Biotech 4Food

Co-funded by the European Union

Portfolio of innovation investment projects led by SMEs

Biotech 4Food

Notes

www.i4be.eu/biotech4food/

@Biotech4Food

Acceleration of new promising circular agri-food value chains and sustainable industrial interregional investments in SMEs, by integration of advanced biotechnology

Project mission

The Biotech4Food project aims to facilitate investment & innovation across new value chains at the nexus between biotechnologies and the agri-food & nutraceuticals industries, thanks to interregional collaborations.

1. **Access to experts through regional & EU activities**
2. **SME Project financing**
3. **Exploratory missions**

The project in a nutshell:

- Supporting SME/startup projects
- Accelerating the implementation of innovative technologies
- Strengthening collaboration between different players in Europe
- Facilitating public and private investment in SMEs
- Sharing the skills and know-how of local, regional and national companies in the application of biotechnologies in the agri-food and nutraceuticals industries
- Raising public authorities' awareness of the opportunities offered by the sector

Key outputs

- **11** Ingredients validated
- **29** Processes optimised and scaled-up
- **23** Formulations tested
- **13** Collaborations initiated
- **6** Initial sales identified

Find here our analysis of strengths, challenges and opportunities for microbial proteins, microalgae, and probiotic supplements

Target groups

- SMEs in the agri-food and nutraceuticals industries
- Companies offering biotechnology solutions
- Clusters, accelerators and other intermediaries
- RTOs, pilot facilities and other innovation facilitators
- Regional/national authorities, funding agencies, policy makers
- Financial players (banks, venture capital companies, investment funds, etc.)

The non-industrial partners of the Biotech4Food project

The consortium finds its origin in the existing Thematic Smart Specialisation Partnership *'Ingredients for the Bioeconomy'* (I4BE Partnership). The structure, framework and strategy of the I4BE partnership form the basis and starting point for the current project.

Discover the different regional innovation ecosystems involved in the project

Join our b2match platform to discover market opportunities, exclusive content, networking opportunities and more

The industrial partners of the Biotech4Food project groups

The Biotech4Food project mobilises 15 European agri-food SMEs to accelerate their investment in agrifood biotechnology. The project benefits from a total budget of €4.2 million, of which €2.03 million goes directly to the SMEs for their innovation projects.

Geographical coverage

Belgium

- Artechno
- Avecom
- Calidris Bio
- Superbiotics
- THT/Puratos

France

- ABYSS Ingredients
- BCF Life Sciences
- COCONT
- SADEF

Greece

- EVYP
- KOUKAKIS FARM
- Provil

Italy

- BUGSLAB

Spain

- Ingredalia
- Hifas Innovation Hub

Abyss Ingredients

Caudan, France

Natural Marine Ingredients, for health benefits, based on scientific and clinical studies

Company presentation

Abyss Ingredients was founded in 2004 on the initiative of Brittany's **fishing and fish processing professionnals** who aimed at **valuate marine by-products**. Our **R&D team** works together with **universities** and **CRO** on **innovation** and **new developments** to respond to the **growing demand of natural and sustainable healthy-aging solutions**. The efficacy of our ingredients is **scientifically proven**: we heavily invest in studies to bring to our clients full solution.

Key Figures

+20 years' experience

65% export sales

1/3 of our R&D workforce

13 published studies

AromaClean

Abyss Ingredients launched few years back the marine bioactive ingredients: **Cartidyss®**.
The typical "fishy" flavor (taste and smell) for our Cartidyss is **a barrier to our market**. Indeed, **competitive collagens are flavorless**.
Fish flavor for our Collagen is rather a "**No Go**" for cosmetic applications and cosmetic clients.
The objective of this project was to **evaluate and validate innovative biotech process from a technical and financial point of view**.

Key outputs

3 deodourisation processes tested

1 validated Adsorption resins

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Abyss Ingredients

Artechno
Gembloux, Belgium

High performance fermentation for circular food applications

Company presentation

Artechno is a **specialist in microbial solutions** developed from **fermentation of bacteria**, yeast and fungi. Supported by **more than 1,000 scientific papers**, eco-friendly solutions are proposed to our partners to meet the challenges of **healthy eating**, of finding **natural solutions in animal feed** and **plant nutrition**. Artechno's know-how is particularly developed in SPORE FORMING BACTERIA (mainly BACILLUS species).

Key Figures

Services in 5 continents

Eco-Friendly solutions

12 employees

+3 million turnover

Agroflowval & Porcbiota

During previous R&D&I projects (Agroflowva & Porcbiota), Artechno **optimized its fermentation culture conditions,** especially for spore-forming, aerobic and anaerobic germs, resistant to drying. The yields, especially in spores' production, had **considerably increased** and allowed commercialisation for **nutraceutical and food applications**, as well as **feed and agricultural usages.**

Within the B4Fproject, Artechno aimed to integrate this optimization in a **scale up installation** by recalculating the sparger, the gas flow, the compression and other physiological factors (influence of the CO2, the Oxygen concentration of the environment).

The biomass raw material used as microorganisms' culture media are **residues of the potato** processing industry (Lutosa) and constitutes therefore a perfect example of an **integrated circular economy** approach.

Key outputs

Fermentation scale-up optimization in a 8 000L fermenter

Reduced energy and water consumption

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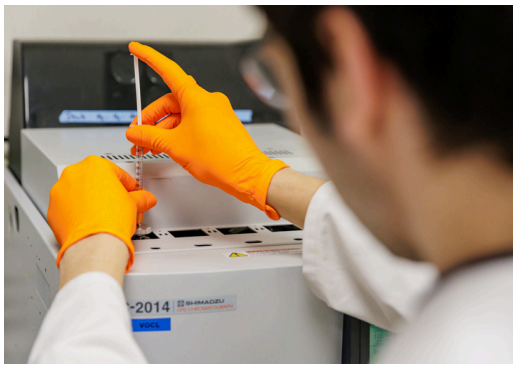
Avecom

Ghent, Belgium

Sustainable Solutions for Environmental Recovery and Side Stream Valorization

Company presentation

Avecom is a SME that emerged as a **spin-out company** from the **University of Ghent** (UGent). Avecom's specialization lies in the **fields of biodegradation**, **microbial fermentation** and the **engineering of microbial consortia**. These competences enable us to offer **sustainable and cost-effective solutions** for **environmental remediation** and **biomass fermentation**. Within their portfolio, Avecom has developed **diverse biomass fermentation platforms**, originating from byproducts generated by food, agro and other industries.



Key Figures

+20 years of experience	**1995** foundation	**1M €** turnover	**12** employees

ProMic from Apple Pomace

The project aimed to establish a robust, stable and cost-efficient **microbial protein production process** through biomass fermentation, **starting from residual materials derived from the fruit industry**, notably apple pomace. Various fermentation configurations were demonstrated and fine-tuned, including **batch** and **continuous systems**, in addition to exploring the **use of mono- and co-culture strategies**. This initiative was in alignment with the overarching goal of advancing sustainable protein production, primarily for use in animal feed and ultimately for human consumption, by valorizing a readily abundant byproduct that currently lacks efficient processing pathways.

The project's primary activities were **multifaceted** and **centered around advancing the production of SCP from apple pomace**, a residual byproduct from the fruit industry, over the course of one and a half years.

Key outputs

1 validated microbial protein powder

1 validated process
Scaled at 30 L

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Avecom

BCF Life Sciences

Pleucadeuc, France

From circular economy to proven performance

Specialist in the extraction of free amino acids

Company presentation

BCF Life Sciences specialises in the **extraction of natural amino acids** (L-Cystine and L-Tyrosine) **and their derivatives** (Carbocisteine, etc.) of 100 % traced origin for the pharmaceutical and health care industries. BCF Life Sciences products are marketed by the **leading names** in the fields of **pharmaceuticals**, **food supplements** (nutraceuticals) and **baby foods**. BCF Life Sciences also develops and markets a range of **highly soluble and highly bioavailable free amino acid mixes** with very low molecular weight.

Key Figures

38.2 million € in 2018

185 employees

64 % of sales made overseas

2 sales offices in Thailand & Colombia

Automating amino acid production for greater efficiency

The investment project consisted of **securing and increasing amino acid extraction capacity** in order to **meet the sustained demand** of BCF's customers, via the automation and modernization of part of the equipment, making it possible to carry out a key to the extraction process (spinning).

This investment was also part of a **quality dimension**, given the markets in which BCF Life Sciences operates, particularly in human health (child and medical nutrition, pharmaceuticals, food supplements).

The project was axpexted to contribute to a production increase objective lying between +3 and +5%,

particularly due to :

- Automatic dismantling;
- Automated spin recipes;
- Increased spin capacity;
- Remote production monitoring.

Key outputs

3 production steps fully implemented and validated

Improved remote production monitoring

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BCF Life Sciences

Bugslab

Parma, Italy

Multi-enzymatic treatment of insect flour

Company presentation

BUGSLAB SOC AGRICOLA SRL is an Italian start-up specialised in the production of **insects** (currently crickets and locusts) **and insect based products** (dried crickets and cricket flour). Bugslab's products are currently mostly used in the **pet food industry** and also starting to be used in the feed and food industries as legislation has evolved to open these new markets. Bugslab also develops **insect rearing technology** and industrial processes to continuously improve the efficiency of its production.

Key Figures

3 Ton of insects per month

Largest cricket producer in Italy

Most sustainable protein

Lower risk of Spillover

Insect Flour

Various insects have emerged as **novel food** or feed resources (for fish, poultry and pigs) due to their **economical**, **eco-friendly**, and **nutritive** characteristics. However, several studies on livestock have shown a reduced apparent digestibility coefficient when insects were supplied as a replacement for commercial meals related to chitin. In addition, when approved as novel food, some issues arose with the **safety of insects**, especially as **allergens**. As a consequence, novel processing techniques are required to reduce the allergic potential of insect proteins, improve the digestibility and the biofunctional properties of insect meal.

The project developed a biotechnological and sustainable protocol based on **enzymes** to deliver **insect flour containing protein and chitin** hydrolysed in oligopeptides and chitooligosaccharides respectively, to improve digestibility, prebiotic potential and reduce allergenicity, delivering healthier insect based ingredients for food and feed applications, stimulating sustainable food consumption.

Key outputs

Process scale-up optimisation to 10L

Increased protein deigestibility from 59% to 68%

CRICKETS FLOUR

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Calidris

Antwerpen, Belgium

Calidris Bio

Sustainable protein to feed a growing population

Company presentation

Calidris Bio is a **biotechnology company** who developed the **fermentative production of Microbial Protein** (MP) by bacteria utilizing renewable resources. Calidris Bio's first product is a **high-protein ingredient** for use in **food and premium feed**. Calidris Bio stands out from other microbial protein producers in that the product is **highly nutritious** (>72% protein with a high concentration of essential amino acids), and that the production process is **independent of agricultural resources** since CO2-derived renewables are used as a feedstock.

Key Figures

> 80%
Crude protein

Rich in essential amino acids

> 90%
Digestibility

Produced at ton-scale

Advancing efficient and scalable microbial protein production

The project aimed to **improve the overall yield** of the **first industrial production** runs of Calidris Bio's alternative microbial protein.
Calidris Bio utilizes **CO2-derived renewables** as carbon source for a methylotrophic bacterium in a fermentative process to produce Microbial Protein (MP), a **next-generation alternative protein** source that can be produced **completely independent of modern agricultural techniques**.

Expected results:

- Improved substrate to **protein rich biomass conversion rate** to at least 80% of the theoretical maximum value;
- Improve the **metabolic shift** towards protein rich biomass and decrease product loss during downstream processing;

Key outputs

> 40% Improved productivity

80%
Protein recovery

-55%
In production cast

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Calidris Bio

Cocont

Clermont-Ferrand, France

Sustainable plant-based food that promotes local agricultural sectors

Company presentation

COCONT's aim is to make **better use of local agricultural sectors** to develop **new fermented plant-based foods** that meet the challenges of food and nutrition, while having a **positive impact on health and the environment**. The company is committed to **ensuring France's food sovereignty**, and has positioned itself as part of a process of reindustrialisation through a low-carbon industry. To ensure COCONT's rapid development as a specialist in the manufacture of fermented plant-based alternatives, we need to **finalise the development** of these **bioprocesses** on an **industrial scale**.

Key Figures

1 Million invested in innovation

Re-industrialisation of France

Food sovereignty and decarbonisation of industry

Support from **idea to manufacturing**

Nutriferments Industry

Nutriferments Industry's main objective was to **develop tempeh-type**, **soya-free** finished products with a variety of plant protein sources (cereals and legumes) and in various forms on an industrial scale.

For COCONT, this project represented an opportunity to diversify its offering, **increase its annual sales** by €1.5 million and create four full-time jobs by 2026.

Key outputs

3 Finished products validated : Red and white quinoa; green lentils and einkorn; and chickpeas and barley

Reduced fermentation time

Increased batch size (300L)

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EVYP
Thessaloniki, Greece

EVYP Crop Biostimulation Technologies

Biotechnological transformation of plant-based proteins for poultry feed

Company presentation

EVYP L.L.P. is an innovative Greek company, specialized in the production of exclusively **plant origin non-GMO hydrolyzed proteins** and amino acids for agricultural use. Its primary focus is in the production and marketing of **Food Insect Attractants and Biostimulants.**

Key Figures

6 decades expertise

High quality operation

Awared innovative orientation

Carbon neutral objective

Amino4Food : Biotechnological transformation of plant-based proteins for poultry feed

Livestock production significantly contributes to the agrifood sector. Concerns on **resource availability, animal health, productivity, and environmental impact** are of major importance.
Innovative livestock **feed solutions** can help improve feed quality and feed-to-weight ratio, hence addressing such concerns.

The project focused on the use of **plant derived amino acids** in chicken diet to improve their well-being and performances.
The project adapted procedures for agricultural biostimulant production through hydrolysis fo feed uses. It assessed its impact on growth and quality of the final product.

Key outputs

2 formulations selected for broilor chickens

Increased peromance and meat quality

Positive effect on gut microbiome

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Hifas Innovation Hub

Pontevedra, Spain

Scaling up production of mushroom-Foods for Special Medical Purposes (FSMPs)

Company presentation

Internal Venture Builder of Hifas da Terra Group specialized in **entrepreneurship and innovation around mycology**. With an agile structure, market focus, talent at all levels (founders, employees and investors), strategic capital, knowledge and the necessary experience to **turn an innovative idea into a high impact business**. It is part of a group with **more than 20 years** of research on functional fungi.

Key Figures

+25 years expertise

Disruptive fungi-based innovation for healthcare

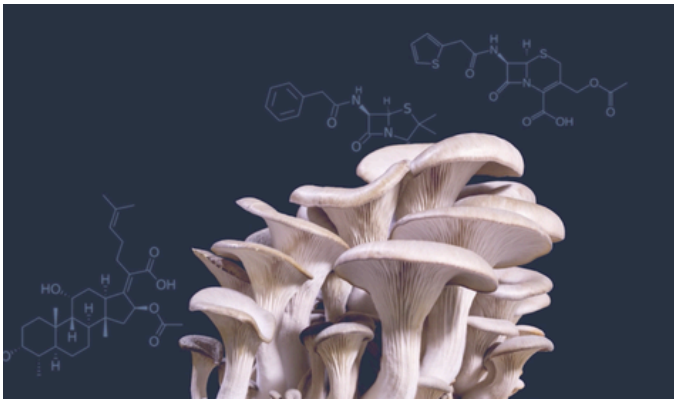
Novel drugs from fungi

Patented Technology

Mushroom-Foods for Special Medical Purposes (FSMPs)

Hifas Innovation Hub is interested in scaling the production of a foods for **special medical uses** for cancer patients at risk of malnutrition that incorporates **Hericium erinaceus mycelial** extract rich in beta-glucans to improve functionality at the immune level.

Hifas has developed a new process for the production of fungal ingredients through fermentation in a liquid medium that reduces waste, pollution, material consumption, energy use and increases functionality.



Key outputs

Functional ingredient upscaled to 100L

2 Validated FSMP formulations

High beta-glucan level

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Hifas Biologics

Ingredalia

Milagro, Spain

Enzyme assisted extraction of bioactive compound from vegetal by product

Company presentation

INGREDALIA S.L. is an innovative **technology-based** company located in Milagro (Navarra) whose business model is rooted in the **revalorization** of vegetal by-products It was set up in 2017 to develop and commercialise **natural functional ingredients**, made from vegetable by-products originated by agri-food companies, mainly from the canned and frozen food sector.

Key Figures

Circular Economy principle

Patented technology

Sustainability as their DNA

Real-time monitoring

ByEnzime : Enzyme assisted extraction of bioactive compound from vegetal byproducts

The current methodology to obtain high-added-value compounds from vegetal by-products is highly dependent on the use of **organic solvents**. The use of those chemicals **compromises the environmental** impact of by-product revalorization.

Ingredalia aimed to use **enzyme mixes to pre-treat the raw material**, liberating the cell's compounds otherwise extracted by the solubilization with ethanol, acetone or other solvents.

At the same time, the filtration process was improved by using micro membranes.

This equipment is highly reusable and avoids the utilization of single-use filters (used so far). Furthermore, it increases the extraction's **purity and yield**. while facilitating **enzyme recovery**, increasing the number of cycles in which they can be used.

Key outputs

Reduced enzyme dosage

Improved polyphenol extraction

Improved antioxidant capacity

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Koukakis Farm

Thessaloniki, Greece

Further development & launch of the My VeFir vegan product line

Company presentation

Koukakis Farm is one of the **strongest milk and yoghurt manufacturers** in Greece. The factory is located at Kilkis, in a completely **natural environment**.
The company produces **premium products** made exclusively from top quality fresh milk & ingredients.

Key Figures

CRYSTAL Taste Awards 2023-2024

No1 in KEFIR in Greece

Exports + 26 countries

41M € turnover

Superior Taste Awards

My VeFir

'My VeFir' is a series of **ready-to-drink** beverages from **plant-based** raw materials, offering an alternative for kefir. It will be a **fermentation based** product with special aromas and flavours aiming to cover the needs of different consumer segments. **My VeFir**, a brand name based on the contraction of **vegan** and **kefir**, will target the **average** consumer but also those who follow a **vegetarian** or **vegan** lifestyle, and consumers with **lactose intolerance** or allergic for animal proteins.
Within the project, fermentation was explored and tested, to obtain a superior taste, texture, mouthfeel, and aromas.

Additionally, by using probiotic bacteria, the product was expected to benefit the digestive system and reinforce the immune system.

Key outputs

2 main plant bases assessed
Oat selected as prefered base

Better stability and shelf life

Overall better sensory and functonal properties

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PROVIL
Thessaloniki, Greece

Microalgae derived EPS as a sustainable food additive

Company presentation

PROVIL SA is a Greek company that produces i**ngredients and supplements** for the food industry, mass catering, gastronomy and for meat retail business. For more than **25 years**, PROVIL has been the trusted partner of both food production companies and professionals of gastronomy and organized catering in Greece and abroad, with our name being synonymous to **know-how, quality**, continuous **development** and **reliability**.

Key Figures

+25 years expertise	**Trusted partner** for companies	**Inspire** nutrition	**25 tons/day** capacity

AlgaeEPS4Food

One of the most crucial concern facing the food industry is the search of new **alternative ingredients** sources that both pandemic and energy crisis periods highlighted significantly.
The project focused on the use of **EPS derived from microalgae**, cultivated with cheese whey, as a sustainable food additive for replacement the existing ingredients.
The project implementation provided the company the opportunity to **explore, test and use** new local sources by utilizing biotechnology.

Key outputs

1
Optimised cultivation and extraction protocal with whey subtrate.

3
Validated applications as structural ingredients in sauces, light mayonnaise and marinades

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SADEF

Aspach-le-Bas, France

A fermented ingredient to replace preservation additives for fresh-cut fruit and vegetables

Company presentation

Heir to **more than 70 years** of know-how in agronomy, SADEF is now a **reference laboratory for the analysis of agri-environmental expertise**. To strengthen its research and innovation capacities, SADEF integrated in October of 2024 **senior R&D experts** from an **agri-food R&D company** with solid expertise in **biotechnology applied to the food sector**.

Key Figures

Newly integrated agrifood branch

Sustainable solutions from farm to fork

Multi-accredited laboratory

70+ years of expertise

Veg'Guard 2.0

Designing healthier, more sustainable, and consumer-friendly processed food products or ingredients is **a challenge for the food industry**. One path of innovation to **create foods** that meet both **sustainability goals** and **consumers' expectations** for "naturalness and health" is to reconsider food preservatives.

SADEF's newly acquired agrifood branch is **developing a preservative fermented ingredient**. To start, two types of applications were targeted:

- Pre-cut fruit and vegetables
- Ready-to-eat salads

The project had **two main objectives**:

- **To extend the shelf-life of products**
- **To replace additive preservatives** such as potassium sorbate and benzoate, whilst attaining the same level of efficiency.

After finetuning the fermented preservative ingredient, SADEF's agrifood R&D team developed a range of fermented ingredients for different food matrices, testing its production at both pilot and industrial scale.

Once validated at production scale, a **commercial strategy and industrial partnerships** was be developed for the ingredient's launch.

Key outputs

2
Validated natural preservatives

2
Formulation routes established

Performance comparable to potassium sorbate

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SADEF – Nutrition Hub

Superbiotics

Gembloux, Belgium

Development of innovative solutions for everyone's well-being

Company presentation

Founded in 2019 on the expertise of Vésale Pharma, Superbiotics' mission is to **develop innovative technologies** and **produce and formulate microbiotic solutions** comprising live probiotic strains. The company also aims to **valorize and patent processes or strains** that have demonstrated a **significant impact** on **human** and **animal health**. The identification of new physiological functionalities will enable the formulation of **high value-added compounds**.

Key Figures

Global presence

+2500 kg
Strains Each year

Intelicaps®
micro-encapsulation technology

2019
creation of the company

Scaling-up & market access for food supplements

Superbiotics faces **2 major challenges** for marketing its products: the **long-term preservation of the functional capabilities of probiotics** and the **need for objective demonstration of the positive impact of probiotics on human health**.
The project aimed to:

- **Replace freeze-drying** by low-energy and low temperature drying methods at industrial scale;
- **Increase the productivity** (about 10-15%) and the yield of the manufacturing process of the Intelicaps® encapsulated probiotic;
- **Extend the stability and thus the shelf-life** of our existing and new finished products;
- **Register new products** according to regulatory requirements.

Key outputs

2
Fully operational fluid-bed drying equipment

10%
Higher yield

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THT
Namur, Belgium

Biotechnological valorisation of probiotic byproducts

Company presentation

THT is a biotech company active in the production of **biotics via fermentation** for the food supplements (probiotics, postbiotics) and food (fermentation starters) markets. THT is particularly expert in the **selection and production** of **lactic acid bacteria**. THT differentiates from its competitors by the **diversity** of its various offer and its **ability to adapt** to customer demand. THT is part of the **Puratos Group**.

Key Figures

Diversity offer

+30 years expertise

High adaptation ability

30 different strains produced

Surnabio : Turning fermentation supernatants into new functional products

The **fermentation** processes implemented at THT generate **2 products** : **bacterial biomass** which is used to make finished products (probiotics and starters) and **supernatants**.
These supernatants are known to have potential **health benefits** depending on their chemical composition. They are not valued for now and are considered like a waste.
Therefore, the aim of the project was to use biotechnology processes and adapt fermentation technologies to produce bacterial biomass but also to obtain valuable supernatants that could become new ingredients for food and health applications or even for other applications like chemistry and feed. These innovations will allow THT to evolve to a more circular and resilient economy.

Key outputs

8 Health-related metabolites identified

9 New documented formulations launched

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Any question ? Reach out

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