



GELITA Collagen Peptide Concepts for Beauty & Body Toning

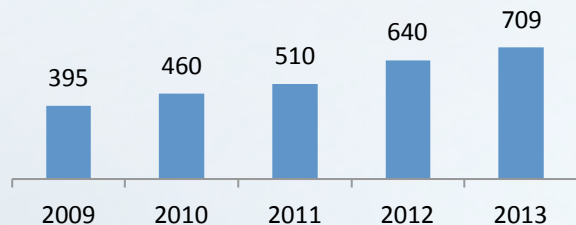
*Dr. Stephan Hausmanns
VP BU Health & Nutrition*

GELITA

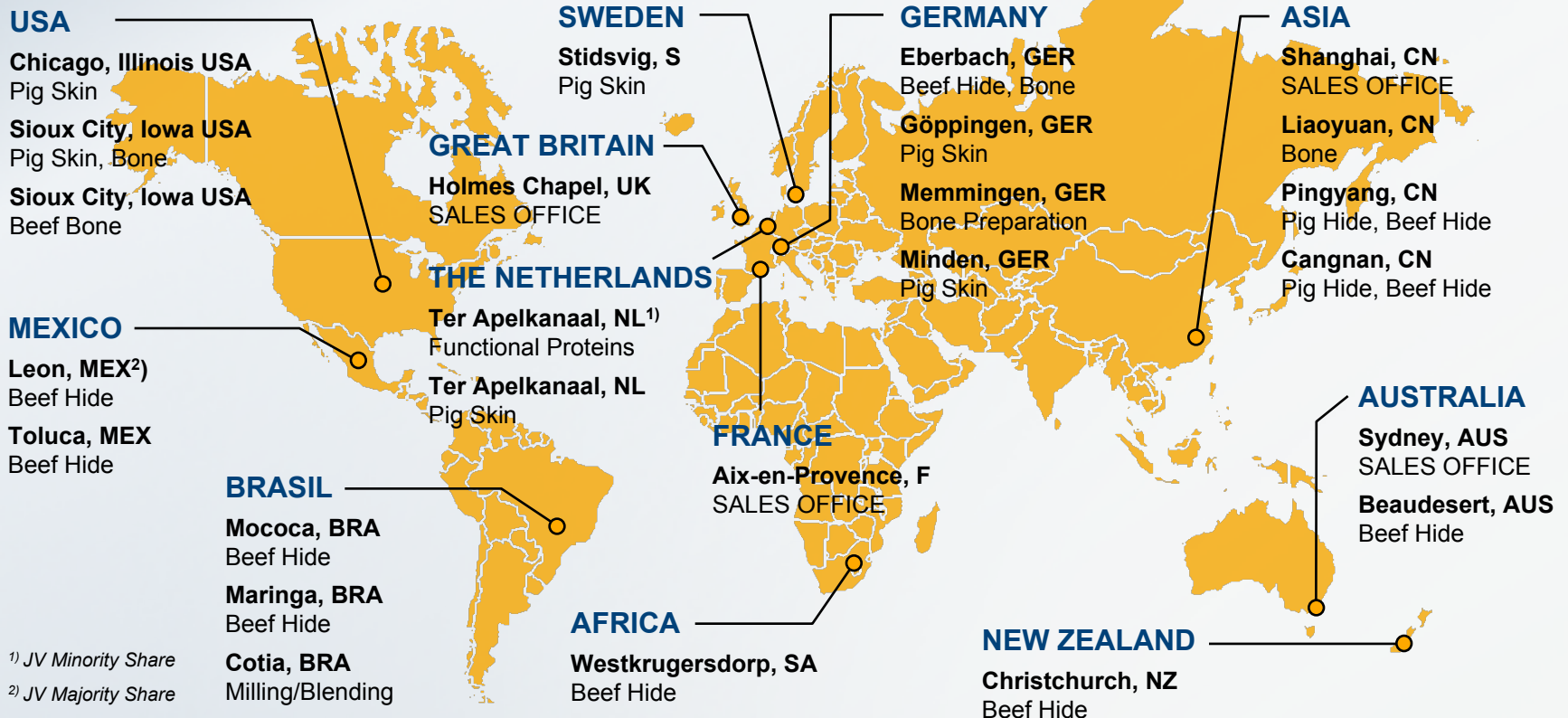
GELITA at a glance.

- **Legal Form:** GELITA is an independent, unlisted stock company owned by the founding families
- **Founding Year:** 1875
- **Headquarters:** Eberbach, Germany
- **Production Plants:** 21
- **Sales Offices:** 4
- **Market Share:** ~ 22% (Market Leader)
- **Employees:** ~ 2,650

Turnover in Mio. €



Our locations are part of our philosophy: we are there where we are needed.



¹⁾ JV Minority Share

²⁾ JV Majority Share

Our values – the basis for a successful cooperation.

To facilitate this ongoing process our cooperation is based on fundamental values:

- **TRUST**

We are frank, honest and fair and deal with each other respectfully

- **COURAGE**

We are courageous and prepared to take risk to find new pathways to success

- **PASSION**

We all wish to achieve the best possible result

- **EMPATHY**

We fully understand others and are always prepared to help

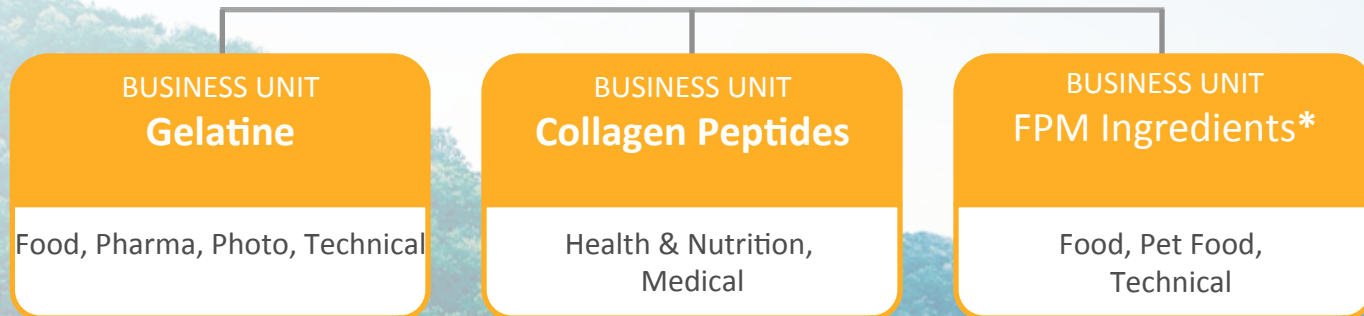
- **COMMITMENT**

We act consistently and decisively, deliver what we promise, rely on each other and are completely committed to acting in the interests of our company



Our global business unit structure – three strong pillars to serve customer demands.

GELITA



*Fats, Proteins, Minerals

GELITA Business Unit - Health & Nutrition

BUSINESS UNIT
Collagen Peptides

Health & Nutrition

Global Product Management Unit & Accelerator of GELITA's Health & Nutrition Business

Areas of Expertise

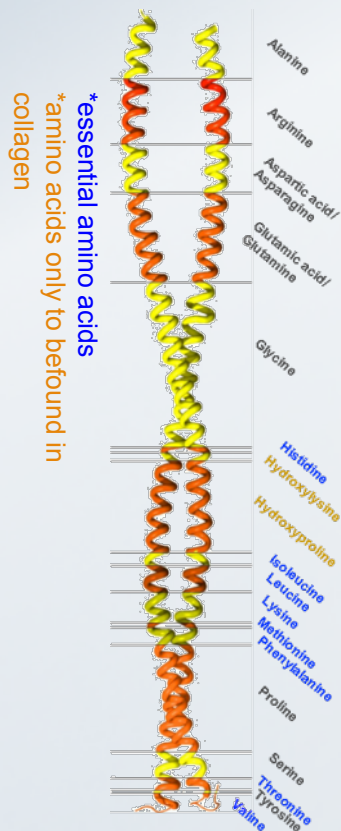
- Life Science*
- Application Development
- Product & Process Development
- B2B Ingredient Management
- B2C Consumer Solution Business
- Marketing & Market Research
- Regulatory / IP

*International and national collaborations

- Collagen Research Institute Kiel, Germany
- SIT Hamburg, Germany
- University of Freiburg, Germany
- Tufts Medical Center, Boston, USA
- Penn State University, PA, USA
- University of Lund, Sweden
- University of Kuopio, Finland
- CSIRO, Melbourne, Australia
- University of Utrecht, The Netherlands
- University of Manchester, UK



Collagen Protein & Body Composition



Next to water (60%), human bodies consist out of proteins (20%), fats (15%), minerals (4%) and carbohydrates (1%)



With up to 35% of the whole body protein content, collagen is the most abundant protein in humans



With ~50% of collagen amino acids being either proline / hydroxyproline or glycine, these amino acids count for about 15% of total human amino acid composition

The Role of Collagen in the Human Body

Biological role of Collagen: adding stability to life (structure protein)

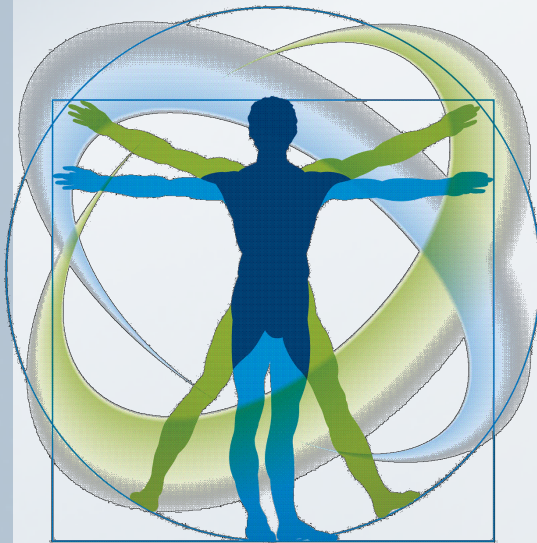
Collagen is the main component of connective tissue

Collagen in the musculoskeletal system:

- Up to 70% of dry cartilage mass (joints, meniscus)
- Main component of tendons (>85%) and ligaments (>70%)
- Also abundant in bone, blood vessels and intervertebral disc
- Accounting for 6% of the weight of strong, tendinous muscles

Collagen in the skin:

- Up to 75% of dry skin mass



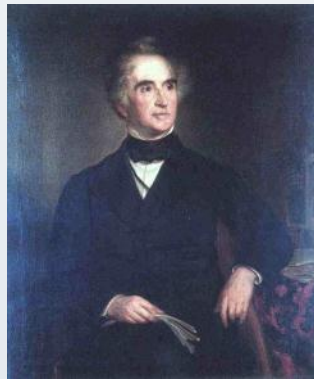
Bioactivity of Collagen Peptide: Historical Background



The Nutritional Therapy of Saint Hildegard of Bingen (1098 – 1179)

„He who has stabbing pain in his limbs and joints as well as stomach and intestinal pain, should frequently eat plenty of well-cooked beef trotters, including fat and calluses. That soon gets rid of the pain.“

Paris, National Library, Cod. 6952



Justus von Liebig
(1803 – 1873)

“Collagen glue” can Contribute to Rebuild and Maintain

Collagen Structures and could cause an Increase in Collagen Mass

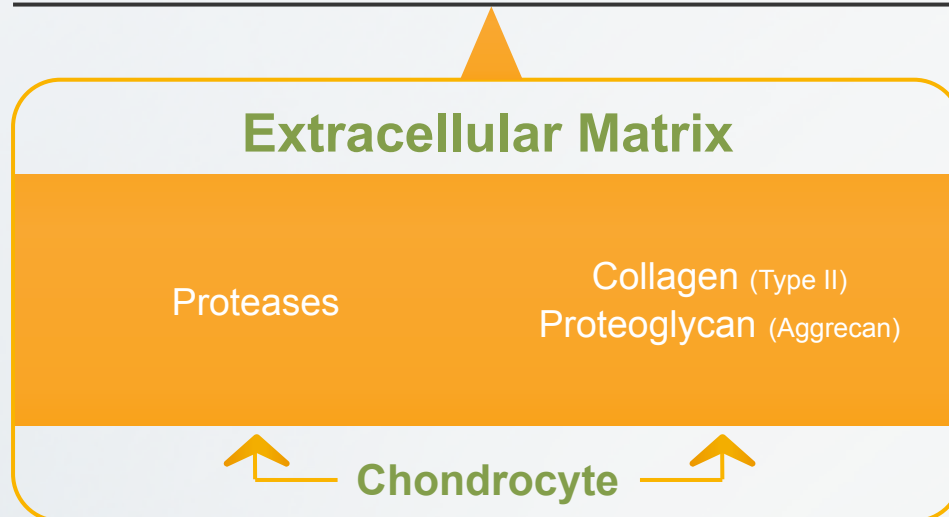
³⁷⁴ Voit (1872) S. 310. Originalquelle: Liebig, Thierchemie, 2. Auflage, 1843, S. 100.

Healthy Joint Cartilage

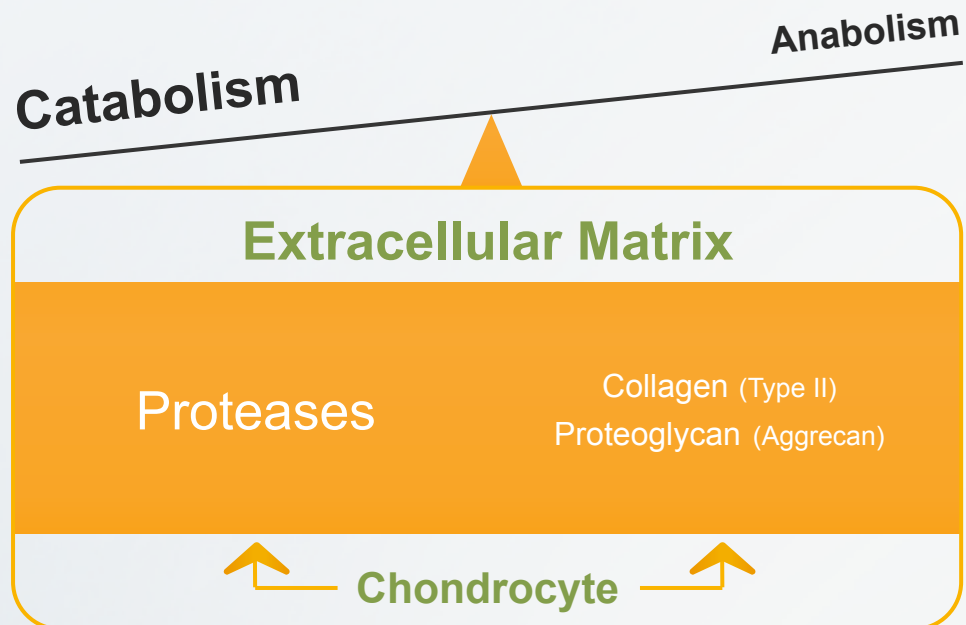


Catabolism

Anabolism

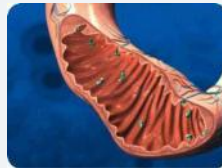


Cartilage Degeneration



GELITA Collagen Peptides Preclinical Research Path

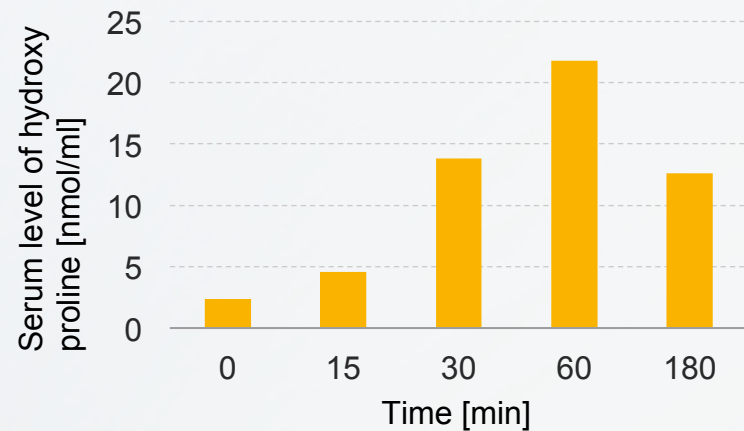
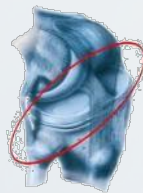
Rapidly absorbed,
partially in intact form



Distribution &
accumulation in the
target organ



Stimulatory and
regulatory effect in
bones, joints and the
skin

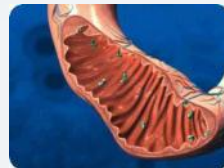


Iwai et al. (2005) J. Agric. Food Chem. 53: 6531-6536 (modified)

- Excellent and rapid absorption of collagen peptides after oral uptake (Iwai et al. 2005)
- Significant and continuous increase of collagen-specific amino acids in human blood after collagen peptide supplementation (Beuker et al. 1993)

GELITA Collagen Peptides Preclinical Research Path

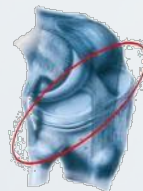
Rapidly absorbed,
partially in intact form



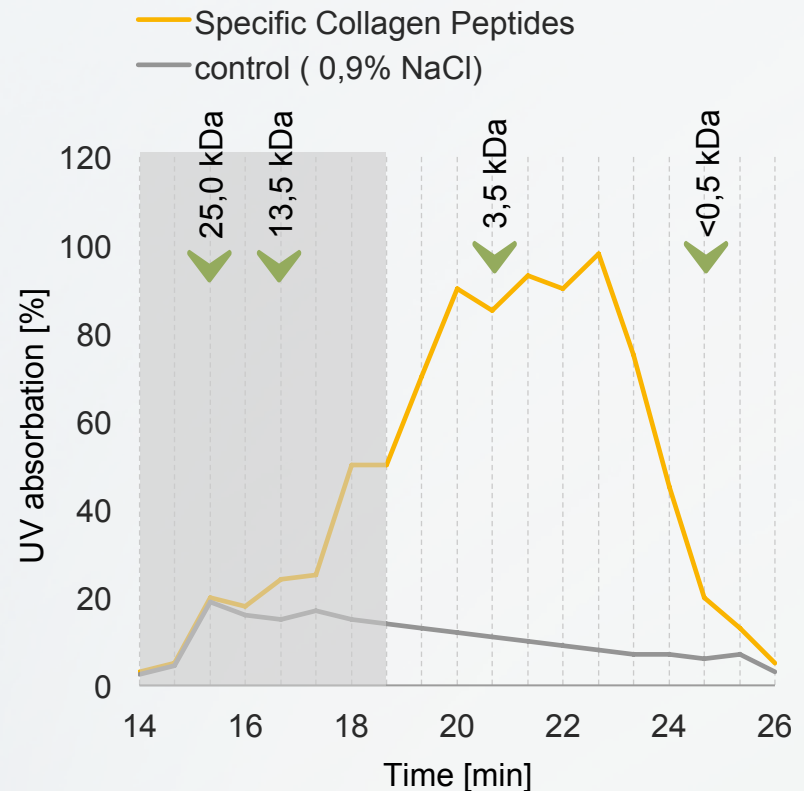
Distribution & accumulation in the target organ



Stimulatory and regulatory effect in bones, joints and the skin



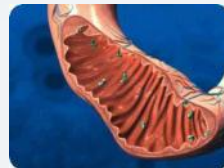
Absorption profile of SCP



Oesser et al., J. Nutr. (1999), 129, (modified)

GELITA Collagen Peptides Preclinical Research Path

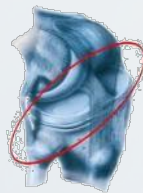
Rapidly absorbed,
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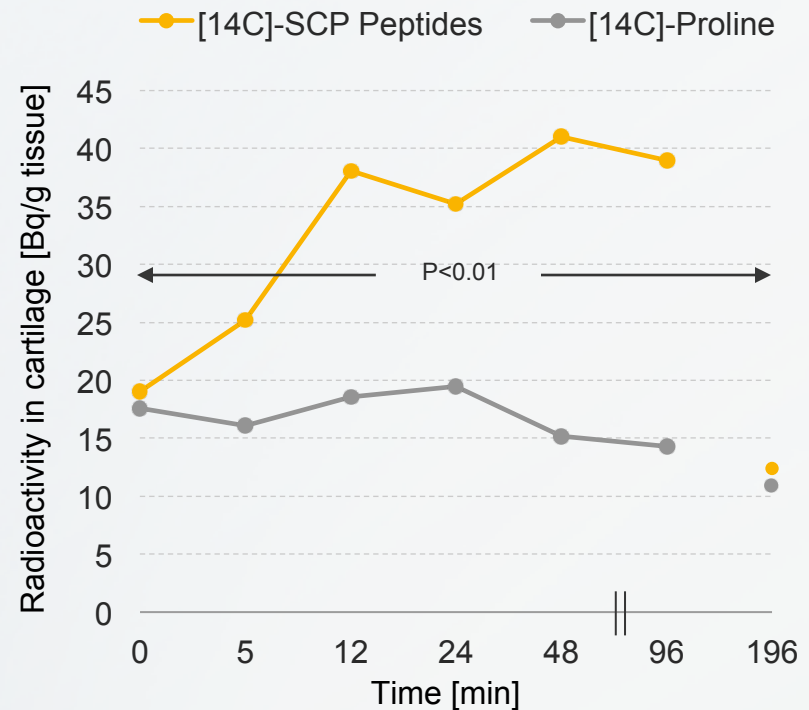
Distribution & accumulation in the target organ



Stimulatory and regulatory effect in bones, joints and the skin



Accumulation of SCP peptides in cartilage tissue

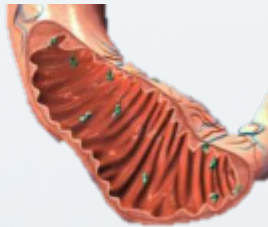


Oesser et. J. Nutr. (1999) 129 (modified)

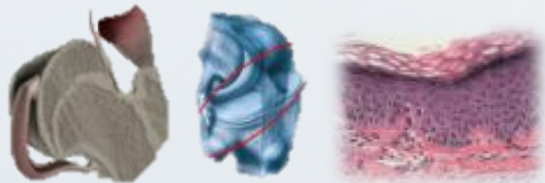
GELITA Collagen Peptides

Preclinical Research Path

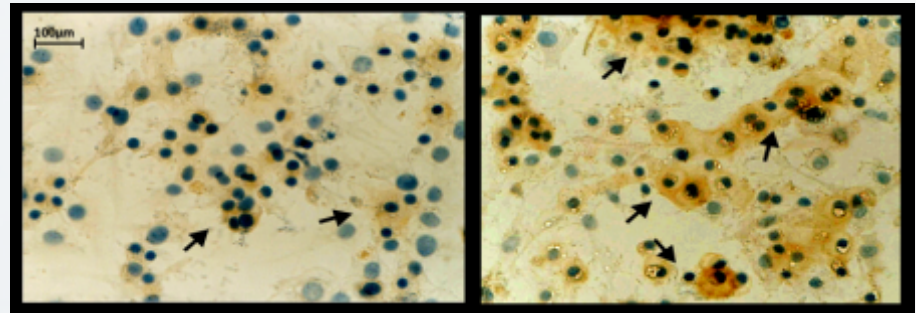
Rapidly absorbed, partially in intact form



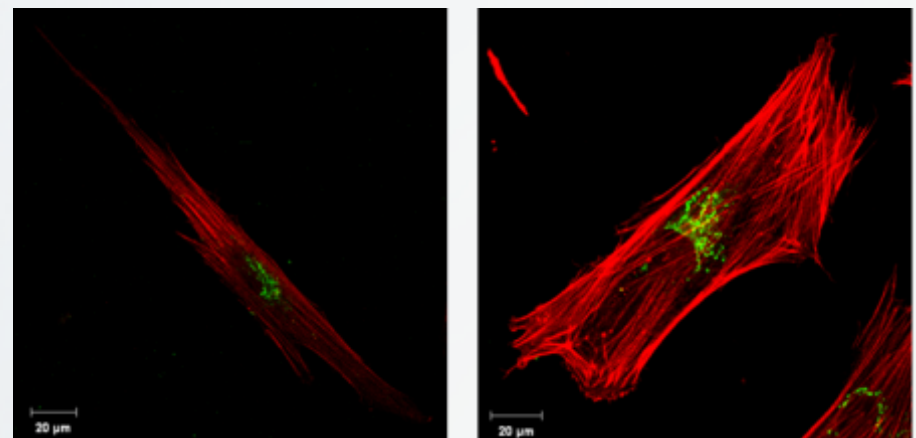
Distribution & accumulation in the target organ



Stimulatory and regulatory effect in bones, joints and the skin



Chondrocytes



Fibroblasts

Without CP

With CP

Target Group Specific Solutions



- cellulite



- beauty



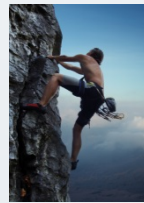
- weight management



- bone stability



- bone density



- increased performance



- body toning



- healthy joints



- sarcopenia

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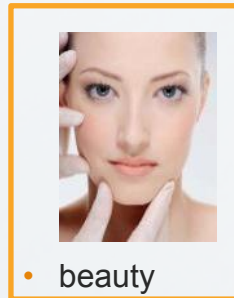
80



Target Group Specific Solutions



- cellulite



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GELITA Collagen Peptides for Beauty Applications



- Scientific backup for communication with consumers
- Recommended dosage of 5-10g / day.
- Halal certified fish and bovine grades available
- Excellent sensory profile for manifold applications



CDIAL Halal approved / accepted by MUI Indonesia

Beauty-From-Within Matters: Skin Ageing

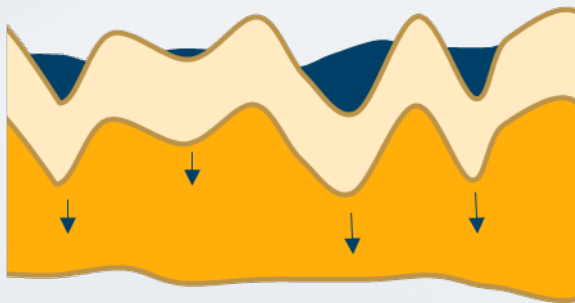
- Collagen is the major structural component of skin (mainly in dermis), comprising about 80% of dry skin weight.
- Collagen mainly influences skins water binding capacity, elasticity and outside appearance (wrinkles).
- Loss of Collagen starts with the age of ~ 30 and significantly increase after menopause (2% p.a.).



* after menopause, Chung et al 2001; Li et al 2005, Patriarca et al 2007

Why Beauty-From-Within Matters:

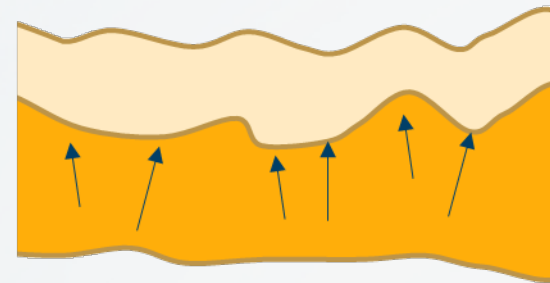
Topical masking & temporary improvement of skin conditions



Effect of Topical Cosmetics and Increased Aging



Significant, sustained & cause related improvement of skin conditions



Effect of Beauty-From-Within

Improvement in Skin Moisture – Ohara et al. 2009

Study Design

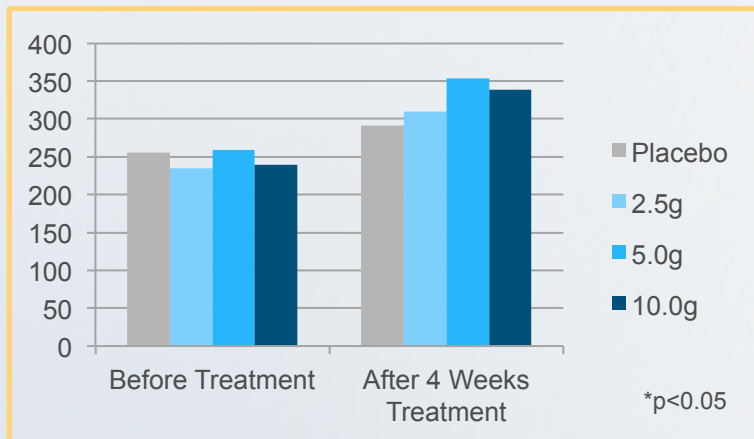
- Double blind, placebo controlled, randomized
- Participants: 214 healthy female volunteers (mean age 34.1 +- 5.9 years)
- Supplementation: Collagen peptides oral dosage 2.5g, 5.0g and 10.0g per day vs. placebo
- Test period: 4 weeks
- Parameters tested:
 - Moisture content of stratum corneum (outer layer of epidermis)
 - Skin firmness
 - Transepidermal water loss
 - Viscoelasticity

Improvement in the Skin Moisture Content of Stratum Corneum Following 4 Weeks of Collagen Peptides Ingestion, Ohara et al. (2009)

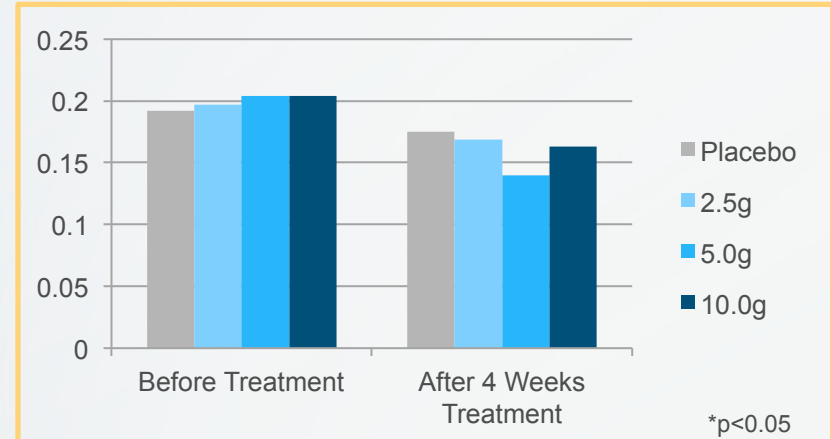
Improvement in Skin Moisture – Study Results

- Significant increase in moisture content in all groups
- No significance was measured for moisture content, transepidermal water loss or viscoelasticity for the collagen peptide groups vs placebo
- A subgroup analysis in subjects > 30 years old showed a significant dose-dependent effect in skin moisture for collagen peptides vs placebo
- A dose-dependent effect in skin firmness with significant results was observed for 5 and 10g collagen peptides vs placebo

Skin Moisture (μ S) in Subgroup Age >30*



Skin Firmness R0 (mm)*



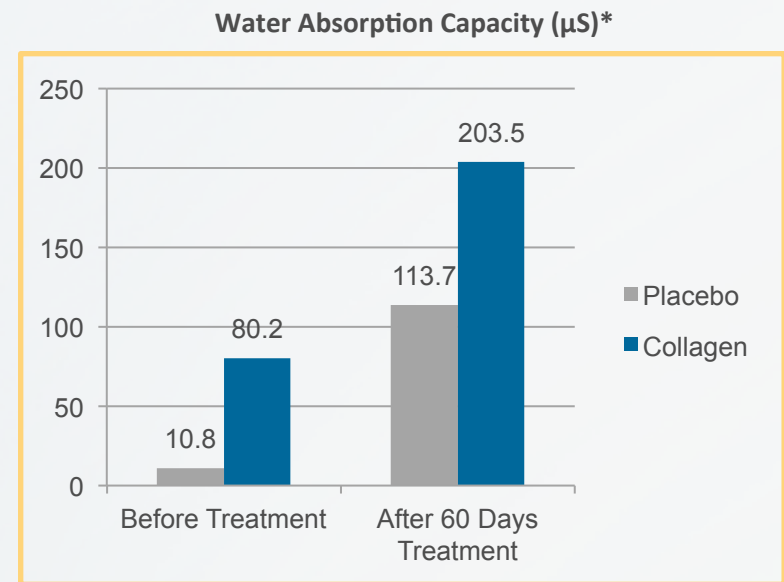
The Effect of Oral Ingestion of Collagen Peptide on Skin Hydration – Sumida et al. (2004)

Study Design

- Double blind, placebo controlled, randomized
- 39 healthy Japanese women (aged 20 - 30 years)
- Supplementation: Collagen peptides oral dosage of 10g per day vs. placebo
- Test period: 60 days
- Parameters tested:
 - Water absorption ability of stratum corneum (outer layer of epidermis)

Results

- Water absorption ability of stratum corneum of volunteers who ingested 10g of collagen peptides daily increased gradually through 60 days vs placebo



* adapted from Sumida et al. (2004)

Exemplary Products With GELITA PEPTIPLUS®

Advantages

- Excellent solubility
- Neutral taste and odour
- Excellent stability in beverages
- Compressible into tablet format
- Applicable in UHT milk products



NUTRICE, BR: Skin Lift

Beauty from within



- Powder sachet
- Dosage: 8.1g/day Collagen peptide
- Direct marketing/ sold in drugstore

Country: **BR**
Category: **Dietary supplement**
Channel: **Direct marketing**
Package type: **Sachet (10 g)**
Package size: **30 x 10g**
Flavor: **diverse**
Total protein content per serv.: **8.1g**
Collagen peptide content per serv.: **8.1g**

Medex, SI: Kolagen u prahu

Beauty from within



Country: **Slovenia**
Category: **Dietary supplement**
Channel: **health stores / supermarkets**
Package type: **can**
Package size: **150 g**
Flavor: **unflavored**
Total protein content: **10 g/serving**
Collagen peptide content: **10.0 g/serv.**

- 10g GELITA Collagen Peptides
- 100% hydrolyzed collagen
- For Hair and Nails
- Target group: women

Guangzhou Cotime Healthcare Food Co., Ltd., CN: Fishburg Collagen

Beauty from within



Country: **CN**
Category: **dietary supplement**
Channel: **MLM**
Package type: **sachet**
Package size: **6g per sachet**
Flavor: **Natural**
Total protein content: **5.8g/serving**
Collagen peptide content: **5.8 g/serv.**

- Powder Sachet
- 5.8g Collagen Peptides
- Contains vitamin C
- Improves skin moisture

INOVA, CO: Colageína 10

**Premium Beauty from within
Regain Beautiful Skin**



Country: **Columbia**
Category: **Dietary supplement**
Channel: **TV Direct Sales**
Product type: **can with powder**
Package size: **195 g**
Flavor: **Orange**
Total protein content per serv.: **ca. 177 g**
Collagen peptide content per serv.: **ca. 177g**

- Powder mix with collagen peptides
- Dosage: 5.9 g/serving
- Beauty from Within
- Targeting (menopausal) women
- TV Direct Sales

Vinamilk, Vietnam: ProBeauty

Beauty from Within



Country: **Vietnam**
 Category: **Dairy product**
 Channel: **Mass Market**
 Package type: **Cup**
 Package size: **100 g per cup**
 Flavor: **Blueberry / Pomegranate**
 Total protein content: **4,2 g/ 100g**
 Collagen peptide content: **1,35 g/ 100g**

- Yoghurt
- 1,35 g Collagen Peptides in 100g yoghurt
- 2,7 g Collagen Peptides in 2 cups
- 9,0 mg Vitamin C in 100g yoghurt
- Beauty from Within
- Targets women
- US\$ 40 cents/cup
- Marketing expense: 2MM Euro

Vinamilk, Vietnam: ProBeauty

<http://www.youtube.com/watch?v=zJdEzCnJw7Y>

Target Group Specific Solutions



- cellulite



- beauty



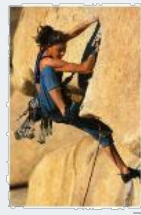
- weight management



- bone stability



- bone density



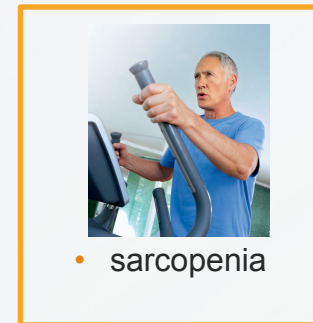
- increased performance



- body toning



- healthy joints



- sarcopenia

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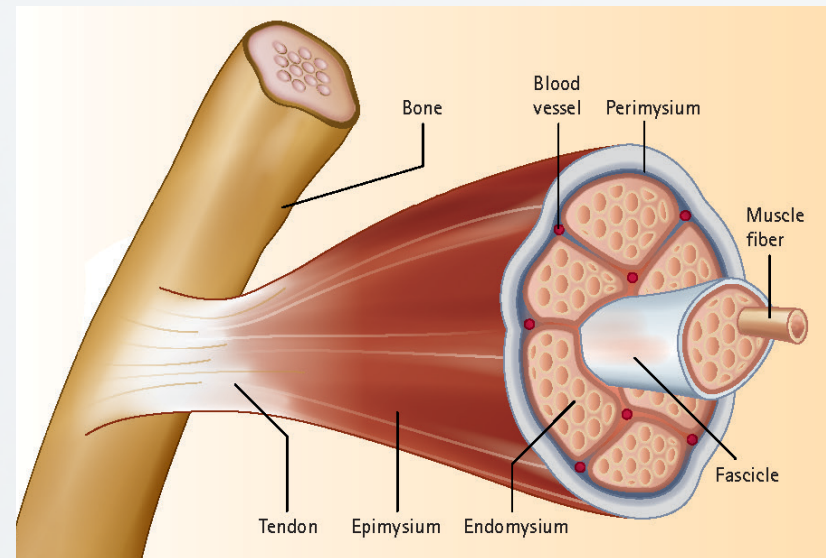


Sarcopenia – Suggested Definition

Sarcopenia:

age related loss of muscle mass, strength and / or functionality

- 8% loss of muscle mass per decade – age 40-70
- 15% loss of muscle mass per decade after 70



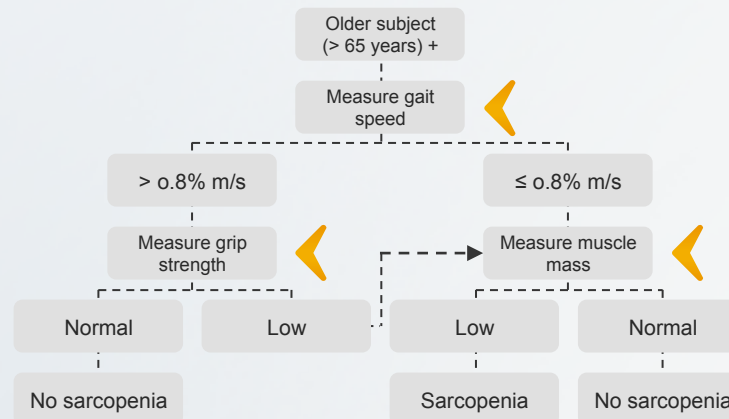
Cruz-Jentoft et al. 'Sarcopenia: European consensus on definition and diagnosis'; Age and Ageing 2010; 39; 412-423
Benton MJ AJN; December 2011; Volume III; Issue 12; p. 38-44

Sarcopenia – Suggested Classification and Determination

“Conceptual stages of sarcopenia” (EWGS OP):

Stage	Muscle mass	Muscle strength	Performance
Presarcopenia	▼		
Sarcopenia	▼	▼	Or ▼
Severe sarcopenia	▼	▼	▼

Suggested algorithm for case finding in older individuals:



Cruz-Jentoft et al. ‘Sarcopenia: European consensus on definition and diagnosis’; Age and Ageing 2010; 39; 412-423

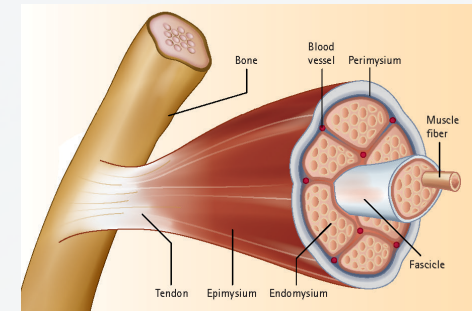
Importance of Lean Body Mass / Muscle Mass

Lean body mass (LBM):

- Anything but fat (muscle, organs, bone)
- Accounts for about 75% of normal body weight
- Muscle is the largest component of LBM

Functions of skeletal muscle:

- Mobility, balance and physical strength
- Generates heat (energy)
- Protein / amino acid pool for skin, immune & digestive system
- Survival during periods of metabolic strength



➤ **Body toning (transformation of fat mass into muscle mass) is an important aspect for fitness, wellbeing and weight management.**

For Muscle Maintenance:

Exercise

- Type (resistance exercise)
- Frequency



Nutrition

- Macronutrients (protein)
- Micronutrients (minerals & vitamins)
- Timing (in close proximity to exercise)



Is it Really all about Essential Amino Acids?

Essential amino acids can't be synthesized by the human body, must be included in the diet

Conditionally essential amino acids are non-essential amino acids which the body cannot synthesize in the required amount in certain situations or during certain life stages, e.g.

- Recovery from intense activities
- Suffering or recovering from injuries and diseases
- Being at a life stage where nutrient absorption and metabolism capabilities are slower
- Being under stress

Collagen Peptide contain a high concentration of conditionally essential AAs

TABLE 10-1 Indispensable, Dispensable, and Conditionally Indispensable Amino Acids in the Human Diet

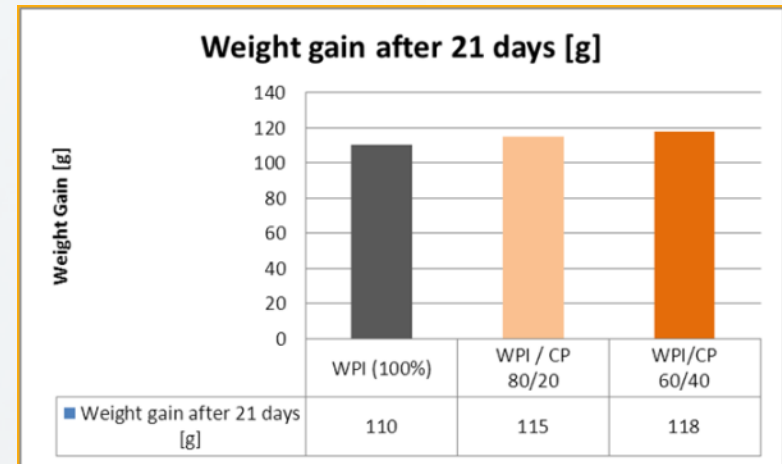
Indispensable	Dispensable	Conditionally Indispensable ^a	Precursors of Conditionally Indispensable
Histidine ^b	Alanine	Arginine	Glutamine/glutamate, aspartate
Isoleucine	Aspartic acid	Cysteine	Methionine, serine
Leucine	Asparagine	Glutamine	Glutamic acid/ammonia
Lysine	Glutamic acid	Glycine	Serine, choline
Methionine	Serine	Proline	Glutamate
Phenylalanine		Tyrosine	Phenylalanine
Threonine			
Tryptophan			
Valine			

^a Conditionally indispensable is defined as requiring a dietary source when endogenous synthesis cannot meet metabolic need.

^b Although histidine is considered indispensable, unlike the other eight indispensable amino acids, it does not fulfill the criteria used in this report of reducing protein deposition and inducing negative nitrogen balance promptly upon removal from the diet. SOURCE: Laidlaw and Kopple (1987).

Mixtures of WPI and Collagen Peptides Result in Same Growth Rate of Rats

- No significant difference in growth of rats between Whey Protein Isolate (WPI) and 60/40 mixtures of WPI and Collagen Peptides (CP).
- In all other indexes of protein nutritive value the 60/40 mixture of WPI and CP revealed equal or superior to casein and 100% WPI.



Ziegler et al., Rev. Nutr. Campinas, 22(1); 61 – 70, jan./feb., 2009 (adapted)

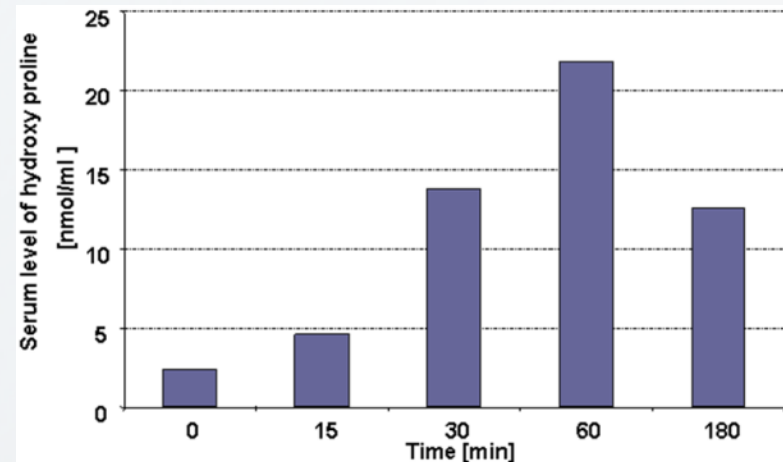
Tabela 3. Valores obtidos para nitrogênio (N) ingerido, nitrogênio fecal, digestibilidade (D) verdadeira e PDCAAS para ratos em dietas com 12% proteína de diferentes fontes.

Tratamento	N ingerido (g)		N fecal (g)		D (%)		PDCAAS (%)
	M	DP	M	DP	M	DP	M
CC	8,48	0,47 ^a	0,92	0,35 ^a	90,54	4,11 ^b	90,54 ^a
WPI	7,19	0,48 ^b	0,69	0,12 ^{ab}	92,07	1,47 ^b	92,07 ^a
HCB	2,70	0,52 ^c	0,16	0,06 ^d	98,45	2,85 ^a	0,00 ^a
WPI:HCB 20:80	6,39	1,05 ^b	0,58	0,08 ^b	92,69	1,65 ^b	46,34 ^d
WPI:HCB 40:60	6,41	0,82 ^b	0,54	0,21 ^{bc}	93,42	2,84 ^b	65,39 ^c
WPI:HCB 60:40	6,98	0,50 ^b	0,38	0,14 ^{bc}	96,23	2,25 ^a	76,89 ^b
WPI:HCB 80:20	7,38	0,24 ^{ab}	0,62	0,19 ^{ab}	93,18	2,36 ^b	83,86 ^a

Resultados são média (M) e desvio-padrão (DP) de 6 animais por tratamento ± desvio-padrão. Médias seguidas por uma mesma letra (coluna) não diferem entre si, ao nível de 5% de probabilidade pelo teste de Tukey.

Collagen Peptides: A Highly Available Source of Protein

- Excellent and rapid absorption of collagen peptides after oral uptake
- Significant and continuous increase of collagen-specific amino acids in human blood after collagen peptide supplementation
- Rapid absorption important for post-exercise recovery



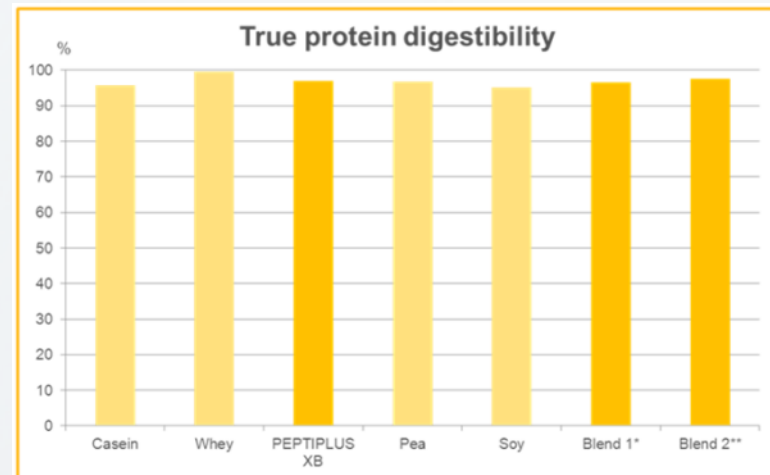
Iwai et al.(2005) J. Agric. Food Chem.; modified

High Digestibility of Collagen Peptide Confirmed in Comparison with Other Proteins

- Animal study (NIZO, NL, 2013) confirms high digestibility of Collagen Peptides in blends and as such.
- Study conducted with male WISTAR Unilever weanling rats, 8 per protein group; 50 – 70 g body weight each.
- True protein digestibility:

$$TD\% = \frac{N_i - (F_n - M_n)}{N_i} \times 100 \%$$

- Ni = nitrogen intake = food intake day 5-9 x nitrogen content
- Fn = faecal nitrogen = faecal weight x nitrogen content
- Mn = faecal metabolic nitrogen loss (due to e.g. micro-biological activity in large intestine \square gas production)



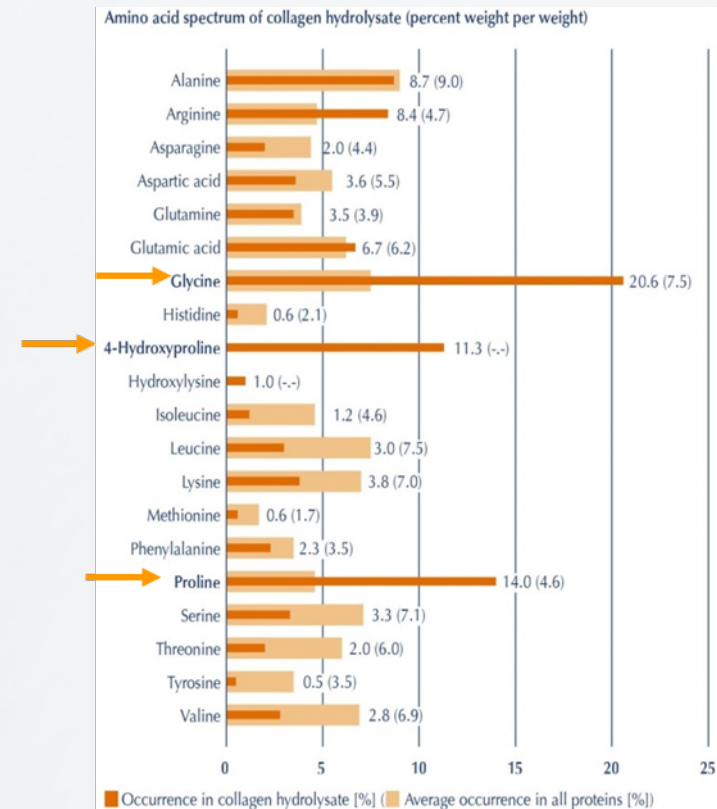
Data generated by NIZO, NL: 2013

Blend 1: 57.1 % Collagen peptide; 21.4 % Pea protein; 21.4 % Soy protein

Blend 2: 50 % Collagen peptide; 50 % Whey protein isolate

Collagen Peptides – Unique Amino Acid Profile

- About 30% of body's protein is collagen
- Collagen is the main component of connective tissue
- High content of conditionally essential & glycogenic amino acids, e.g.:
 - Arginine: Precursor for nitric oxide (NO)
 - Glycine: Precursor of glutathione (endogenous anti-oxidant)
 - Glycine and Arginine: Creatine precursor



Comparison between AAs of average food proteins considered “complete proteins” versus food sources of collagen proteins.

Courtesy: GELITA Health CH-Alpha Monograph

Sarcopenia Study (2009)

Study Design:

- Blinded comparative, cross-over study, whey protein vs. tryptophan fortified collagen peptide (fCP) diet
- 9 woman, 71 +/- 1 year, no exercise
- Protein supplementation: 0,8 g/kg body weight, 15 days, ~ 1 week washout in-between trials

Result:

- Whey protein group showed significant higher nitrogen excretion and body weight decrease with no difference on body fat
- fCP diet maintained nitrogen balance and preserved lean body mass

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Research and Professional Briefs

RESEARCH

Effects of Whey and Fortified Collagen Hydrolysate Protein Supplements on Nitrogen Balance and Body Composition in Older Women

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ABSTRACT
Many elderly people have a low intake of dietary protein, yet their protein requirement may be higher than the current Recommended Dietary Allowance. High-quality protein supplements may be useful to enhance nitrogen retention and increase the availability of essential amino acids in elderly people. We compared the nitrogen balance of two protein supplements (Resource Biotecprotein Instant Protein Powder, Nestlé HealthCare Nutrition, Minnetonka, MN, a whey protein concentrate; or Pro-Sit 101, Medical Nutrition USA, Englewood, NJ, a concentrated, fortified, collagen protein hydrolysate) varying in type but not amount of protein content using a crossover study design. The study consisted of two 15-day diet trials separated by a ≥1-week washout period. Nine healthy elderly women (age 71±1 years) were provided a eu-

letic diet containing approximately the protein Recommended Dietary Allowance of 0.8 g/kg body weight/day. The supplements constituted about half of the total protein provided to each subject. Nitrogen balance responses were assessed over days 8 to 10 and days 11 to 14 of each trial. Measured nitrogen content of the foods indicated that subjects consumed 0.81±0.02 g protein/kg/day and 0.85±0.05 g/kg/day for the whey and fortified collagen protein trials, respectively. Body weight decreased ($P=0.02$) after consumption of the whey supplement, with no significant changes in body weight or composition resulting from the consumption of the collagen supplement. Nitrogen excretion was higher during the whey supplement trial than during the collagen trial ($P=0.047$). Therefore, a concentrated, fortified, hydrolyzed collagen protein supplement maintained nitrogen balance and preserved lean body mass during 15 days of consumption of a relatively low-protein diet.

J Am Diet Assoc. 2009;109:1082-1087.

Adequate dietary protein is essential to maintain lean body mass and provide adequate amounts of amino acids for protein synthesis in all tissues. Sarcopenia is the age-associated loss of muscle mass (1) and is associated with an increase in body fat, decreased basal metabolic rate and daily energy needs, loss of bone mass, and reduced strength and functional status (2). A growing body of evidence indicates that aging may be associated with increased need for dietary protein (3-5) and that consumption of a eucalear diet providing the Recommended Dietary Allowance (RDA) for protein (0.8 g/kg body weight/day) results in a significant loss of muscle mass in healthy older men and women (6). Several nutrition surveys demonstrate that a significant percentage of free-living, community-dwelling elderly people as well as those living in long-term care facilities consume less than the current RDA for protein (7,8), which may result in the loss of skeletal muscle mass (9,10) and subsequent morbidity, functional decline, and mortality.

Given that many elderly people consume a relatively low-protein diet at the same time that dietary protein requirements are likely increased, a high quality, low-fat protein supplement has been shown to reduce complications and decrease mortality for those in a hospital setting (10). Both whey and fortified collagen are marketed and used in long-term care settings to increase dietary protein intake in elderly people with low food intake (11). The purpose of this study was to compare two commonly used protein supplements on nitrogen balance and

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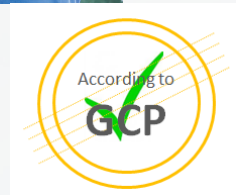
Manuscript accepted: October 3, 2008.
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Freiburg Sarcopenia Study (2013)

Study Design

- Double blind, randomized, placebo controlled study
- Subjects: n = 60 men aged 65 +, Sarcopenia class I & II, 6 drop outs
- Weight: ca. 85kg, body fat: ca. 30%
- 15g PEPTIPLUS® or placebo – daily intake
- Duration: 3 months
- Including 3x60min training per week
- Primary outcome: gain of fat and fat free mass (DXA)
- Secondary outcome: isokinetic leg strength



Conclusion

- Exercise supports stimulation of muscular anabolic response
- Collagen peptides have shown to improve lean body mass and reduce fat mass following resistance exercise significantly compared with placebo

PEPTIPLUS® Significantly Improves Body Composition

- Fat free mass significantly increased by 1,3 kg in Peptiplus group versus placebo
→ ~ 50% higher muscle gain
- Fat mass significantly decreased by 1,9 kg in Peptiplus group versus placebo
→ ~ 50% higher fat loss
- Almost no change in body weight, but ca. 13.5% reduction of body fat in the placebo group and ca. 20% reduction in the PEPTIPLUS® group.

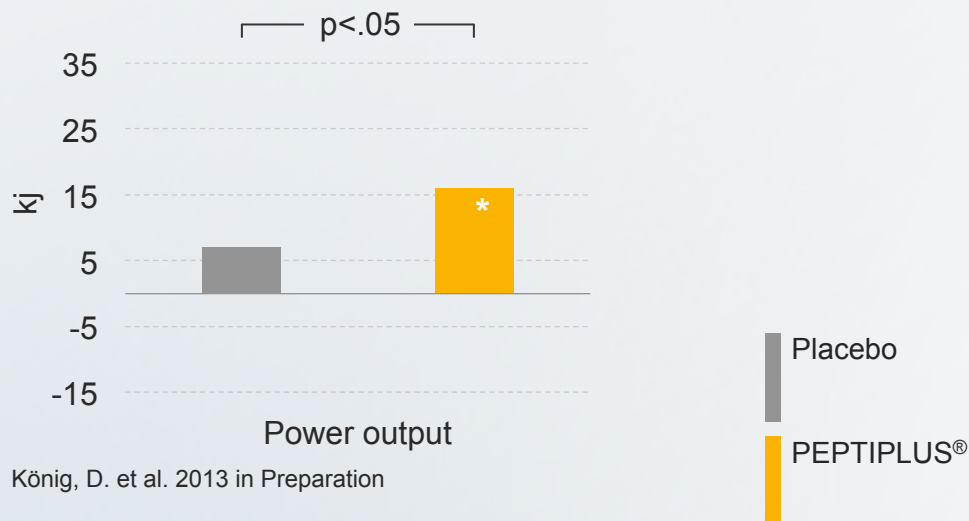


König, D. et al. 2013 in Preparation



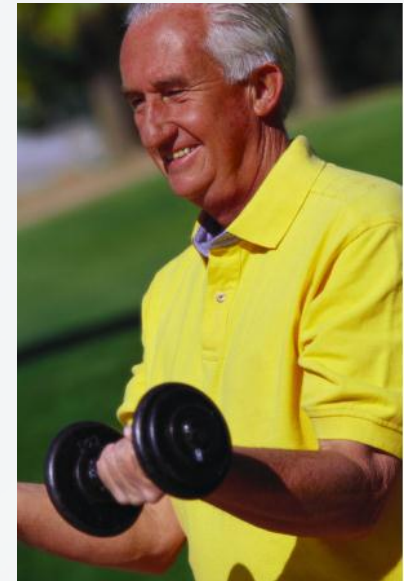
PEPTIPLUS® Significantly Improves Power Output

- Power output increased significantly by ~ 100%
- Compared to a muscle mass increase of 50%, thus also the muscle quality is increased



Overall Comparison of Findings in Respect to Lean Body Mass and Fat Mass

- The group doing resistance exercise in combination with supplementation of specific collagen peptides (PEPTIPLUS®) in close proximity to exercise increased lean body mass and decreased fat mass significantly compared to the group with non-caloric placebo 'doing exercise alone'
→ improved body composition
- The effects were more pronounced than the impact seen in the previously described studies with multi-protein blends (mainly whey based) and soy.



Target Group Specific Solutions



- cellulite



- beauty



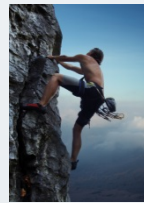
- weight management



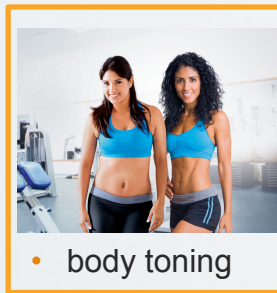
- bone stability



- bone density



- increased performance



- body toning



- healthy joints



- sarcopenia

10

20

30

40

50

60

70

80



Freiburg Body Toning Study (2014)

Study Design (Draft)

- Double blind, randomized, placebo controlled study
- Subjects: n = 60 men aged 35 - 65
- 15g PEPTIPLUS® or placebo – daily intake
- Duration: 3 months
- Including 3x60min training per week
- Primary outcome: gain of fat and fat free mass (DXA)
- Secondary outcome: isokinetic leg strength

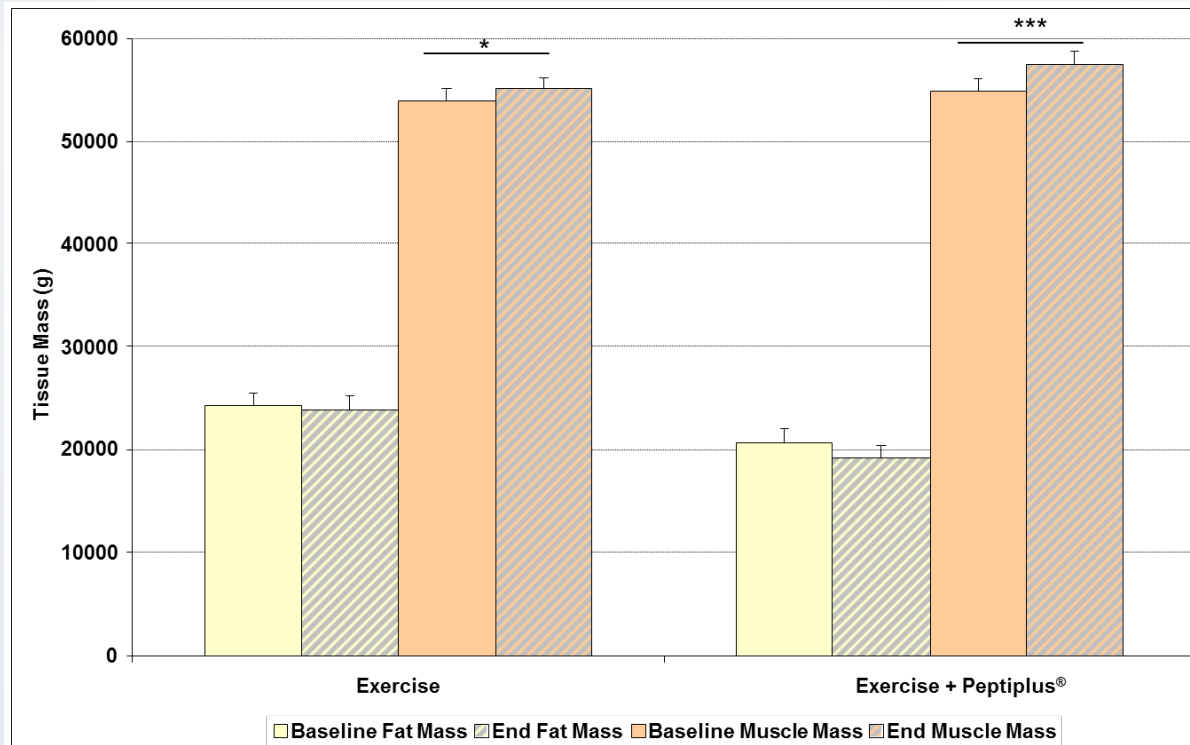


Conclusion

- Exercise supports stimulation of muscular anabolic response
- Collagen peptides have shown to improve lean body mass and reduce fat mass following resistance exercise significantly compared with baseline and against placebo in the group of with > 25% fat mass.

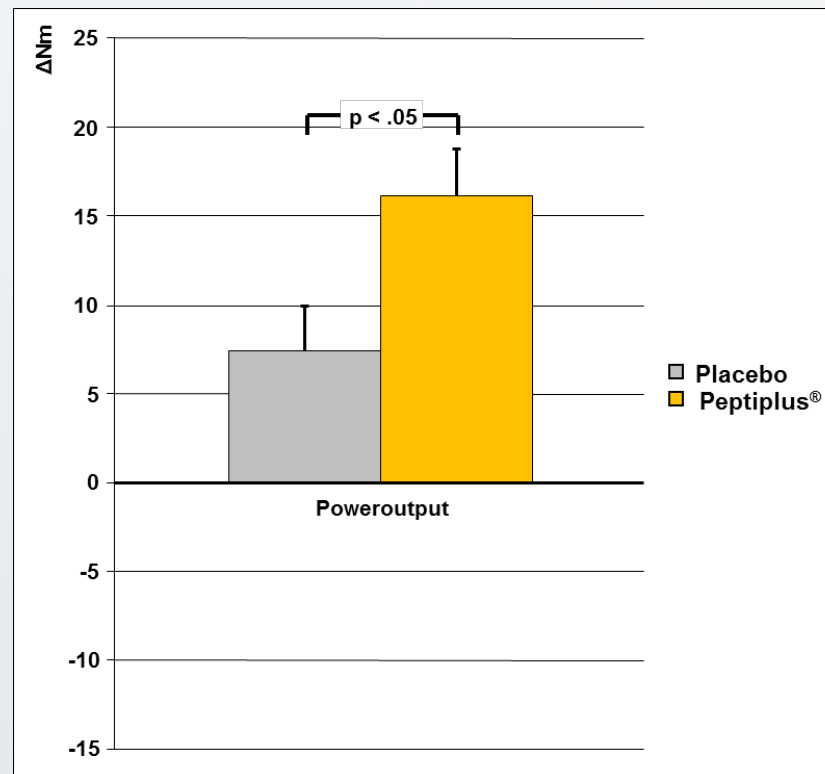
PEPTIPLUS® Significantly Improves Muscle Mass

- Significant increase of muscle mass in placebo and verum group; effect is more pronounced after PEPTIPLUS® treatment



PEPTIPLUS® Significantly Increases Muscle Power

- Statistically significant Increase in Muscle Power Compared to Placebo in Accordance with the demonstrated Muscle Mass gain



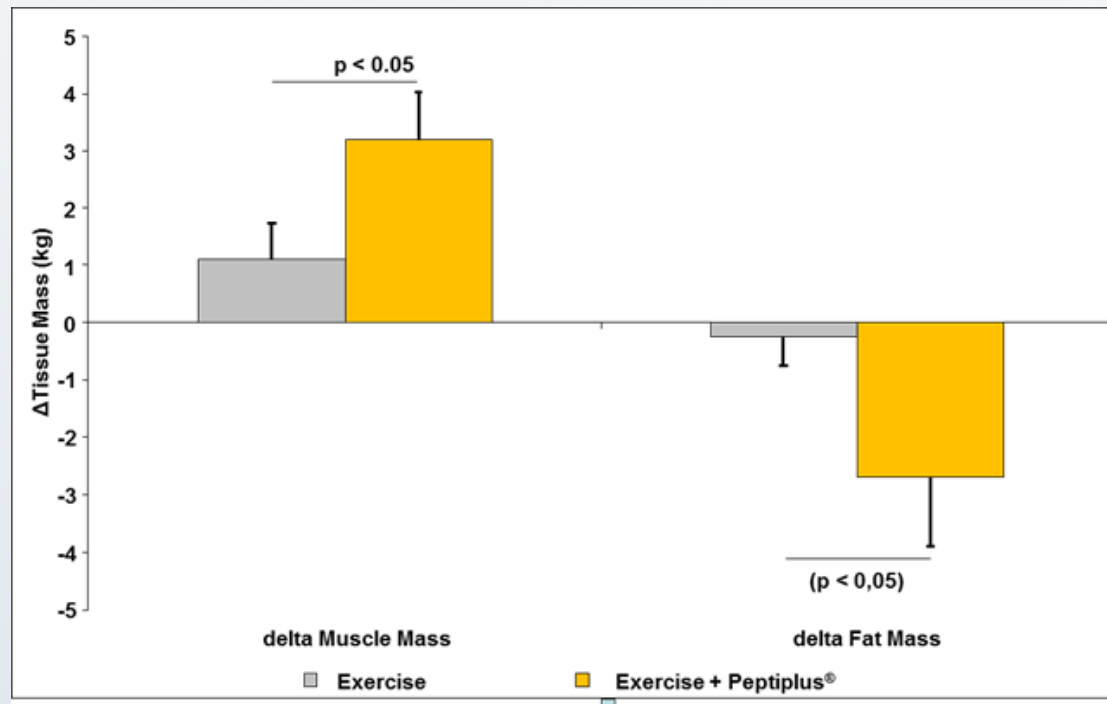
Influence of Body Composition on Effect Size

- Subgroup analysis of changes in fat and muscle mass with regard to the fat mass at baseline
- Effect of collagen protein fortification on improvement of body composition more pronounced in people with higher fat mass



Pronounced Muscle Mass Increase and Fat Mass Reduction after CP intake in Overweight Men

- Sub-group analysis including men with an initial fat mass > 25% of body mass.
- Statistically significant advantage of PEPTIPLUS® supplementation in combination with 3-month resistance training compared to merely training.



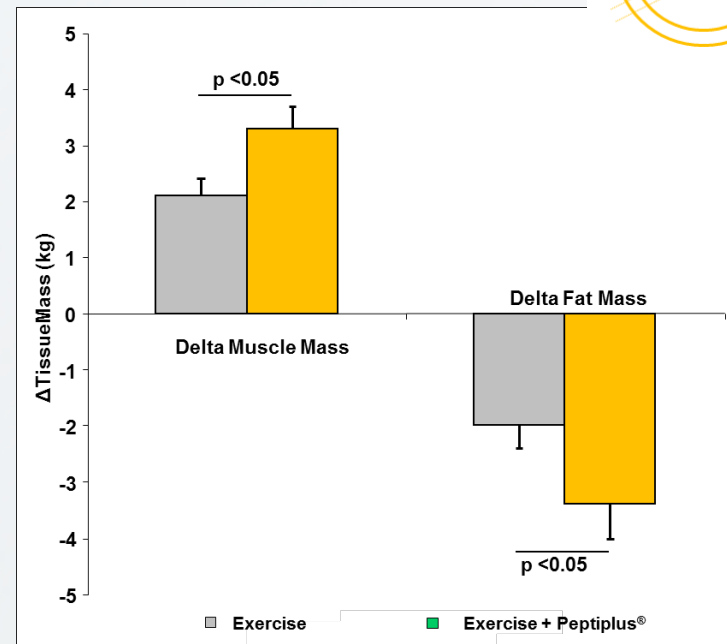
Meta-Analysis of 2 RCT Studies*: Effect of PEPTIPLUS® on Changes in Body Composition

- Balanced Study Groups and almost identical Study Designs.

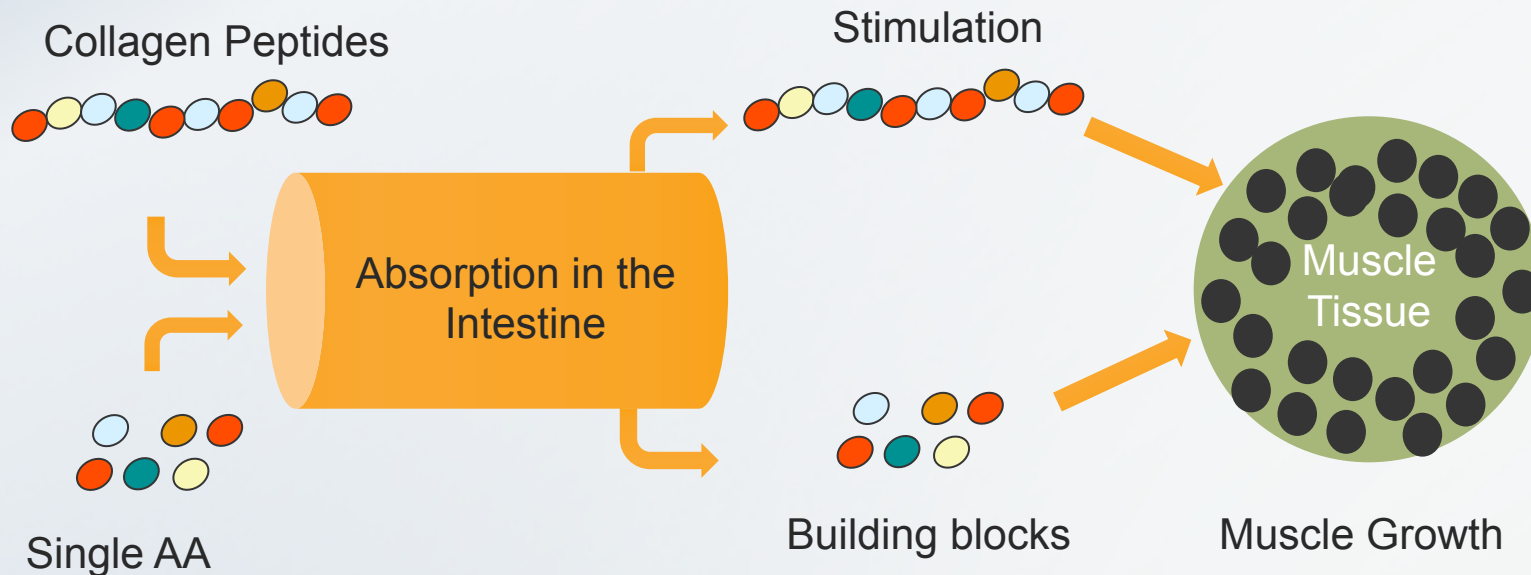
	Exercise	Exercise + CP
n	52	53
Age (yrs.)	60 ± 12	61 ± 12
Weight (kg)	82 ± 13	83 ± 13
Height (cm)	175 ± 4.7	175 ± 6.0

Body Toning Overall Conclusion

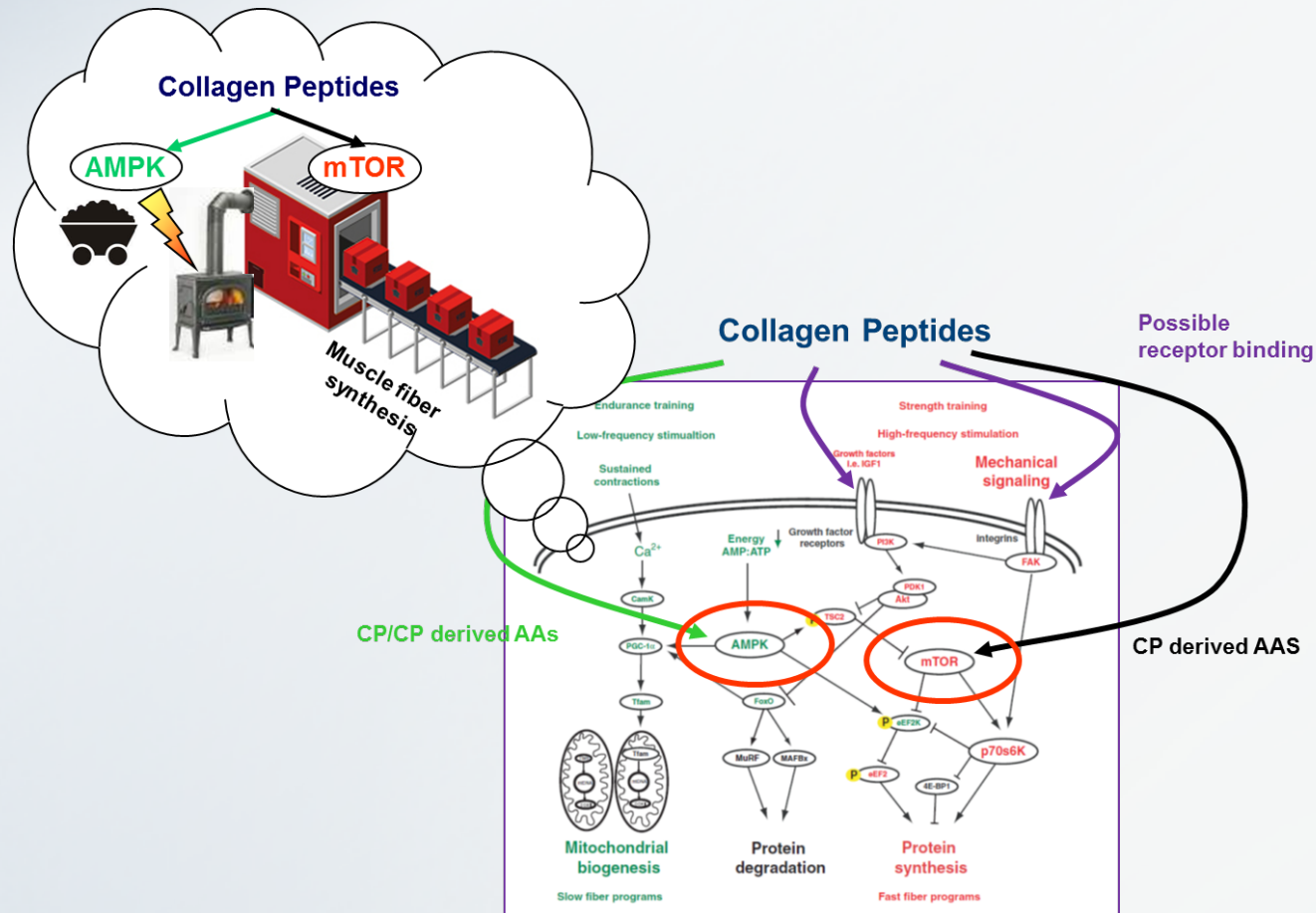
- PEPTIPLUS® supplementation in combination with 3-month resistance training demonstrated a statistically significant advantage compared to placebo indicated by an increase in muscle mass and reduction fat mass



The Role of AA and Peptides in Muscle Metabolism



Suggested Mode of Action – Stimulation of Muscle Formation with Peptiplus®



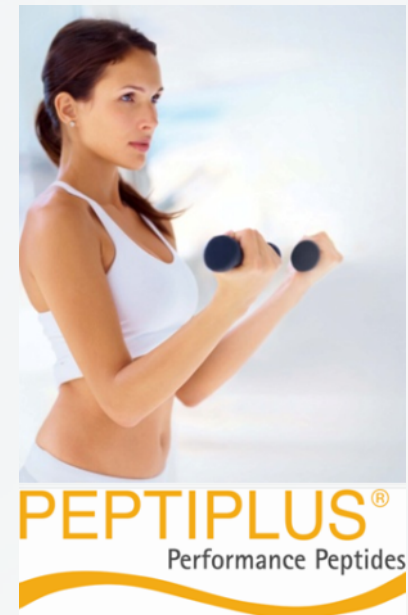
Dose Recommendation for Collagen Peptide based Protein Fortification

- Provided that the requirements for indispensable amino acids are fulfilled (19% of total protein intake for healthy adults*), 15g of collagen protein fortification is recommended.
- As pure collagen supplementation in addition to normal (low collagen) diet
- As mix with e.g. whey; 75/25 ration for a healthy adult (70 kg body weight, 0,8 g/kg body weight total protein intake, PDCAAS value ~ 80)

* Biesalski et al, Medical Nutrition, 3rd Edition (2004), p 107 (ISBN 3-13-100293-X)

Conclusion – PEPTIPLUS® Supports “Body Toning”

- Significant results for muscle growth and fat loss (Body Toning) with collagen peptides in a placebo-controlled study with 60 subjects underlines the need to reposition collagen peptides as valuable protein
- Science in protein is not written in stone. Mechanism of metabolic effects (building block and / or stimulation, amount of protein, impact of different amino acids e.g. EAA, CEAS, BCAA, timing of consumption) is by far not fully understood
- Specific collagen peptides (PEPTIPLUS®) can play a significant role for muscle maintenance / slowing the progress of sarcopenia



Protein Bars



Beautyin
Brazil



Atlantic Multipower
Germany



ALDI Süd, GER: Power Eiweiß Shake

Weight Management



Country: **Germany**
Category: **Fitness / Body Toning**
Channel: **Mass Market**
Package type: **can**
Package size: **360g**
Flavor: **chocolate and vanilla**
Total protein content: **33,7g/serving**

- GELITA Collagen Peptides
- Weight Management
- Dosage: 300ml low-fat-milk + 30g powder/serving
- 1-2 servings/day
- Target: gain and preserve muscle mass
- Channel: Mass Market („ALDI Süd“)

Ready-to-Drink Products using Collagen Peptides



PepsiCo
USA & UK



Red Bull
Thailand



Monster
USA



Scitec Nutrition
Hungary



Protein2o
USA



New Whey Nutrition
USA



NRGFUEL
UK

Thank you!

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