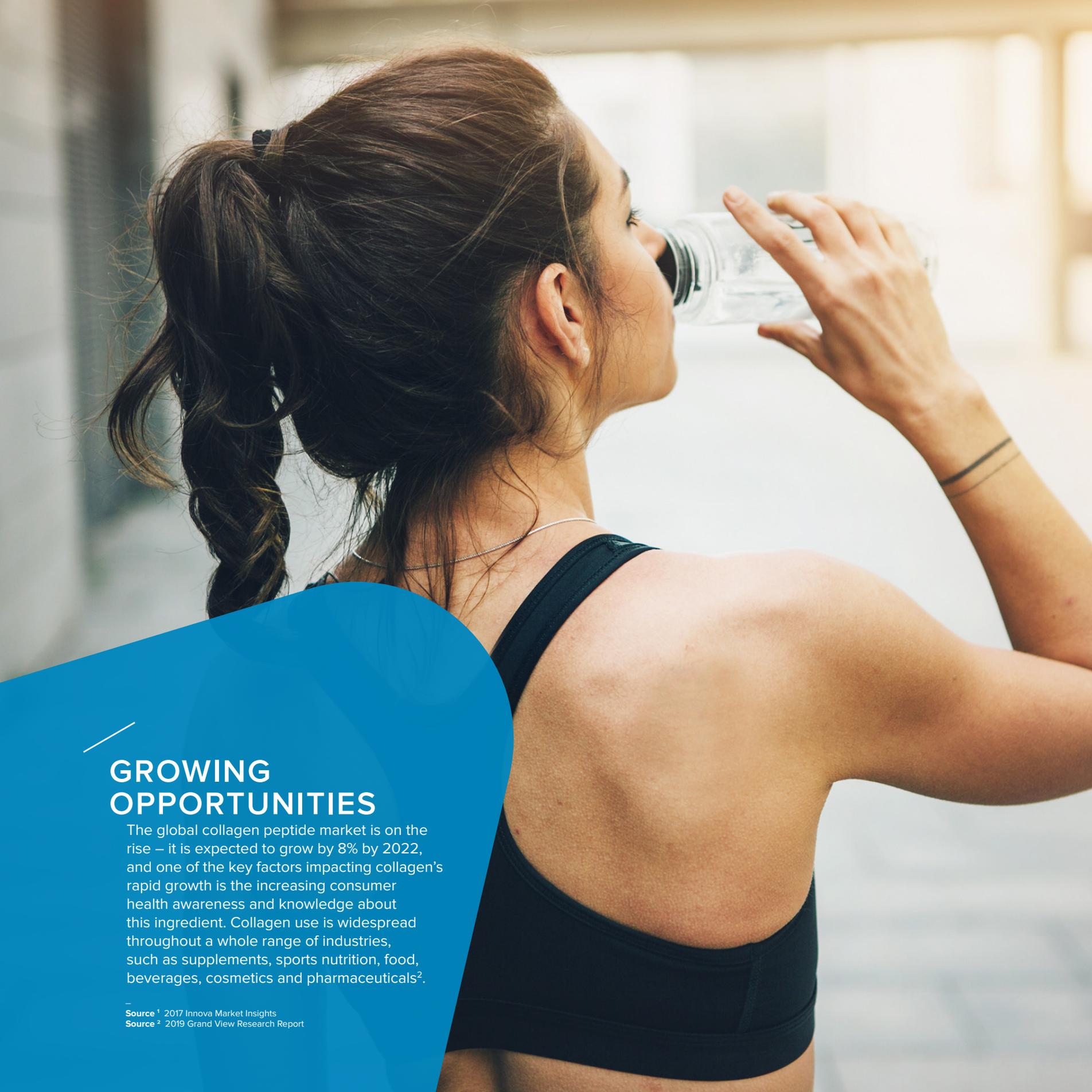


**SOLUGEL**<sup>®</sup>  
collagen peptides

**THE NATURAL SOLUTION**  
for your health



PB LEINER  
The Clear Solution



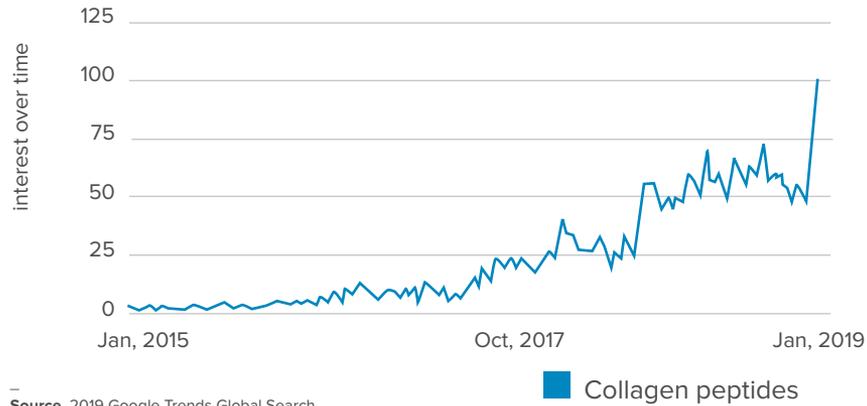
## GROWING OPPORTUNITIES

The global collagen peptide market is on the rise – it is expected to grow by 8% by 2022, and one of the key factors impacting collagen's rapid growth is the increasing consumer health awareness and knowledge about this ingredient. Collagen use is widespread throughout a whole range of industries, such as supplements, sports nutrition, food, beverages, cosmetics and pharmaceuticals<sup>2</sup>.

—  
Source <sup>1</sup> 2017 Innova Market Insights

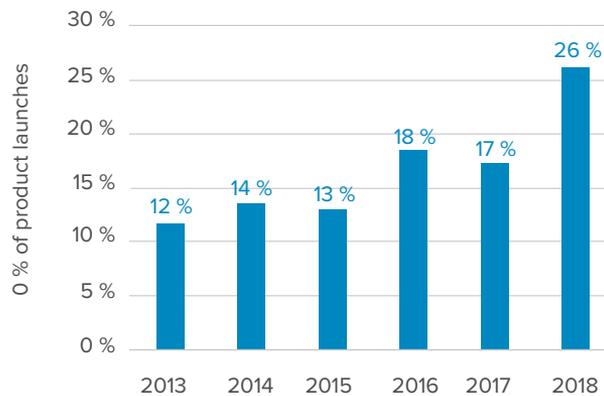
Source <sup>2</sup> 2019 Grand View Research Report

The consumers' growing interest in collagen peptides is also reflected in their online behavior. According to Google Trends, consumer interest in collagen peptides has dramatically increased in recent years as they look for information about collagen peptides and their health and beauty benefits online.



Source 2019 Google Trends Global Search

Consumers' demand for collagen has naturally driven new product development (NPD) in the recent years, with over 25% of increase in new product launches in 2018 compared to 2017. Consumers around the world are becoming more and more aware of the benefits of nutritionally enhanced products, as well as the health impact of natural ingredients, such as collagen, in their food and beverages.



Source Innova Market Insights - New product launches featuring collagen

Source <sup>3</sup> 2019 Innova Market Insights



## SOLUGEL® COLLAGEN PEPTIDES

Collagen is the most abundant protein in the human body, and it accounts for over 30% of the body's protein. More than twenty different types of collagen have been identified as the key building blocks that provide support and structure to our bodies. Collagen is present in all connective tissues such as skin, bones, cartilage, tendons, ligaments and blood vessels. As the structural framework of the body, collagen plays a crucial role in supporting and connecting everything together.

Collagen peptides, which are also known as collagen hydrolysate or hydrolyzed collagen, are a type of highly digestible protein obtained by enzymatic hydrolysis of collagen-rich materials. Significant number of clinical studies, including PB Leiner's clinical studies on SOLUGEL® collagen peptides, show the benefits of collagen peptides in relation to the skin, bones and joints, weight management and sports nutrition<sup>4</sup>.

<sup>4</sup> Source <sup>4</sup> Contact PB Leiner's sales team ([info@pbleiner.com](mailto:info@pbleiner.com)) for more information about the clinical studies

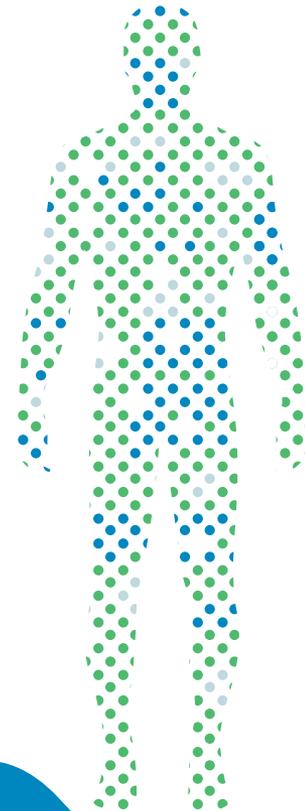
## Collagen...

70 %  
of skin

30 %  
of bones

80 %  
of Tendons/Ligaments

>30 %  
of total protein  
in the body



Collagen can also be found in eyes, ears, nose cartilage, teeth, lungs, blood vessels, muscles...

Collagen  
is the building  
block of  
our body

## SOLUGEL<sup>®</sup>, our collagen peptides

**SOLUGEL<sup>®</sup>**  
collagen peptides



### Beauty from within

- Skin smoothness
- Skin elasticity
- Skin hydration



### Bone and joint health

- Bone and joint health
- Maintain healthy bone mineral density
- Support healthy bones
- Support healthy joints
- Support joint comfort



### Sports nutrition

- Protein source
- Rapid absorption
- Support tissue regeneration through exercise
- Long lasting satiety effects
- Anti-oxidative effects
- Boost amino acids precursors of creatine
- Support joint function through exercise



### Personal care

- Skin care
- Hair care
- Nail care

## SOLUGEL<sup>®</sup> contains Type I and Type III collagen proteins

SOLUGEL<sup>®</sup> mainly contains peptides obtained from Type I and Type III collagen. The most common collagen in the human body is Type I, which is found in connective tissues (skin, bones and tendons).

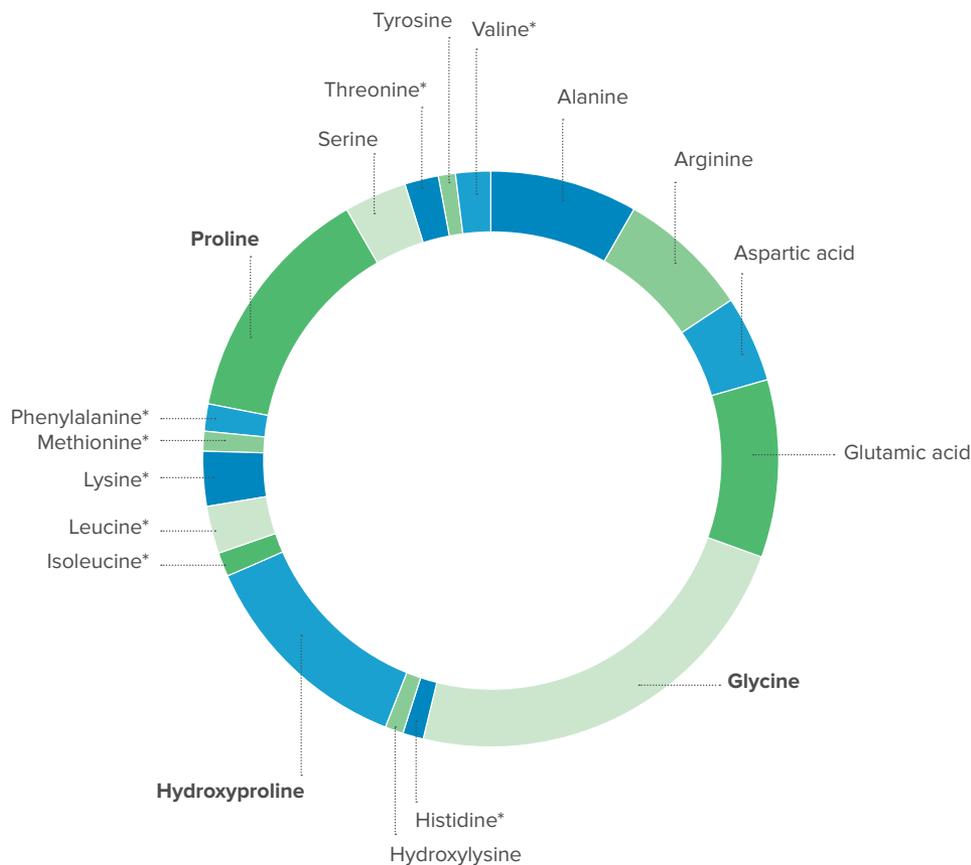
The presence of Type III collagen strongly depends on age: young skin may contain up to 50% of type III collagen, but as we age this reduces to 5-10%.



# Bioactive SOLUGEL® collagen peptides are pure proteins

SOLUGEL® is composed of high-quality collagen peptides obtained from natural animal sources. By breaking down proteins enzymatically into smaller peptides, bioactive SOLUGEL® is obtained and can be easily absorbed by the human body. Indeed, just 15 minutes after ingestion, collagen peptides can already be detected in the blood. The presence of amino acids and peptides in the blood stream reaches a maximum level after 1-2 hours and remains in the blood circulation for as long as 6 hours. \*

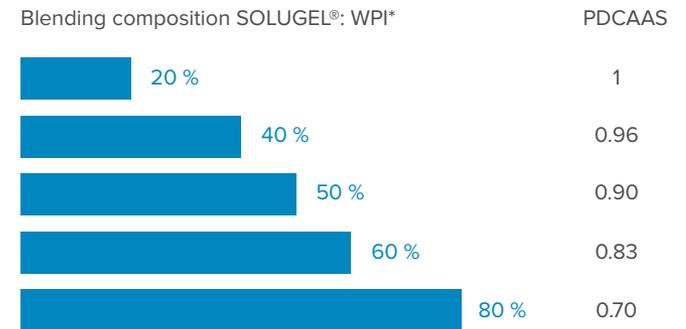
As a pure protein source, SOLUGEL® collagen peptides consist of a unique combination of amino acids, which include 8 out of 9 amino acids that are essential to our bodies. Unlike other proteins, SOLUGEL® collagen peptides are rich in hydroxyproline, which is an important component of collagen. It is also an excellent source of glycine and proline.



\* Essential amino acid

## Complete protein blends

SOLUGEL® collagen peptides can be easily blended with other common proteins in order to achieve a complete protein product PDCAAS (Protein Digestibility Corrected Amino Acid Score) of 1, which is essential for some applications.



\* WPI: whey protein isolate

# SOLUGEL® collagen peptides

- the natural solution for your health!

## Contributes to your clean label innovations

Nowadays, consumers and producers are increasingly aware of the value that natural and healthy ingredients bring. “Natural” and “Clean label” are major trends in the food and beverages sector. Consumers are actively scanning product packaging and comparing similar products, which results in the avoidance of products with long and chemical-sounding ingredient lists, as well as E-number ingredients.

As pure protein made from natural sources, SOLUGEL® collagen peptides contribute to your clean label formulations. They are considered to be a food ingredient in most countries and do not require an E-number. They can be labeled as collagen peptides, gelatin, gelatin hydrolysate, collagen hydrolysate or (collagen) protein hydrolysate. Consumers around the world associate a healthy and natural image with products that contain collagen peptides, and this makes it an appealing ingredient in clean label innovations.

## SOLUGEL® collagen peptides are the ideal ingredient choice for your healthy, clean and natural formulation

- Pure protein
- Highly digestible
- Natural and clean label (no E-numbers)
- Free from sugar, fat, cholesterol and carbohydrates
- Free from additives and preservatives
- Free from artificial colors, flavors and sweeteners
- Gluten free
- GMO-free
- GRAS





## SOLUGEL® unique properties for your risk-free formulations

### **High protein content (over 91%)**

Ideal for high protein supplements, food applications and in combinations with other proteins

### **Neutral in flavor and odor**

Very easy to integrate in different product formats (RTD, powder mixes, beverages)

### **Easy dissolution, easy processing and easy handling**

Free flowing and dust-free, SOLUGEL® is easy to work with

### **Clear solutions in water, unaffected by pH and temperature**

Stable and clear solutions even after heat treatment using a wide range of pH

### **Soluble at room temperature**

Ideal for instant preparations as no heating is needed

### **Low viscosity even at low temperatures**

It does not change the end-product characteristics

### **Low molecular weight allows for rapid absorption after ingestion**

Provides amino acids and peptides for endogenous collagen synthesis

### **Heat stable**

Suitable for common heat treatments such as pasteurization and UHT processing

Thanks  
to these  
unique properties,  
SOLUGEL® can be  
easily applied in various  
delivery systems and  
products such as:

<b>Application category</b>	<b>Application</b>
<b>Supplements</b>	Drinks: Liquids and gels Powders Capsules and Tablets Microencapsulation
<b>Functional Foods and Beverage</b>	Protein and cereal bars Cereals and oatmeal Confectionery: Gummies, marshmallows, hard candies, chews and chocolates Dry-mix desserts: Table jellies, flans and mousses Ready-to-eat desserts Diary: Yogurts, milk, ice cream Bakery: Bread, cookies and crackers pet foods`
<b>Personal Care Products</b>	Cosmetics, shampoos, lotions, gel, creams, nail polish/remover, lipstick and soap
<b>Technical applications</b>	Electroplating Fertilizer Wine & juice clarification

# SOLUGEL® collagen peptides the natural solution for your health

## Complete product range

As a global leading producer of collagen peptides, PB Leiner provides a complete range of high-quality collagen peptides under the SOLUGEL® brand name. PB Leiner's bioactive SOLUGEL® collagen peptides are available with different functional properties and can be based on different animal sources, which include halal, kosher, pasture-raised, and grass-fed products.

SOLUGEL® collagen peptides are obtained from natural sources and produced in line with the highest safety standards. The latest premium offer SOLUGEL® Dissolution Series features products with neutral flavor and taste, as well as excellent dissolution. SOLUGEL® collagen peptides can help to provide the nutritional and/or functional properties that are necessary to create new, innovative and healthy food products.

## SOLUGEL® standard product portfolio

<b>Raw Material</b>	<b>Product</b>	<b>Powder characteristics</b>
Bovine	SOLUGEL®	Agglomerated and fine powder
Porcine	SOLUGEL®	Agglomerated and fine powder

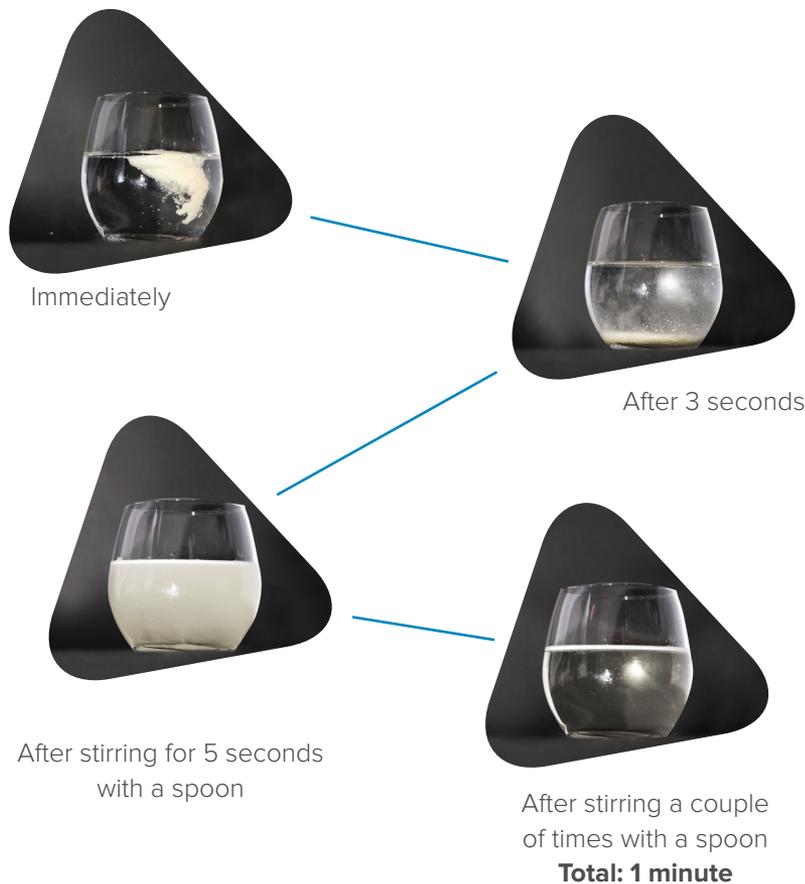
In addition to the standard portfolio, PB Leiner can offer you different products that are customized to your application needs. Please contact our sales team ([info@pbleiner.com](mailto:info@pbleiner.com)) to find out more.



# SOLUGEL® Dissolution Series: Excellent powder characteristics

As PB Leiner's latest premium offer, SOLUGEL® Dissolution Series are offered in an agglomerated powder form with excellent solubility and dispersibility. Consequently, it reduces the risk of dust and/or lump formation when dissolving, which makes them an ideal ingredient for all "instant" applications such as smoothie powders or collagen drinks.

**Agglomerated product (5g in 300ml water at 20°C)**



# SOLUGEL® collagen peptides - the numerous health benefits

Oral intake of SOLUGEL® collagen peptides may provide numerous health benefits. With the right dosage spread over time, SOLUGEL® collagen peptides may contribute to the healthy functioning of your body, including skin, bone and joint health.

Health benefits	Dosage	Effects	Studies*
<b>Beauty</b>	2.5-10 g/day, 2-3 months	Increases hydration, firmness and elasticity of the skin	<i>In vitro</i> and <i>in vivo</i> studies
<b>Joints</b>	5-10 g/day, 4-6 months	Helps to maintain the structure and functionality of joints	<i>In vitro</i> and <i>in vivo</i> studies
<b>Bones</b>	5-20 g/day, 6-12 months	Supports healthy bones and maintains healthy bone mineral density	<i>In vitro</i> and <i>in vivo</i> studies
<b>Satiety</b>	15-25 g/day	Reduces the calorie intake in subsequent meals	<i>In vivo</i> study

*Recommended dosage and duration of oral intake of collagen peptides*

\* Information about the scientific studies listed above are available upon request (info@pbleiner.com).





## OUR SERVICES

### The Clear Solution

We focus on finding clear solutions for our customers in the food, health, beauty and pharma markets. Our technical experts can help you manage issues you might have in your production process and even work with you to develop products fully customized to your needs.

### Global presence – local knowledge

Our global presence (production sites in Asia, Europe, North and South America) gives us an even distribution of expertise and knowledge over our organization ensuring that there is always knowledge in your area for you to work with.

### Regulatory support: traceability, accountability & transparency

Our regulatory services are amongst the best and fastest on the market: we know which documentation is needed at each step of the process and this is why we can proactively provide them. Furthermore, our active scanning of the regulatory developments throughout the world enables us to update you on an “as-it-happens” basis.

### Exploring market opportunities

Exploring gelatin and collagen applications is good; exploring market opportunities is better. We never forget that our products play an active role in helping you to achieve market success. This is why we invest in market scanning in order to detect upcoming commercial and consumer trends, to inspire you and to find a matching product or feature in our range to help you seize opportunities.

### Product development support

Our technical experts know all about collagen. And this knowledge not only relates to the products themselves, but also how they behave under different conditions in your production processes. It is for this reason that we invite you to e-mail us right away with your questions or problems - and we'll be quick to reply.



Davenport (USA)

Santa Fe (Argentina)

Acorizal (Brazil)

Treforest (UK)

Vilvoorde (Belgium) / Headquarters  
R&D Center

Nienburg (Germany)

Nehe (China)

**SOLUGEL**<sup>®</sup>  
collagen peptides

**SOLUGEL®**  
collagen peptides

Brings elasticity, smoothness  
and hydration to the skin



**SOLUGEL®**  
collagen peptides

Helps to maintain strong  
bones and healthy joints



**SOLUGEL®**  
collagen peptides

Offers a unique combination  
of amino acids for sports and  
active lifestyle



**PB LEINER**

The Clear Solution

**EMEA & Africa**

Marius Duchéstraat 260  
1800 Vilvoorde - Belgium  
+ 32 2 255 62 21

[www.pbleiner.com](http://www.pbleiner.com) - [info@pbleiner.com](mailto:info@pbleiner.com)



**LATAM & Oceania**

Parque Industrial Sauce Viejo  
Ruta 11 Km 455  
(CP 3017) Sauce Viejo - Santa Fe  
Argentina  
+54 342 450 11 01

**North America**

7001 North Brady Street,  
Davenport,  
Iowa 52806 - USA  
+1 563-386-8040

**Asia**

Room503, NO.329,  
TianYao Qiao Road,  
XuHui District, Shanghai,  
China,  
+ 86 21 64360106

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