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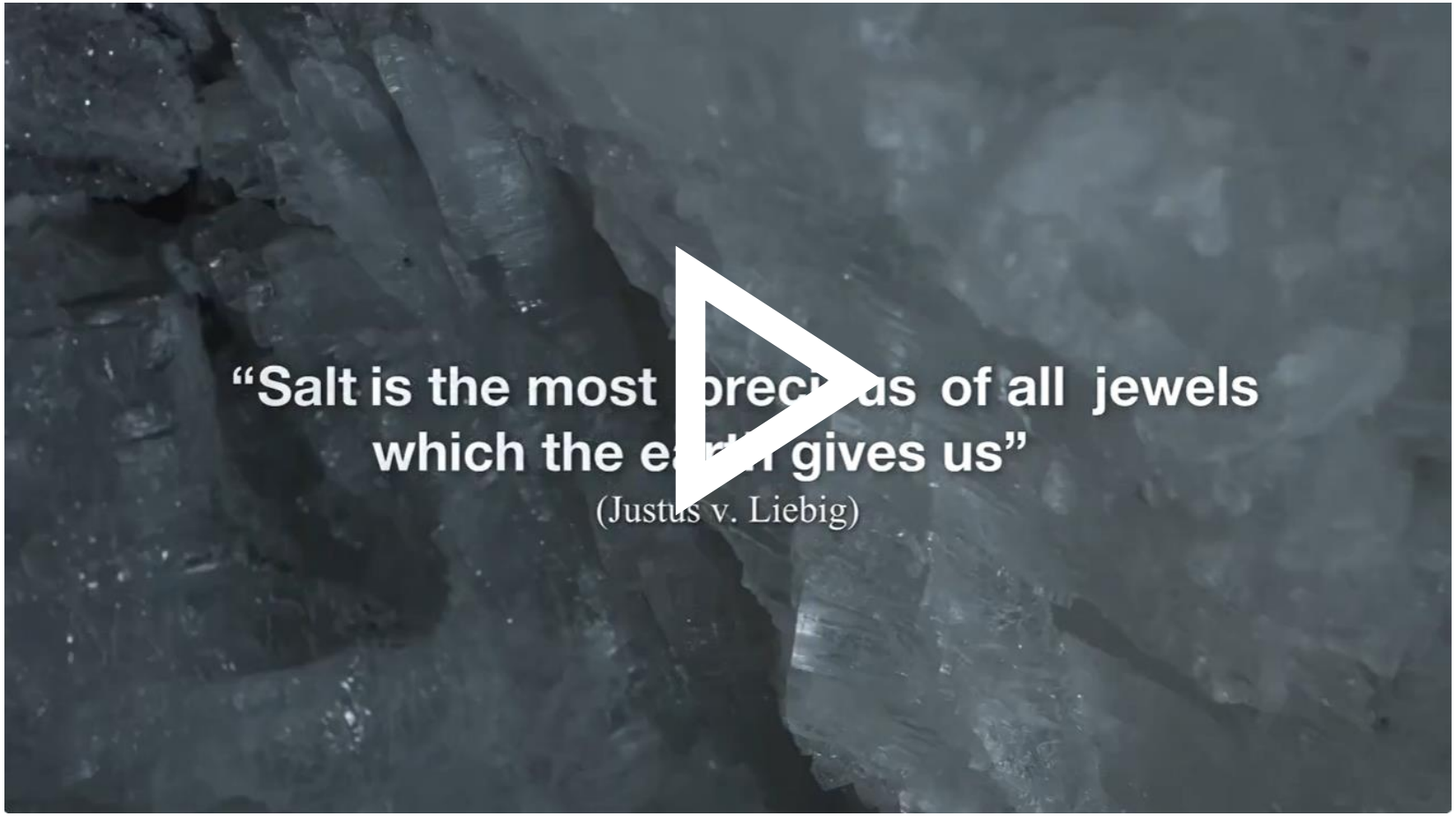
High value mineral salts

Mineral Solutions for Healthy Aging: Where Science Meets Market Opportunity.

Wen Xuan, Yeo
Dr. Paul Lohmann (Asia)

Dr Paul Lohmann



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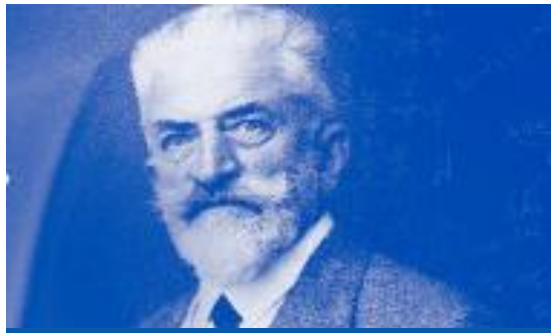

Founded 1886 in Hamelin

Production Site
Emmerthal

Production Site
Lueneburg

700 Employees

Managing Directors

€ 170 million Turnover p.a.
(approx. US$ 200 million)

Product Catalogue
https://www.lohmann-minerals.com

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Agenda

- The Healthy Aging Market
- Opportunities for Dairy in Healthy Aging
- Mineral Solutions – Backed by Science
- Prototype Examples from DPL

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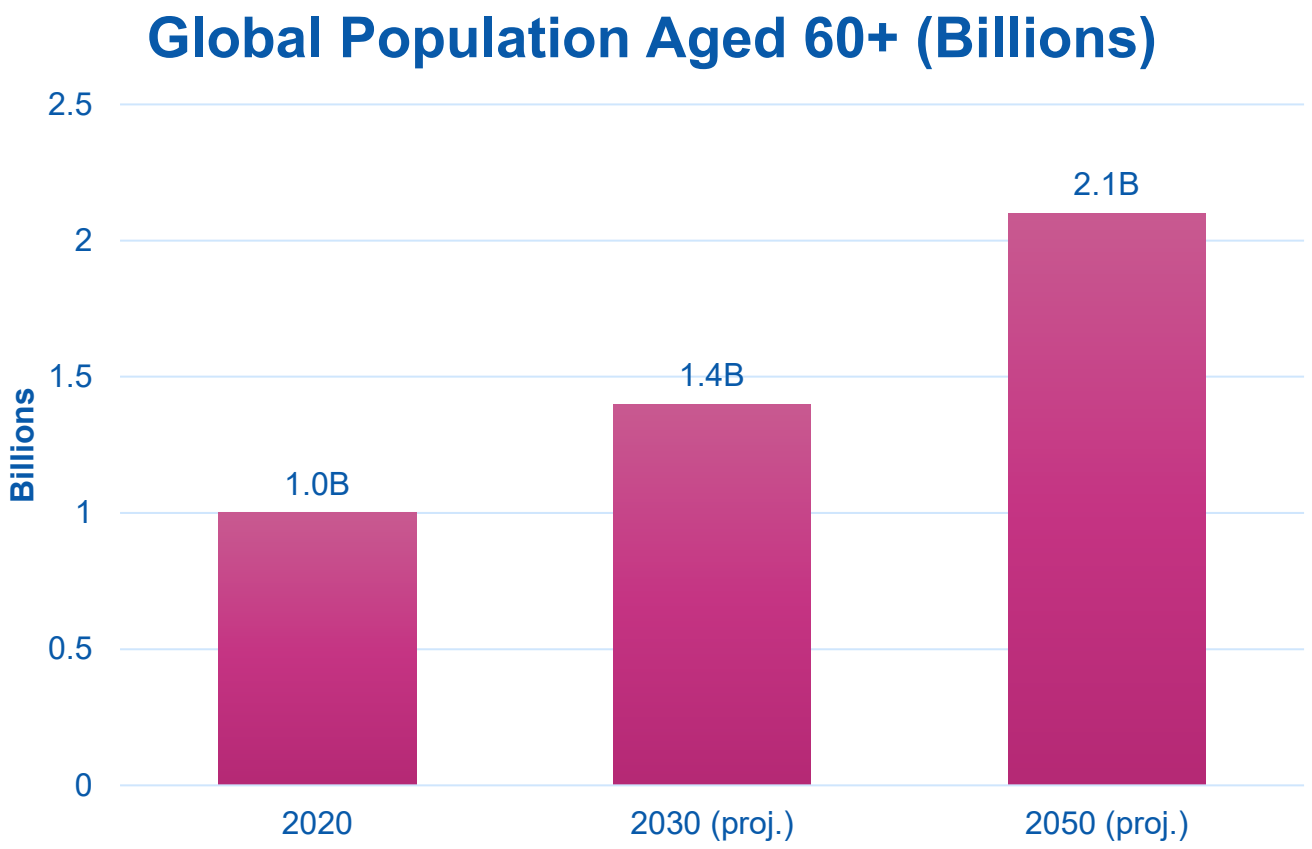
Why Healthy Aging?



22%

of the world's population will be 60+ by 2050, up from 12% in 2015.

By 2030, 1 in 6 people worldwide will be 60+.

The 80+ population triples between 2020 and 2050, reaching 426 million

Sources: WHO, "Ageing and Health" fact sheet (2025); UN DESA, World Population Prospects 2024 — Summary of Results.

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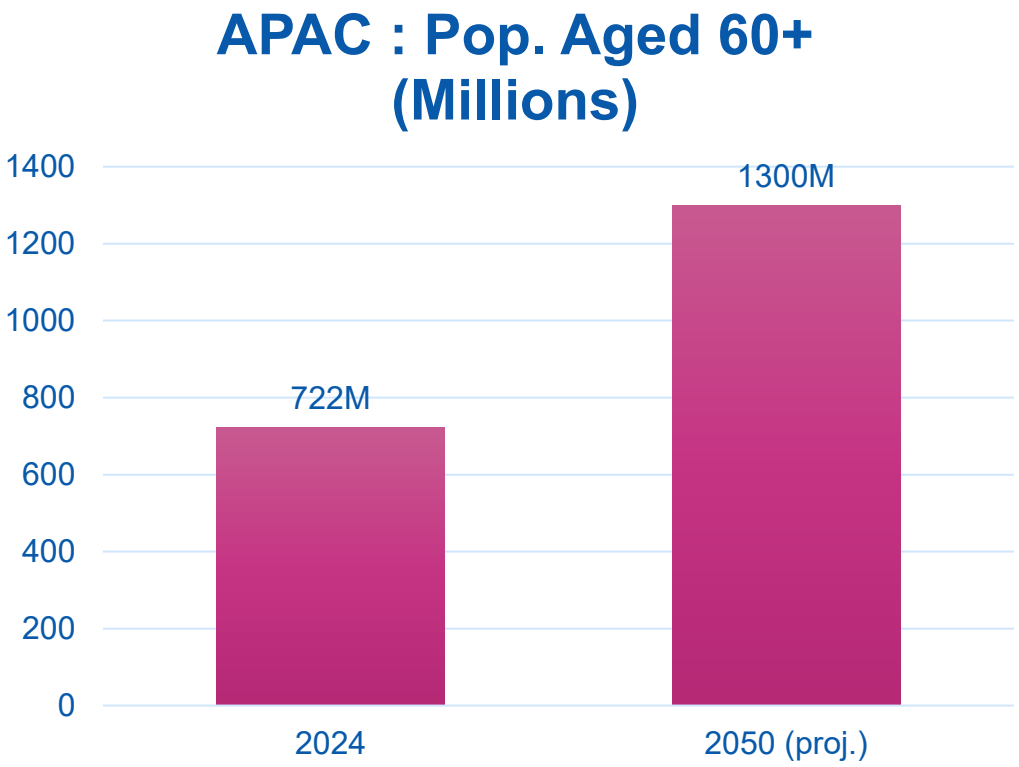
APAC Is Aging Faster Than Anywhere Else



15.1% → 25.9%

share of APAC population aged 60+, 2024 → 2050

60%

of the world's 60+ population already lives in APAC + Oceania

503M → 996M

APAC's 65+ population, 2024 → 2050 (nearly doubling again, having already tripled since 1990)

91M → 279M

APAC's "oldest-old" (80+) population, 2024 → 2050 — roughly tripling, the highest-need segment of all.

APAC total population: 4.8B (2024, ~60% of the world) → 5.2B (2050) — so the 60+ segment is growing far faster than the population as a whole.

Sources: UN ESCAP, "2024 ESCAP Population Data Insights"; UN ESCAP, "Asia-Pacific Regional Conference on Population Ageing" (2024); UN ESCAP, "Perspectives on Population Ageing in Asia-Pacific."

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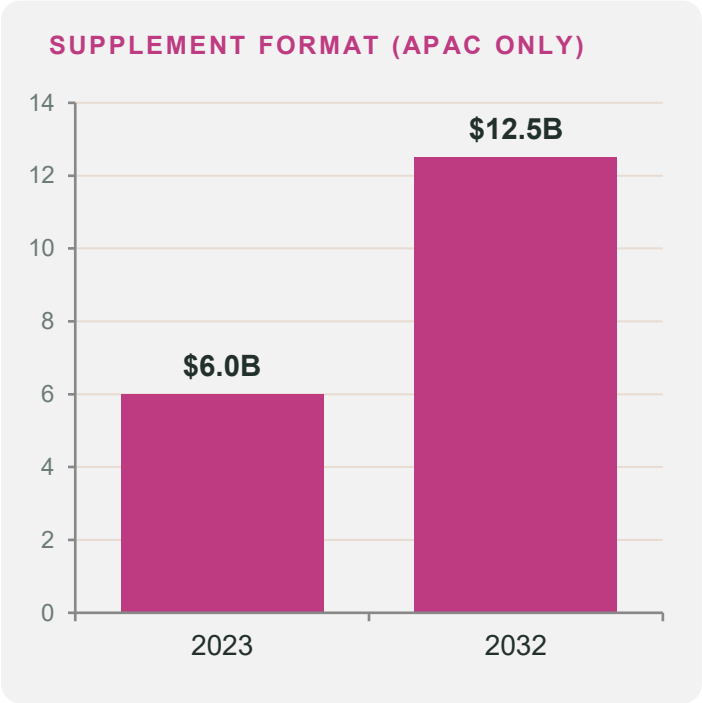
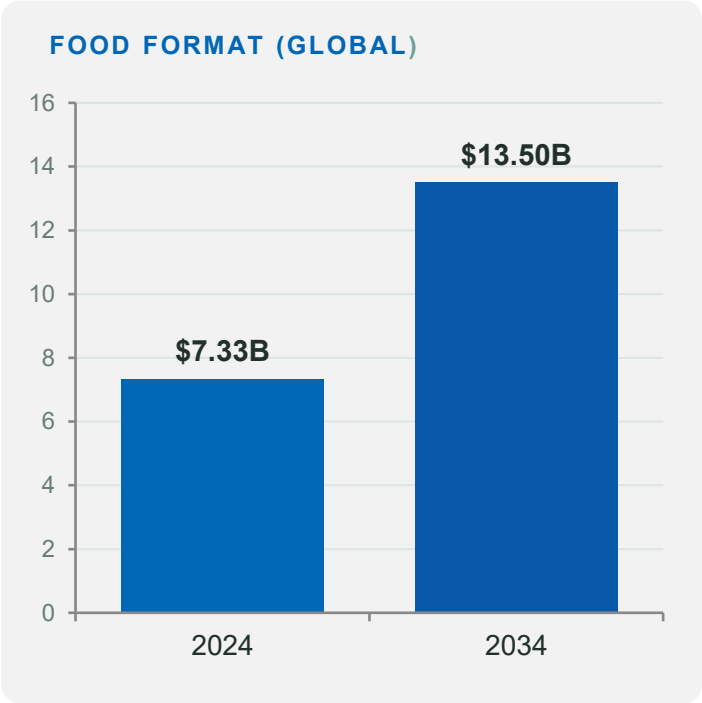
Healthy Aging Market Growth

8.14% **CAGR — Healthy Aging Supplements**
APAC, 2023-2032

6.3% **CAGR — Functional Food for Elderly**
Global, 2024-2034





Sources: Expert Market Research/ResearchAndMarkets, "Functional Food for Elderly Market" (2026); Lucintel (2026); Market Research Future, "Healthy Aging Supplement Market" (2025).

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Dairy the Ideal Medium

1. Nutrient density, bundled naturally
2. The dairy matrix
3. Fermentation Options

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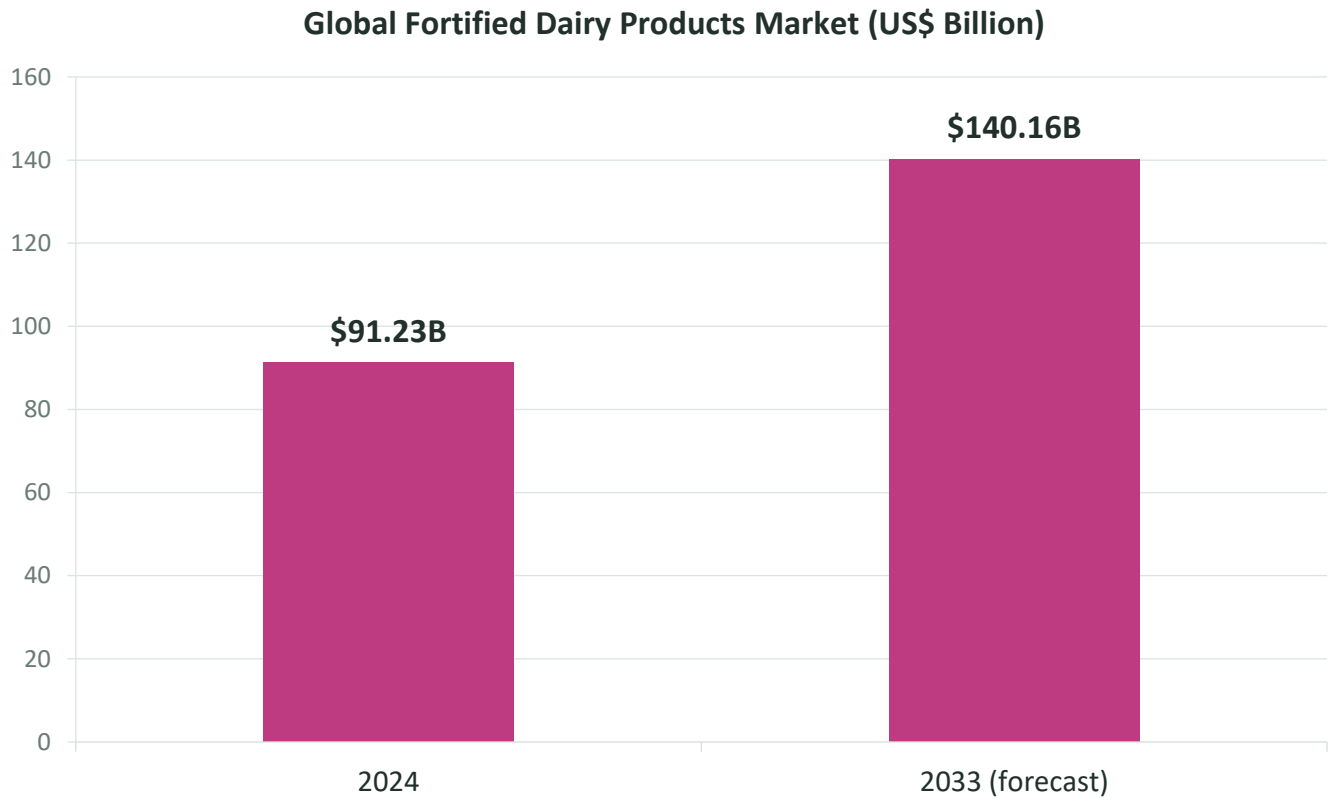
Fortified & Functional Dairy Market



Estimated 4.9%

global CAGR (2025-2033) — the market grows by roughly 54% over the period.

APAC: largest region at 40.3% share (2024) and fastest-growing at 5.9% CAGR

Yogurt: 48.2% product share — the leading fortified/functional dairy format

Probiotics/prebiotics: 49.6% share by ingredient type — the dominant fortification approach

Sources: Grand View Research, "Fortified Dairy Products Market" (2025); Mordor Intelligence, "Fortified Dairy Products Market" (2025); Coherent Market Insights (2025); Market Research Future (2026).

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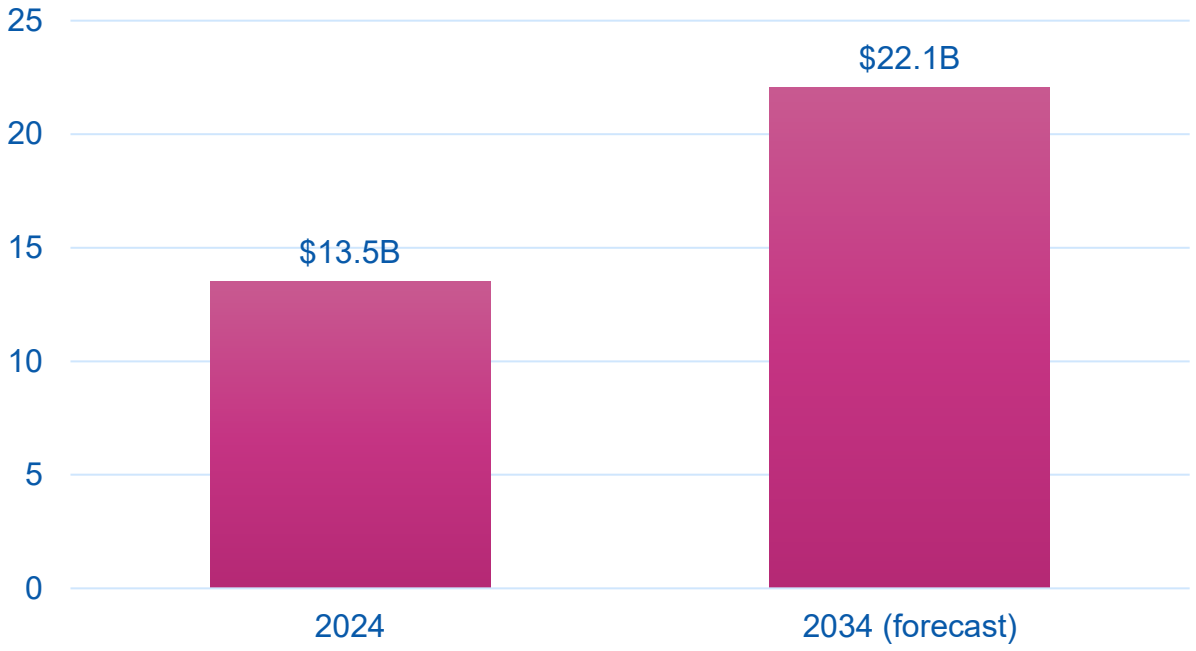
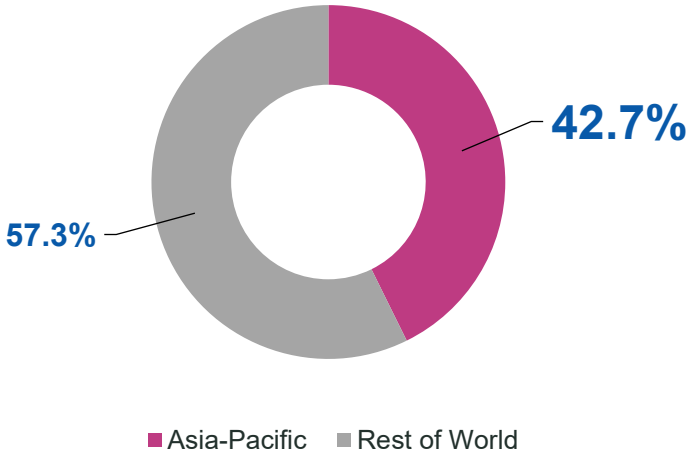
Dairy Category - Adult & Senior Milk Powder

Global Adult Milk Powder Market (US$ Billion)



APAC Share of Global Adult Milk Powder Market



APAC fastest-growing region

Sources: Future Market Report, "Adult Milk Powder Market" (2026); Market Reports World, "Adult Milk Powder Market" (2025). Note: other vendors size this same market as low as ~$5-6.5B (2024

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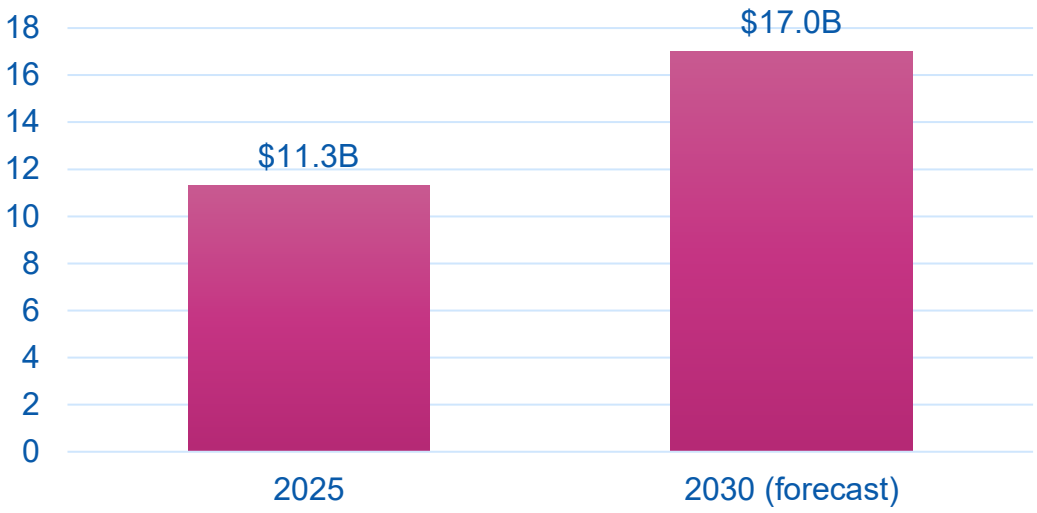
Dairy Alternatives (APAC)

Compete for the same healthy-aging areas: calcium, protein and easy digestibility.

APAC Dairy Alternatives Market (US$B)



8.54%

CAGR, APAC dairy alternatives, 2025-2030

~53%

of the global dairy alternatives market is in APAC — the largest region

Why it matters for aging

Lactose intolerance prevalent among Asian adult populations

Non-dairy milk is ~90% of the APAC dairy-alternatives market; soy leads at ~56% penetration

Calcium, vitamin D and protein fortification is now standard in new launches

Sources: Mordor Intelligence, "Asia-Pacific Dairy Alternatives Market" (2025); Precedence Research, "Plant-based Milk Market" (2026); FoodNavigator-Asia (2026); Green Queen (2026).

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Minerals for Healthy Aging

Muscle, connective tissue and bones

Calcium, Magnesium and **Potassium** contributes to normal muscle function

Copper and **Manganese** contributes to maintenance of normal connective tissues

Calcium, Manganese, Magnesium and **Zinc** contributes to the maintenance of normal bones

General Wellness

Potassium contributes to the maintenance of normal blood pressure

Chromium contributes to the maintenance of normal blood glucose levels

Energy metabolism

Calcium, Copper, Iron, Magnesium and **Manganese** contributes to normal energy-yielding metabolism

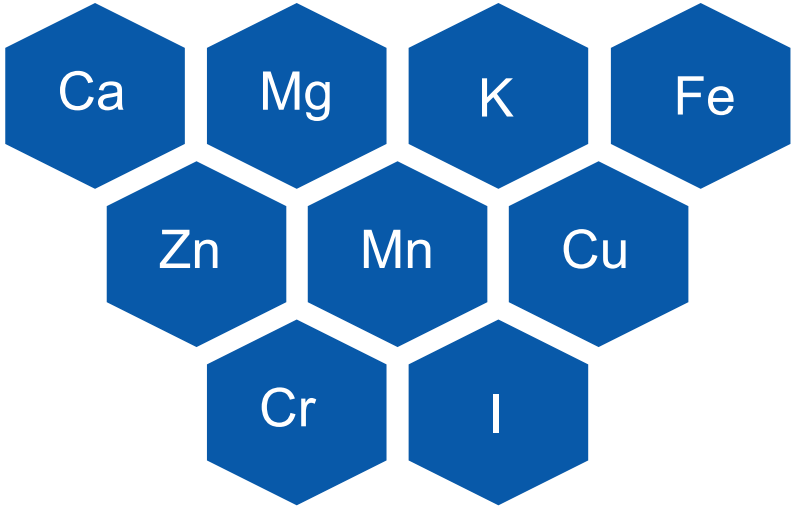
Zinc contributes to normal carbohydrate metabolism

Zinc and **Chromium** contributes to normal macronutrient metabolism

Cognitive health and mental wellness

Iodine, Iron and **Zinc** contributes to normal cognitive function.

Magnesium contributes to normal psychological function



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Healthy Aging Solutions from DPL

Calcium Citrate Malate

LomaBiome®

LomaChelateX®

Dr. Paul Lohmann®

Bone Health

Understanding Bone Health

Bones are essential for maintain the body's structural, mobility and protection of organs

- Positive bone balance from birth to adulthood: bone growth
- Negative bone balance after peak bone mass has been reached.
- **If bone mass reach below a certain threshold it will develop into Osteoporosis**

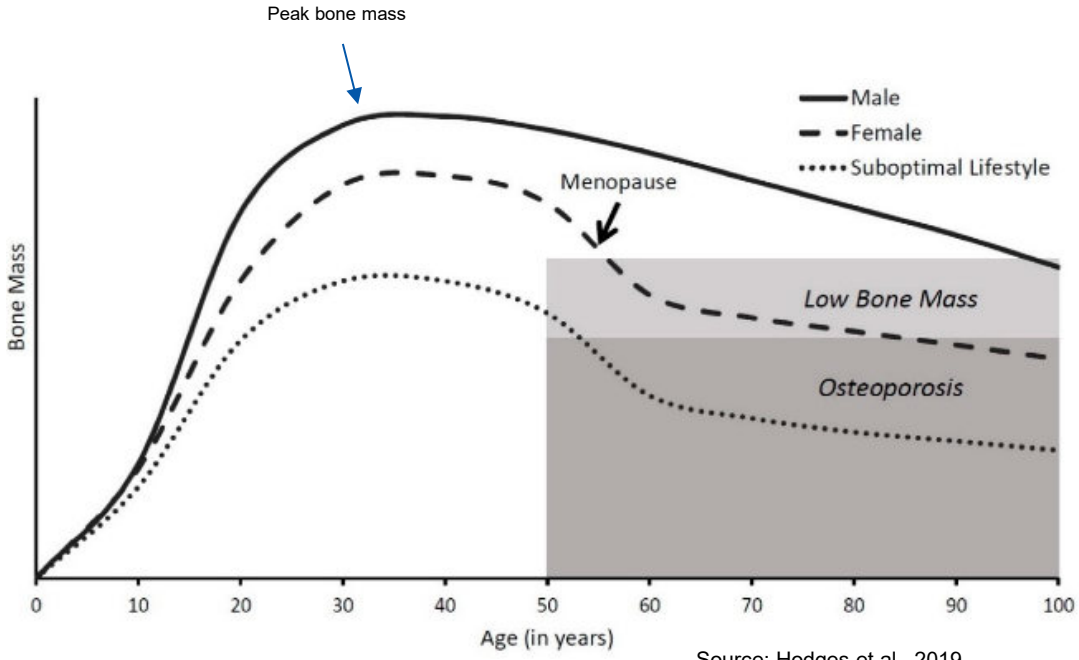
Osteoporosis

systemic skeletal disease characterized by low mineral bone mass and microarchitectural deterioration of bone tissue.

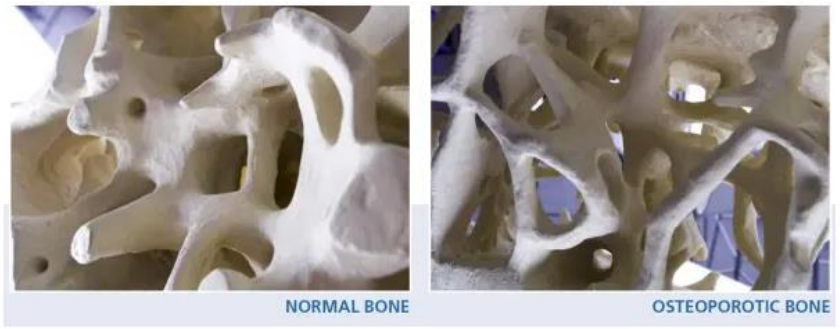
Decreased bone mineral density
➔ increased fracture risk

Osteoporosis is linked to increase risk of mortality, risk of falls, frailty and reduced mobility.

No cure but can be managed through other factors through diet, supplementation and exercise.



Source: Hodges et al., 2019



Source: https://www.osteoporosis.foundation/health-professionals/about-osteoporosis

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Calcium Citrate Malate

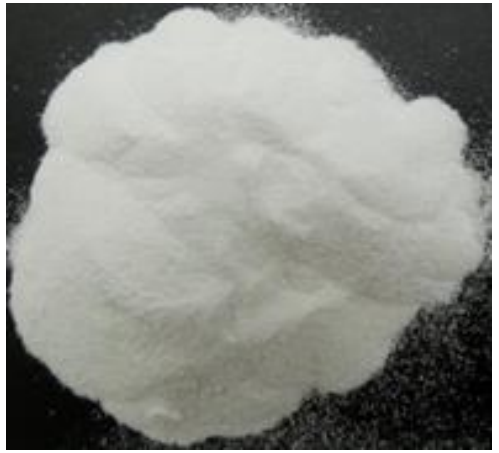
Calcium Citrate Malate is formed by reaction of a Ca source with malic acid and citric acid.

Identification

Formula: $Ca_6(C_6H_5O_7)_2(C_4H_4O_5)_3$
CAS: 142606-53-9
Appearance: white powder
pH value (1 %): 7
Solubility: - -
Mineral content: approx. 21 % Ca

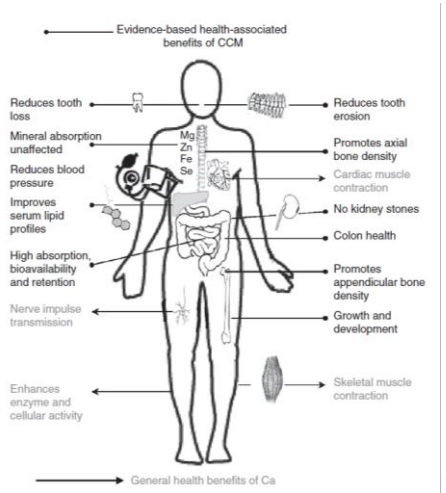
Application:

- Yoghurt
- Dairy-based desserts
- Beverages - Turbid juices
- Food supplement formats



Evidence based benefits – High number of scientific studies

- **Soluble at high pH conditions**
- **Beneficial for bone & tooth health**
- **No increased risk for kidney stones**
- **Good absorbability**
- **Highly bioavailable**



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Efficiency Study – Calcium Citrate Malate vs Calcium Carbonate

A controlled trial of the effect of calcium supplementation on bone density in postmenopausal women Dawson-Hughes et al. (1990)

Design: 2-year random., double-blind, placebo-controlled

Subjects: 301 healthy postmenopausal women

Method: Ca plasma level, bone density

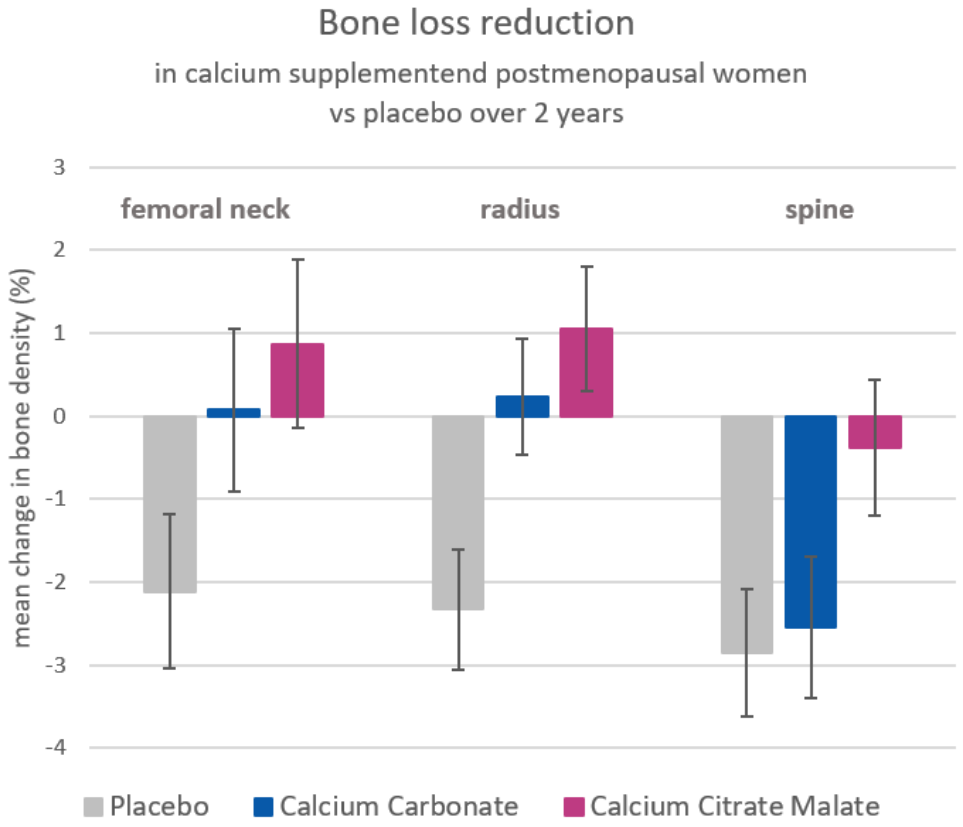
Dose: 500 mg/day Ca; $CaCO_3$ or CCM or placebo

Measured outcome: bone loss at the femoral neck, radius and spine.

In maintaining of bone density in femoral neck, radius and spine is Calcium Citrate Malate at least

3 times more efficient

than Calcium Carbonate



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Market Samples

Instant Skim Milk Powder Enriched with Calcium and Vitamins A and D
Company: Planta Industrial de Guatemala
Country: Guatemala
Event Date: June 2024
Ingredients: Skimmed Milk Powder (Skimmed, Powdered), Calcium Citrate Malate, Soy Lecithin (Emulsifiers), Vitamin A, Vitamin D

Night Minerals Berry Flavored Magnesium + Calcium Nighttime Drink Dietary Supplement
Company: Wholier, USA
Country: USA
Event Date: Mar 2025
Ingredients: Calcium (Calcium Citrate Malate (Marine Origin, Plant Based), **Magnesium (Magnesium Glycinate, magnesium citrate (from seawater)**), organic superfood berry blend (Blackberry Powder (Powdered, Organic), Acai Fruit Powder (Powdered, Organic), Blueberry Powder (Powdered, Organic)), Sour Cherry Juice
other ingredients: Citric Acid, Berry Flavour (Mixed, Organic), Monk Fruit (Siraitia Grosvenori), Stevia Extract, Purple Carrot Extract (Food Colours, Powdered)

Important Minerals for Bone Health

Mg Magnesium

- Important in conversion of vitamin D to its active form.
- Involve in the regulation of Parathyroid hormones which is essential in Calcium homeostasis.
- cofactor in hydroxyapatite crystal formation

Zn Zinc

- Important osteoblast activity – building new bones
- Cofactor in formation of collagen and important connective tissue in bones

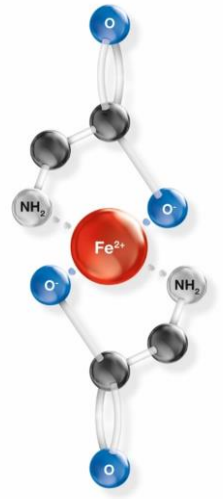
Mn Manganese

- A cofactor for enzymes for cartilage and the bone matrix
- Important in collagen-formation pathway.

Cu Copper

- Important in the cross linking of collagen.

LomaChelateX



LomaChelateX®

Dr. Paul Lohmann's brand of fully reacted and fully chelated bisglycinate range.

What does fully reacted mean?

Fully reacted means that mineral ion is completely bound to the ligand amino acid (glycine) in a 1:2 ratio

Why is that important?

Only fully reacted Bisglycinates are real chelates and offer the substantial advantages stated in scientific literature.

Key features

- Gentle on the stomach
- Superior bioavailability
- Lesser risk of interactions with other ingredients

Product Range

- LomaChelateX mineral bisglycinates:
  - Calcium bisglycinate
  - Magnesium bisglycinate
  - Iron bisglycinate
  - Zinc bisglycinate
  - Copper bisglycinate

LomaChelateX - Fully Chelated

- All our LomaChelateX® Mineral Bisglycinates are proven true amino acid chelates.
- Free glycine and chelated glycine show different carbon signals in 13C-NMR* spectroscopy.

The shift from 173 ppm to 180 ppm comfirms the complete chelation of the DPL Magnesium Bisglycinate

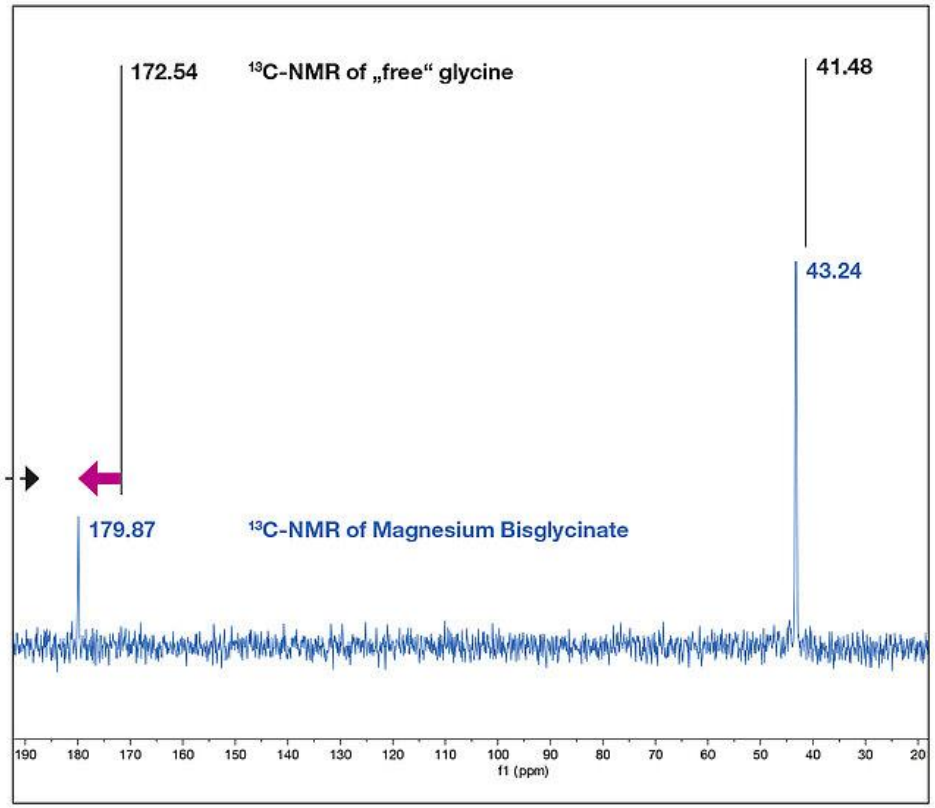


Figure 1: Comparison of ^{13}C-NMR Spectra of “free” glycine and Magnesium Bisglycinate

*Nuclear magnetic resonance spectroscopy (NMR)

Market Samples

Apple Flavoured Multivitamin Vitality B Milk
Company: Standard Foods
Country: Taiwan
Event Date: Aug 2024
Ingredients: Waters, White Sugar, Whole Milk Powder (Powdered), Milk (Raw), Skimmed Milk Powder (Skimmed, Powdered), Sodium Carboxymethyl Cellulose, Flavouring Substances, Citric Acid, Calcium Carbonate, Apple Juice Concentrate (Concentrate), Malic Acid, Trisodium Citrate, Vitamin C, Beta-Carotene, Magnesium Phosphates, Niacinamide, Vitamin E, Ferrous Bisglycinate, Zinc Gluconate, Vitamin A, Cholecalciferol, Vitamin B6, Vitamin B1, Riboflavin, Vitamin B12, Folic Acid

Strawberry Yogurt
Company: Alpina Productos Alimenticios
Country: Colombia
Event Date: Jun 2026
Ingredients: skimmed milk, preparation (strawberry pieces (strawberry, grape juice, apple pulp, water, thickener (polydextrose), sweetener (enzymatically produced steviol glycosides))), thickener (corn starch), skimmed milk powder, gelling agent (gelatin), stabilizer (pectin), flavors (natural flavor, artificial flavor), natural colorings (carmine, annatto), vitamins and minerals (zinc (zinc bisglycinate), vitamin B5 (calcium pantothenate), vitamin D3 (coated cholecalciferol), vitamin B1 (thiamin hydrochloride), vitamin B12 (cyanocobalamin)), sweetener (enzymatically produced steviol glycosides), dairy cultures (Lactobacillus bulgaricus, Streptococcus thermophilus), probiotic cultures (Lactobacillus casei, Lactobacillus acidophilus)

LomaBiome

LomaBiome®

- Dr. Paul Lohmann range of salts of Short Chain Fatty Acids (SCFA).
- SCFAs are postbiotics, which are key bioactive metabolites.
- They maintain gut function, influence metabolic activity, and support overall well-being.

Key features

- Easier to handle
- More stable
- Weaker smell compared to fatty acids

Product Range

- **LomaBiome® Butyrates**
- LomaBiome® Propionates

Butyrate – Effects on Human Health

Most important SCFA

Gut health

- Strengthens gut barrier
- Supports mucosal protection
- Reduces risk for colorectal cancer

Immune system

- Reduces inflammation
- Modulate immune response

Effects against obesity

- Adipocyte size reduction
- Body weight control
- Improves insulin sensitivity

Systemic health

- Cardiovascular health
- Reduces blood pressure

Metabolic/systemic health

- Improves cardiovascular health
- Enhances energy metabolism
- Reduces lipid deposition

Neuroprotection

- Gut-brain axis modulation
- Neuroprotection
- Mood and behavior modulation (e.g. stress response)

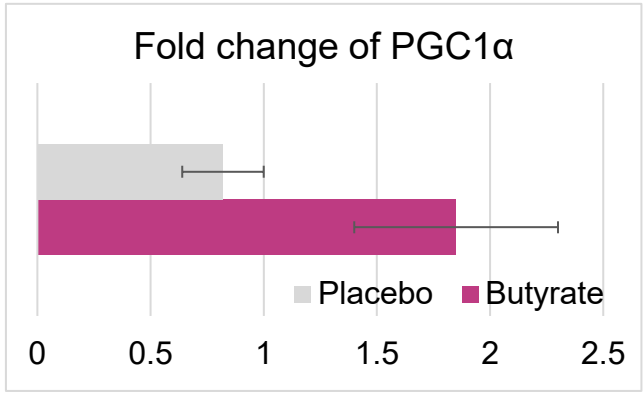
Anti-inflammation

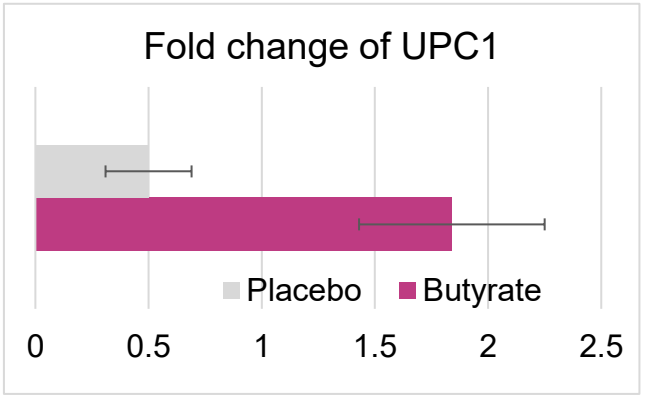
- Suppresses pro-inflammatory cytokine
- Improves inflammatory bowel diseases

LomaBiome® Sodium Butyrate

Obesity

LomaBiome® Sodium Butyrate increases the expression of thermogenic and oxidative metabolism–regulating genes and reduces body weight, BMI, and waist circumference. LomaBiome® Sodium Butyrate significantly decreased fasting blood glucose and low-density lipoprotein cholesterol while increasing high-density lipoprotein cholesterol. In addition, food intake and appetite were significantly reduced.





Amiri et al. (2024) **Expression of PGC-1α, PPAR-α and UCP1 genes, metabolic and anthropometric factors in response to sodium butyrate supplementation in patients with obesity**

Design: a triple-blind, randomized placebo-controlled clinical trial

Subjects: 50 individuals with obesity

Material: Sodium butyrate

Dose: 600 mg/day + hypo-caloric diet

Measured outcome: anthropometric characteristics, food consumption, and feelings of hunger, serum levels of metabolic indices and the mRNA expression of the PGC-1α, PPAR-α, and UCP-1 genes

Parameters difference (end - baseline)	Sodium Butyrate	Placebo
weight	↓ - 2.82 kg	- 0.37 %
BMI	↓ - 0.96	- 0.095
waist circumference	↓ - 4 cm	- 1 cm
fasting blood sugar	↓ - 3 mg/dl	+ 5 mg/dl
low-density lipoprotein cholesterol (LDL)	↓ - 15 mg/dl	+ 12.4 mg/dl
increased high-density cholesterol (HDL)	↑ + 10 mg/dl	- 2 mg/dl

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LomaBiome® Sodium Butyrate

Well-being

LomaBiome® Sodium Butyrate reduces inflammation by decreasing levels of faecal calprotectin and serum hs-CRP. In addition, it improved patients' sleep quality and overall quality of life. The upregulation of CRY1, CRY2, PER1, and BMAL1 suggests that butyrate supplementation improves clinical outcomes in patients with ulcerative colitis through modulation of circadian clock gene expression.

Firoozi et al. (2024).
Effects of short-chain fatty acid-butyrate supplementation on expression of circadian clock genes, sleep quality, and inflammation in patients with active ulcerative colitis: a double-blind randomized controlled trial

Design: randomized placebo-controlled trial

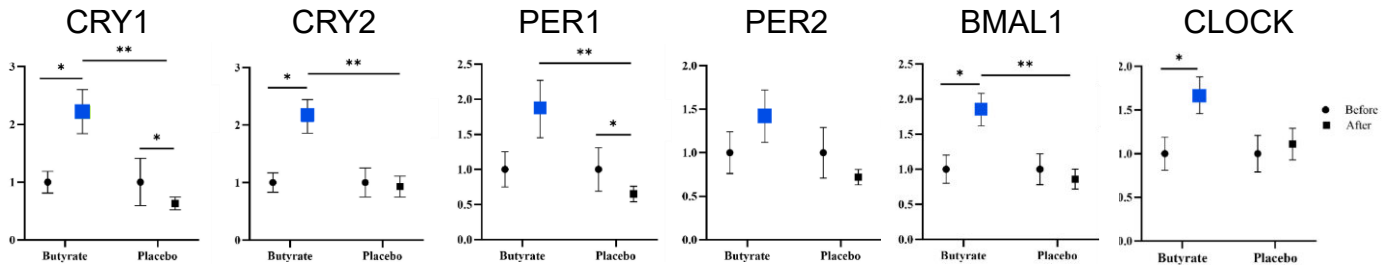
Subjects: active ulcerative colitis (UC) patients

Material: Sodium butyrate

Dose: 600 mg/kg, 12 weeks

Measured parameters: expression of circadian clock genes, faecal calprotectin and serum level of high-sensitivity C-reactive protein (hs-CRP), the sleep quality, quality of life - inflammatory bowel disease questionnaire

Circadian clock gene expression



Changes as compared with the placebo group

calprotectin	hs-CRP	sleep disturbances	life quality
Δ_{CALP} −134	Δ_{hrCRP} −0.36	PSQI score −2.94	IBDQL scores +17
vs +52 placebo	vs +0.48 placebo	vs +1.16 placebo	vs - 3.50 placebo

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Market Samples

Nutritious Cereal for Middle-Aged and Senior Groups
Company: Na Sen Biotechnology, China
Country: Nigeria
Event Date: June 2021
Ingredients: mixed grains (Wheat, Corn Flour, Barley Malt Extract, Fructose Syrup, Barley, Soy Lecithin, Calcium Carbonate, Salt, Flavouring Substances, stabilizer (Sodium Sulfate, Guar Gum, Xanthan Gum, Pentasodium Triphosphate, Sodium Polyphosphate, Sodium Phosphates), Beta-Carotene), Non Dairy Creamer (Creamer, Non-Dairy) (Glucose Syrup, Vegetable Oils (Vegetable Based), **Sodium Butyrate**, Dipotassium Hydrogen Phosphate, Mono- and Di-glycerides of Fatty Acids, Silicon Dioxide), White Sugar, Calcium Carbonate, Flavouring Substances

IBS Max 1000 Sodium Butyrate
Company: DOZ, Poland
Country: Poland
Event Date: May 2026
Ingredients: **Sodium Butyrate**, capsule shell (Hydroxypropyl Methylcellulose (Thickeners)), Celluloses (Bulking Agents), Hydroxypropyl Methylcellulose (Thickeners), Ethyl Cellulose (Glazing Agents)

Healthy Aging is not only for Older adults

Mineral Concepts from Dr. Paul Lohmann

DPL Offerings

- Meal replacement concepts
- Electrolyte / rehydration concepts
- Magnesium options for various application

Market Trends

- Bridging nutrient gaps, e.g. weight loss therapy
- Oral rehydration drinks – sports recovery
- Improve Sleep and reduce stress, maintain energy levels

Let’s formulate together

Dr. Paul Lohmann®

Join us at the ADC booth

Fortified Pudding

Vitamin B Complex + Iron + Calcium

Fortified with

Ferric Pyrophosphate

- Providing 15% Thai RDI for Iron

Calcium Citrate Malate

- Providing 15% Thai RDI for Calcium

Dr. Paul Lohmann®

THANK YOU

Visit us at the ADC booth!

Wen Xuan, Yeo
Manager for Marketing & Application Engineering

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