

An ideal synergy

The unique composition of both polar lipids and fatty acids in milk polar lipids create an almost ideal synergy between technology and physiology.

What does that mean?

Milk polar lipids in general have an impressive effect on digestive health which means they protect both stomach and intestinal mucosa against the attack of aggressive substances like non-steroidal anti-inflammatory drugs (NSAIDs) as for example aspirin and indomethacin. They also protect the intestine against pathogenic bacteria, preventing diarrhea and other digestive problems.

In discussion is the curative effect of sphingolipids (and milk phospholipids in general) on inflammatory bowel disease (e.g. Crohn's disease).

Milk Phospholipids in Infant Formula

It is beyond any doubt that human milk is the optimal diet for infants. Breast milk provides all nutrients that are essential for the proper development of babies. Therefore, human milk composition is the golden standard for the development of artificial infant formula products. It is common sense amongst pediatricians that the lipid composition of formula products is of great importance for visual acuity, cognitive performance, proper growth and the development of the immune system.

30 years ago artificial milk substitutes were exclusively based on cows or soya milk devoid of several minor, but very important compounds found in human milk. The new area of modern infant formula started with the inclusion of egg phospholipids carrying long chain, polyunsaturated fatty acids (LC-PUFA) like arachidonic (ARA) and docosahexaenoic acid (DHA). Only recently it has been recognized that not only LC-PUFA are of crucial importance for the proper development of newborn babies but also the inclusion of sphingolipids, especially

sphingomyelin, ceramides and – of special importance – gangliosides. Sphingomyelin plays an important role in neonatal gut maturation and protection and contributes to the myelination of the developing central nervous system.. SPM metabolites protect the newborn digestive tract against pathogenic bacteria preventing severe diarrhea and potentially even necrotic enterocolitis. For the roles of ceramides and gangliosides see above.

The newly developed concentrates of milk polar lipids are therefore valuable sources for these substances and are indispensable ingredients for modern, scientifically based human milk substitutes.

Milk phospholipids in functional foods

There are several factors making milk phospholipids attractive for the formulation of functional foods (not to forget infant formula) – besides their widespread nutritional benefits:

- Stable against oxidation
- Bland milk taste
- Easily dispersible (as 20 % concentrate on milk carrier)

Added value – The Technological Advantages

In addition to the nutritional benefits, LIPAMIN M 20 offers technological advantages for the formulation of infant- and functional food such as oxidation stability, milky taste and good emulsifying properties.

Milk Phospholipids are suited for use in infant formula, follow-on-formula, nutritional products or dietary supplement and dermatological applications.

LIPAMIN M20 is no subject to Novel Food-Regulation as it is lecithin on a milk based carrier.

There are several reasons for the development of gastrointestinal discomfort, like daily stress, food sensitivity and allergies, genetic predisposition, altered gut flora or deregulation of brain-gut cross-talk.[2] Physiologically, the discomfort is mainly caused by ileum contractions which lead to altered intestinal mobility and symptoms such as cramps, bloating and rumbling. There is a demand for gut health ingredients that are able to balance these ileum contractions and to adjust the functionality back to a physiological level.

Benegut® is a new, natural, IP protected gut health ingredient. It combines prokinetic and antispasmodic activity with anti-inflammatory efficacy, leading to an immediately perceptible improvement of gastrointestinal discomfort.

Traditional food use and Efficacy

Benegut® is a *Perilla frutescens* (L.) leaf extract. *Perilla frutescens* (L.) is an annual edible herbaceous plant native to Asia. Common names are Shiso, Japanese Melisse or Japanese Basil. *Perilla* belongs to the mint family, Lamiaceae. The green *Perilla* leaves are used as tea, food or spice. Traditional medical applications are all linked to infections of the respiratory tract or the immune system [3]. Little is known about the phytochemical composition of *Perilla* leaves. Many studies focus on rosmarinic acid and/or luteolin as key ingredients responsible for antioxidative, anti-inflammatory and anti-allergic effects. [4, 5] Recent phytochemical investigation of *Perilla* leaves, lead to the discovery of a novel compound, Vicenin 2, not described as constituent for *Perilla* leaves before. Furthermore, novel potential biological activity was elucidated for Vicenin 2. Based on these investigations a *Perilla* leaf special extract, Benegut®, was developed.

This extract demonstrated in in vitro, ex vivo and in human studies beneficial effects for gut health. An ex vivo study explored the beneficial antispasmodic effects of *Perilla* leaf special extract for gut health in comparison with isolated Vicenin 2. The antispasmodic effect was investigated using an isolated adult male Wistar rat's ileum contraction. The contractions were triggered by two different substances: acetylcholine was used to represent a neurotropic effect comparable to a stress induced spasm; barium was used to mimic a musculotropic effect, representing contractions triggered by food allergens, for example. Both *Perilla* leaf special extract and isolated Vicenin 2 demonstrated antispasmodic effects, inhibiting musculotropic activity and neurotropic, cholinergic activity and having no direct spasmolytic activity. This behavior underlays the safe use of Benegut® for application in dietary supplements. [6] In a second study the acute neuroactive effect on the neuronal activity of murine frontal cortex networks was tested by means of electrophysiological multi-channel recording. *Perilla* leaf special extract demonstrated prokinetic activity. In addition an ex vivo study was carried out to confirm the known anti-inflammatory effects and immune-modulatory properties of *Perilla* leaf special extract. In this study an ex vivo whole blood stimulation assays with human blood leucocytes from 10 volunteers was carried out. Blood samples were specifically stimulated with lipopolysaccharide (LPS) to determine tumor necrosis factor alpha (TNF α) release and the potential reduction of TNF α by *Perilla* leaf special extract. The experiments clearly demonstrated anti-inflammatory properties of *Perilla* leaf special extract by direct suppression of the pro-inflammatory cytokine TNF- α . [7] A recently finalized human study confirmed the beneficial effects of *Perilla* leaf special extract on digestive discomfort.

Benegut® contributes to overall bowel movement and reduced bowel spasms. Consequently symptoms of gastrointestinal discomfort are improved, like bloating, gas,

rumbling, feeling of fullness and abdominal discomfort, including cramps and pain. These new effects plus the known anti-inflammatory effects indicate that *Perilla* leaf special extract is a novel potential ingredient to prevent and improve functional gastrointestinal discomfort. Results of a pilot human study will be soon available. Benegut® is the only commercial available, IP protected special *Perilla frutescens* (L.) extract, which has scientifically proven beneficial effects for digestive health.

Technological aspects

Benegut® is a high quality, sustainable natural ingredient, obtained by water extraction out of *Perilla frutescens* (L.) leaves. It is a water soluble fine beige powder. The production facility and manufacturing process complies with the highest international standards of safety, hygiene and quality control: ISO-9001:2008, ISO-22000:2005 and is GMP certified for dietary supplements Benegut® complies with highest quality and traceability standards, completed by phytochemical characterization and stability data. Benegut® is standardized on a special flavonoid fraction, rosmarinic acid and its key active ingredient Vicenin 2. Due to its low water activity it can be easily blended with probiotics and will not have a negative impact on the stability of the probiotic. Benegut® is approved to be used in food supplements in Europe and the U.S.

Conclusion

Benegut® is a natural, IP protected gut health ingredient which fulfills the legal requirements for its application in food supplements in Europe and the US. Benegut® is able to balance bowel movement and to improve gastrointestinal discomfort by interacting with the neurological system and therefore can counteract the effects of psychosocial factors such as stress, which cause altered gut physiology leading to gastrointestinal discomfort. Benegut® provides good financial returns because it provides beneficial effects which are not available from currently available probiotics and prebiotics.

Literature references

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Benegut®

A natural ingredient that improves gastrointestinal discomfort

Approximately 10-20% of the world's population is affected by a digestive disorder. Nearly everybody experiences gastrointestinal discomfort, which affects quality of life. Symptoms such as bloating and gas affect mood and are often combined with reduced concentration and energy. Consumer research indicates that today one third of consumers who are looking for gut health support do not find an effective product, which works for them. This may be related to the fact that even people with a healthy gut micro flora and no food intolerance suffer from digestive discomfort [1].