

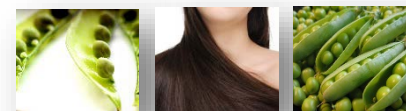
ACB Pisum Sativum Peptide

Anti-Aging, Antioxidant, Volumizing, Film-Forming, Moisturizing, Conditioning



Tomorrow's Vision... *Today!*[®]

ACB Pisum Sativum Peptide



Technical Information

Product Code: 16810

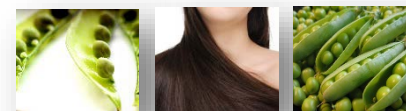
INCI Name: Pisum Sativum (Pea) Peptide

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

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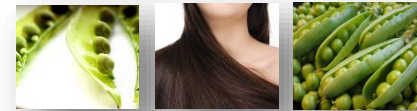
Humble Beginnings



- 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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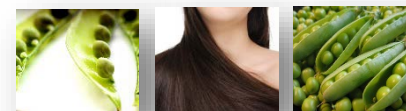
Gaining Popularity

- 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 Hydrolysate¹
 - Highly Soluble (easily digested)
 - Enhances Kidney Function
 - Lowers Blood Pressure

Reference:

1) Ndiaye F, Vuong T, Duarte J, Aluko R, Matar C. Anti-oxidant, anti-inflammatory and immunomodulating properties of an enzymatic protein hydrolysate from yellow field pea seeds. Eur J Nutr. 2012; 51:29–37.

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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 lysine¹
 - 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:

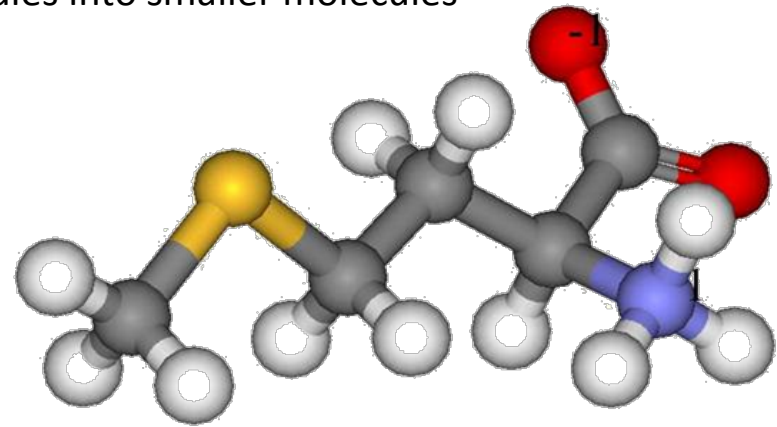
- 1) Helena Kloosterman; USDA National Nutrient Database for Standard Reference. ["Essential Amino Acids Search, pea split"](#)
- 2) Helena Kloosterman; USDA National Nutrient Database for Standard Reference. ["Essential Amino Acids Search, soybeans"](#)

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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

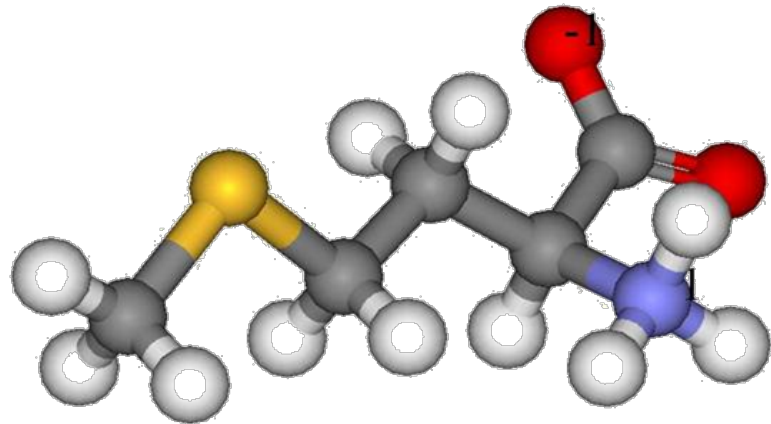


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Benefits of Protein Hydrolysis

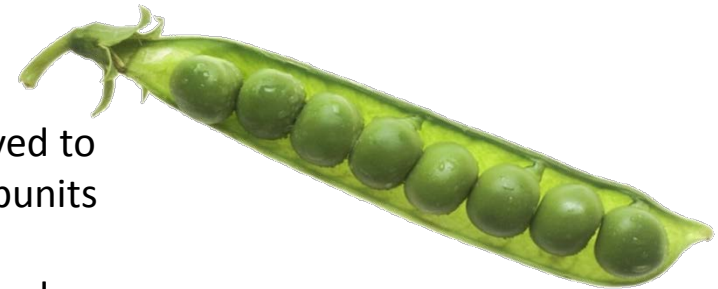
- Can be further modified for use in different applications
- Lower Molecular Weight
- Enhance feel
- Increase Shine
- Hydration
- Conditioning



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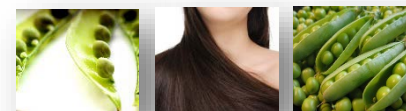
Product Development

- 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

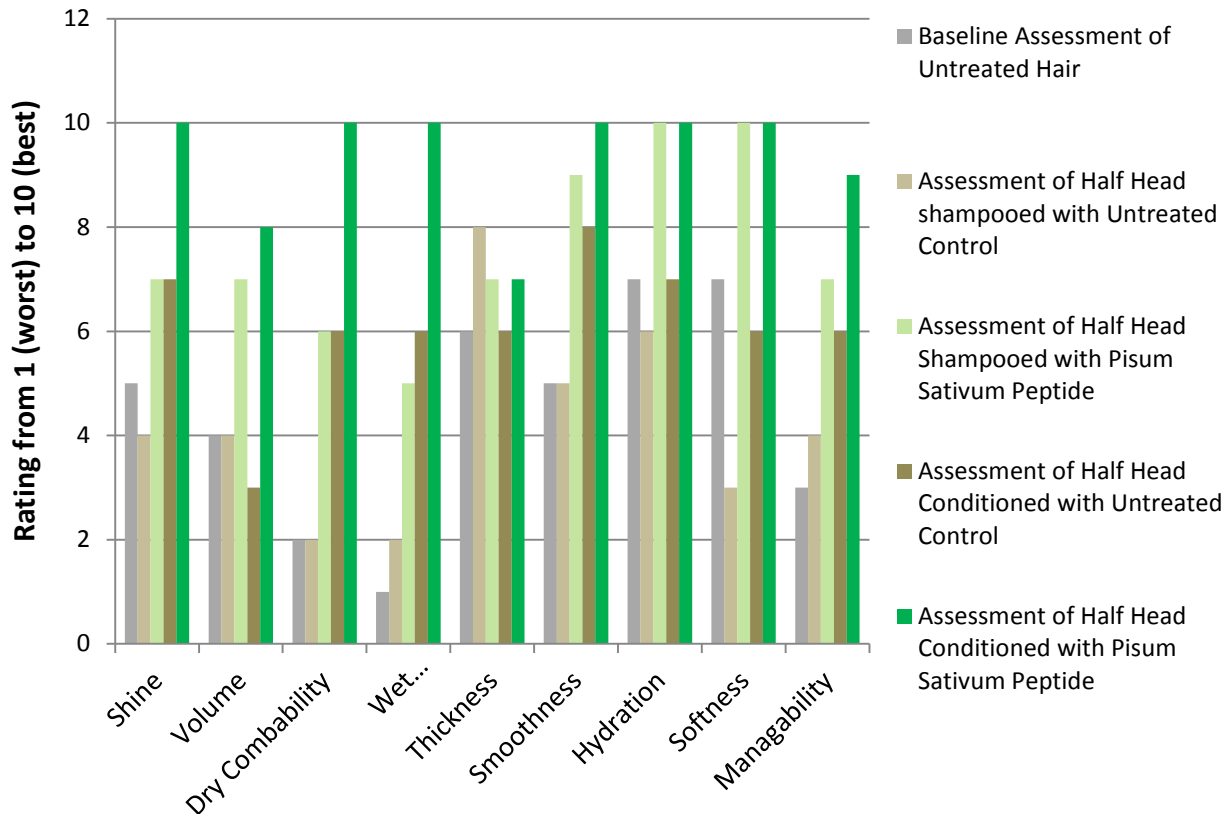
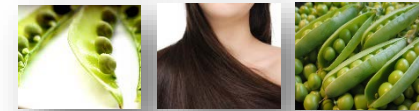
- Assessment of Hair Characteristics
- Half-Head Hair Study
- Increase in Hydration
- Increase in Volume

In-vitro Efficacy Studies

- Oxygen Radical Absorbance Capacity Assay
- Sirius Red Fast Green Report
- Cellular Viability
- TGF- β ELISA

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Assessment of Hair Characteristics



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

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

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Half Head Study

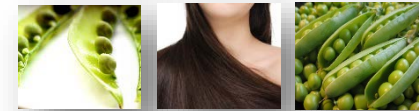


Image 1. Full Head Baseline Photo of Untreated Hair

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

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Half Head Study

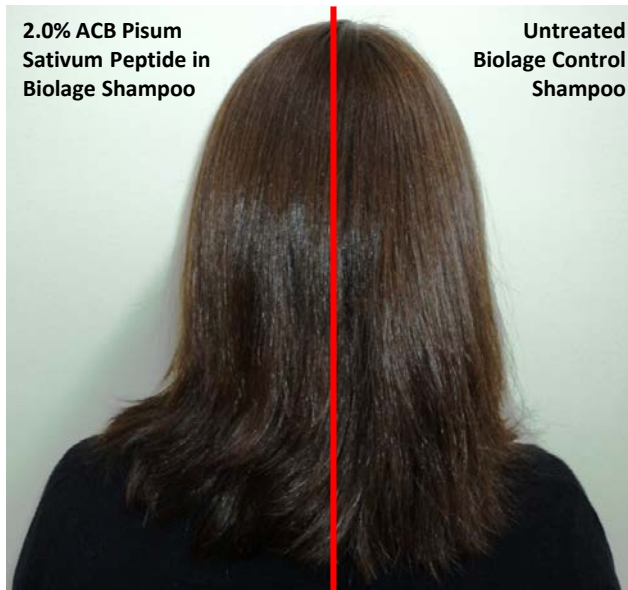


Image 2. Half-Head photo of hair treated with test and control shampoos

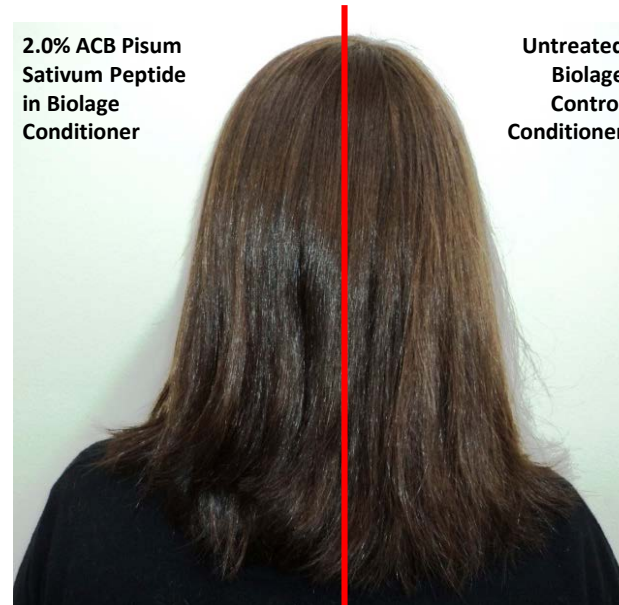


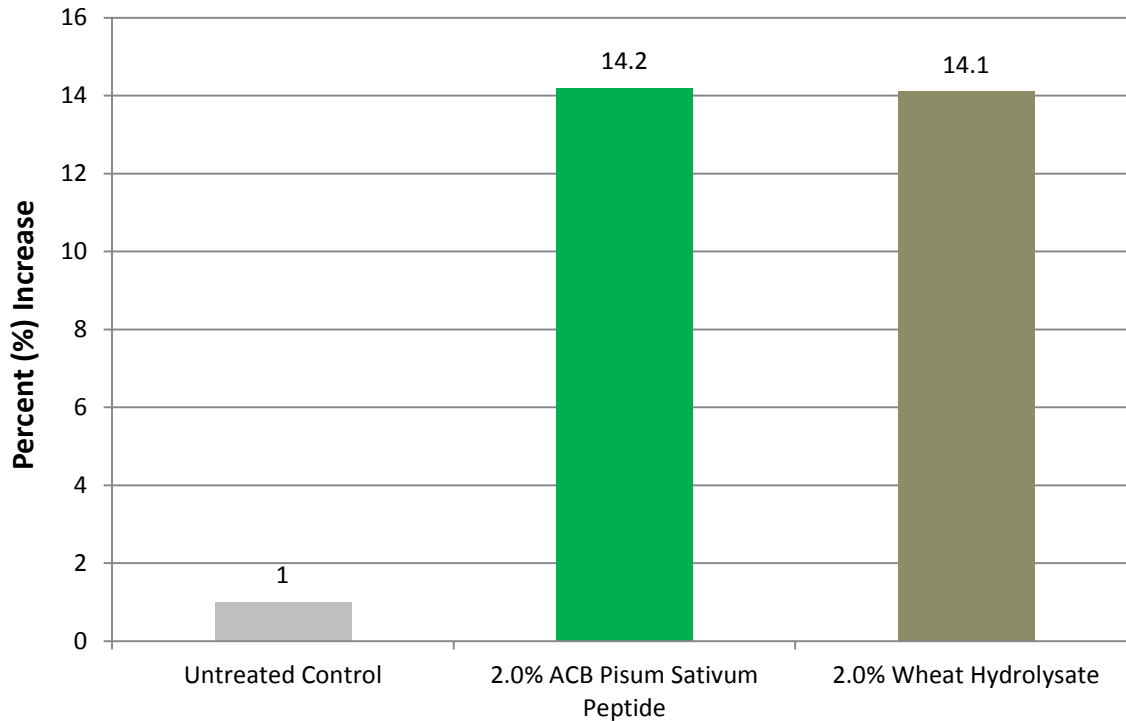
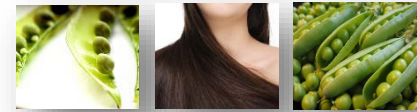
Image 3. Half-Head Photo of hair treated with test and control conditioners

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



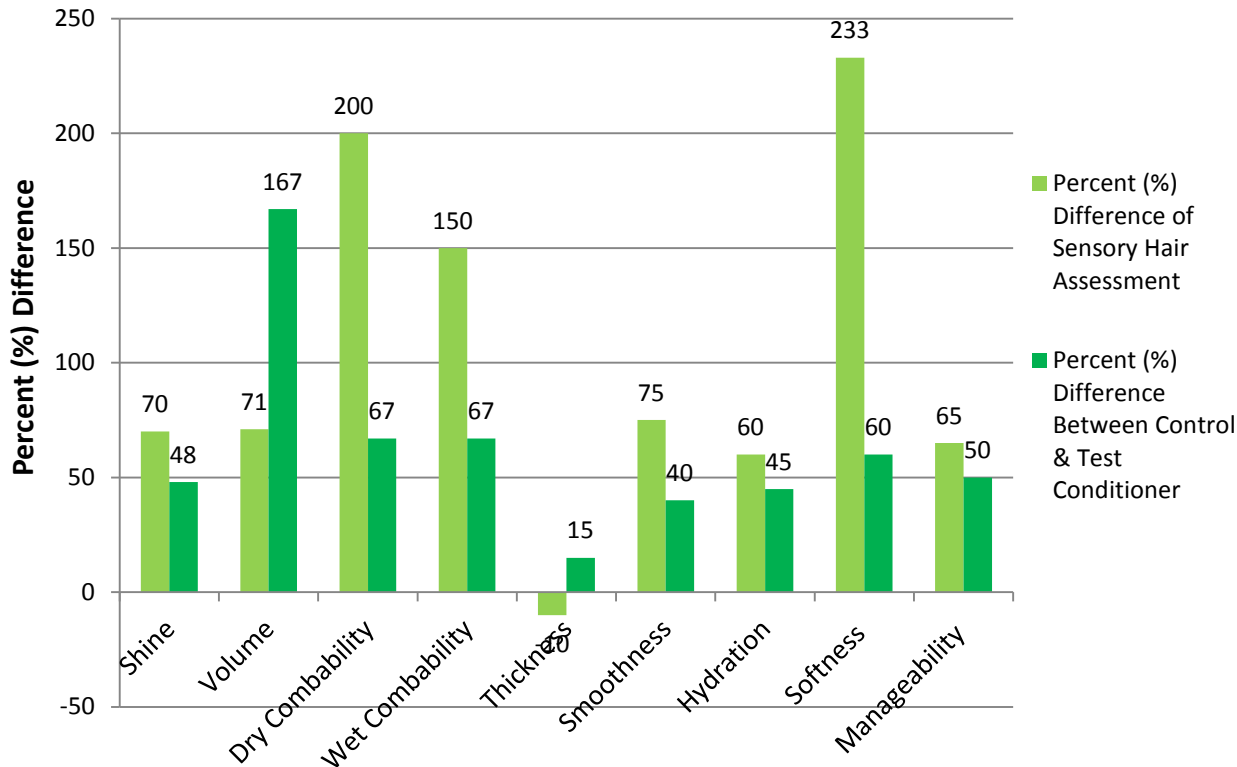
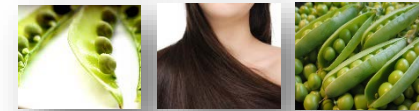
Graph 2. Increase in hair hydration when treated with 2.0% ACB Pisum Sativum Peptide

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**-75%
 - **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

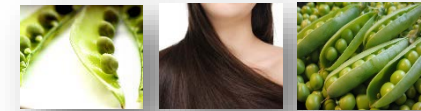
Four Hours After Application



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

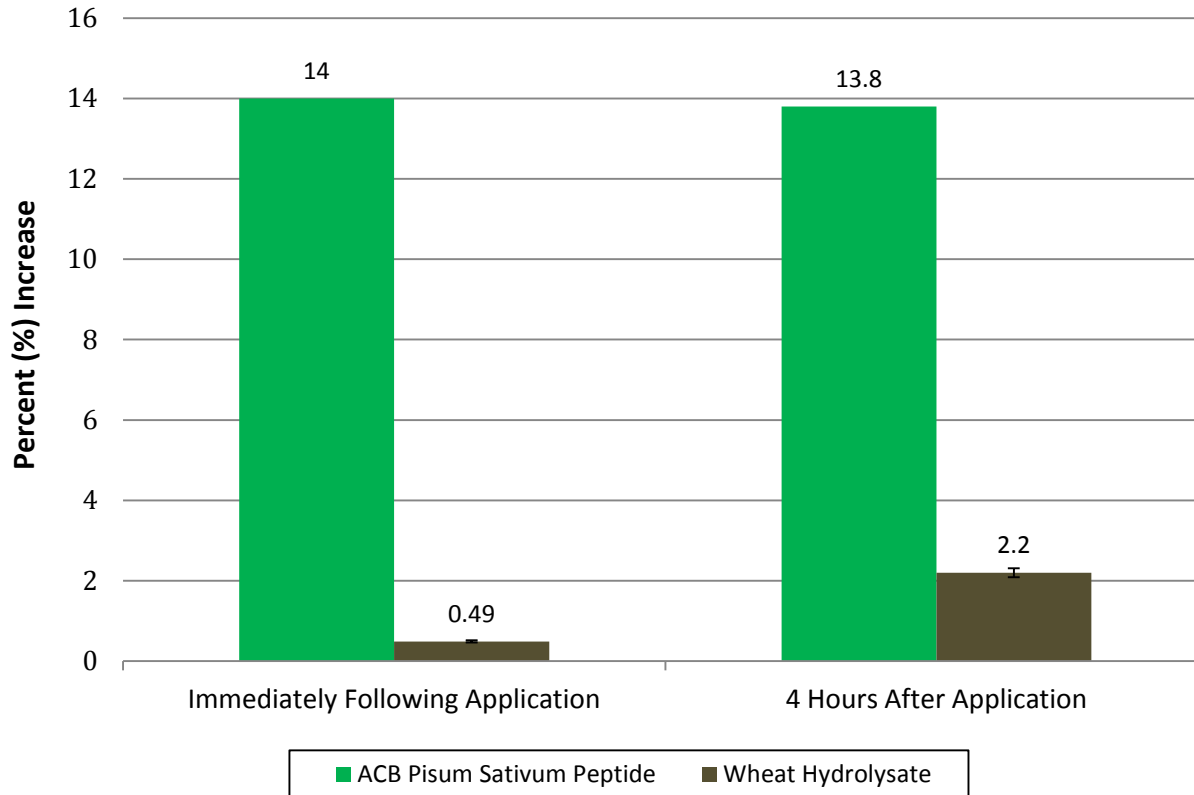


Protocol

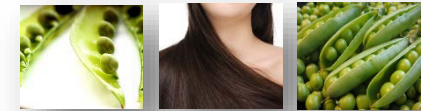
- **Equipment:** Zeiss Axioplan Microscope/Ienapol Polarized Light Microscope/iSolution Software
- **Materials:** 60 strands of hair
- **Test Quantity:** 2.0% in Water
- **Frequency of Application:** Single Application
- **Frequency of Measurement:** Baseline, immediately following application, and again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

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Increase in Volume



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

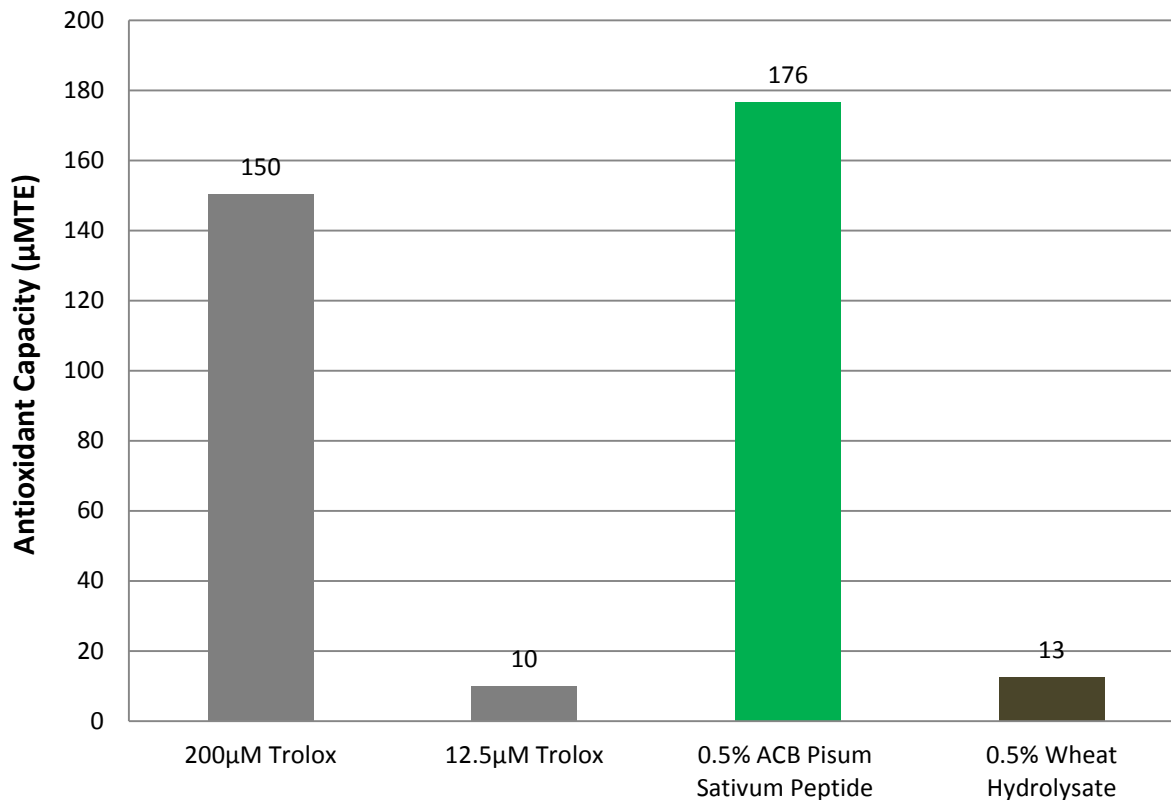


Protocol

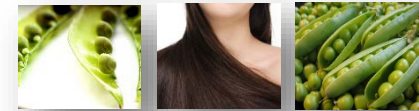
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ORAC Assay



Graph 5. Antioxidant capacity of test materials

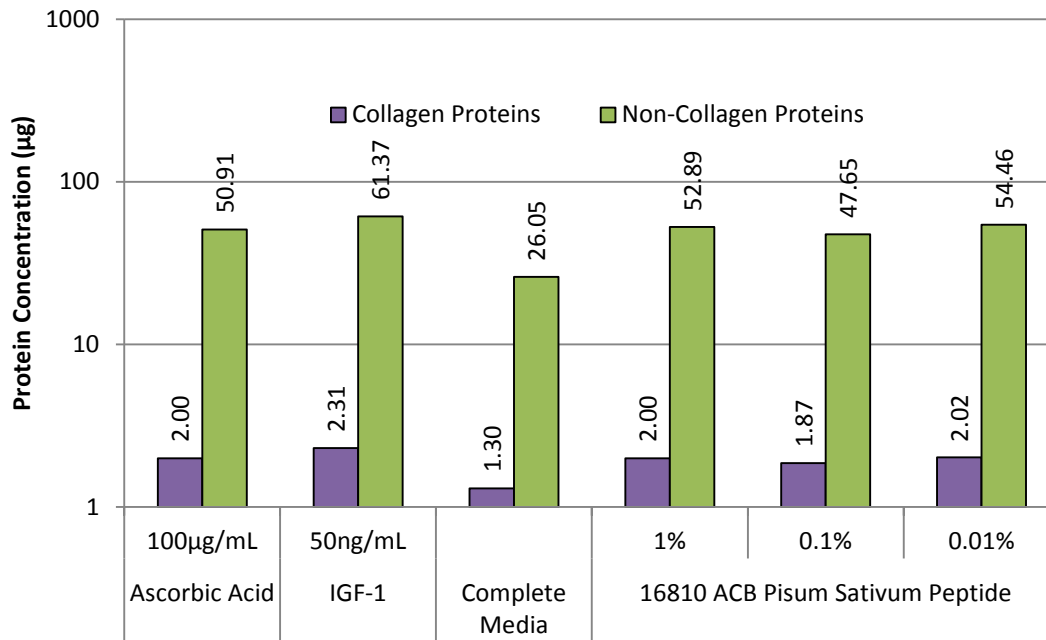
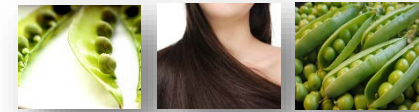


Protocol

- Trolox[®] was used as the positive control
- **Test Quantity:** 0.5%
- Fluorescent measurements were taken every two minutes for two hours
- **ACB Pisum Sativum Peptide** showed antioxidant activity at levels as low as 0.5% concentration

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Sirius Red/Fast Green Collagen Analysis



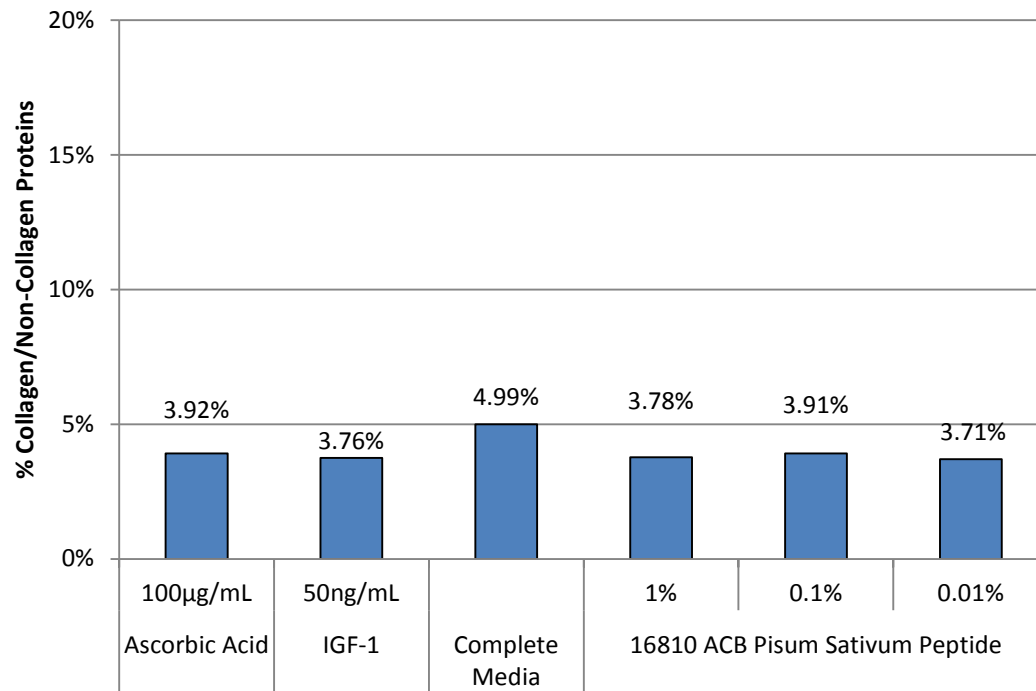
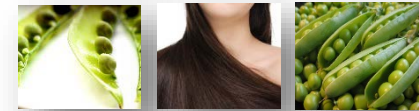
Graph 6. Collagen and non-collagen protein concentrations.

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

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Sirius Red/Fast Green Collagen Analysis



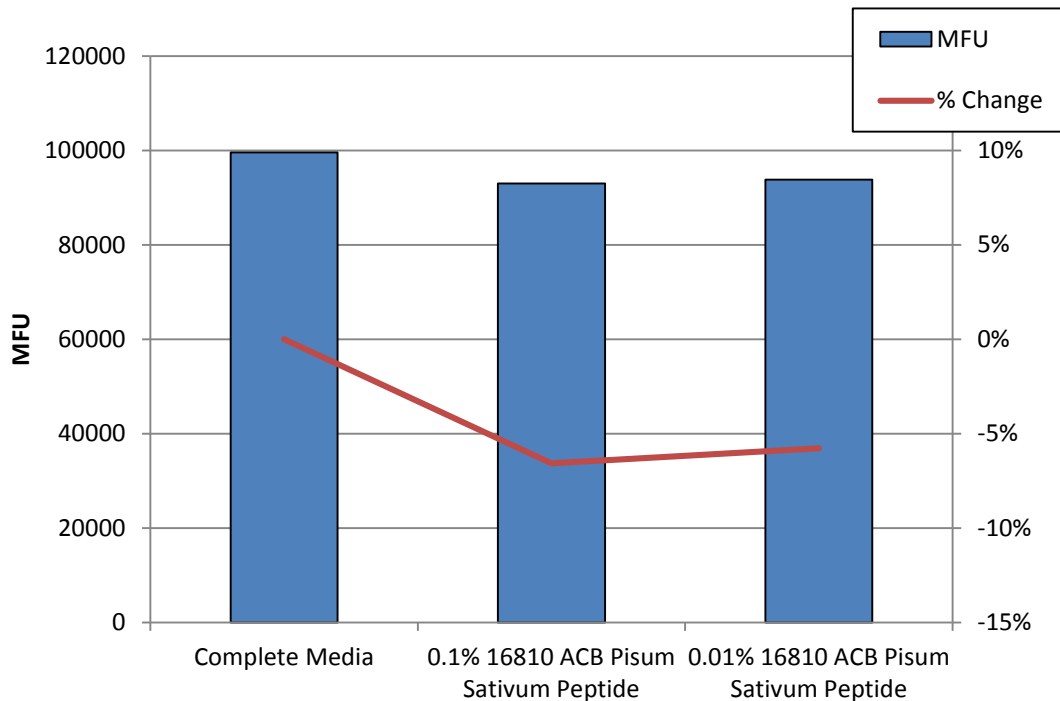
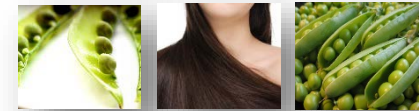
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Graph 7: Percent collagen compared to non-collagen proteins

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Cellular Viability



Graph 8: Cellular Metabolism of **ACB Pisum Sativum Peptide**-treated fibroblasts expressed in terms of percent of control.

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 90 μ L of cell culture media in culture wells
- **ACB Pisum Sativum Peptide** is not cytotoxic

ACB Pisum Sativum Peptide

TGF- β ELISA

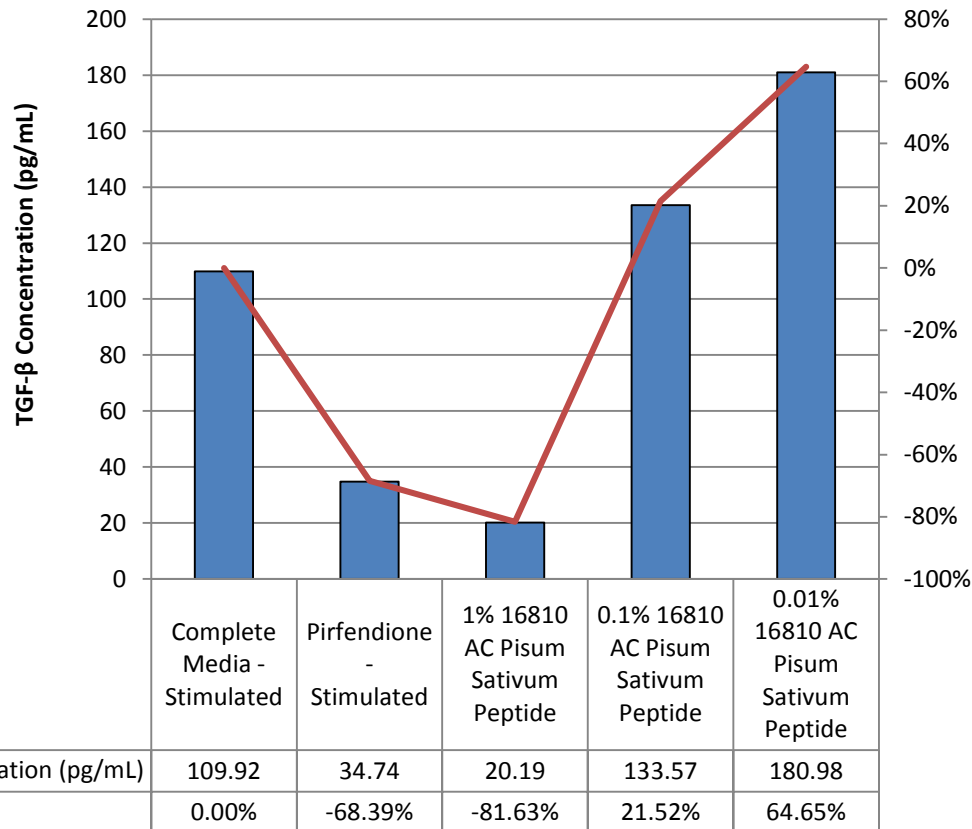
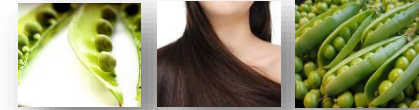


- Transforming Growth Factor Beta 1
 - Hair follicle growth is thought to be regulated by a complex interplay of stimulatory and inhibitory signals
- TGF- β plays a critical role cell cycle regulation and apoptosis
- Male pattern baldness is an apoptosis-driven process resulting in early entry into the catagen hair cycle phase¹
- It has also been shown that TGF- β 1 expression is highest in the late anagen phase and early catagen phase suggesting an important role in hair cycle regulation²
- 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 loss³

1. Yumika Tsuji, et. al. A Potential Suppressor of TGF- β Delays Catagen Progression in Hair Follicles. *JID Symposium Proceedings*, 8: 65-68 (2003)
2. Kerstin Foltzik, et. al. Control of the murine hair follicle regression (catagen) by TGF- β 1 in vivo. *FASEB J*, 14: 752-760 (2000)
3. Roberta Mazzieri, et al. Expression of a truncated latent TGF- β -binding protein modulates TGF- β signaling. *J. Cell Sci.* 118: 2177-2187 (2005)

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TGF-β ELISA

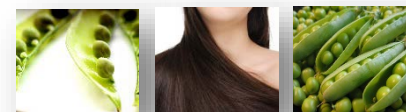


Protocol

- 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 Pisum 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

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INCI Status: Conforms

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Moisturizing, Conditioning

ACTIVE CONCEPTS LLC



THANK YOU

For more information –Visit our website!
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