

# ProCutiGen® Hold Efficacy Data

**Code:** 20831  
**INCI Name:** Phyllostachys Bambusoide Extract  
**CAS #:** 999999-99-4  
**EINECS #:** 310-127-6

Type of Study	Results
<b>HIROX 3D Imaging</b>	Within the images, significantly less damage can be viewed on both the Untreated Virgin swatch and <b>ProCutiGen® Hold</b> treated swatch. Whereas the water treated swatch exhibits significantly more damage visually. In addition to the visual evidence, the photos were quantified via histograms based on luminescence. This clearly depicts the ability of <b>ProCutiGen® Hold</b> to protect the hair fiber reducing overall damage to the fiber.
<b>Scanning Electron Microscopy</b>	When the untreated images are compared to the <b>ProCutiGen® Hold</b> treated swatches, a significant decrease in damage of the cuticle is exhibited. Better yet, the <b>ProCutiGen® Hold</b> treated SEM images depict the creation of a de-novo cuticle on the damaged cuticle.
<b>Style Retention Study</b>	Based on the results, it is clear from viewing the swatches that <b>ProCutiGen® Hold</b> is capable of retaining curls better than the unloaded vehicle comparison. In fact, 2.0% <b>ProCutiGen® Hold</b> retained curls by two times better in a 6 hour period.
<b>Tensile Strength Data</b>	Parameters tested within this set of data are solely based on linear stress applied to the hair. Linear stress applied as a direct parallel force is not the ideal measure of real world stress and strain applied to the hair on a daily basis. In turn, <b>ProCutiGen® Hold</b> does not have an effect on this parameter nor do the claims associated with <b>ProCutiGen® Hold</b> relate to this testing.



**Tradename:** ProCutiGen™ Hold

**Code:** 20831

**CAS #:** 999999-99-4

**Test Request Form #:** 3152

**Lot #:** NC170117-M

**Test Performed:**  
Hirox 3D Imaging

## Background

Everyday stressors come in all forms whether environmental, chemical, or thermal. Rather than focusing on repairing broken bonds that occur during physical and chemical stress, **ProCutiGen™ Hold** consists of bivalent cationic peptides that create a *de novo* cuticle on the hair to prevent damage from happening in the first place.

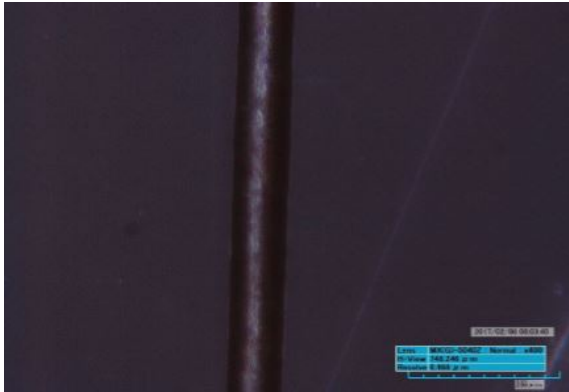
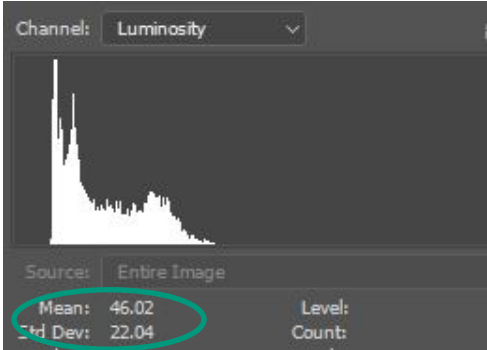
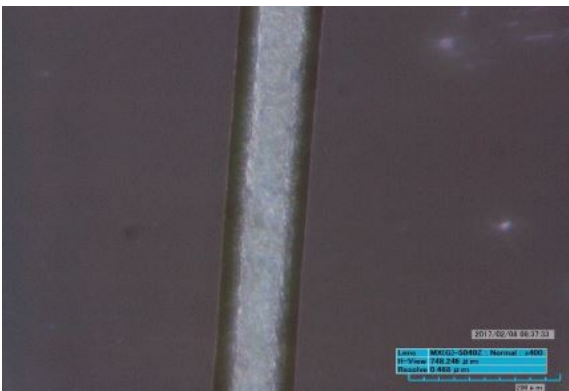
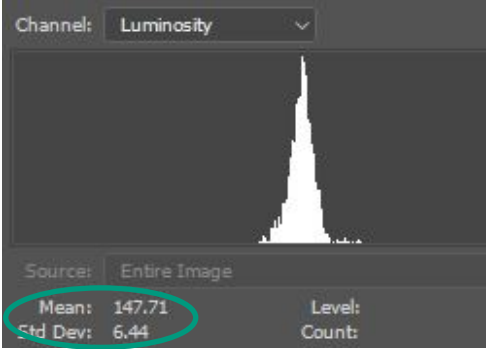
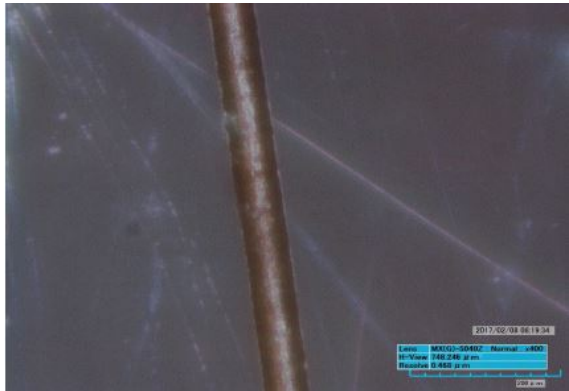
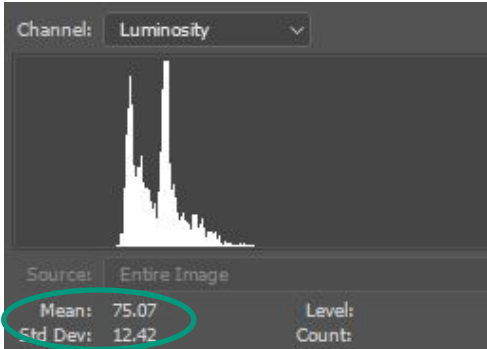
This study was conducted to determine if **ProCutiGen™ Hold** is capable of modifying hair shape while protecting it from styling damage.

## Methods & Materials

This study was conducted by salon professionals using Sensationnel Bare & Natural Brazilian 100% Virgin Remi Unprocessed Human Hair (Hair Zone Moonachie, NJ). One swatch, left unaltered, was analyzed as the control. Two test swatches were treated and submitted for testing. One swatch was treated, spritzed with water, allowed to dry, curled holding for 10 seconds and released. The other test swatch was treated, spritzed with a 2.0% ProCutiGen™ Hold solution and water, allowed to dry, curled holding for 10 seconds and released. The swatch treatment was designed to mimic everyday effects of curling the hair. It is important to note no additives or fixatives were used in the test solution. This was done intentionally in order to visually see clear results.

Manufacturing Solutions Center (MSC) located in Conover, North Carolina was asked to perform Hirox 3D Imaging on the five hair swatches provided by Active Concepts, LLC. MSC utilized a KH-7700 Hirox 3D Imaging Microscope to perform the test. The lens used was MX(G)-5040Z with magnification ranging from 50x-300x.

## Results

Swatch Description	HIROX Image	Histogram Quantification
Untreated Virgin Hair		 <p>Channel: Luminosity</p> <p>Source: Entire Image</p> <p>Mean: 46.02      Level:</p> <p>Std Dev: 22.04      Count:</p>
Water Treated & Curled		 <p>Channel: Luminosity</p> <p>Source: Entire Image</p> <p>Mean: 147.71      Level:</p> <p>Std Dev: 6.44      Count:</p>
Water + 20831 ProCutiGen™ Hold & Curled		 <p>Channel: Luminosity</p> <p>Source: Entire Image</p> <p>Mean: 75.07      Level:</p> <p>Std Dev: 12.42      Count:</p>

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## Discussion

Hirox 3D Microscopic Examination is a test method for microscopic examination of hair samples. Damage of the hair fiber can be seen within these images in which the damaged areas of the fiber fluoresce. The more fluorescence a fiber exhibits, the more damaged. Within the images above significant less damage can be viewed on both the Untreated Virgin swatch and **ProCutigen™ Hold** treated swatch. Whereas the water treated swatch exhibits significantly more damage visually. In addition to the visual evidence, the photos were quantified via histograms based on luminescence. The values denoted clearly depict the ability of **ProCutigen™ Hold** to protect the hair fiber reducing overall damage to the fiber. **ProCutigen™ Hold** consists of bivalent cationic peptides that create a *de novo* cuticle on the hair to prevent damage from happening in the first place.



# Scanning Electron Microscopy

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**Tradename:** ProCutiGen™ Hold

**Code:** 20831

**CAS #:** 999999-99-4

**Test Request Form #:** 3152

**Lot #:** NC170117-M

**Test Performed:**

Scanning Electron Microscopy (SEM)

## Background

Everyday stressors come in all forms whether environmental, chemical, or thermal. Rather than focusing on repairing broken bonds that occur during physical and chemical stress, **ProCutiGen™ Hold** consists of bivalent cationic peptides that create a *de novo* cuticle on the hair to prevent damage from happening in the first place.

This study was conducted to determine if **ProCutiGen™ Hold** is capable of modifying hair shape while protecting it from styling damage.

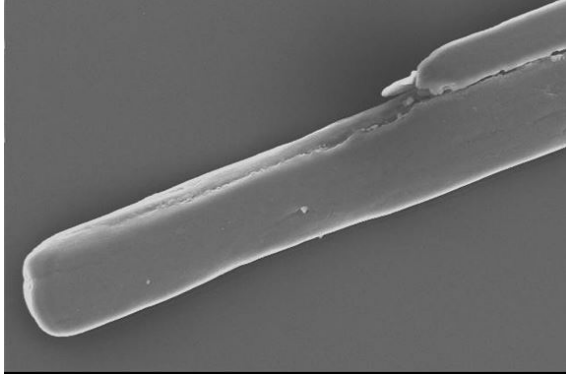
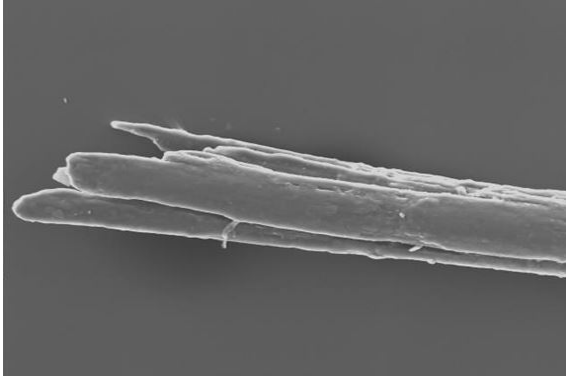
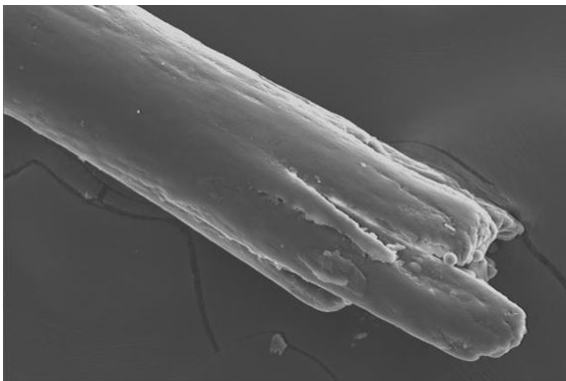
## Methods & Materials

This study was conducted by salon professionals using Sensationnel Bare & Natural Brazilian 100% Virgin Remi Unprocessed Human Hair (Hair Zone Moonachie, NJ). One swatch, left unaltered, was analyzed as the control. Two test swatches were treated and submitted for testing. One swatch was treated, spritzed with water, allowed to dry, curled holding for 10 seconds and released. The other test swatch was treated, spritzed with a 2.0% **ProCutiGen™ Hold** solution and water, allowed to dry, curled holding for 10 seconds and released. The swatch treatment was designed to mimic everyday effects of curling the hair. It is important to note not additives or fixatives were used in the test solution. This was done intentionally in order to visually see clear results.

Gaston College Textile Technology Center located in Belmont, North Carolina was asked to perform Scanning Electron Microscopy Imaging (SEM) on the swatches provided by Active Concepts, LLC. Gaston College used a Zeiss DSM 962 to perform the test at 20.0kV using a magnification range from 50x-300x. This method utilizes an electron microscope that produces images a chemically treated hair by scanning the hair with a focused beam of electrons. These electrons interact with the atoms of the hair sample to provide images of the hairs surface topography and surface composition.

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## Results

Swatch Description	SEM Image
Untreated Virgin Hair	
Water Treated & Curled	
Water + <b>20831 ProCutigen™ Hold &amp; Curled</b>	

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# Scanning Electron Microscopy

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## Discussion

Standard Electron Microscopy (SEM) imaging shows high resolution images of the hair cuticles of each hair swatch. The SEM images depict how the outermost layer of the hair, the cuticle, is effected by stressors, in this case styling stressors. The SEM imaging demonstrates that, Untreated Virgin hair is clearly already prone to damage from everyday aggressors, showing characteristic signs of breakdown. The imagery results of the water treated, curled sample depict an extensively damaged, split cuticle. This type of damage leads to irregular growth, breakages, and overall unhealthy, dead appearance. At a singular level, one cuticle may not seem important, but these strand to strand imperfections contribute to a much bigger picture of unhealthy and unprotected hair. When the untreated images are compared to the **ProCutiGen™ Hold** treated swatches, a significant decrease in damage of the cuticle is exhibited. Better yet, the **ProCutiGen™ Hold** treated SEM images depict the creation of a *de-novo* cuticle on the damaged cuticle. The cuticle corrects and acts as a protective layer to the fiber. The cuticle formation **ProCutiGen™ Hold** employs also exhibits properties such as moisturization, pH balance, barrier protection, and additionally, protection from hair weakening after exposure to styling rendering **ProCutiGen™ Hold** the ideal addition to everyday treatment to repair and protect against everyday stressors as well as styling stressors.

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# Style Retention Study

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**Tradename:** ProCutiGen™ Hold

**Code:** 20831

**CAS#:** 999999-99-4

**Test Request Form #:** 3294

**Lot#:** NC170117-M

**Sponsor:** *Active Concepts, LLC; 107 Technology Drive Lincolnton, NC 28092*

**Study Directors & Principal Investigators:** *Hillary Phillis & Tia Alkazaz*

## Introduction

**ProCutiGen™ Hold** is capable of modifying hair shape while protecting it from styling damage. Rather than focusing on repairing broken bonds that occur during physical and chemical stress, **ProCutiGen™ Hold** consists of bivalent cationic peptides that create a *de novo* cuticle on the hair to prevent damage from happening in the first place. The formation of this biomimetic cuticle helps to retain style while offering protection from harsh styling treatments to promote healthy hair.

The purpose of this study is to determine the style retention properties of **ProCutiGen™ Hold** on both styled hair.

## Methods & Materials

This study was conducted using two sets of hair, Sensationnel Bare & Natural Brazilian 100% Virgin Remi Unprocessed Human Hair (Hair Zone Moonachie, NJ).

The humidity chamber was equilibrated two hours prior to testing at 25°C and 90% Relative Humidity. Then two swatches were washed and allowed to dry under ambient conditions. The swatches were then combed 30 times each to remove tangles. The virgin straight hair set; one of the swatches was treated with the unloaded vehicle (water) and the second swatch was treated with the vehicle containing 2.0% **ProCutiGen™ Hold**. Both hair swatches were then curled with a curling iron. After completing the respective hair treatment, the tresses were hung on the support stand in the humidity chamber. The length and width was measured of each swatch. Pictures were taken immediately after hanging the swatches, 6 hours, 8 hours, and 24 hours later.

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## Results



**Figure 1. Curled Hair at T=0**  
L- Untreated, R-Treated



**Figure 2. Curled Hair at T=6hrs**  
L- Untreated, R-Treated



**Figure 3. Curled Hair at T=8hrs**  
L- Untreated, R-Treated



**Figure 4. Curled Hair at T=24hrs**  
L- Untreated, R-Treated

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# Style Retention Study

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Swatch	Percent Difference Style Retention 6hrs	Percent Difference Style Retention 8hrs	Percent Difference Style Retention 24hrs
Untreated Curled	17.1%	19.9%	21.6%
2.0% <b>ProCutiGen™ Hold</b> + Curled	9.6%	18.1%	18.6%

\*\*Percent difference calculated based on tresses at T=0

## Discussion

Based on the results, it is clear from viewing the swatches that **ProCutiGen™ Hold** is capable of retaining curls better than the unloaded vehicle comparison. In fact, 2.0% **ProCutiGen™ Hold** retained curls by two times better in a 6 hour period. **ProCutiGen™ Hold** held significantly better in the 6 hours time period and held evenly for the remaining 24 hours. It is important to also note, not only the percent difference calculation, but how the hair took the curl initially took. It is evident that the treated swatch curled better with a more uniform, tame curl. As time lapsed, the untreated swatch does increase in width demonstrating that **ProCutiGen™ Hold** may also protect against frizz in humid environments. For this reason, we can conclude that **ProCutiGen™ Hold** is an ideal ingredient to add to hair care applications designed to provide curl retention over a longer period of time.

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# Tensile Strength Data

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**Tradename:** ProCutiGen™ Hold

**Code:** 20831

**CAS #:** 999999-99-4

**Test Request Form #:** 3152

**Lot #:** NC170117-M

**Test Performed:**

Flexabrasion

**Methods & Materials**

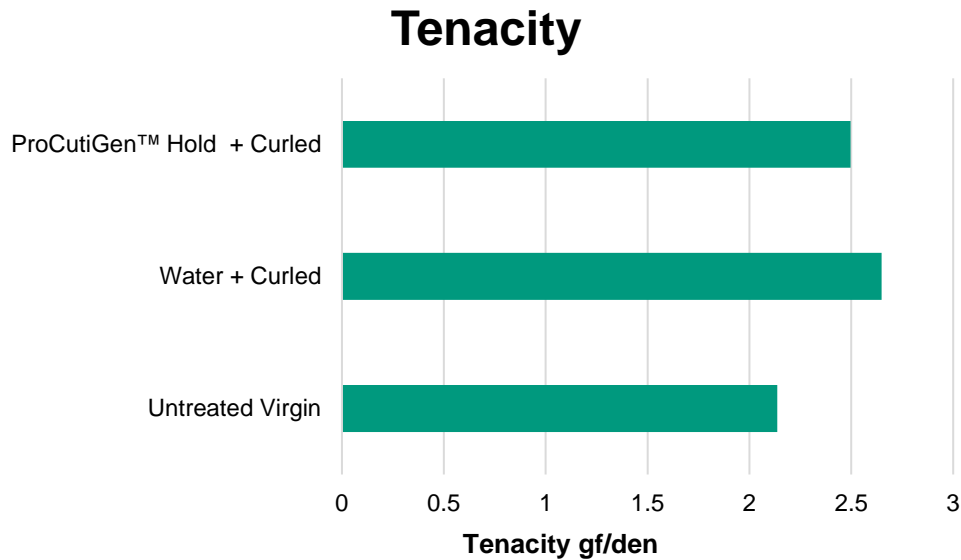
This study was conducted by salon professionals using Sensationnel Bare & Natural Brazilian 100% Virgin Remi Unprocessed Human Hair (Hair Zone Moonachie, NJ). One swatch, left unaltered, was analyzed as the control. Two test swatches were treated and submitted for testing. One swatch was treated, spritzed with water, allowed to dry, curled holding for 10 seconds and released. The other test swatch was treated, spritzed with a 2.0% **ProCutiGen™ Hold** solution and water, allowed to dry, curled holding for 10 seconds and released. The swatch treatment was designed to mimic everyday effects of curling the hair. It is important to note no additives or fixatives were used in the test solution. This was done intentionally in order to visually see clear results.

Gaston College Textile Technology Center was asked to perform Tensile Strength on ten (10) hair swatches provided by Active Concepts, LLC. Gaston College used an Instron 5966 to perform the test, using test method ASTM-D2256-10. This method specifies the test conditions for determining the tensile properties of hair using the single-strand method. The process determines the quality of the raw material and aids in controlling the quality of the end product. To determine tensile strength and elongation at break, specimens are clamped in the appropriate grips and extended at constant rate until failure occurs.

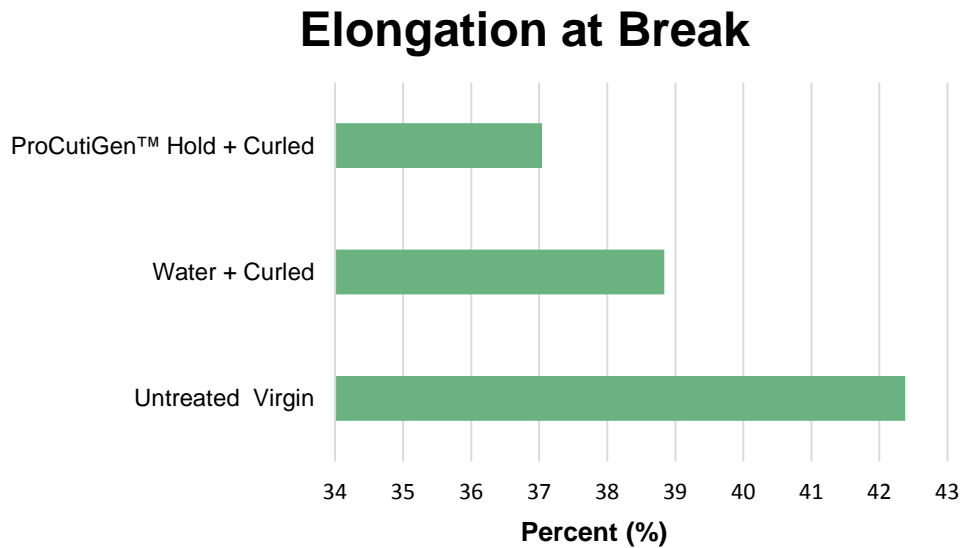
According to ASTM-D2256-10, single-strand hair specimens are broken on a tension testing machine at a predetermined elongation rate and the breaking force and the elongation at break are determined. Elongation at a specified force or the force or tenacity at a specified elongation may also be obtained. Breaking force, breaking tenacity, elongation, initial and chord modulus, and breaking toughness of the test specimen, in terms of linear density, may be calculated from machine scales, dials, recording charts, or by an interfaced computer.

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## Results



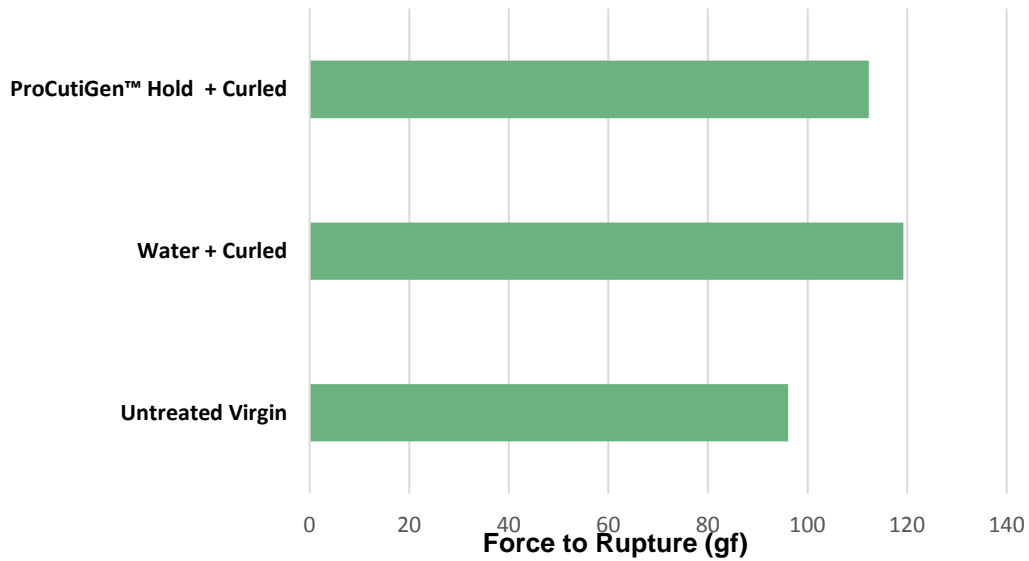
**Figure 1.** Tenacity, defined as the ultimate (breaking) force of the fiber (in gram-force units) divided by the denier



**Figure 2.** Elongation at break or fracture strain of test fibers

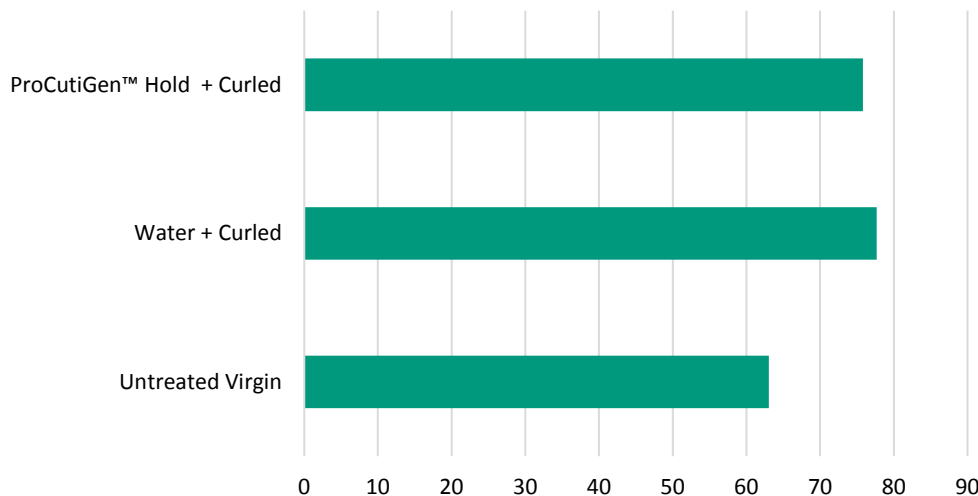
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## Force Rupture



**Figure 3.** Force to rupture, is the force measured in gram-force (gf) necessary to rupture the hair

## Modulus of Elasticity



**Figure 4.** Modulus of Elasticity (Young's Modulus) is the ratio of tensile stress to tensile strain (gf/den)

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# Tensile Strength Data

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## Discussion

Tensile strength is defined as the resistance of a material to break under tension. Gaston College Textile Technology Center assessed the following tensile strength factors; Tenacity, Elongation at Break, Force to Rupture, and Modulus of Elasticity (Young's).

Tenacity is the customary measure of strength of a fiber usually defined as the ultimate (breaking) force of the fiber (in gram-force units) divided by the denier. The results above indicate that **ProCutiGen™ Hold** does not have an effect on this parameter.

Elongation at break, also known as fracture strain, is the ratio between changed length and initial length after breakage of the test specimen expressing the capability of a material to resist changes of shape without crack formation, how much a hair fiber will stretch before it breaks. Fibers that are weaker and less resistant to breakage have a greater elongation at break (%). The results above indicate that **ProCutiGen™ Hold** does not have an effect on this parameter.

Force to rupture, is the force measured in gram-force (gf) necessary to rupture the hair. How long it takes to break the hair fiber. No significant improvement was exhibited using **ProCutiGen™ Hold** on this parameter.

Modulus of Elasticity (Young's modulus) describes tensile elasticity, or the tendency of the hair to deform along an axis when opposing forces are applied along that axis; it is defined as the ratio of tensile stress to tensile strain (gf/den). The results above indicate that **ProCutiGen™ Hold** does not have an pronounced effect on this parameter.

Parameters tested within this set of data are solely based on linear stress applied to the hair. Linear stress applied as a direct parallel force is not the ideal measure of real word stress and strain applied to the hair on a daily basis. In turn, **ProCutiGen™ Hold** does not have an effect on this parameters nor do the claims associated with **ProCutiGen™ Hold** relate to this testing.

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