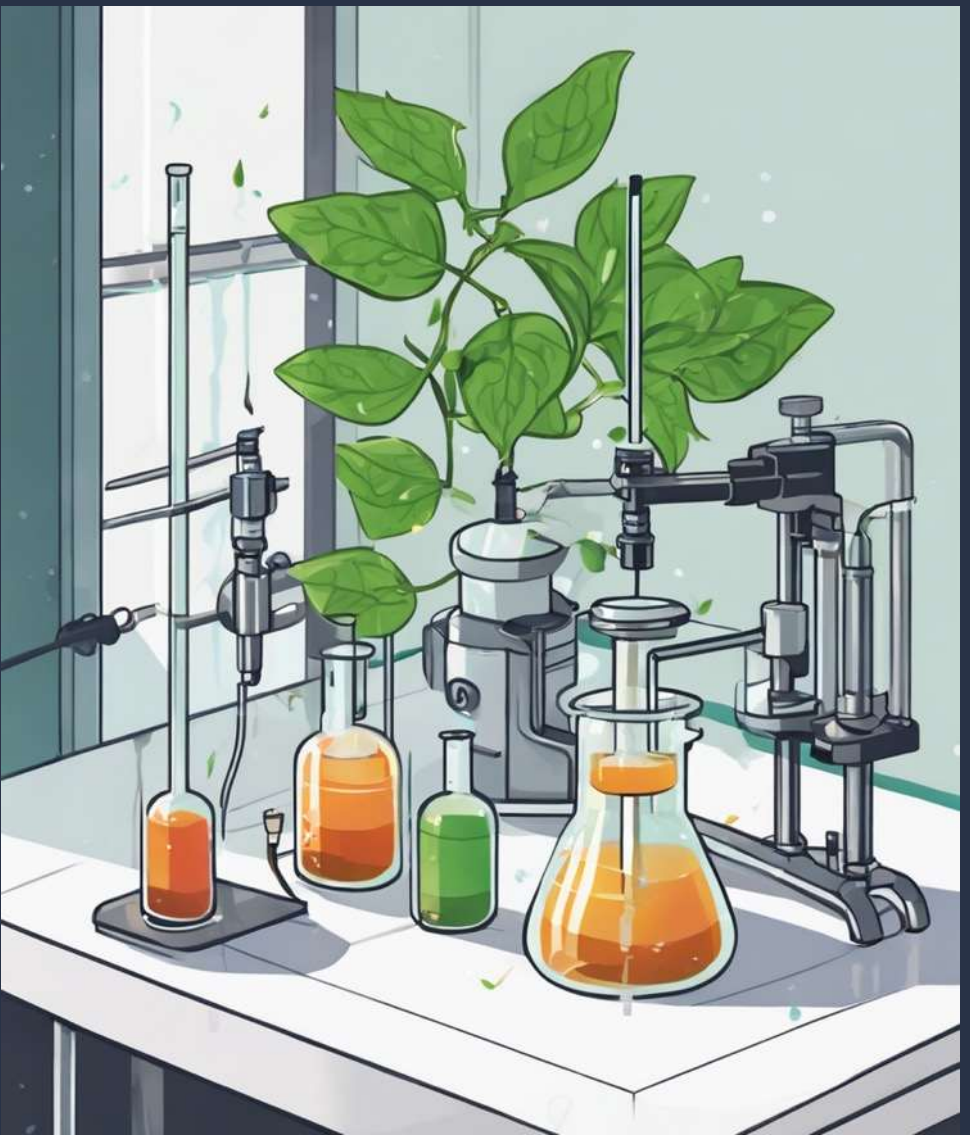
Technology 3

The computational approach for drug discovery is relatively established, but the utilization of furofuran lignans from Beilschmiedia pulverulenta presents a novel application in this context.

4 Maturity

The computational methods for predicting pharmacological activities and drug likeliness properties are mature and widely used in drug discovery, providing a solid foundation for the study's findings.

PUB - 2022



METHODS FOR EXTRACTION AND ISOLATION OF AGATHISFLAVONE FROM POINCIANELLA PYRAMIDALIS

Unveiling the Secrets of Agathisflavone Extraction

Federal University of Bahia

Novel methods for the extraction and isolation of agathisflavone from Poincianella pyramidalis leaves are presented, offering high yields and purity. The study compares traditional chromatographic techniques and complexation with inorganic bases, highlighting the efficiency of automatic flash chromatography in two steps. The purified compound exhibited >99% purity, demonstrating the effectiveness of the applied methodologies.

METHODS FOR EXTRACTION AND ISOLATION OF AGATHISFLAVONE FROM Poincianella pyramidalis

Sectors:

- NACE: C.20.4, C.21.2, C.21.3
- Pharmaceuticals
- Natural products
- Chemical synthesis

Benefits:

- High-yield extraction of agathisflavone
- Enhanced purity of the isolated compound
- Reduction in solvent usage and time-consuming procedures

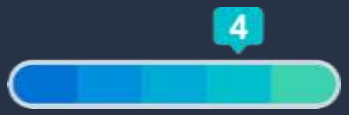
Scores:

Feasibility 4

The methods can be feasibly applied in the pharmaceutical and natural product extraction sectors, offering potential for large-scale production of agathisflavone.

3 Innovation

The methods represent an improvement in the purification of agathisflavone, enhancing yields and purity, but do not introduce radically new techniques.



Technology 3

The technologies utilized, such as chromatography and complexation, are established, but the study's approach optimizes their application for agathisflavone extraction.

4 Maturity

The methods leverage mature technologies and techniques, such as chromatography and extraction, and demonstrate their effectiveness in isolating agathisflavone with high purity.

Records Summary (3)

Type	Year	Title	Abstract	Organizations
PUB	2023	Polyprenols in Ginkgo biloba; a review of their chemistry (synthesis of polyprenols and their derivatives), extraction, purification, and bioactivities	This review focuses on the lesser-studied polyprenols in Ginkgo biloba, detailing their chemistry, extraction, purification, and bioactivities. It explores various extraction and purification methods and	- University of Missouri
PUB	2023	Chemical profiling and biological activities of Opopanax hispidus extracts: A comparative insight on conventional and green extraction technologies	The study explores the potential of Opopanax hispidus extracts obtained through various extraction methods, revealing high phenolic and flavonoid content. The extracts exhibit antioxidant, neuroprotective, antity	- University of Novi Sad - University of Belgrade - Selcuk University
PUB	2023	Combining DoE and MASE: a winning strategy for the isolation of natural bioactive compounds from plant materials	The text discusses the challenges of biomass extraction in nature-aided drug discovery and the potential of microwave-assisted solvent extraction (MASE) to optimize the process. It highlights the need for a more	- University of Pavia
PUB	2023	From Waste to Green: Water-Based Extraction of Polyphenols from Onion Peel and Their Adsorption on Biochar from Grapevine Pruning Residues	This study explores the potential of biochar (BC) obtained from grapevine pruning residues to remove polyphenolic compounds from onion peel extracts. The extracts were obtained using green chemistry principles, and the BC	- Institute of Agriculture and Tourism - University of Zagreb
PUB	2023	Exploring the Potential of Furofuran Lignans Isolated from Beilschmiedia pulverulenta for Drug Development: A Computational Approach	This study explores the pharmacological and bioactivity of furofuran lignans from Beilschmiedia pulverulenta for drug discovery. In silico studies predict promising pharmacokinetic activities	- Umaru Musa Yar'Adua University - Sultan Idris University of Education
PUB	2022	Optimization of ultrasound-assisted extraction of bioactive compounds from coffee pulp using propylene glycol as a solvent and their antioxidant activities	The study explores the use of alternative solvents, such as propylene glycol, in the extraction of bioactive compounds from coffee pulp. It investigates the impact of extraction parameters on antioxidant content and activities	- Mae Fah Luang University
PUB	2022	METHODS FOR EXTRACTION AND ISOLATION OF AGATHISFLAVONE FROM Poincianella pyramidalis	Agathisflavone, a natural biflavone with potential for new drug development, poses challenges for large-scale production. This study compares purification methods from Poincianella pyramidal	- Federal University of Bahia

PUB - 2022

ENHANCING THE PRODUCTION OF THE PHENOLIC EXTRACTS OF ASPARAGUS USING AN ADVANCED GREEN PROCESS

Revolutionizing Asparagus Phenolic Extract Production

University of Granada

Federal University of Santa Maria

Food Science and Nutrition

+3 more

Cutting-edge extraction techniques and green chemistry principles are employed to enhance the recovery of bioactive compounds from green asparagus, offering a novel and efficient approach to studying the phytochemical composition of this widely consumed vegetable. The study showcases the potential of pressurized liquid extraction (PLE) using GRAS solvents, coupled with advanced analytical methods, to yield superior results compared to conventional extraction protocols.

Enhancing the Production of the Phenolic Extracts of Asparagus Using an Advanced Green Process

Sectors:

- NACE: A.01.19, C.10.39, C.10.83
- Food technology
- Pharmaceuticals
- Nutraceuticals

Benefits:

- Enhanced recovery of bioactive compounds from green asparagus
- Improved understanding of phytochemical composition
- Efficient and environmentally friendly extraction methods

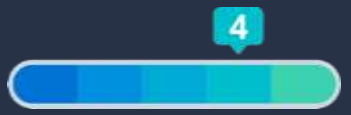
Scores:

Feasibility 4

The advanced extraction techniques and green chemistry principles can be feasibly implemented in the asparagus production sector, offering improved methods for studying phytochemical composition.

4 Innovation

The use of advanced PLE techniques and analytical methods represents a moderately disruptive innovation in the field of phytochemical extraction, offering a more efficient and comprehensive approach to studying bioactive compounds.



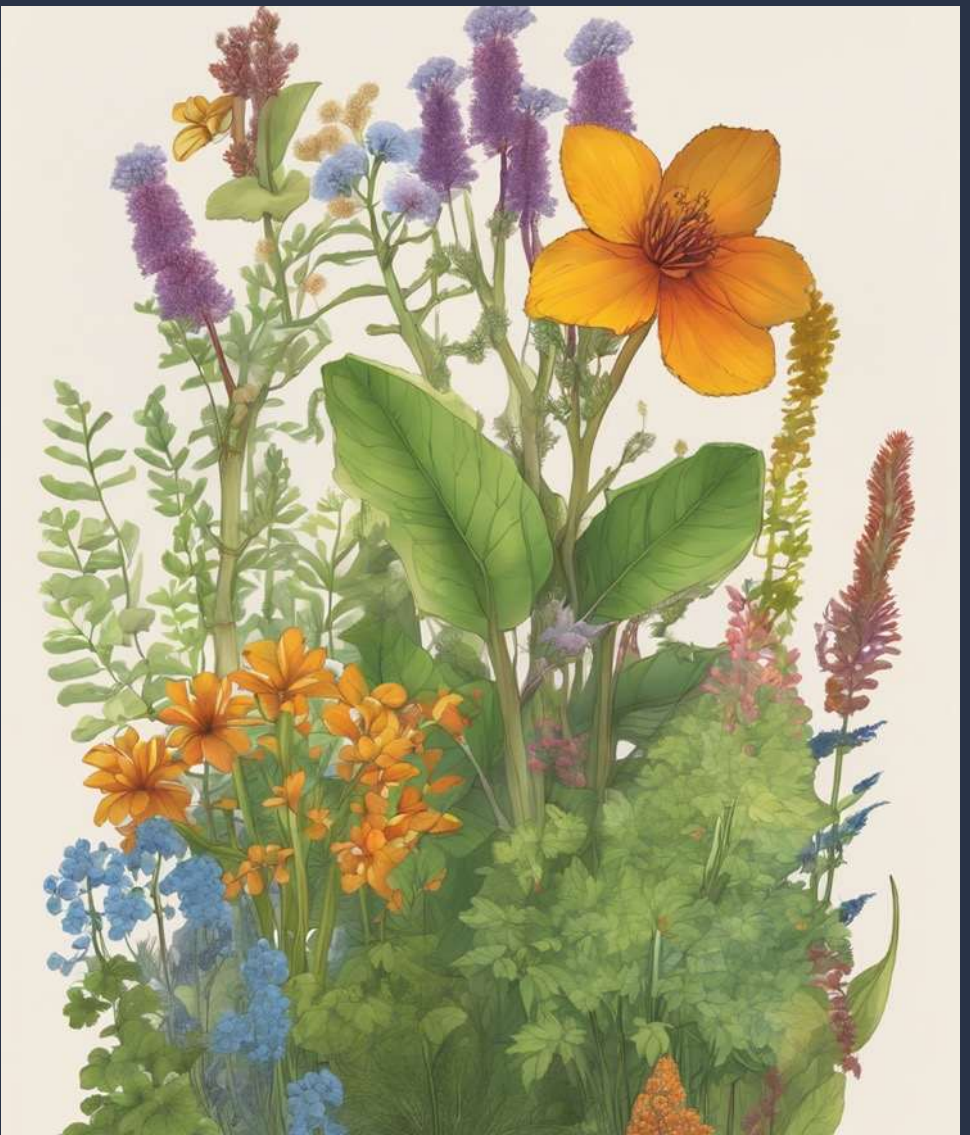
Technology 4

The utilization of PLE and advanced analytical methods introduces relatively novel technologies to the extraction and analysis of bioactive compounds from green asparagus, offering advancements in efficiency and accuracy.

3 Maturity

While the advanced techniques are innovative, they may require further validation and standardization before widespread adoption, impacting the maturity score.

PUB - 2022



GREENMOLBD: NATURE DERIVED BIOACTIVE MOLECULES' DATABASE

GreenMolBD: A Treasure Trove of Nature-Derived Bioactive Molecules

Dongguk University

University of New South Wales

Pharmacology Research Division

GreenMolBD is a pioneering database providing comprehensive information on bioactive molecules derived from medicinal plants, offering valuable insights for drug development. The database encompasses detailed profiles of plants, their chemical constituents, and pharmacological evidence, along with in silico descriptions, quantum properties, drugability, and biological target information. With 1846 associated targets and 6,864 compounds, it serves as a vital resource for nature-inspired rational drug discovery.

GreenMolBD: Nature Derived Bioactive Molecules' Database

Sectors:

- NACE: C.21.20, Q.86.90, M.72.19
- Pharmaceuticals
- Biotechnology
- Natural products

Benefits:

- Comprehensive information on bioactive molecules from medicinal plants
- Facilitation of nature-inspired rational drug discovery
- Valuable resource for drug development and target identification

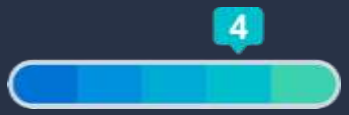
Scores:

Feasibility 4

The database can be highly beneficial for biomedical researchers and pharmaceutical companies seeking nature-derived lead compounds for drug development.

4 Innovation

The database presents a novel and dynamic approach to consolidating information on bioactive molecules from medicinal plants, offering a valuable resource for drug discovery.



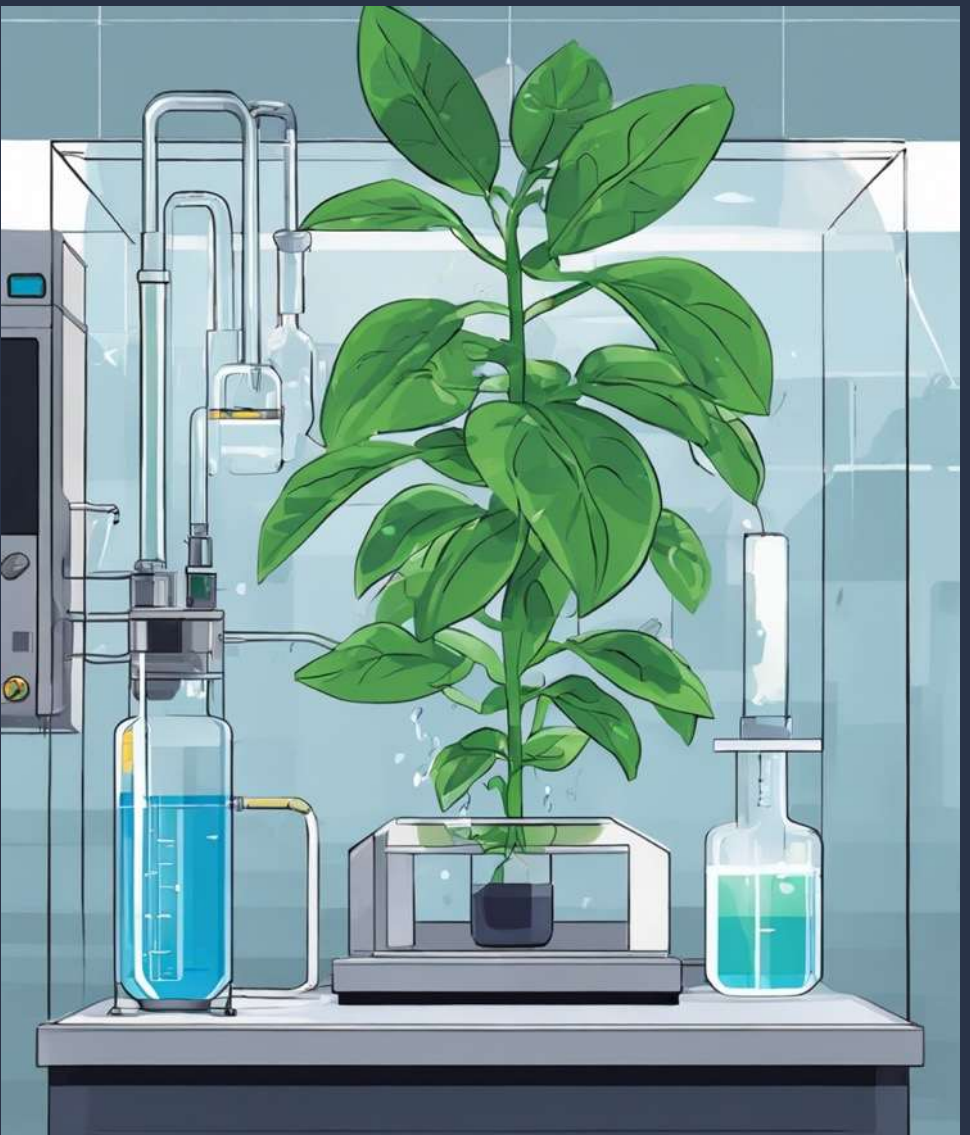
Technology 3

While the technologies used for data mining and in silico analysis are established, their application in the context of nature-derived bioactive molecules is relatively novel.

4 Maturity

The database integrates well-established technologies such as MySQL, HTML, PHP, and JavaScript, and its comprehensive coverage of bioactive molecules demonstrates a mature and ready-to-use resource.

PUB - 2022



ULTRASONIC ASSISTED EXTRACTION OF ACHYROCLINE SATUREIOIDES LAM, D.C, (MARCELA) IN AQUEOUS MEDIA IMPROVES EXTRACTION YIELD AND ENHANCES SELECTIVE BIOACTIVE EXTRACTION

Revolutionizing Bioactive Extraction with Ultrasonic Assistance

TECNOLOGIAS VR

University of the Republic of Uruguay

This study explores the use of ultrasonic assisted extraction (UAE) to enhance the aqueous extraction of bioactive compounds from the marcela plant. The application of UAE significantly improves the extraction yield and selectivity of bioactive compounds, offering potential for more efficient and sustainable extraction processes.

Ultrasonic assisted extraction of Achyrocline satureioides Lam, D.C, (marcela) in aqueous media improves extraction yield and enhances selective bioactive extraction

Sectors:

- NACE: C.10.83, C.10.84
- Pharmaceuticals
- Natural products
- Herbal supplements

Benefits:

- Significantly improved extraction yield and selectivity of bioactive compounds
- Enhanced efficiency and sustainability in natural product extraction processes
- Potential for the development of novel bioactive compound extraction methods

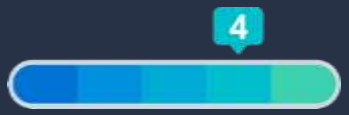
Scores:

Feasibility 4

The UAE technique can be feasibly implemented in the natural products extraction sector, offering a more efficient and sustainable alternative to traditional extraction methods.

4 Innovation

UAE presents a moderately disruptive innovation in the field of bioactive compound extraction, offering a more effective and selective extraction method compared to conventional techniques.



Technology 3

The use of ultrasonic assistance in extraction processes is relatively novel and can bring advancements in the extraction of bioactive compounds, but it is not entirely groundbreaking.

4 Maturity

UAE technology is mature and ready for implementation, with proven effectiveness in enhancing extraction processes and selectivity of bioactive compounds.

PUB - 2022

AN INSIGHT INTO EXTRACTION, ISOLATION, IDENTIFICATION AND QUANTIFICATION OF BIOACTIVE COMPOUNDS FROM CRATAEGUS MONOGYNA PLANT EXTRACT

Unveiling the Secrets of Crataegus Monogyna Bioactive Compounds

Molecular Pharmacology

Exploring the extraction, isolation, identification, and quantification of bioactive compounds from Crataegus monogyna, this review emphasizes the significance of standard analytical techniques in harnessing the potential of medicinal plants for drug development. The study delves into critical parameters such as time, temperature, yield of extract, total phenolic content, and antioxidant activity to enhance the production of antioxidant-rich bioactive compounds from C. monogyna plant extract.

An Insight into Extraction, Isolation, Identification and Quantification of Bioactive Compounds from Crataegus Monogyna Plant Extract

Sectors:

- NACE: C.10.3, C.21.2, C.21.3
- Pharmaceuticals
- Natural health products
- Nutraceuticals

Benefits:

- Enhanced understanding of bioactive compound extraction techniques
- Potential for developing new drugs from natural sources
- Improved production of antioxidant-rich bioactive compounds

Scores:

Feasibility 3

The implementation of the described techniques in the pharmaceutical and natural health product sectors is feasible, but may require adaptation to specific plant species.

3 Innovation

The review presents advancements in analytical techniques for extracting bioactive compounds, contributing to the ongoing evolution of natural product-based drug development.

Technology 3

The analytical techniques discussed represent incremental advancements in the field of natural product extraction and quantification.

3 Maturity

The analytical techniques are well-established, but the standardization of methods for industrial-scale production remains a challenge.

PUB - 2022

IDENTIFICATION OF PLANT-DERIVED BIOACTIVE COMPOUNDS USING AFFINITY MASS SPECTROMETRY AND MOLECULAR NETWORKING

Revolutionizing Drug Discovery with Affinity Mass Spectrometry

University of Johannesburg

Metabolomics

Affinity selection-mass spectrometry (AS-MS) offers a label-free binding assay system for identifying bioactive compounds, providing a concise, accurate, and adaptable approach applicable to any drug target. However, competitive binding limits its potential. This paper proposes combining AS-MS with metabolite profiling and molecular networking to enhance the identification of bioactive compounds in plant extracts, potentially revolutionizing drug development.

Identification of Plant-Derived Bioactive Compounds Using Affinity Mass Spectrometry and Molecular Networking

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Pharmaceuticals
- Biotechnology
- Chemical

Benefits:

- Accurate and adaptable identification of bioactive compounds
- Potential revolutionization of drug development
- Enhanced drug discovery through combined metabolite profiling and molecular networking

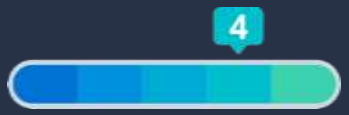
Scores:

Feasibility 4

The innovative approach is feasible for drug discovery in the pharmaceutical sector, offering a versatile and adaptable method for identifying bioactive compounds.

4 Innovation

AS-MS presents a moderately disruptive innovation in drug discovery, offering a more concise and accurate alternative to conventional biochemical approaches.



Technology 3

The technology is relatively novel in the context of drug discovery, offering potential advancements in compound identification and characterization.

3 Maturity

The technology is at a moderate level of maturity, with significant prominence in HTS labs and potential for further development and adoption.

PUB - 2022

A GREEN METHOD OF EXTRACTING AND RECOVERING FLAVONOIDS FROM ACANTHOPANAX SENTICOSUS USING DEEP EUTECTIC SOLVENTS

Revolutionary Green Extraction of Flavonoids from Acanthopanax senticosus

Liaocheng University

Utilizing deep eutectic solvents (DES) and response surface methodology (RSM), this study presents an innovative green extraction method for flavonoids from Acanthopanax senticosus. The optimal DES composition and extraction conditions resulted in a 40.7% increase in flavonoid yield compared to traditional ethanol extraction. Additionally, efficient recovery using macroporous resin and the recyclability of DES further highlight the environmental friendliness of this method.

A Green Method of Extracting and Recovering Flavonoids from Acanthopanax senticosus Using Deep Eutectic Solvents

Sectors:

- NACE: C.10.92, C.20.59
- Herbal medicine
- Natural product extraction
- Pharmaceuticals

Benefits:

- Significantly increased flavonoid yield compared to traditional methods
- Environmentally friendly and recyclable extraction process
- Potential for application in herbal medicine and pharmaceutical industries

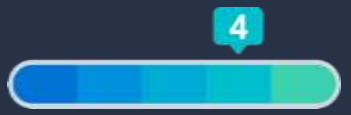
Scores:

Feasibility 4

The green extraction method using DES and RSM can be feasibly implemented in the herbal medicine and natural product extraction sector.

4 Innovation

The use of DES and RSM represents a disruptive innovation in the extraction of bioactive compounds, offering significant improvements in yield and environmental sustainability.



Technology 4

The utilization of DES and RSM in flavonoid extraction presents a novel and disruptive technology, offering a more sustainable and efficient alternative to traditional organic solvents.

3 Maturity

While the use of DES and RSM is innovative, it may require further validation and standardization before widespread adoption.

PUB - 2022

CAROTENOID RECOVERY FROM TOMATO PROCESSING BY-PRODUCTS THROUGH GREEN CHEMISTRY

Revolutionary Carotenoid Recovery from Tomato By-Products

University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

University of Sfax

Suranaree University of Technology

Utilizing green chemistry principles, this study presents a sustainable method for recovering carotenoids from tomato processing by-products. The use of generally recognized as safe (GRAS) solvents, freeze-drying, and ultrasound extraction resulted in high carotenoid yields, particularly with ethyl lactate and ethyl acetate solvents. The extracted carotenoids were successfully integrated into flaxseed, grape seed, and hempseed oils, enhancing their health-promoting properties and rheological characteristics.

Carotenoid Recovery from Tomato Processing By-Products through Green Chemistry

Sectors:

- NACE: C.10.3, C.10.4, C.10.8
- Food and beverage
- Nutraceuticals
- Sustainable agriculture

Benefits:

- Sustainable recovery of bioactive compounds from agro-industry by-products
- Enhanced functional properties of oils through carotenoid enrichment
- Promotion of circular economy principles and waste minimization

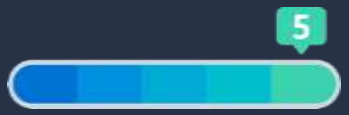
Scores:

Feasibility 5

The recovery method is highly feasible for the food and nutraceutical industry, aligning with circular economy principles and offering a sustainable solution for utilizing agro-industry by-products.

5 Innovation

The use of green chemistry principles and GRAS solvents for carotenoid recovery represents a significant innovation in the field of sustainable food production and waste reduction.



Technology 5

The application of ultrasound extraction and the use of GRAS solvents for carotenoid recovery demonstrate technological advancements in sustainable extraction methods.

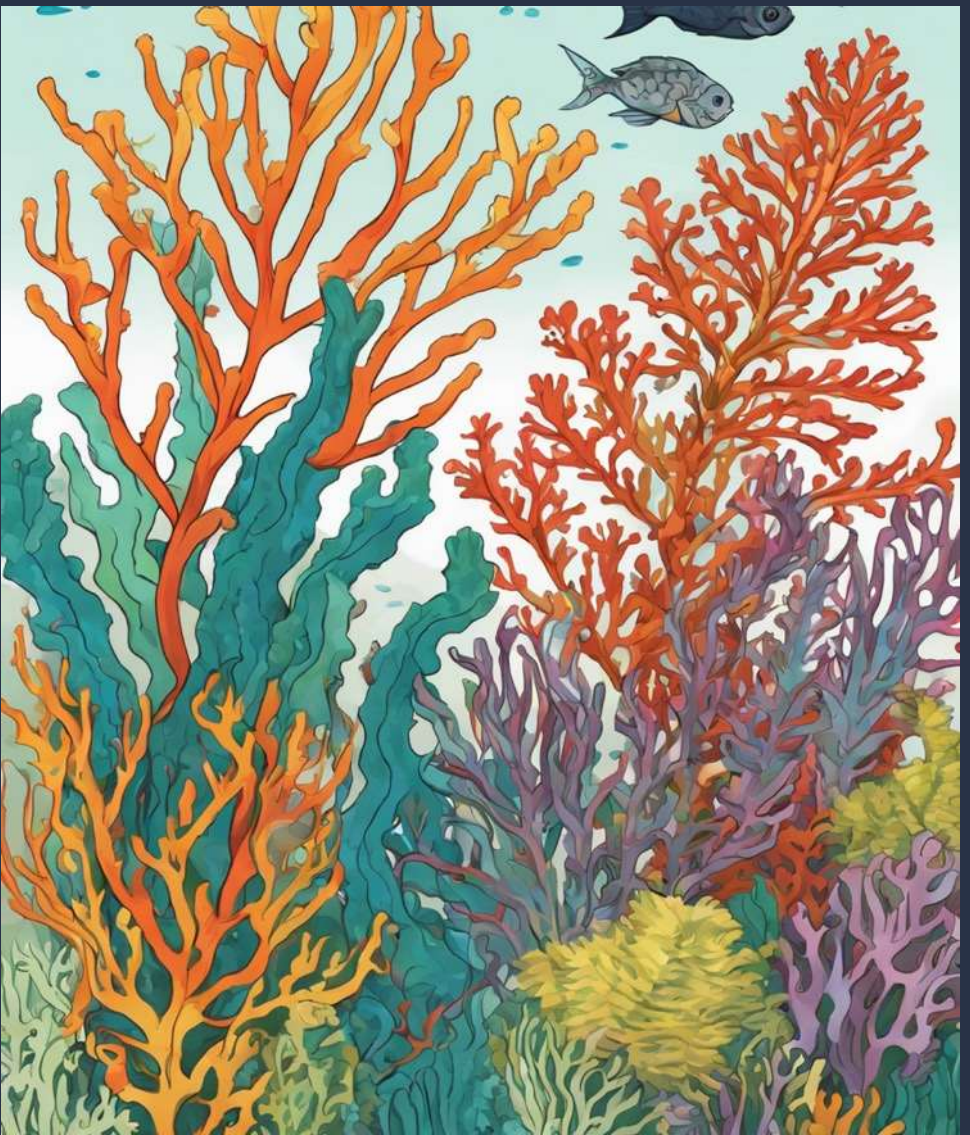
4 Maturity

The use of freeze-drying and spectrophotometric measurements are well-established methods, while the integration of carotenoids into oils presents a moderately mature technology.

Records Summary (4)

Type	Year	Title	Abstract	Organizations
PUB	2022	Enhancing the Production of the Phenolic Extracts of Asparagus Using an Advanced Green Process	The study focuses on the extraction of bioactive compounds from green asparagus using environmentally friendly techniques such as pressurized liquid extraction (PLE) with GRAS solvents. Advanced analytical methods were employed to	- University of Granada
PUB	2022	GreenMolBD: Nature Derived Bioactive Molecules' Database	The text describes the development of a database, GreenMolBD, to provide comprehensive information on bioactive compounds from medicinal plants, aiding drug discovery. It covers phytoconstituents' properties,	- Dongguk University - Pharmacology Research Division - University of New South Wales
PUB	2022	Ultrasonic assisted extraction of Achyrocline satureioides Lam, D.C, (marcela) in aqueous media improves extraction yield and enhances selective bioactive extraction	This study explores ultrasound-assisted extraction (UAE) as a green chemistry technique for obtaining bioactive compounds from the marcela plant. The research demonstrates that UAE with water as a solvent at different	- University of the Republic of Uruguay - TECNOLOGIAS VR
PUB	2022	An Insight into Extraction, Isolation, Identification and Quantification of Bioactive Compounds from Crataegus Monogyna Plant Extract	The text discusses the potential of bioactive compounds from Crataegus monogyna for new drug development. It emphasizes the need for standard analytical techniques for extraction, isolation, and quantification of these	- Molecular Pharmacology
PUB	2022	Identification of Plant-Derived Bioactive Compounds Using Affinity Mass Spectrometry and Molecular Networking	Affinity selection-mass spectrometry (AS-MS) is a label-free binding assay using UHPLC-MS size-based separation to identify and characterize bioactive compounds. It offers potential	- University of Johannesburg
PUB	2022	A Green Method of Extracting and Recovering Flavonoids from Acanthopanax senticosus Using Deep Eutectic Solvents	The study explores green extraction of flavonoids from Acanthopanax senticosus using deep eutectic solvents (DES) and macroporous resin. Optimal conditions for extraction	- Liaocheng University
PUB	2022	Carotenoid Recovery from Tomato Processing By-Products through Green Chemistry	The study focuses on the sustainable recovery of carotenoids from tomato processing by-products using green chemistry principles and GRAS solvents. Ethyl lactate and ethyl acetate proved effective for caroten	- University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca - University of Sfax - Suranaree University of Technology

PUB - 2022



AN OVERVIEW OF POTENTIAL SEAWEED-DERIVED BIOACTIVE COMPOUNDS FOR PHARMACEUTICAL APPLICATIONS

Unveiling Seaweed's Potential for Pharmaceutical Applications

University of Coimbra

University of Aveiro

Seaweeds from various phyla offer a rich source of bioactive compounds with diverse properties, including antioxidant, antimicrobial, and antiviral activities. These compounds hold promise for pharmaceutical, cosmetic, and nutraceutical industries, aiming to replace synthetic compounds with natural alternatives. The review emphasizes the need for further research to fully harness seaweed's potential and promote sustainable and healthier product development.

An Overview of Potential Seaweed-Derived Bioactive Compounds for Pharmaceutical Applications

Sectors:

- NACE: C.21.20, C.20.59, C.21.10
- Cosmetic
- Nutraceutical
- Biotechnology

Benefits:

- Potential replacement of synthetic compounds with natural alternatives
- Enhanced human health through bioactive compounds
- Promotion of sustainable and healthier product development

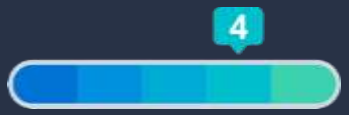
Scores:

Feasibility 4

The utilization of seaweed-derived bioactive compounds in pharmaceutical applications is feasible, given the growing interest in natural alternatives and the demonstrated beneficial properties of these compounds.

4 Innovation

The use of seaweed-derived bioactive compounds represents a moderately disruptive innovation in the pharmaceutical industry, offering natural alternatives to synthetic compounds and promoting sustainable product development.



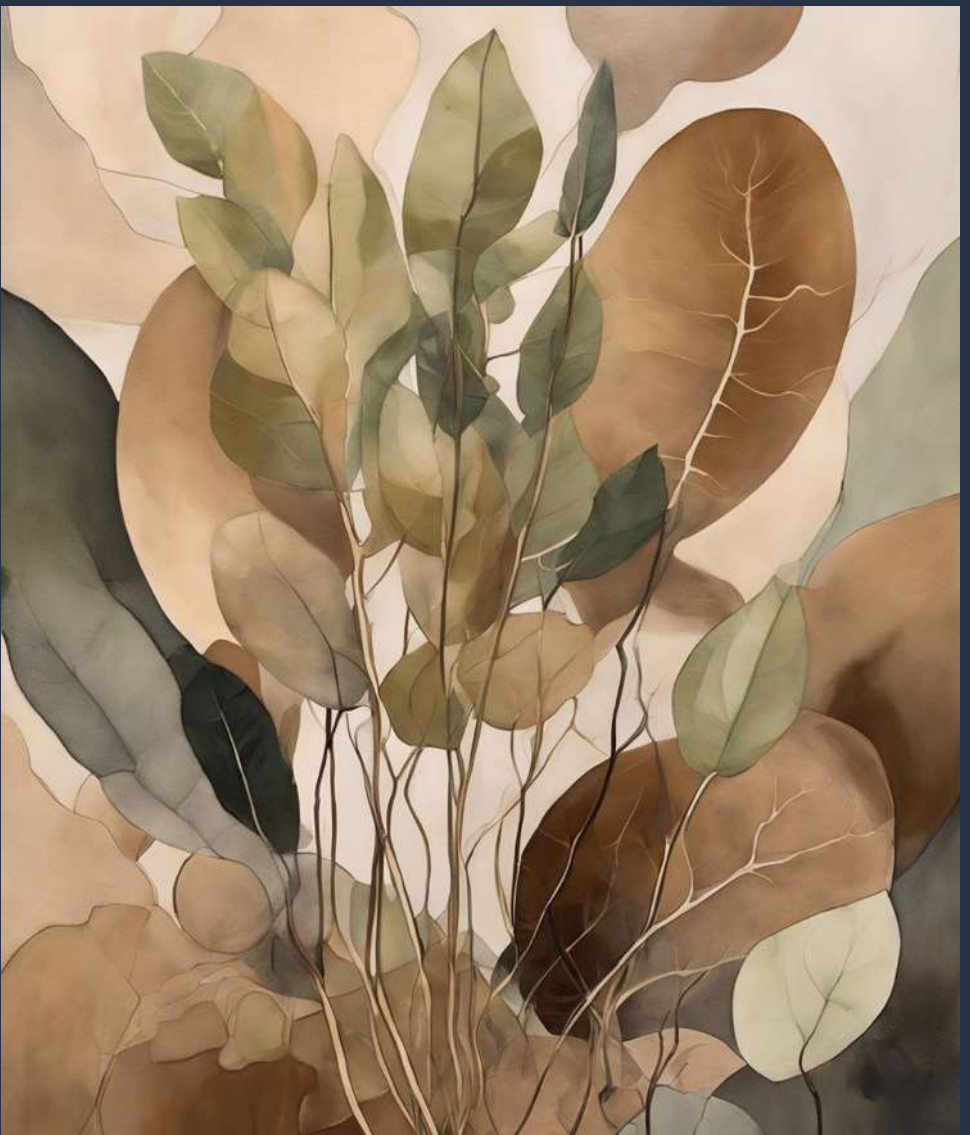
Technology 3

While the use of seaweed-derived compounds is not entirely novel, their potential for pharmaceutical applications and the shift towards natural ingredients contribute to moderate disruptiveness.

4 Maturity

The bioactive compounds derived from seaweeds have been increasingly studied and utilized, indicating a mature stage for their application in pharmaceutical and related industries.

PUB - 2022



PHYTOCHEMICAL SCREENING, ANTI-INFLAMMATORY, AND ANTIDIABETIC ACTIVITIES OF DIFFERENT EXTRACTS FROM CARALLUMA EDULIS PLANT

Caralluma edulis: A Promising Source of Anti-Inflammatory and Antidiabetic Compounds

Siedlce University Of Natural Sciences And Humanities

University of Veterinary and Animal Sciences

Medical University of Lublin

+1 more

Study validates traditional use of Caralluma edulis in treating diabetes and inflammatory conditions. Methanol extract showed highest content of bioactive compounds and demonstrated superior anti-inflammatory and antioxidant potential. While not effective in acute diabetic model, all extracts exhibited antidiabetic potential in subacute model without adverse effects. Caralluma edulis holds promise for drug development and as a natural remedy for inflammatory disorders and diabetes.

Phytochemical Screening, Anti-Inflammatory, and Antidiabetic Activities of Different Extracts from Caralluma edulis Plant

Sectors:

- NACE: C.21.20, C.21.30, C.10.30
- Pharmaceuticals
- Nutraceuticals
- Natural remedies

Benefits:

- Validation of traditional medicinal use of Caralluma edulis
- Potential for drug development in treating inflammatory disorders and diabetes
- Demonstrated safety and efficacy in animal models

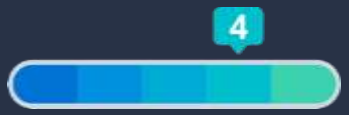
Scores:

Feasibility 3

The findings could be applied in pharmaceutical and nutraceutical sectors for developing anti-inflammatory and antidiabetic products.

3 Innovation

The study presents novel evidence supporting the traditional use of Caralluma edulis, but the findings are not highly disruptive in the field of natural remedies.



Technology 2

The technology used for phytochemical screening and bioactivity assessment is not highly disruptive, as these methods are well-established in natural product research.

4 Maturity

The methods and technologies used in the study are mature and widely accepted in the field of natural product research.

PUB - 2022

NATURALLY OCCURRING O-HETEROCYCLES AS ANTICANCER AGENTS

O-Heterocycles: Nature's Anticancer Arsenal

The University of Nizwa

Martin Luther University of Halle Wittenberg

Natural O-heterocycles have emerged as promising anticancer agents, offering unique structures and mechanisms of action. Recent advancements in chemical synthesis and bioevaluation techniques have facilitated the development of these compounds into potential anticancer drugs. This review highlights the bioactivities, natural sources, and chemistry of selected O-heterocycles, emphasizing their relevance in current anticancer drug discovery and development.

Naturally Occurring O-Heterocycles as Anticancer Agents

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Pharmaceuticals
- Biotechnology
- Natural Products

Benefits:

- Potential for developing novel anticancer drugs from natural sources
- Utilization of unique structures and mechanisms of action for drug development
- Contribution to current anticancer drug discovery and development

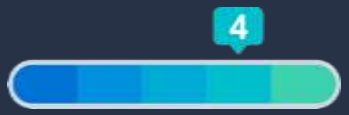
Scores:

Feasibility 4

The utilization of naturally occurring O-heterocycles as anticancer agents is feasible, given the advancements in chemical synthesis and bioevaluation techniques.

4 Innovation

The unique structures and mechanisms of action of O-heterocycles contribute to their moderate disruptiveness in the field of anticancer drug development.



Technology 3

While the technology is not highly disruptive, the utilization of natural O-heterocycles presents novel approaches in anticancer drug development.

4 Maturity

The natural sources and chemistry of O-heterocycles are well-established, and advancements in synthetic modifications and bioevaluation techniques contribute to their maturity in drug development.

PUB - 2022

MODERN APPROACHES IN THE DISCOVERY AND DEVELOPMENT OF PLANT-BASED NATURAL PRODUCTS AND THEIR ANALOGUES AS POTENTIAL THERAPEUTIC AGENTS

Revolutionizing Drug Discovery with Plant-Based Natural Products

Jazan University

This review highlights the resurgence of interest in natural product drug discovery, particularly from plant sources, driven by technological advancements. It emphasizes the importance of an integrated interdisciplinary approach utilizing modern drug development principles, including bioactivity-guided fractionation, molecular modeling, and high-throughput bioassays. The study underscores the potential of plant-based natural products and their analogues as crucial sources for the development of new therapeutic drugs.

Modern Approaches in the Discovery and Development of Plant-Based Natural Products and Their Analogues as Potential Therapeutic Agents

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Pharmaceuticals
- Biotechnology
- Natural Products

Benefits:

- Revival of interest in natural product drug discovery
- Potential for developing new therapeutic drugs
- Integration of modern drug development principles for efficient drug discovery

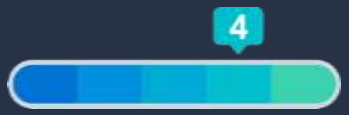
Scores:

Feasibility 4

The integration of modern drug development principles and technological advances makes the application of plant-based natural products feasible in the pharmaceutical sector.

4 Innovation

The review emphasizes the resurgence of interest in natural product drug discovery, driven by modern approaches, indicating a moderate level of disruptiveness in the field.



Technology 4

The use of modern approaches such as molecular modeling and high-throughput bioassays represents a relatively novel and disruptive application in natural product drug discovery.

4 Maturity

The modern approaches and technologies mentioned are mature and ready for application, with proven success in drug discovery research.

PUB - 2022

[A STRATEGY TO DISCOVER LEAD CHEMOME FROM TRADITIONAL CHINESE MEDICINES BASED ON NATURAL CHROMATOGRAM-EFFECT CORRELATION (NCEC) AND NATURAL STRUCTURE-EFFECT CORRELATION (NSEC): MAHONIA BEALEI AND MAHONIA FORTUNEI AS A CASE STUDY]

Unveiling Lead Chemome from Traditional Chinese Medicines

[China Pharmaceutical University]

[Liaoning University of Traditional Chinese Medicine]

Novel strategy introduces lead chemome concept for drug discovery, exemplified by Mahonia bealei and Mahonia fortunei. Utilizing natural chromatogram-effect correlation (NCEC) and natural structure-effect correlation (NSEC), the study identifies potent acetylcholinesterase (AchE) inhibitors and generates a lead chemome of 10 structurally related natural compounds. The lead chemome exhibits nanomolar IC50 values comparable to galantamine, providing valuable insights for drug design and structure optimization.

A strategy to discover lead chemome from traditional Chinese medicines based on natural chromatogram-effect correlation (NCEC) and natural structure-effect correlation (NSEC): Mahonia bealei and Mahonia fortunei as a case study

Sectors:

- NACE: C.21.20, C.21.30, C.21.90
- Pharmaceuticals
- Natural product drug discovery
- Traditional Chinese medicine

Benefits:

- Introduction of a novel lead chemome concept for drug discovery
- Identification of potent AchE inhibitors from traditional Chinese medicines
- Insights for drug design and structure optimization from lead chemome compounds

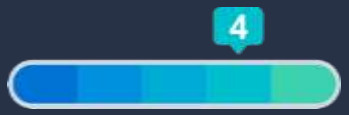
Scores:

Feasibility 4

The strategy can be applied to traditional Chinese medicines and potentially extended to other natural product sources for drug discovery.

4 Innovation

The concept of lead chemome introduces a new approach to drug discovery, offering a comprehensive starting point and direction for structure optimization.



Technology 3

The use of natural chromatogram-effect correlation and natural structure-effect correlation represents a novel approach, but the technologies involved are not highly disruptive.

4 Maturity

The strategy is based on established principles of natural product analysis and structure-activity relationship, indicating a mature foundation for application.

Records Summary (5)

Type	Year	Title	Abstract	Organizations
PUB	2022	An Overview of Potential Seaweed-Derived Bioactive Compounds for Pharmaceutical Applications	Seaweeds, rich in bioactive compounds, hold potential for drug development and industrial applications. Their unique properties, including antioxidant and antimicrobial activities, make them valuable for pharmaceutical and nutraceutical industries	- University of Coimbra
PUB	2022	Phytochemical Screening, Anti-Inflammatory, and Antidiabetic Activities of Different Extracts from Caralluma edulis Plant	The study extracted bioactive compounds from Caralluma edulis using different solvents and evaluated their anti-inflammatory and antioxidant activities. The methanol extract showed the highest bioactive content and potential for drug development	- Siedlce University Of Natural Sciences And Humanities - University of Veterinary and Animal Sciences - Medical University of Lublin - Islamia University of Bahawalpur
PUB	2022	Naturally Occurring O-Heterocycles as Anticancer Agents	The text discusses the significance of natural bioactive compounds, particularly O-heterocycles, in the development of anticancer drugs. It highlights the potential of these compounds derived from natural sources and emphasizes their	- The University of Nizwa - Martin Luther University of Halle Wittenberg
PUB	2022	Modern Approaches in the Discovery and Development of Plant-Based Natural Products and Their Analogues as Potential Therapeutic Agents	This text highlights the resurgence of natural product drug discovery due to technological advancements. It emphasizes the importance of plant-based natural products and discusses approaches for selection, extraction, and bioactivity-guided fractionation.	- Jazan University
PUB	2022	A strategy to discover lead chemome from traditional Chinese medicines based on natural chromatogram-effect correlation (NCEC) and natural structure-effect correlation (NSEC): Mahonia bealei and Mahonia fortunei as a case study	This study introduces the concept of lead chemome for drug discovery, using natural compounds from Mahonia bealei and Mahonia fortunei as examples. Through natural structure-effect correlation, a lead chemome	- China Pharmaceutical University - Liaoning University of Traditional Chinese Medicine

PUB - 2022

ANTIDIABETIC PHYTOCHEMICALS FROM MEDICINAL PLANTS: PROSPECTIVE CANDIDATES FOR NEW DRUG DISCOVERY AND DEVELOPMENT

Hunting for Antidiabetic Gold in Medicinal Plants

State University of Bangladesh

University of Dhaka

Fujian Agriculture and forestry University

+10 more

This review highlights the growing interest in medicinal plants as potential sources for novel antidiabetic drugs. It emphasizes the need for new drugs due to resistance and side effects of current treatments. The review presents promising phytochemicals and plant extracts with significant antidiabetic potential, offering a potential avenue for drug discovery and development.

Antidiabetic Phytochemicals From Medicinal Plants: Prospective Candidates for New Drug Discovery and Development

Sectors:

- NACE: C.21.20, C.10.30, C.21.10
- Pharmaceuticals
- Biotechnology
- Natural Products

Benefits:

- Potential for discovering new antidiabetic drugs with reduced side effects
- Exploration of natural sources for drug discovery
- Highlighting the importance of phytochemicals in drug development

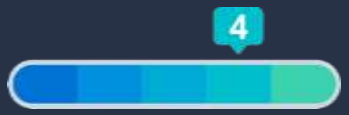
Scores:

Feasibility 3

The potential for discovering new antidiabetic drugs from medicinal plants is feasible, but it requires extensive research and validation in the pharmaceutical sector.

4 Innovation

The review presents a moderately disruptive approach by focusing on natural sources for drug discovery, challenging the dominance of synthetic antidiabetic drugs.



Technology 3

The use of phytochemicals from medicinal plants for drug discovery is a moderately disruptive concept, as it challenges the traditional reliance on synthetic compounds.

4 Maturity

The use of phytochemicals from medicinal plants for drug discovery is a mature concept, supported by extensive in vitro, in vivo, and clinical studies.

PUB - 2022

GREEN EXTRACTION OF BIOACTIVE COMPOUNDS FROM APPLE POMACE BY ULTRASOUND ASSISTED NATURAL DEEP EUTECTIC SOLVENT EXTRACTION: OPTIMISATION, COMPARISON AND BIOACTIVITY

Revolutionary Extraction Method Unlocks Apple Pomace's Hidden Treasures

Food Science and Technology

Sher-e-Kashmir University of Agricultural Sciences and Technology

Ultrasound-assisted extraction using natural deep eutectic solvents (NADES) offers a green and efficient method for extracting bioactive compounds from apple pomace. Optimized extraction parameters and HPLC analysis revealed quercetin as the main compound, showcasing the potential for high-value bioactive compound extraction from agricultural waste.

Green extraction of bioactive compounds from apple pomace by ultrasound assisted natural deep eutectic solvent extraction: Optimisation, comparison and bioactivity

Sectors:

- NACE: C.10.3, C.10.4, C.10.8
- Pharmaceuticals
- Nutraceuticals
- Waste management

Benefits:

- Green and sustainable extraction method
- High-value bioactive compound extraction from agricultural waste
- Potential for commercialization of bioactive compounds from apple pomace

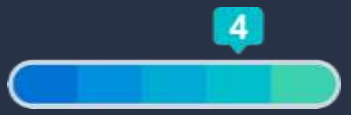
Scores:

Feasibility 4

The innovative extraction method can be feasibly implemented in the food and agricultural sector, offering a sustainable approach to obtaining bioactive compounds from apple pomace.

4 Innovation

The use of NADES coupled with ultrasound-assisted extraction presents a disruptive approach to traditional solvent-based extraction methods, offering higher efficiency and sustainability.



Technology 4

The utilization of NADES and ultrasound in extraction processes represents a novel and disruptive technology in the field of bioactive compound extraction from agricultural waste.

3 Maturity

While the technology is innovative, further validation and adoption in industrial-scale applications may be required to enhance maturity.

PUB - 2022

A BRIEF REVIEW OF PLANT CELL TRANSFECTION, GENE TRANSCRIPT EXPRESSION, AND GENOTYPIC INTEGRATION FOR ENHANCING COMPOUND PRODUCTION

Revolutionizing Plant Compound Production with Transfection

Jammu University

Central University of Himachal Pradesh

Biotechnological tools, including plant cell transfection and gene transcript expression, are revolutionizing the production of secondary metabolites in plants. Techniques such as CRISPR-Cas9 and stable transfection aim to enhance the production of bioactive compounds, offering potential for drug discovery and industrial applications.

A Brief Review of Plant Cell Transfection, Gene Transcript Expression, and Genotypic Integration for Enhancing Compound Production

Sectors:

- NACE: C.10.3, C.21.2, C.21.3
- Biotechnology
- Pharmaceuticals
- Natural Products

Benefits:

- Enhanced production of bioactive compounds in plants
- Potential for drug discovery and development
- Industrial applications in pharmaceuticals, food additives, and natural pesticides

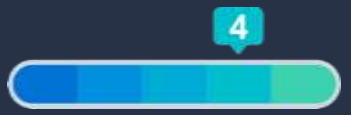
Scores:

Feasibility 4

The application of plant cell transfection and gene transcript expression is feasible in the biotechnology and pharmaceutical sectors, offering potential for enhanced compound production.

5 Innovation

The use of biotechnological tools for enhancing compound production represents a highly disruptive innovation, offering new avenues for drug discovery and industrial applications.



Technology 4

The use of techniques such as CRISPR-Cas9 and stable transfection represents a novel approach in the field of plant compound production, offering significant advancements.

3 Maturity

While some techniques are relatively mature, such as CRISPR-Cas9, others may require further development and optimization for widespread application in plant compound production.

Records Summary (6)

Type	Year	Title	Abstract	Organizations
PUB	2022	Antidiabetic Phytochemicals From Medicinal Plants: Prospective Candidates for New Drug Discovery and Development	This text discusses the need for novel antidiabetic drugs due to resistance and side effects of current medications. It highlights the potential of bioactive compounds from natural sources, particularly plants, for the development of	- State University of Bangladesh - Beijing Institute of Pharmacology and Toxicology - The University of Asia Pacific - University of Dhaka +8 more
PUB	2022	Green extraction of bioactive compounds from apple pomace by ultrasound assisted natural deep eutectic solvent extraction: Optimisation, comparison and bioactivity	Natural deep eutectic solvents (NADES) and ultrasound-assisted extraction (UAE) were studied for extracting bioactive compounds from apple pomace. Seven NADES were tested, with	- Sher-e-Kashmir University of Agricultural Sciences and Technology
PUB	2022	A Brief Review of Plant Cell Transfection, Gene Transcript Expression, and Genotypic Integration for Enhancing Compound Production	The text discusses the importance of secondary metabolites from plants and the use of biotechnological tools, such as plant cell transfection and CRISPR-Cas9, to enhance the production of bio	- Central University of Himachal Pradesh - Jammu University
PUB	2022	Withania somnifera (L) Dunal (Ashwagandha) for the possible therapeutics and clinical management of SARS-CoV-2 infection: Plant-based drug discovery and targeted therapy	The text discusses the potential use of bioactive compounds from the medicinal plant Withania somnifera (Ashwagandha) for managing and treating SARS-CoV-2 infection. It	- Jamia Millia Islamia University - Indian Institute of Technology Kharagpur - Manipal University India - Invertis University - H+ Technology +5 more

PUB - 2022

EXTRACTION OF BIOACTIVE COMPOUNDS FOR ANTIOXIDANT, ANTIMICROBIAL, AND ANTIDIABETIC APPLICATIONS

Exploring Plant Extracts for Health Benefits

King Faisal University

University of Gujrat

King Faisal Specialist Hospital And Research Center

Study investigates the potential of plant extracts from Citrullus colocynthis, Solanum nigrum, Solanum surattense, Calotropis procera, Agave americana, and Anagallis arvensis for antioxidant, antimicrobial, and antidiabetic properties. Ethanol/methanol extraction and GCMS/FTIR analysis revealed active compounds. The extracts exhibited significant -amylase inhibition (43-96%) and antioxidant activity (up to 78.1%), indicating their potential as natural sources for therapeutic agents and drug discovery.

Extraction of Bioactive Compounds for Antioxidant, Antimicrobial, and Antidiabetic Applications

Sectors:

- NACE: C.10.3, C.21.2, C.21.3
- Pharmaceuticals
- Natural health products
- Biotechnology

Benefits:

- Identification of potential natural sources for therapeutic agents
- Contribution to drug discovery and development of new products
- Insights into the bioactive potential of plant extracts for health applications

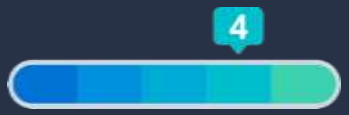
Scores:

Feasibility 4

The findings are applicable to the pharmaceutical and natural health product sectors, offering potential for the development of new products and therapies.

3 Innovation

The study presents novel findings on the bioactive properties of the plant extracts, contributing to the growing field of natural product-based therapeutics.



Technology 3

The use of GCMS and FTIR for compound analysis is established, but the application in the context of plant extracts for health benefits adds value to the existing knowledge.

4 Maturity

The use of plant extracts for health applications is a mature field, and the study provides valuable insights into the bioactive potential of the selected plants.

PUB - 2022

MODERN APPROACHES IN THE DISCOVERY AND DEVELOPMENT OF PLANT-BASED NATURAL PRODUCTS AND THEIR ANALOGUES AS POTENTIAL THERAPEUTIC AGENTS

Revolutionizing Drug Discovery with Plant-Based Natural Products

Jazan University

Substance Abuse

Toxicology Research

This review highlights the resurgence of interest in natural product drug discovery, particularly from plant sources, due to technological advancements. It provides an overview of modern approaches in the selection, extraction, biological screening, and analogue development of plant-based natural products, emphasizing the bioactivity-guided fractionation approach. The integration of interdisciplinary technological advances is deemed crucial for successful natural product development, with a focus on efficient selection methods, advanced extraction procedures, and high-throughput bioassays.

Modern Approaches in the Discovery and Development of Plant-Based Natural Products and Their Analogues as Potential Therapeutic Agents

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Pharmaceuticals
- Biotechnology
- Natural Products

Benefits:

- Revival of interest in natural product drug discovery
- Potential for developing new therapeutic drugs from plant-based sources
- Integration of modern approaches for efficient drug discovery

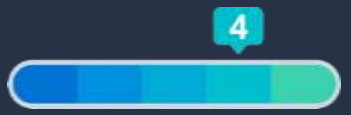
Scores:

Feasibility 4

The integration of modern drug-development principles and technological advances makes the application of plant-based natural products feasible in the pharmaceutical sector.

4 Innovation

The review emphasizes the resurgence of interest in natural product drug discovery, highlighting the potential for significant advancements in therapeutic drug development.



Technology 4

The integration of modern approaches such as molecular modeling and virtual screening in natural product drug discovery represents a disruptive advancement in the field.

4 Maturity

The modern approaches and technological advancements discussed in the review are mature and ready for application in natural product drug discovery.

PUB - 2021

GREEN AND SUSTAINABLE VALORIZATION OF BIOACTIVE PHENOLIC COMPOUNDS FROM PINUS BY-PRODUCTS

Unlocking Pine By-Products' Potential: Green Extraction of Bioactive Phenolic Compounds

University of Minho

Novel extraction methods utilizing green technologies enable the valorization of bioactive phenolic compounds from pine residues, offering diverse industrial applications. Pine extracts exhibit promising bioactivities, including anti-inflammatory, antimicrobial, and cardioprotective properties, positioning them for use in functional foods, pharmaceuticals, and cosmetics. The review emphasizes the circular economy perspective and the potential of pine by-products in contributing to sustainable industrial practices.

Green and Sustainable Valorization of Bioactive Phenolic Compounds from Pinus By-Products

Sectors:

- NACE: A.02.20, C.10.83, C.20.59
- Food additives
- Nutraceuticals
- Cosmetics

Benefits:

- Sustainable valorization of pine by-products
- Diverse industrial applications of bioactive compounds
- Contribution to circular economy and green chemistry principles

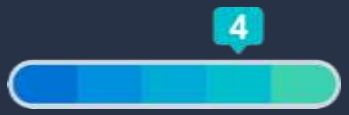
Scores:

Feasibility 4

The utilization of ecofriendly technologies for extracting bioactive compounds from pine by-products aligns with sustainable practices and can be feasibly implemented in the European bioenergy and bioproducts sector.

4 Innovation

The adoption of green extraction technologies represents a moderate level of disruptiveness, offering a more sustainable and efficient approach to obtaining bioactive compounds from pine residues.



Technology 4

The use of emerging green technologies such as ultrasounds, microwaves, and supercritical fluids presents a novel approach to extracting bioactive compounds, potentially revolutionizing the valorization of pine by-products.

3 Maturity

While the green extraction technologies are relatively mature, further research is needed to fully characterize the individual phenolic compounds in pine extracts and optimize their industrial applications.

PUB - 2021

COMBINATORIAL BIOSYNTHESIS OF SULFATED BENZENEDIOL LACTONES WITH A PHENOLIC SULFOTRANSFERASE FROM FUSARIUM GRAMINEARUM PH-1

Fungal Enzyme Unleashes Sulfated Benzenediol Lactones

University of Arizona

Chinese Academy of Agricultural Sciences

Xinjiang University

Discovery of FgSULT1, a phenolic sulfotransferase from Fusarium graminearum PH-1, enables the modification of benzenediol lactones and related compounds, enhancing their solubility and potential bioactivity. This opens avenues for the biosynthesis of bioactive sulfates and probes for mycotoxins, precarcinogenic toxins, and xenobiotics.

Combinatorial Biosynthesis of Sulfated Benzenediol Lactones with a Phenolic Sulfotransferase from Fusarium graminearum PH-1

Sectors:

- NACE: C.20.5, C.21.2, C.21.3
- Pharmaceuticals
- Agriculture
- Environmental monitoring

Benefits:

- Enhanced solubility and bioactivity of nutraceuticals and drugs
- Potential for drug discovery in human and veterinary medicine
- Applications in crop protection and environmental monitoring

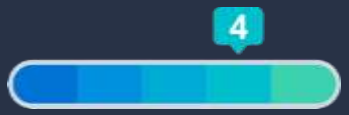
Scores:

Feasibility 4

The discovery of FgSULT1 provides a novel enzymatic platform for the biosynthesis of sulfated compounds, with potential applications in drug discovery, crop protection, and environmental monitoring.

4 Innovation

The discovery of FgSULT1 expands the known sulfotransferase superfamily to fungi, offering new opportunities for the biosynthesis of bioactive sulfates and probes for various applications.



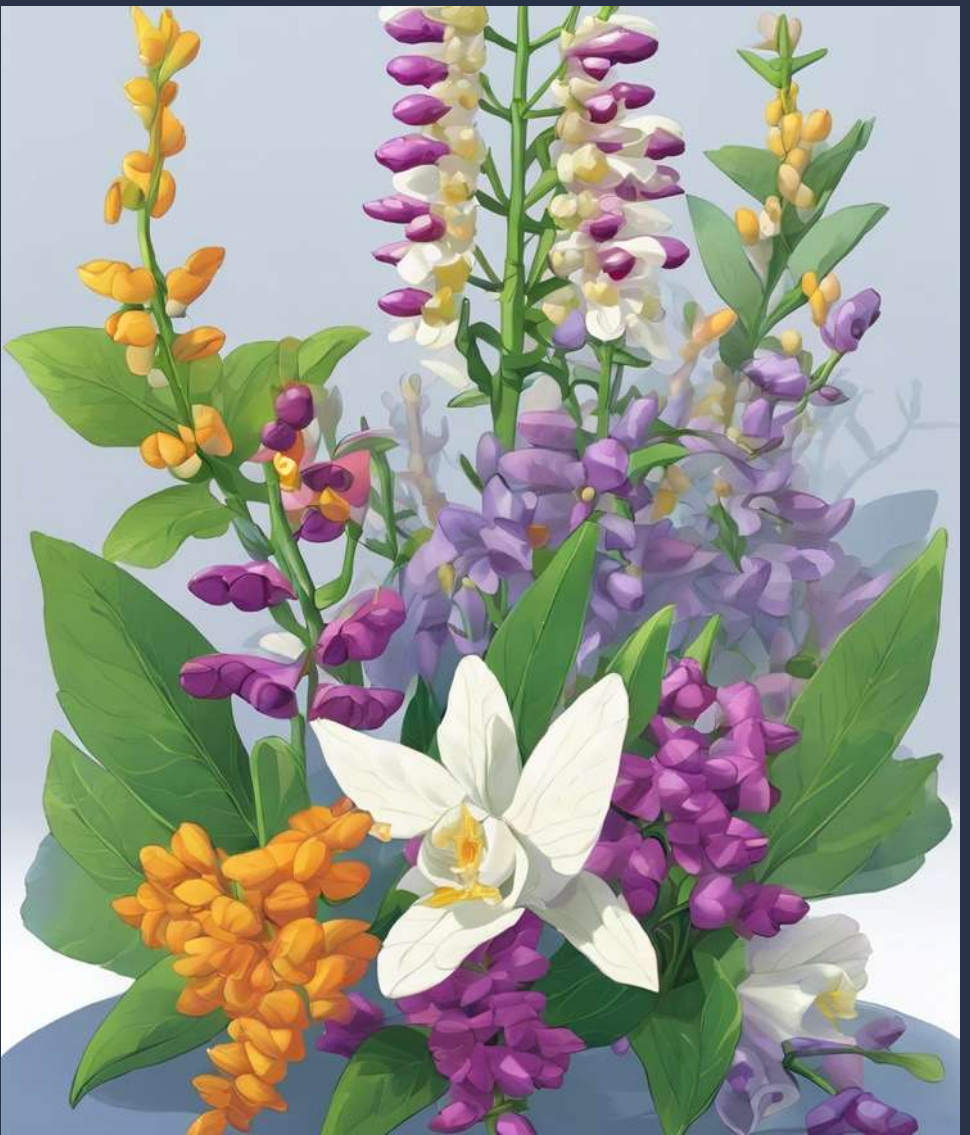
Technology 4

The utilization of FgSULT1 for biosynthesis of sulfated compounds represents a novel and potentially disruptive approach, offering new possibilities for drug discovery and environmental monitoring.

4 Maturity

The discovery and characterization of FgSULT1 demonstrate the maturity of the technology, providing a clear understanding of its structure and catalytic function.

PUB - 2021



RECENT RESEARCH PROGRESS ON NATURAL SMALL MOLECULE BIBENZYLS AND ITS DERIVATIVES IN DENDROBIUM SPECIES

Dendrobium Bibenzyls: Nature's Potential Therapeutic Powerhouse

University of Sichuan

University of Miami

University of Electronic Science and Technology of China

+2 more

Research on bibenzyls in Dendrobium species reveals 89 derivatives with diverse pharmaceutical activities, including anti-tumor, anti-diabetes, neuroprotective, antioxidant, anti-inflammatory, and antiplatelet aggregation effects. Compounds like moscatilin, gigantol, and chrysotoxine show promise as lead compounds, with potential for treating tumors, diabetes, Alzheimer's disease, and Parkinson's disease. The natural origin and wide availability of bibenzyls present significant development prospects for therapeutic applications.

Recent research progress on natural small molecule bibenzyls and its derivatives in Dendrobium species

Sectors:

- NACE: C.21.20, C.21.10, C.21.30
- Pharmaceuticals
- Biotechnology
- Natural Products

Benefits:

- Diverse pharmaceutical activities with potential for therapeutic applications
- Identification of lead compounds for further study and synthesis
- Wide availability and natural origin of bibenzyls present significant development prospects

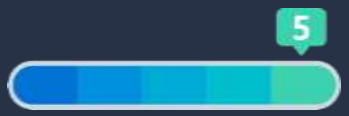
Scores:

Feasibility 5

The diverse pharmaceutical activities of bibenzyl derivatives in Dendrobium species present significant potential for application in the pharmaceutical and biotechnology sectors.

5 Innovation

The wide-ranging pharmaceutical activities of bibenzyl derivatives, along with the identification of lead compounds, demonstrate the disruptive potential of this natural small molecule in therapeutic development.



Technology 5

The natural origin and wide availability of bibenzyls, coupled with their diverse pharmaceutical activities, signify a disruptive potential in therapeutic development.

4 Maturity

The identified bibenzyl derivatives and their pharmaceutical activities demonstrate a high level of maturity in terms of potential therapeutic applications, with lead compounds already under further study and synthesis.

PUB - 2021

LACTIC ACID-BASED DEEP NATURAL EUTECTIC SOLVENTS FOR THE EXTRACTION OF BIOACTIVE METABOLITES OF HUMULUS LUPULUS L.: SUPRAMOLECULAR ORGANIZATION, PHYTOCHEMICAL PROFILING AND BIOLOGICAL ACTIVITY

Lactic Acid-Based Deep Eutectic Solvents for Enhanced Extraction of Bioactive Compounds from Hop

Marche Polytechnic University

National Institute of Nuclear Physics, Italy

University of Milan Bicocca

+1 more

Novel lactic acid-based deep eutectic solvents (LaDES) were developed to improve the extraction efficiency of bioactive compounds from hop cones. The study compared the phytochemical profiles and biological activities of LaDES extracts with those of a control extract, demonstrating superior extraction of hop bitter acids, non-phenolic pigments, and polyphenols. Additionally, the LaDES exhibited high antiradical potential and inhibited both Gram-positive and negative bacteria.

Lactic acid-based deep natural eutectic solvents for the extraction of bioactive metabolites of Humulus lupulus L.: Supramolecular organization, phytochemical profiling and biological activity

Sectors:

- NACE: C.20.4, C.10.8, C.21.2
- Pharmaceuticals
- Nutraceuticals
- Natural Products

Benefits:

- Enhanced extraction efficiency of bioactive compounds from natural sources
- Superior phytochemical profiles and biological activities of LaDES extracts
- Potential applications in pharmaceutical and nutraceutical industries

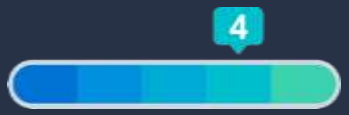
Scores:

Feasibility 4

The use of LaDES for enhanced extraction of bioactive compounds from natural sources can be feasible for the pharmaceutical, nutraceutical, and natural products industries.

3 Innovation

The use of LaDES for extraction is moderately disruptive, offering improved efficiency compared to traditional extraction methods.



Technology 3

The use of LaDES represents a moderate technological disruption in the field of natural product extraction, offering enhanced extraction capabilities.

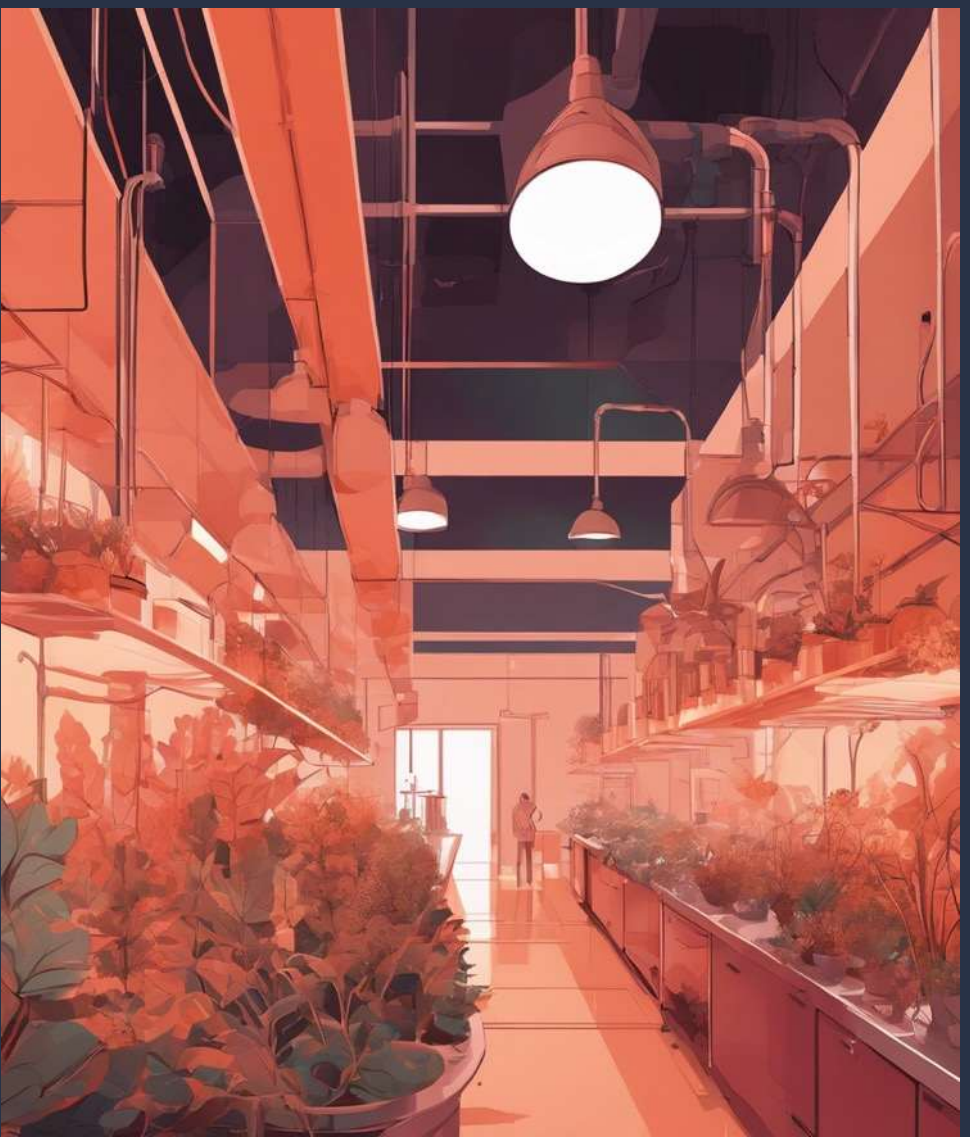
4 Maturity

The technology of using LaDES for extraction is mature and ready for implementation, with demonstrated efficacy in extracting bioactive compounds from natural sources.

Records Summary (7)

Type	Year	Title	Abstract	Organizations
PUB	2022	Extraction of Bioactive Compounds for Antioxidant, Antimicrobial, and Antidiabetic Applications	This study explores the potential of secondary metabolites from various plants for antioxidant, antibacterial, antifungal, and antidiabetic properties. The crude extracts were obtained through solvent extraction, and GCMS	- King Faisal Specialist Hospital And Research Center - King Faisal University - University of Gujrat
PUB	2022	Modern Approaches in the Discovery and Development of Plant-Based Natural Products and Their Analogues as Potential Therapeutic Agents	This review highlights the resurgence of natural product drug discovery, emphasizing the importance of plant-based compounds. It discusses modern approaches, such as bioactivity-guided fractionation, molecular modeling, and high-throughput	- Jazan University
PUB	2021	Green and Sustainable Valorization of Bioactive Phenolic Compounds from Pinus By-Products	The text discusses the potential of pine residues as a source of bioactive compounds for industrial applications. It highlights the use of eco-friendly technologies such as ultrasounds and supercritical fluids for extraction, emphasizing	- University of Minho
PUB	2021	Combinatorial Biosynthesis of Sulfated Benzenediol Lactones with a Phenolic Sulfotransferase from Fusarium graminearum PH-1	This text discusses the discovery of a phenolic sulfotransferase, FgSULT1, from the plant-pathogenic fungus Fusarium graminearum PH-1. The enzyme was	- University of Arizona - Chinese Academy of Agricultural Sciences - Xinjiang University
PUB	2021	Recent research progress on natural small molecule bibenzyls and its derivatives in Dendrobium species	The Dendrobium genus contains phenolic compounds with potential medical uses. 89 bibenzyl derivatives have been identified, showing pharmaceutical activity including anti-tumor, anti-diabetes, neuroprotective	- University of Sichuan - University of Miami - University of Electronic Science and Technology of China - Chengdu University of Traditional Chinese Medicine
PUB	2021	Lactic acid-based deep natural eutectic solvents for the extraction of bioactive metabolites of Humulus lupulus L.: Supramolecular organization, phytochemical profiling and biological activity	The study explores the use of natural deep eutectic solvents to enhance the extraction of bioactive compounds from hop cones. Lactic acid-based solvents showed promising extraction efficiency and phytochemical	- Marche Polytechnic University - National Institute of Nuclear Physics, Italy - University of Milan Bicocca

PUB - 2021



INFRARED ASSISTED EXTRACTION OF BIOACTIVE COMPOUNDS FROM PLANT MATERIALS: CURRENT RESEARCH AND FUTURE PROSPECT

Shining a Light on Infrared-Assisted Extraction

University of Sichuan

This review explores the potential of infrared-assisted extraction (IAE) for obtaining bioactive compounds from plant materials. It highlights IAE as a simple, rapid, and cost-effective technique with industrial-scale application potential. Future research should focus on energy consumption reduction, green chemistry extraction processes, simplified operation steps, intelligent extraction process, and the establishment of kinetic and thermodynamic models.

Infrared assisted extraction of bioactive compounds from plant materials: Current research and future prospect

Sectors:

- NACE: C.10.83, C.10.84
- Pharmaceuticals
- Natural products

Benefits:

- Simple, rapid, and cost-effective extraction technique
- Potential for industrial-scale application
- Future potential for energy-efficient and green chemistry processes

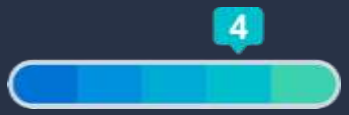
Scores:

Feasibility 4

The IAE technology can be feasibly implemented in the plant extraction industry due to its simplicity and cost-effectiveness.

3 Innovation

IAE presents moderate disruptiveness in the field of bioactive compound extraction, offering improvements in efficiency and scalability.



Technology 3

The use of IAE in plant material extraction represents a moderate technological disruption, offering potential advancements in extraction processes.

4 Maturity

IAE technology is mature and ready for industrial-scale application, with potential for further advancements in energy-efficient and green chemistry processes.

PUB - 2021

POTENTIAL ROLE OF IN VITRO-IN VIVO CORRELATIONS (IVIVC) FOR THE DEVELOPMENT OF PLANT-DERIVED ANTICANCER DRUGS

Unveiling the Power of IVIVC for Plant-Derived Anticancer Drugs

CSIR - Central Leather Research Institute

Plant-derived natural products and their analogs are a rich source of clinically useful anticancer agents. In vitro-in vivo correlations (IVIVC) play a crucial role in overcoming solubility, resistance, and metabolic limitations of these drugs, facilitating their development and enhancing product quality. IVIVC also reduces the need for human studies during pharmaceutical development, making it a valuable tool for dosage form development and pharmaceutical technology.

Potential Role of In Vitro-In Vivo Correlations (IVIVC) for the Development of Plant-Derived Anticancer Drugs

Sectors:

- NACE: C.21.20, C.21.30, C.21.10
- Pharmaceuticals
- Biotechnology
- Cancer research

Benefits:

- Enhanced drug development and product quality for plant-derived anticancer drugs
- Reduction in the need for human studies during pharmaceutical development
- Improved dosage form development and pharmaceutical technology

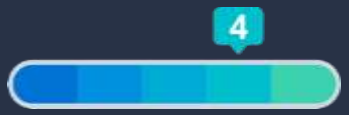
Scores:

Feasibility 4

The application of IVIVC in the development of plant-derived anticancer drugs is feasible, as it leverages established pharmaceutical technologies and can enhance the development and quality of these drugs.

3 Innovation

The use of IVIVC in the development of plant-derived anticancer drugs is moderately disruptive, as it introduces a valuable tool for enhancing drug development and reducing the need for human studies.



Technology 3

IVIVC is relatively novel in the context of plant-derived anticancer drugs and can bring advancements in drug development and quality enhancement.

4 Maturity

IVIVC is a mature technology and ready for use, with established applications in pharmaceutical technology and drug development.

PUB - 2021

BIOACTIVE C_(17) AND C_(18) ACETYLENIC OXYLIPINS FROM TERRESTRIAL PLANTS AS POTENTIAL LEAD COMPOUNDS FOR ANTICANCER DRUG DEVELOPMENT

Bioactive Acetylenic Oxylipins: Potential Anticancer Lead Compounds

University of Aalborg

C_(17) and C_(18) acetylenic oxylipins from terrestrial plants exhibit cytotoxic, anti-inflammatory, and potential anticancer properties. They induce cell cycle arrest and apoptosis in cancer cells, activate cytoprotective enzymes, and act as ligands for the nuclear receptor PPAR. These compounds show promise as lead compounds for anticancer drug development.

Bioactive C_(17) and C_(18) Acetylenic Oxylipins from Terrestrial Plants as Potential Lead Compounds for Anticancer Drug Development

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Pharmaceuticals
- Biotechnology
- Natural Products

Benefits:

- Potential for developing novel anticancer drugs
- Unique mechanisms of action for cancer treatment
- Exploration of natural compounds for pharmaceutical applications

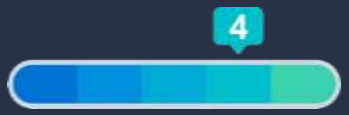
Scores:

Feasibility 3

The implementation of these compounds in anticancer drug development requires extensive research and clinical trials, but their potential as lead compounds is promising.

4 Innovation

The unique mechanisms of action and potential as lead compounds for anticancer drugs make these acetylenic oxylipins moderately disruptive in the field of cancer treatment.



Technology 3

The use of acetylenic oxylipins as lead compounds for anticancer drugs represents a novel approach, but further technological advancements may be needed for their full utilization.

4 Maturity

The cytotoxic, anti-inflammatory, and anticancer effects of these acetylenic oxylipins have been demonstrated, indicating a certain level of maturity in their potential as lead compounds for drug development.

PUB - 2021

ISOLATION OF BIOACTIVE COMPOUNDS FROM MEDICINAL PLANTS USED IN TRADITIONAL MEDICINE: RAUTANDIOL B, A POTENTIAL LEAD COMPOUND AGAINST PLASMODIUM FALCIPARUM

Unveiling Potential Lead Compound from Traditional Medicinal Plants

- National Science and Technology Development Agency
- University of Wollongong
- Vietnam Academy of Science and Technology

Study isolates bioactive compounds from Neorautanenia mitis, Hydnora abyssinica, and Senna surattensis, revealing Rautandiol B as a promising lead compound against Plasmodium falciparum. The compounds also exhibit inhibitory activities against Trypanosoma brucei rhodesiense, Mycobacterium tuberculosis, -amylase, and -glucosidase, with potential therapeutic implications for diabetes.

Isolation of bioactive compounds from medicinal plants used in traditional medicine: Rautandiol B, a potential lead compound against Plasmodium falciparum

Sectors:

- NACE: C.21.2, C.21.3, C.21.9
- Pharmaceuticals
- Natural Products
- Diabetes Therapeutics

Benefits:

- Identification of potential lead compound for anti-malarial drug development
- Insights into potential therapeutic applications for diabetes
- Advancement in natural product-based drug discovery

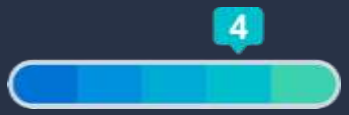
Scores:

Feasibility 3

The isolated compounds could be explored for drug development in the traditional medicine and pharmaceutical sectors.

4 Innovation

The identification of Rautandiol B as a potential lead compound against Plasmodium falciparum presents a significant advancement in the field of natural product-based drug discovery.



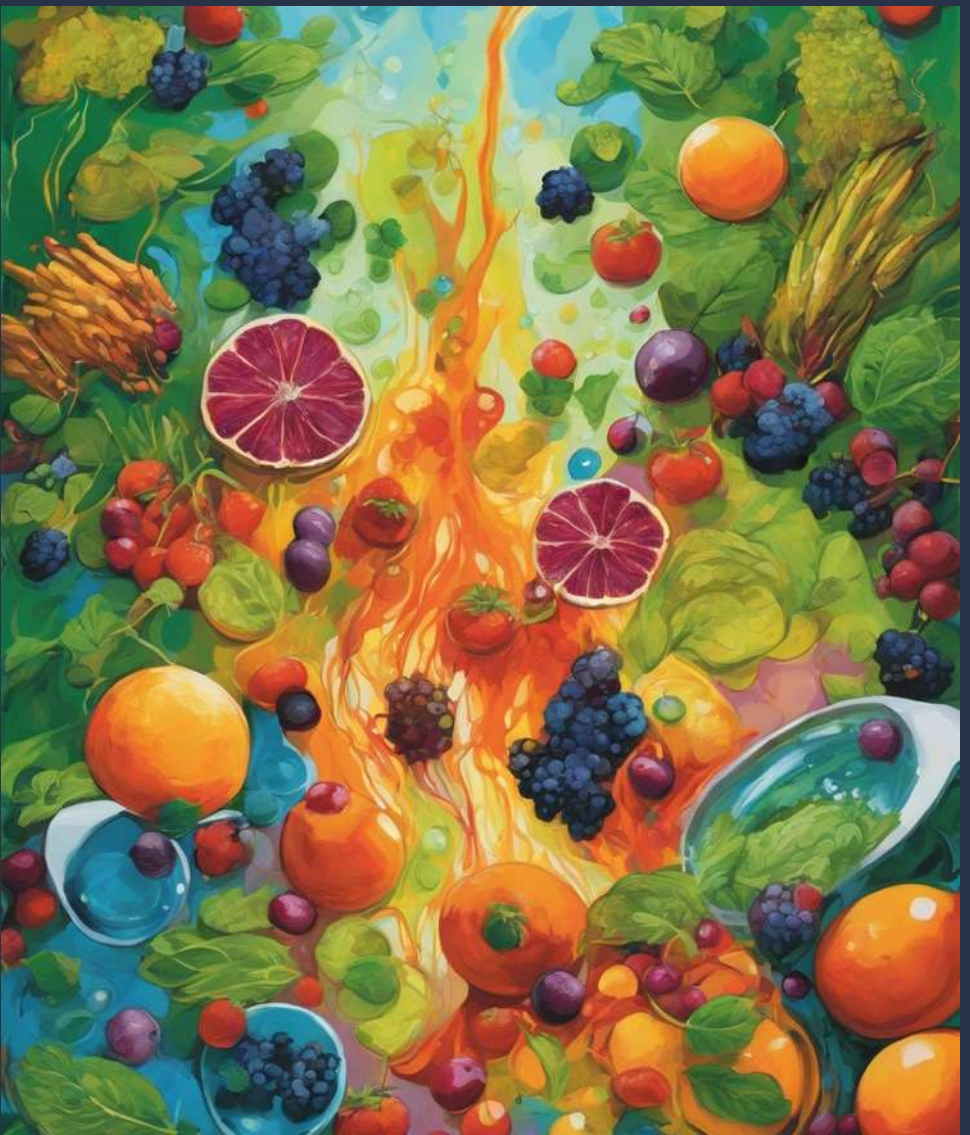
Technology 3

The use of traditional medicinal plants for drug discovery aligns with the growing interest in natural product-based therapeutics.

4 Maturity

The study demonstrates the maturity of the methods used for isolating and evaluating bioactive compounds from medicinal plants.

PUB - 2021



OVERVIEW OF NEOTERIC SOLVENTS AS EXTRACTANTS IN FOOD INDUSTRY: A FOCUS ON PHENOLIC COMPOUNDS SEPARATION FROM LIQUID STREAMS

Neoteric Solvents Revolutionize Phenolic Compounds Extraction

Technical University of Madrid

Neoteric solvents, including ionic liquids, eutectic solvents, and bio-based solvents, offer a greener and more efficient alternative to traditional solvents for extracting bioactive phenolic compounds from liquid agri-food waste streams. This innovation addresses the challenge of recovering valuable bioactive compounds from residual matrices, with potential applications in food, pharmaceutical, and cosmetic industries.

Overview of neoteric solvents as extractants in food industry: A focus on phenolic compounds separation from liquid streams

Sectors:

- NACE: C.10.3, C.11.0, C.20.5
- Pharmaceuticals
- Cosmetics
- Waste management

Benefits:

- Greener and more sustainable extraction of bioactive compounds
- Potential applications in food, pharmaceutical, and cosmetic industries
- Reduction of harmful environmental and health impacts from traditional solvents

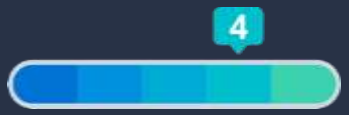
Scores:

Feasibility 4

The use of neoteric solvents for phenolic compounds extraction is feasible in the food industry, offering a greener and more efficient alternative to traditional methods.

4 Innovation

The use of neoteric solvents represents a moderately disruptive innovation, offering a more sustainable and eco-efficient approach to extracting bioactive compounds from liquid agri-food waste streams.



Technology 4

Neoteric solvents, such as ionic liquids and bio-based solvents, introduce novel and sustainable extraction techniques, revolutionizing the recovery of bioactive compounds from liquid agri-food matrices.

3 Maturity

While neoteric solvents are considered greener and more efficient, their widespread adoption and standardization in the food industry may require further development and validation.

PUB - 2021

ETHNOBOTANY AND THE ROLE OF PLANT NATURAL PRODUCTS IN ANTIBIOTIC DRUG DISCOVERY

Unveiling the Antibacterial Potential of Plant Natural Products

Emory University

This review emphasizes the potential of plant natural products (NPs) as a source of antibacterial lead compounds to address the antibiotic resistance crisis. It highlights the rich chemodiversity, global accessibility, and varied antibacterial modes of action of plant NPs. A systematic literature review from 2012 to 2019 identified 459 compounds, with phenolic derivatives comprising 50.8%, terpenoids 26.6%, alkaloids 5.7%, and other metabolites 17%. The review discusses 183 compounds in detail, covering their antibacterial activity, biosynthesis, structure-activity relationship, mechanism of action, and potential as antibiotics, while also addressing emerging trends in antibacterial drug discovery from plants.

Ethnobotany and the Role of Plant Natural Products in Antibiotic Drug Discovery

Sectors:

- NACE: C.21.20, C.21.30, C.21.40
- Pharmaceuticals
- Natural Products
- Biotechnology

Benefits:

- Rich source of potential antibacterial compounds for drug discovery
- Contribution to addressing the antibiotic resistance crisis
- Exploration of diverse antibacterial modes of action

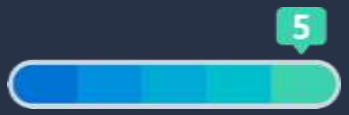
Scores:

Feasibility 5

The findings are highly feasible for the pharmaceutical and natural product industries, offering a rich source of potential antibacterial compounds for drug discovery.

4 Innovation

The review presents a comprehensive analysis of plant NPs with antibacterial activity, contributing to the innovative approach in antibiotic drug discovery.



Technology 3

While the technology of utilizing plant NPs is not entirely novel, the comprehensive analysis and emphasis on their antibacterial potential contribute to the field's advancement.

4 Maturity

The maturity of plant NPs as a source of antibacterial compounds is well-established, with proven clinical effectiveness and a rich history of use in traditional medicine.

PUB - 2021

GREEN NON-CONVENTIONAL TECHNIQUES FOR THE EXTRACTION OF POLYPHENOLS FROM AGRICULTURAL FOOD BY-PRODUCTS: A REVIEW

Revolutionizing Polyphenol Extraction from Agricultural By-Products

University of Milan Bicocca

Innovative extraction techniques like supercritical fluid extraction, pressurized liquid extraction, and ultrasound-assisted extraction offer sustainable and cost-effective methods for obtaining bioactive compounds, particularly polyphenols, from agricultural food by-products. These methods aim to reduce energy consumption, chemical wastes, and petroleum solvents, ensuring safe and high-quality final products for food and cosmetic formulations.

Green non-conventional techniques for the extraction of polyphenols from agricultural food by-products: A review

Sectors:

- NACE: C.10.8, C.20.5, C.20.6
- Cosmetics
- Pharmaceuticals
- Biotechnology

Benefits:

- Sustainable and cost-effective extraction of bioactive compounds
- Reduction in energy consumption and chemical wastes
- Enhanced safety and quality of final products

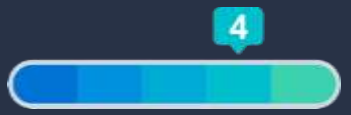
Scores:

Feasibility 4

The adoption of these extraction techniques is feasible in the food processing industry, offering a sustainable approach to obtain bioactive compounds from agricultural by-products.

4 Innovation

The innovative extraction techniques represent a significant advancement in the utilization of agricultural by-products, offering improved extraction yields and minimizing environmental impact.



Technology 4

The application of supercritical fluid extraction, pressurized liquid extraction, and ultrasound-assisted extraction in the food industry is relatively novel, offering a disruptive approach to obtaining bioactive compounds.

3 Maturity

While these techniques are innovative, they may require further refinement and optimization for widespread industrial adoption.

Records Summary (8)

Type	Year	Title	Abstract	Organizations
PUB	2021	Infrared assisted extraction of bioactive compounds from plant materials: Current research and future prospect	The article discusses the use of infrared assisted extraction (IAE) for obtaining bioactive compounds from plant materials. It highlights IAE's simplicity, rapidity, and cost-effectiveness for industrial-scale application	- University of Sichuan
PUB	2021	Potential Role of In Vitro-In Vivo Correlations (IVIVC) for the Development of Plant-Derived Anticancer Drugs	The text discusses the importance of plant-derived bioactive compounds in drug development, particularly for cancer treatment. It emphasizes the extraction and modification of natural compounds, as well as the role of In Vitro-In	- CSIR - Central Leather Research Institute
PUB	2021	Bioactive C_(17) and C_(18) Acetylenic Oxylipins from Terrestrial Plants as Potential Lead Compounds for Anticancer Drug Development	The text discusses the potential of bioactive C_(17) and C_(18) acetylenic oxylipins from terrestrial plants as lead compounds for anticancer drug development. These compounds have	- University of Aalborg
PUB	2021	Isolation of bioactive compounds from medicinal plants used in traditional medicine: Rautandiol B, a potential lead compound against Plasmodium falciparum	In this study, bioactive compounds from Neorautanenia mitis, Hydnora abyssinica, and Senna surattensis were isolated and evaluated for inhibitory activities against various pathogens	- National Science and Technology Development Agency - University of Wollongong - Vietnam Academy of Science and Technology
PUB	2021	Overview of neoteric solvents as extractants in food industry: A focus on phenolic compounds separation from liquid streams	Recent advances in the recovery of bioactive compounds from food industry waste, particularly plant-based phenolic metabolites, are crucial for applications in food, pharmaceutical, and cosmetic industries. The use of eco-efficient	- Technical University of Madrid
PUB	2021	Ethnobotany and the Role of Plant Natural Products in Antibiotic Drug Discovery	This review focuses on the potential of plant natural products (NPs) as a source of antibacterial lead compounds for drug discovery. It systematically highlights 459 compounds, with a focus on their growth inhib	- Emory University
PUB	2021	Green non-conventional techniques for the extraction of polyphenols from agricultural food by-products: A review	The text discusses the importance of extracting bioactive compounds from food by-products, particularly phenolics, for use in food and cosmetic products. It emphasizes the need for innovative, cost-effective, and environmentally friendly	- University of Milan Bicocca

Analytics for this Topic

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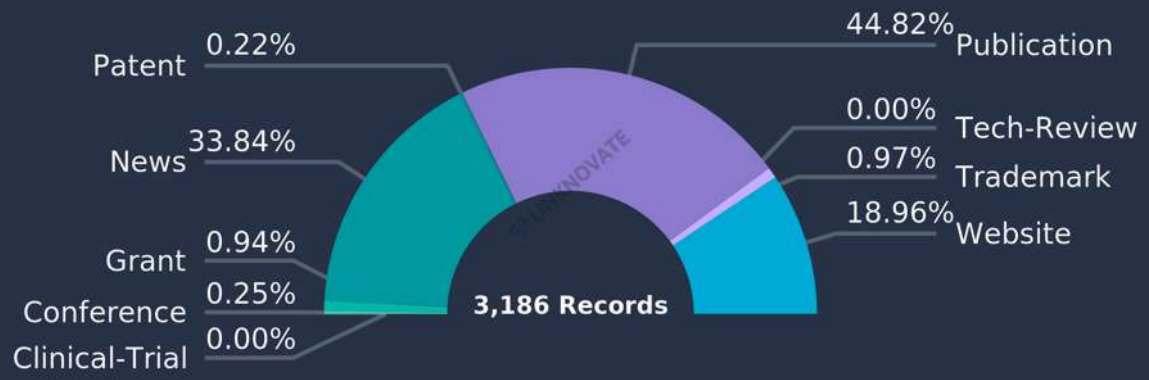
Topic Records - Evolution over Time

The table shows a significant increase in the number of records related to the query "Micro Molecule OR Micromolecule OR Small Molecule OR Bioactive Compound OR Lead Compound" AND "Development OR Production OR Manufacturing OR Creation OR Fabrication OR Purification OR Distillation OR Separation OR Extraction OR Obtaining OR Processing" AND "Natural Origin OR Plant OR Natural Base OR Vegetal Origin OR Vegetal Based" AND "New Drug OR Drug Design OR Drug Discovery OR Drug Development OR Drug Research OR Drug Industry OR Medical Use OR Medical Purpose" from 2010 to 2024. The number of records started at 49 in 2010 and steadily increased, reaching a peak of 696 in 2022 before declining to 606 in 2023 and dropping significantly to 12 in 2024. This suggests a period of intense interest and research followed by a sudden decrease in the following years.

Data Source Distribution

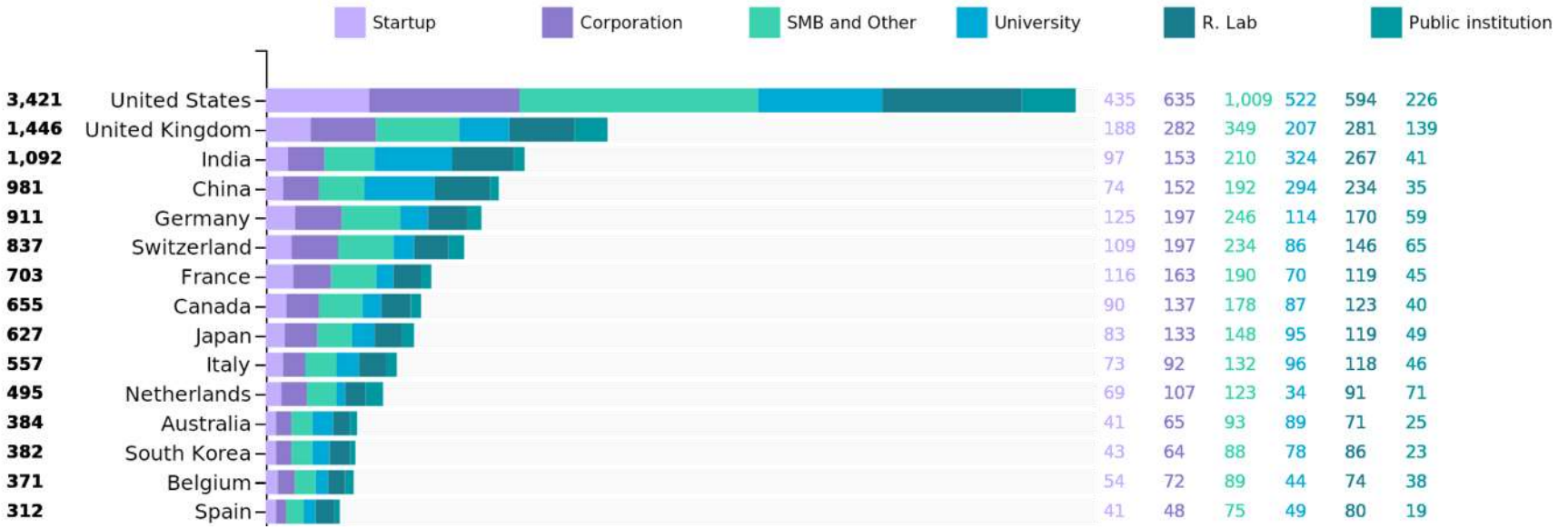


The query for (Micro Molecule OR Micromolecule OR Small Molecule OR Bioactive Compound OR Lead Compound) AND (Development OR Production OR Manufacturing OR Creation OR Fabrication OR Purification OR Distillation OR Separation OR Extraction OR Obtaining OR Processing) AND (Natural Origin OR Plant OR Natural Base OR Vegetal Origin OR Vegetal Based) AND (New Drug OR Drug Design OR Drug Discovery OR Drug Development OR Drug Research OR Drug Industry OR Medical Use OR Medical Purpose) yielded a total of 2,206 records between 2010 and 2024. The distribution of records per type is as follows: clinical trials (0), conference papers (8), grants (30), news articles (1078), patent applications (7), journal articles (1428), technology reviews (0), trademark applications (31), and web pages (604). This indicates a significant amount of information available in news articles and journal articles, with a notable number of web pages and grants as well.

Records per Organization Distribution

The chart shows the distribution of records per organization type for the specified query between 2010 and 2024. The data reveals that the majority of records are attributed to SMEs and other organizations, with a total of 1383 records. Following closely are universities with 1647 records and research labs with 1075 records. Corporations have contributed 775 records, while startups have 529 records. Public institutions have the lowest number of records at 230. This indicates a diverse range of organizations involved in activities related to micro and small molecules, bioactive compounds, drug development, and natural origins during the specified timeframe.

Records Per Entity Distribution Per Country



Looking at geographical activity, the United States and the United Kingdom are the countries with the largest number of entities active in new developments in this field, driven mainly by the high presence of private companies operating in the sector.

Conclusions

In the realm of natural product chemistry, innovative platforms for the purification and production of small molecules have emerged, promising significant advancements in drug discovery, food science, and various industrial applications. These platforms harness cutting-edge technologies to extract, purify, and synthesize small molecules from natural sources in a more efficient, sustainable, and cost-effective manner.

One pioneering approach involves the integration of advanced extraction techniques with novel separation methodologies. For instance, supercritical fluid extraction (SFE) and pressurized liquid extraction (PLE) offer rapid and selective extraction of bioactive compounds from natural matrices such as plants, herbs, and marine organisms. Coupled with high-resolution chromatography and membrane-based separation systems, these techniques enable the isolation and purification of small molecules with unparalleled precision and purity.

Furthermore, the advent of metabolic engineering and synthetic biology has revolutionized the production of natural products through microbial fermentation and cell-based biosynthesis. By genetically engineering microorganisms and cell cultures, researchers can optimize metabolic pathways to efficiently produce target molecules in large quantities. This approach not only circumvents the limitations of traditional extraction methods but also allows for the biosynthesis of rare or complex compounds that are challenging to obtain from natural sources.

In addition to traditional chemical and biological approaches, emerging technologies such as microfluidics and nanotechnology are pushing the boundaries of small molecule purification and production. Microfluidic systems enable precise control over reaction conditions and fluid dynamics, facilitating rapid and parallel synthesis of small molecules on a miniaturized scale. Likewise, nanomaterials and nanostructured membranes offer unique advantages in terms of selective adsorption, catalysis, and separation, enhancing the efficiency and sustainability of purification processes.

Moreover, the integration of artificial intelligence (AI) and machine learning algorithms is revolutionizing the design and optimization of small molecule production processes. By analyzing vast datasets on chemical structures, reaction kinetics, and experimental outcomes, AI-powered platforms can predict optimal reaction conditions, identify novel synthesis pathways, and accelerate the discovery of bioactive compounds from natural sources.

In conclusion, innovative platforms for the purification and production of small molecules from natural origin represent a paradigm shift in the field of natural product chemistry. By leveraging advanced technologies and interdisciplinary approaches, researchers are unlocking the vast potential of natural sources to develop new drugs, functional ingredients, and industrial chemicals that benefit human health and the environment.

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