ACB Pisum Sativum Peptide
Anti-Aging, Antioxidant, Volumizing, Film-Forming, Moisturizing, Conditioning

Tomorrow’s Vision... Today!®
ACB Pisum Sativum Peptide

Technical Information

**Product Code:** 16810

**INCI Name:** Pisum Sativum (Pea) Peptide

**INCI Status:** Conforms

**Suggested Use Level:** 1.0 - 5.0%

**Suggested Applications:** Anti-Aging, Antioxidant, Volumizing, Film-Former, Moisturizing, Conditioning
ACB Pisum Sativum Peptide

About Proteins

• Complex, organic macromolecules essential for sustaining life
• High molecular weights
• Vital components in hair and skin
• Common uses: Film-formers, Moisturizers, Emulsifiers, Strengthening Agents
• Use of Animal Proteins in cosmetics has shifted to Vegetable Proteins
• Due to health and safety concerns
ACB Pisum Sativum Peptide

Humble Beginnings

• Soy, Oat and Wheat Proteins initially overshadowed Pisum Sativum

• Pisum Sativum, or peas, have been cultivated for food since 6000 BC

• Commonly used as an ingredient in thick soups and stews
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Gaining Popularity

- Pisum Sativum Protein peaked the interest of Nutrition and Health Advocates
  - Plant-based
  - Hypo-allergenic
  - Average Biological Value (BV) of 65.4%
  - Indicator of the biological activity of the protein

- Preferred vegetable protein according to a study conducted on the beneficial properties of Pisum Sativum Hydrolysate\(^1\)
  - Highly Soluble (easily digested)

- Enhances Kidney Function

- Lowers Blood Pressure

Reference:
ACB Pisum Sativum Peptide

Benefits

• Complete source of Amino Acids

• Most balanced amino acid profile of any vegetable protein

• Lysine functions as a vital building block in human biology

• Lysine is an essential amino acid, meaning our bodies do not synthesize it naturally

• Must be obtained from other sources
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Benefits of Lysine

• Highest Lysine content compared to other hydrolyzed vegetable proteins
  • 7.22% of the protein is lysine\(^1\)
  • Second highest content of lysine is Soy Protein comprised of 5.74%\(^2\)
• Promotes the health of the hair, scalp and skin
• Contributes to protein formation
• Assists in producing carnitine – known to metabolize fatty acids

References:
2) Helena Kloosterman; USDA National Nutrient Database for Standard Reference. Essential Amino Acids Search, soybeans
Protein Hydrolysis

• Hydrolyzing proteins breaks down the large molecules into smaller molecules

• Smaller molecules are more effective in cosmetics

• Hydrolysis can be conducted using
  • Acid with water
  • Alkaline with water
  • Enzymes with water

• Hydrolyzed Proteins = Lower Molecular Weight
  • 2,000 – 4,000 g/mol
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Benefits of Protein Hydrolysis

• Can be further modified for use in different applications
• Lower Molecular Weight
• Enhance feel
• Increase Shine
• Hydration
• Conditioning
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Product Development

- Controlled Reaction
- Unique process in which microorganisms are employed to hydrolyze the *Pisum sativum* protein into smaller subunits
  - *Lactobacillus* and *Pisum sativum* protein are inoculated
  - *Lactobacillus* secretes lactic acid, inducing hydrolysis of the *Pisum sativum* protein
- Novel protein benefits
  - **HAIR VOLUMIZING**
  - **ANTIOXIDANT PROPERTIES**
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Efficacy Data

**In-vivo Efficacy Studies**
- Assessment of Hair Characteristics
- Half-Head Hair Study
- Increase in Hydration
- Increase in Volume

**In-vitro Efficacy Studies**
- Oxygen Radical Absorbance Capacity Assay
- Sirius Red Fast Green Report
- Cellular Viability
- TGF-β ELISA
Protocol

- Sensory evaluation was conducted for baseline
- **Principle of measurement:** Rubric Measurement from 1-10
- **Test area:** Hair
- **Concentration of active used:** 2.0%
- **Frequency of application:** Single Application

**Graph 1:** Increase in hair hydration when treated with 2.0% ACB Pisum Sativum Peptide.
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Half Head Study

Protocol

- Sensory evaluation was conducted for baseline
- Subject washed & dried hair as normal
- Test area: Hair
- Concentration of active used: 2.0%
- Principle of measurement: Participant assessment of characteristics

Image 1. Full Head Baseline Photo of Untreated Hair
**ACB Pisum Sativum Peptide**

### Half Head Study

*Image 2.* Half-Head photo of hair treated with test and control shampoos

*Image 3.* Half-Head Photo of hair treated with test and control conditioners

### Results

- **ACB Pisum Sativum Peptide** improved hair characteristics 101% more than the control shampoo
  - Improved volume, softness & dry/wet combability
- **ACB Pisum Sativum Peptide** improved hair characteristics 61% more than the control conditioner
  - Improved volume & dry/wet combability
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Increase in Hydration

Graph 2. Increase in hair hydration when treated with 2.0% ACB Pismum Sativum Peptide

Protocol

- **Equipment:** DPM 9003 Nova Impedence Meter
- **Principle of measurement:** Conductance, single frequency
- **Subjects:** 10 (m/f)
- **Test area:** Hair
- **Concentration of active used:** 2.0%
- **Frequency of application:** Single Application
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Percent Difference of Sensory Assessment

Graph 3. Hair Assessment results for sensory characteristics

Protocol

- Compared to control shampoo improved:
  - **Volume**-71%
  - **Softness**-233%
  - **Dry/Wet Combability**-200%, 150% respectively

- Compared to control conditioner improved:
  - **Volume**-167%
  - **Softness**-67%
  - **Dry/Wet Combability**-67%
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Microscopy Imaging

Immediately Following Application

Image 4. Individual strand immediately following treatment with 2.0% Wheat Hydrolysate, note beading

Image 5. Individual strand immediately following treatment with 2.0% ACB Pisum Sativum Peptide

Four Hours After Application

Image 6. Individual strand four hours after treatment with 2.0% Wheat Hydrolysate, note beading

Image 7. Individual strand four hours after treatment with 2.0% ACB Pisum Sativum Peptide

Protocol

• **Equipment:** Zeiss Axioplan Microscope/Ienapol Polarized Light Microscope/iSolution Software

• **Materials:** 60 strands of hair

• **Test Quantity:** 2.0% in Water

• **Frequency of Application:** Single Application

• **Frequency of Measurement:** Baseline, immediately following application, and again four hours after application
Increase in Volume

**Protocol**

- **Equipment**: Zeiss Axioplan Microscope/lenapol Polarized Light Microscope/iSolution Software
- **Materials**: 60 individual strands of hair
- **Test Quantity**: 2.0% in Water
- **Frequency of Application**: Single Application
- **Frequency of Measurement**: Baseline, immediately following application & 4 hours after application

**Graph 4**: Increase in hair diameter after application of 2.0% **ACB Pisum Sativum Peptide** compared to 2.0% Wheat Hydrolysate
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ORAC Assay

Protocol

• Trolox® was used as the positive control

• Test Quantity: 0.5%

• Fluorescent measurements were taken every two minutes for two hours

• ACB Pismum Sativum Peptide showed antioxidant activity at levels as low as 0.5% concentration

Graph 5. Antioxidant capacity of test materials
**Sirius Red/Fast Green Collagen Analysis**

**Protocol**
- **AA2G and IGF-1** were used as positive controls
- **Test Quantity:** 1%, 0.1%, and 0.01%
- 200µL of the Sirius Red/Fast Green dye solution added and incubated at room temperature for 30 minutes
- **ACB Pisum Sativum Peptide** elicited positive effects on collagen synthesis and may lead to improvement in the dermal-epidermal junction integrity and improved scaffolding matrix

**Graph 6.** Collagen and non-collagen protein concentrations.
Sirius Red/Fast Green Collagen Analysis

**Protocol**
- AA2G and IGF-1 were used as positive controls
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**Graph 7:** Percent collagen compared to non-collagen proteins
Cellular Viability

**ACB Pismum Sativum Peptide**

- **Protocol**
  - Human dermal fibroblasts were seeded into 96-well tissue culture plates
  - **Concentrations:** 0.1%, 0.01%
  - Ten microliters of viability reagent was added to 90µL of cell culture media in culture wells
  - **ACB Pismum Sativum Peptide** is not cytotoxic

**Graph 8:** Cellular Metabolism of **ACB Pismum Sativum Peptide**-treated fibroblasts expressed in terms of percent of control.
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TGF-β ELISA

- Transforming Growth Factor Beta 1
  - Hair follicle growth is thought to be regulated by a complex interplay of stimulatory and inhibitory signals

- TGF-β plays a critical role in cell cycle regulation and apoptosis

- Male pattern baldness is an apoptosis-driven process resulting in early entry into the catagen hair cycle phase

- It has also been shown that TGF-β1 expression is highest in the late anagen phase and early catagen phase suggesting an important role in hair cycle regulation

- Inhibition of TGF-β is believed to slow regression into the catagen hair cycle phase and result in follicle and hair shaft retention and prevention of hair loss

TGF-β ELISA

**Protocol**
- Human dermal fibroblasts were seeded into 24-well tissue culture plates & allowed to grow to confluency in complete serum-free media.
- Concentrations: 0.01%, 0.1%, 1.0%
- Concentrations of **ACB Pium Sativum Peptide** were added to complete serum-free media containing 1X Cell Stimulation Cocktail and incubated with fibroblasts for 72 hours.
- The decreased concentration of TGF-β should allow for hair shaft retention and maintenance of the follicle in the anagen growth phase.

**Graph 9:** Stimulated and treated NHDF concentrations and percent change.

<table>
<thead>
<tr>
<th>TGF-β Concentration (pg/mL)</th>
<th>Complete Media - Stimulated</th>
<th>Pirfenidine - Stimulated</th>
<th>1% 16810 AC Pium Sativum Peptide</th>
<th>0.1% 16810 AC Pium Sativum Peptide</th>
<th>0.01% 16810 AC Pium Sativum Peptide</th>
</tr>
</thead>
<tbody>
<tr>
<td>TGF-b Concentration (pg/mL)</td>
<td>109.92</td>
<td>34.74</td>
<td>20.19</td>
<td>133.57</td>
<td>180.98</td>
</tr>
<tr>
<td>% Change</td>
<td>0.00%</td>
<td>-68.39%</td>
<td>-81.63%</td>
<td>21.52%</td>
<td>64.65%</td>
</tr>
</tbody>
</table>
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ACTIVE CONCEPTS LLC

THANK YOU

For more information – Visit our website!
www.activeconceptsllc.com