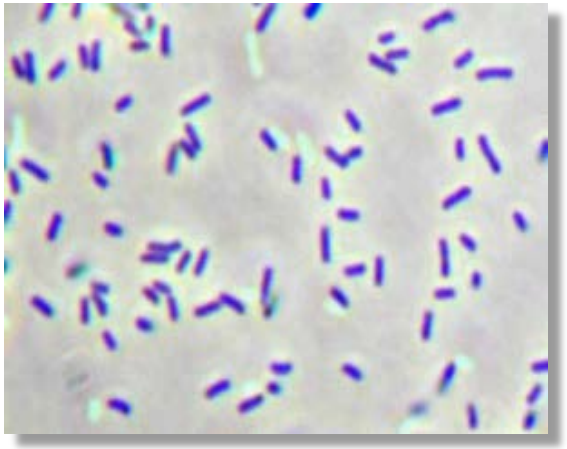
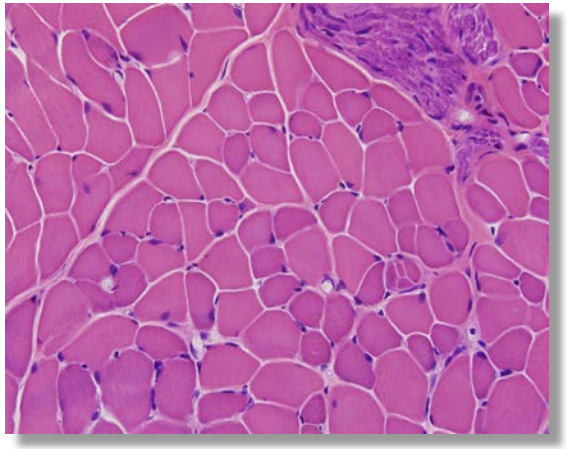
AC CytoSulf PF

Anti-Aging + Slows Cell Turnover + Next Generation Claim





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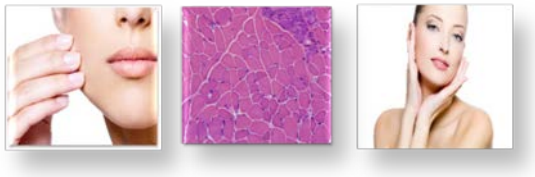

Technical Information:

Product Code: 20793PF

INCI Name: Plankton Extract

INCI Status: Conforms

Suggested Use Level: 1.0-5.0%

Suggested Applications: Anti-Aging, Slows Cellular Turnover, Next Generation Claim

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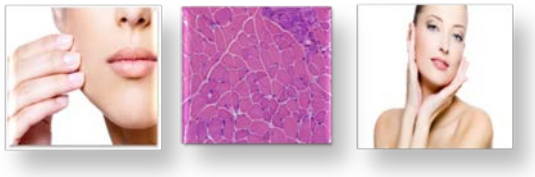
Background



- The cell cycle shows the progression of a cell's life
- Cell life cycle along with cellular turnover directly affects the age and appearance of the skin
- Typical cosmetic products aim to stimulate cell death and increase new cellular growth to enhance appearance of skin
- **AC CytoSulf PF** utilizes a different mechanism for a new, fresh approach to age-defying beauty

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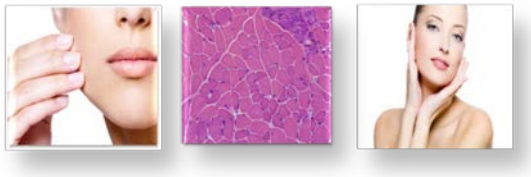
Background



- Studies have confirmed certain organisms living in extreme conditions can become inactive for extended periods of time
- Select extremophiles require elemental sulfur for growth
- It is theorized that these certain species of extremophiles may be linked to cell cycle interruptions via sulfur rich enzymes[1]
- Extremophiles laying dormant due to cell cycle interruptions must adapt over time to survive
- Brings into question sulfur's effect on human cells

1) M, Greener. et al. 2004. Now You're Signaling, With Gas. The Scientist. 26: 105-131.

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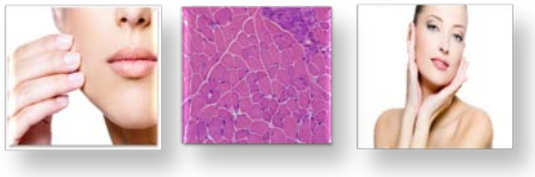
The Science



- Current heart and lung tissue research focused on endogenous SO_2 suggests that SO_2 donors can reduce damage in said tissues by decreasing cell cycle transition
  - Specifically via sulfites/ bisulfates
- Endogenous SO_2 plays a key role in the crosstalk between pathways involved in cell stasis
  - Such as cAMP/PKA and Erk/ MAPK
- Research found that SO_2 inhibited vascular smooth muscle cell proliferation
  - Preventing cell cycle progression from G1 to S phase and by reducing DNA synthesis
- Yet, that endogenous SO_2 did not influence vascular smooth muscle cell apoptosis or death
  - Meaning it was able to suspend the tissue in a type of stasis via suppression of the Erk/MAPK pathway mediated by cAMP/PKA signaling, without causing cell death

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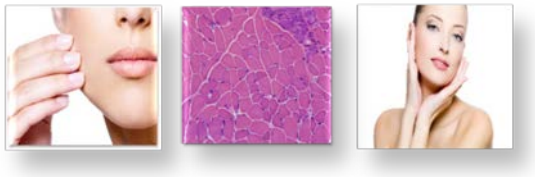
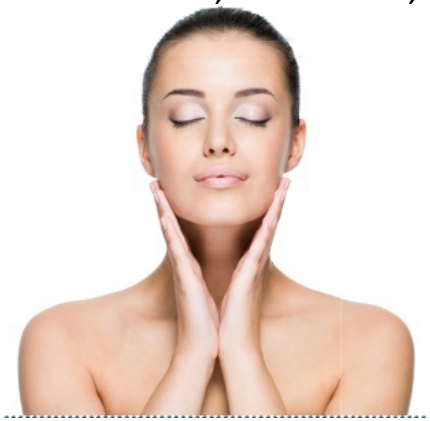
The Science



- Bacterial fermentation has allowed us to capture specific sulfide donors from extreme prokaryotes such as *Sulfolobales*
- Sulfide rich peptides in topical applications are able to slow the cellular aging process and deliver unique pro-aging benefits
- By prolonging a cell's lifecycle you are effectively delaying aging
- Could result in perceivably less wrinkles, more taut, supple, softer skin



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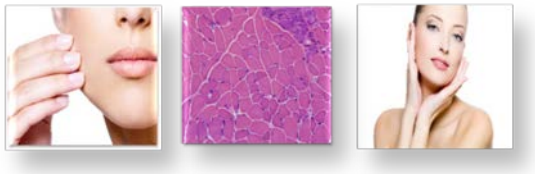
The Science



- Fucci Cell Cycle Assay was conducted to assess ability to induce cytostasis *In-vitro* cultured HaCaT keratinocytes
- HaCaT are immortalized human keratinocytes that have been extensively used to study epidermal homeostasis and have high capacity to differentiate
- Assay designed for live cell imaging of cell cycle progression
- Can be used to assess the effect of compounds on the transition of cells through the cell cycle
- Cell cycle shows the progression of a cell's life
- Cell cycle is comprised of four phases and multiple checkpoints

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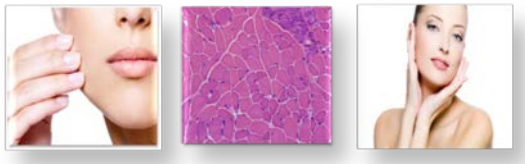
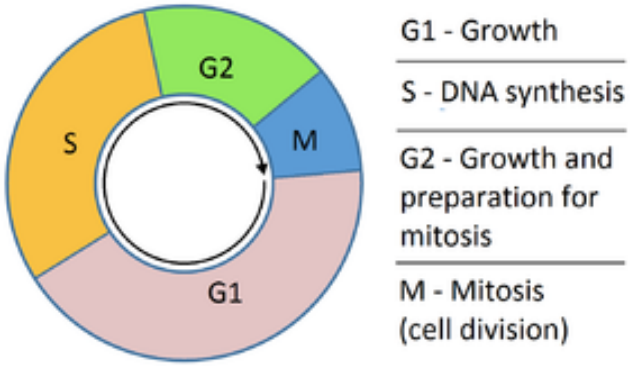
The Cell Cycle



- Cells continue through the phases and change in appearance signifying cell aging, if the cell does not pass through a checkpoint, it will be arrested and held in a resting state
- As with the endogenous gasotransmitter SO_2, the Fucci Cell Cycle Assay proves that this product can also halt the cell cycle of human skin cells
- Specifically in both the G2-M and G1 phase compared to the untreated complete media
- It is suspected that the oxidized sulfur from thermophilic cells act in the same fashion as endogenous SO_2 suspending human keratinocytes in a state of cytostasis



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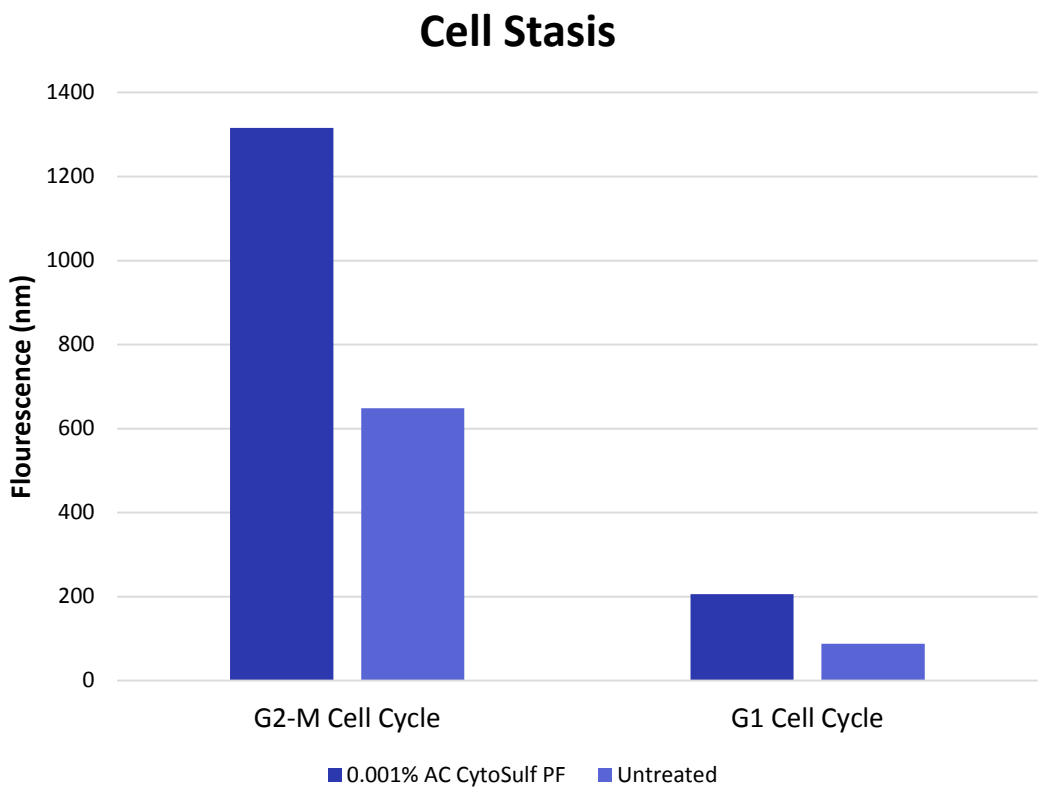

Figure 1. FUCCI Cell Cycle Sensor Assay.

Protocol

- HaCat Keratinocytes seeded into a 24-well tissue culture plate
- Allowed to grow to confluency in complete serum-free media
- Treated with 0.001% **AC CytoSulf PF** for 24 hours
- Assess G2-M phase and G1 phase of cell cycle excitation and emission
- Demonstrated **AC CytoSulf PF** can also halt the cell cycle of human skin cells, specifically in both the G2-M and G1 phase compared to the untreated controls

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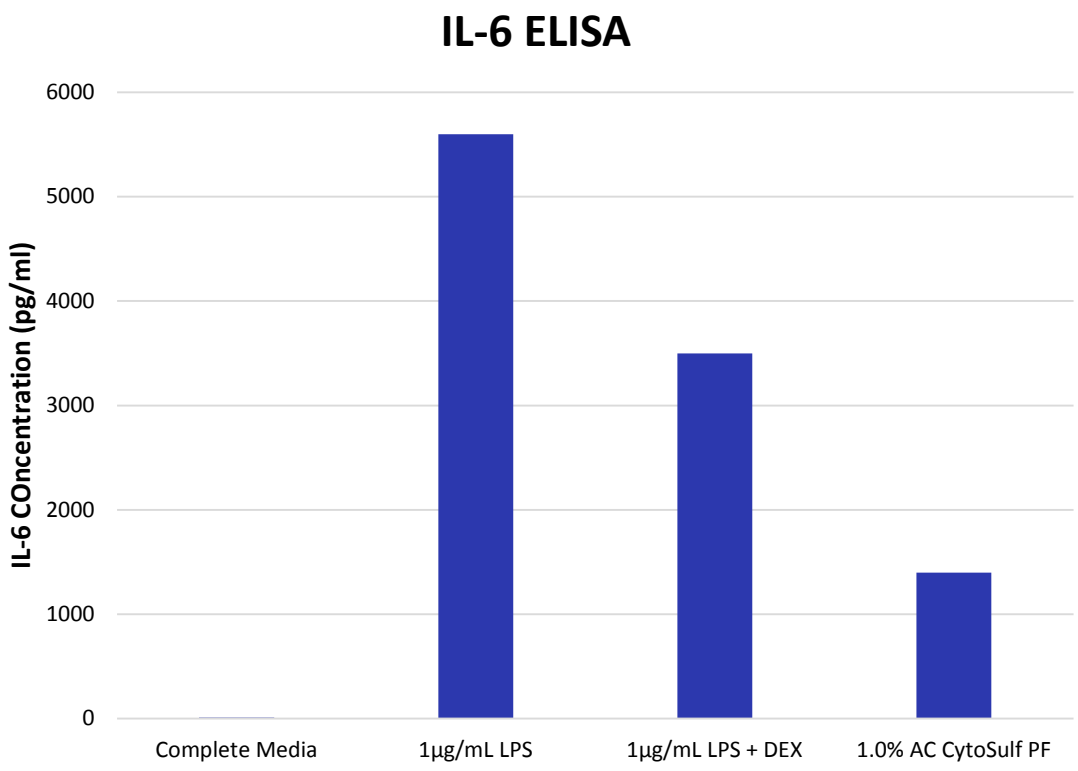

Figure 2. AC CytoSulf PF treated fibroblasts IL-6 concentrations.

Protocol

- Human dermal fibroblasts were seeded into 12-well tissue culture plates
- **AC CytoSulf PF** were added to complete DMEM containing 1µg/mL LPS and incubated with fibroblasts for 24 hours
- **AC CytoSulf PF** exhibited anti-inflammatory effects on LPS-treated fibroblasts
- The changes in IL-6 production using **AC CytoSulf PF** appear to be dose dependent

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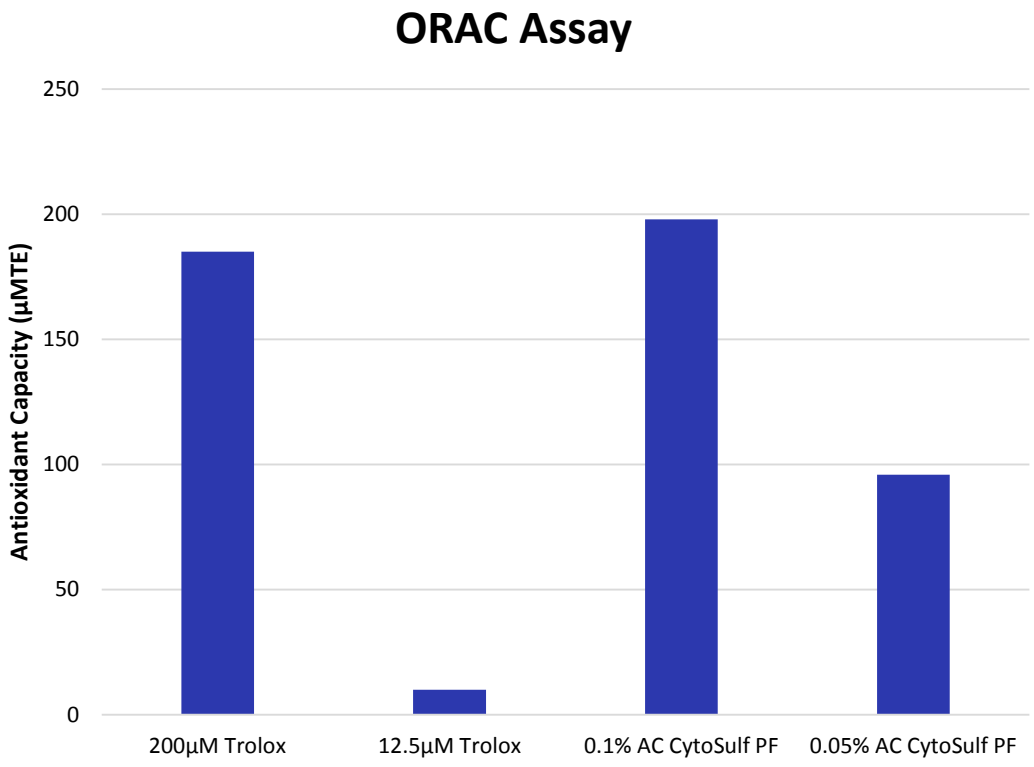

Figure 3. Antioxidant capacity of **AC CytoSulf PF.**

Protocol

- Trolox was used as the positive control
- Solutions were prepared at two concentrations, as a reference
- Florescent measurements were taken every 2 minutes for 2 hours
- **AC CytoSulf PF** showed antioxidant activity

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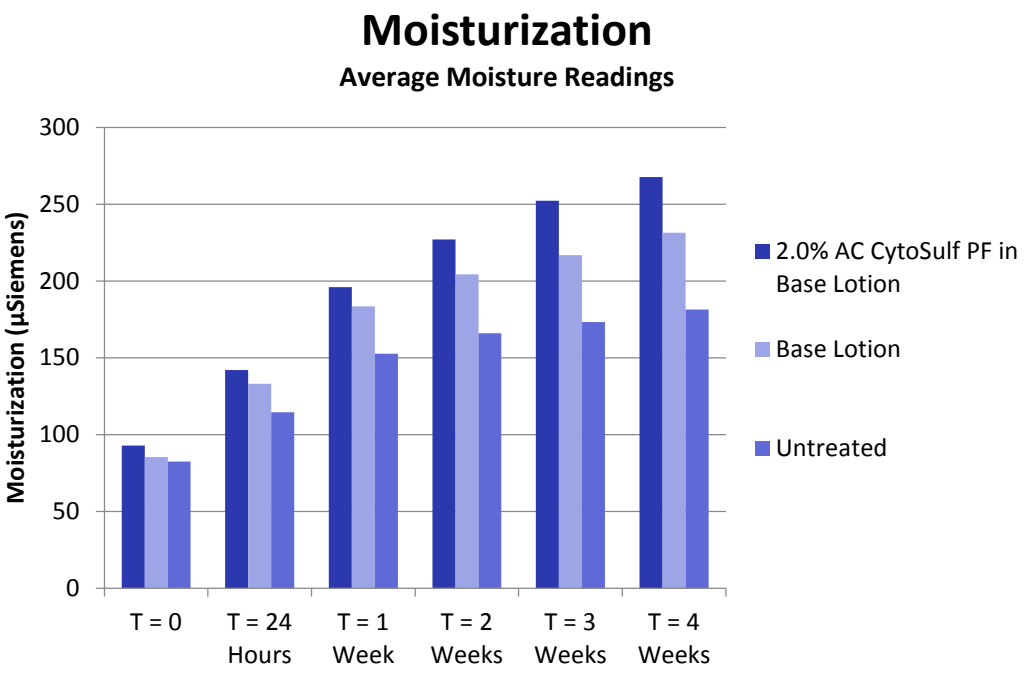

Figure 4. Average increase in moisturization per test site.

Protocol

- **Equipment:** DermaLab Combo
- **Principle of measurement:** Conductance, single frequency
- **Subjects:** 10 (m/f)
- **Test area:** Volar forearms
- **Concentration of active used:** 2.0%
- **Frequency of application:** Twice Daily

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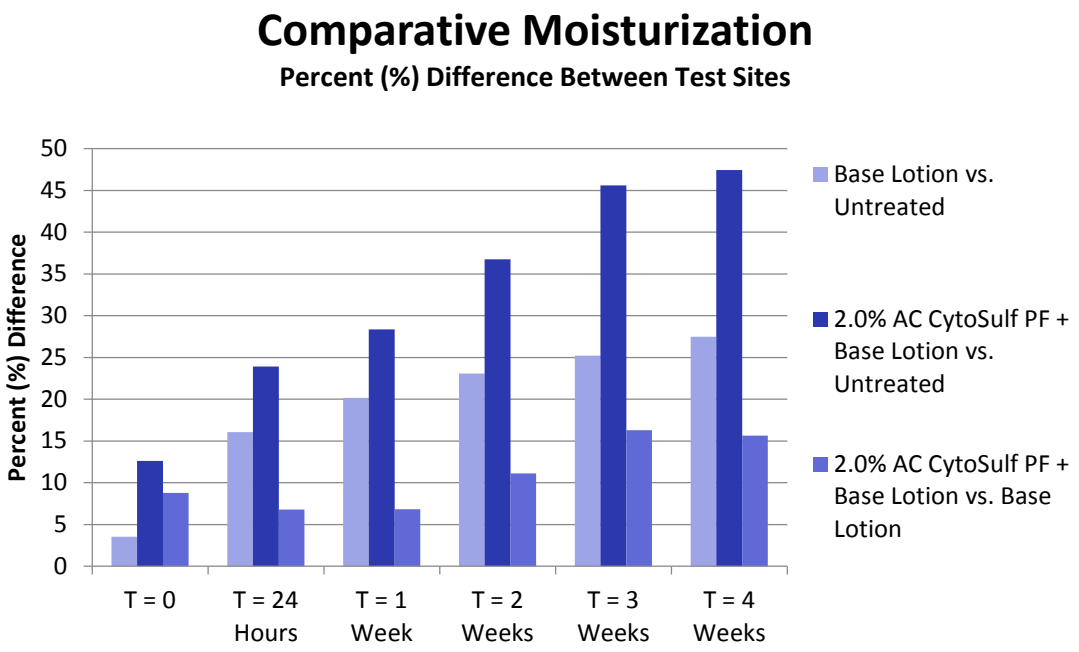

Figure 5. Percent difference in moisturization between two test sites over four weeks.

Protocol

- **Equipment:** DermaLab Combo
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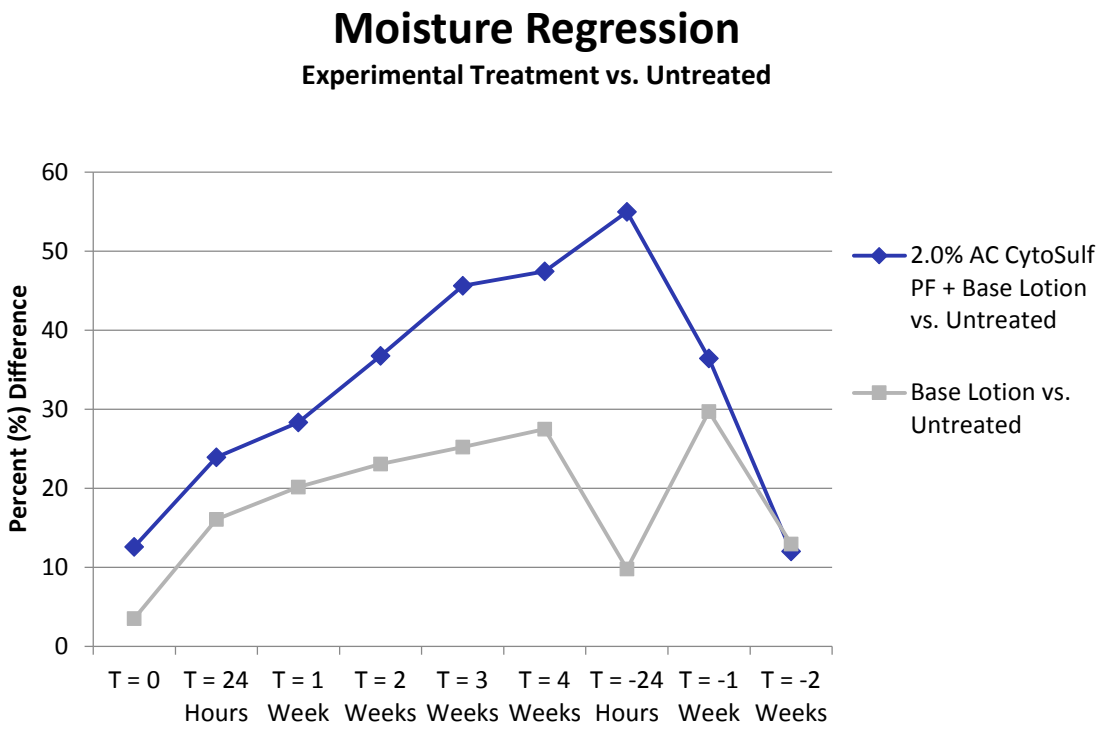

Figure 6. Regression in skin moisturization after application of experimental and base lotion material ceased.

Protocol

- **Equipment:** DermaLab Combo
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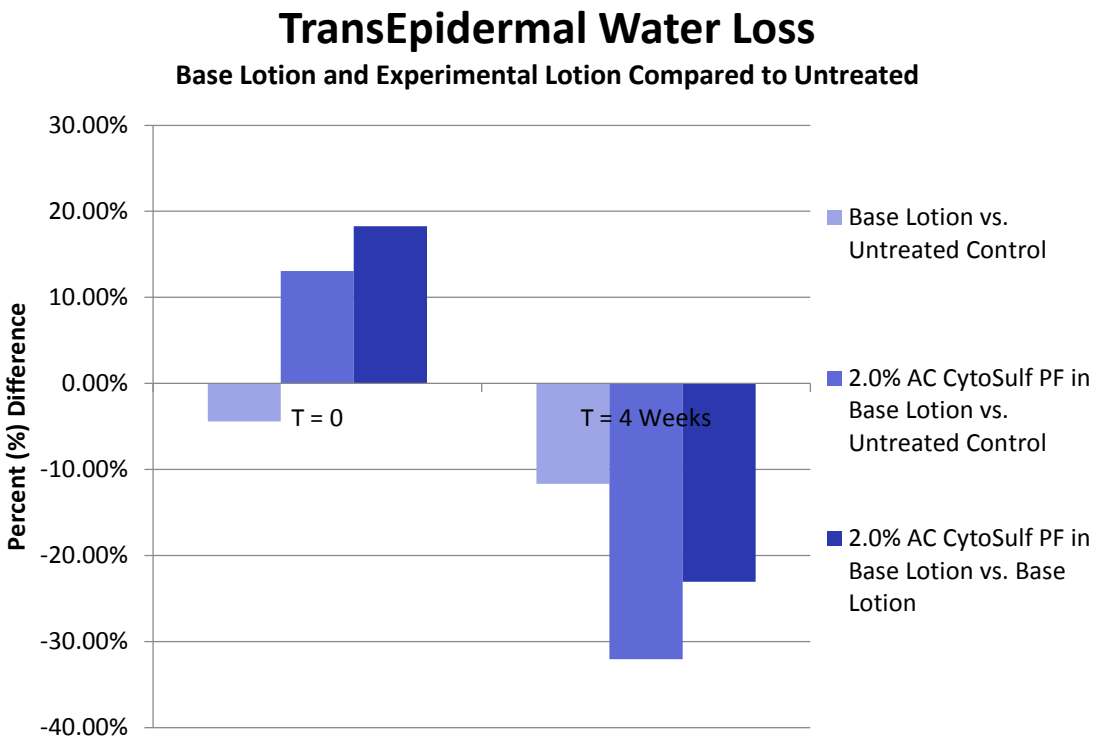

Figure 7. Comparison of percent reduction in water loss over time between two test sites.

Protocol

- **Equipment:** DermaLab Combo
- **Principle of measurement:**Open Chamber, Vapor diffusion gradient
- **Subjects:** 10 (m/f)
- **Test area:** Volar forearms
- **Concentration of active used:** 2.0%
- **Frequency of application:** Twice Daily

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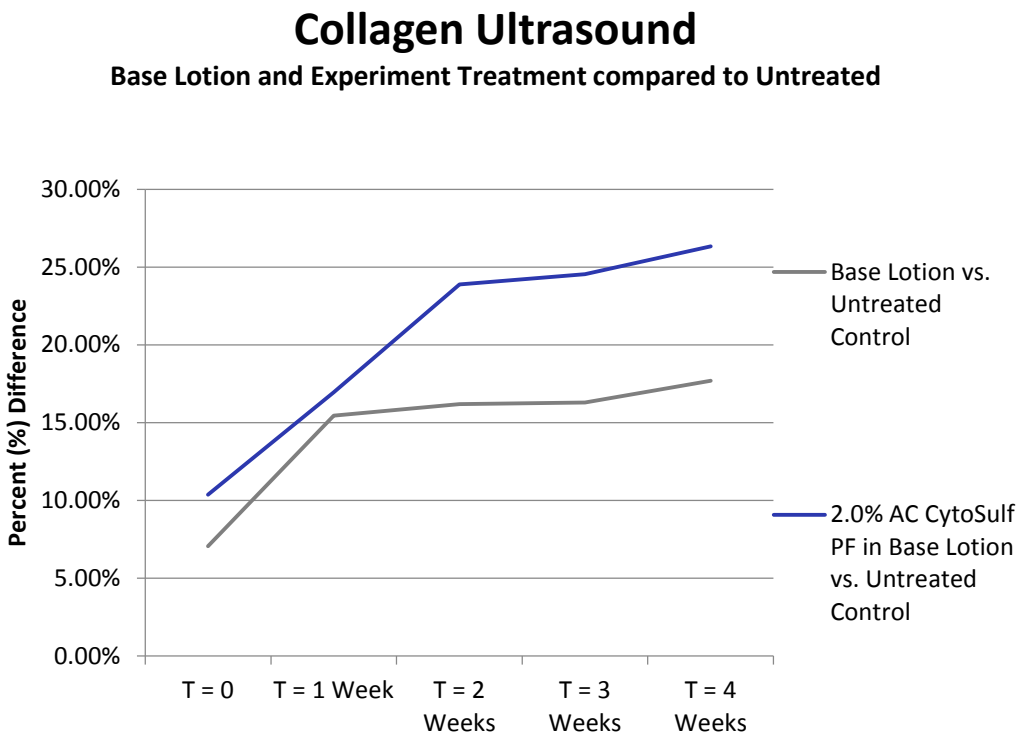

Figure 8. Ultrasound Results Comparing Test Sites to Untreated Control.

Protocol

- **Equipment:** DermaLab Combo
- **Principle of measurement:** Ultrasound Probe
- **Subjects:** 10 (m/f)
- **Test area:** Volar forearms
- **Concentration of active used:** 2.0%
- **Frequency of application:** Twice Daily
- Skin density was improved by 17% after one week and 26% after 4 weeks when compared to the untreated control

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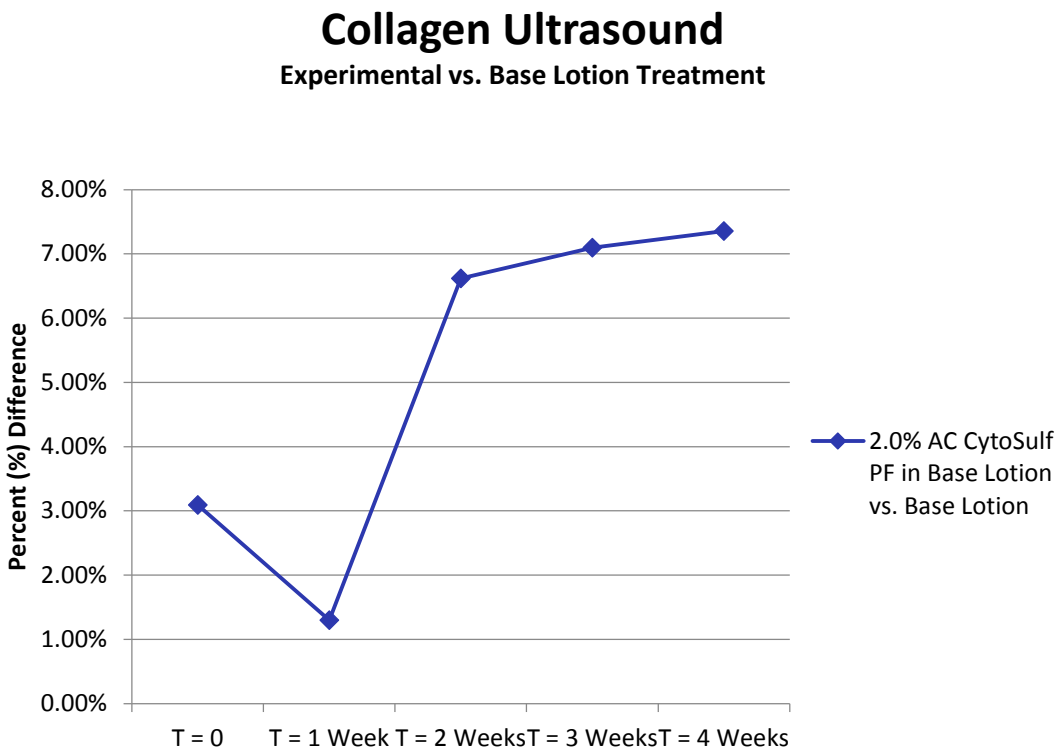

Figure 9. Ultrasound Results Comparing the Difference between the Test Site and the Control Site.

Protocol

- **Equipment:** DermaLab Combo
- **Principle of measurement:** Ultrasound Probe
- **Subjects:** 10 (m/f)
- **Test area:** Volar forearms
- **Concentration of active used:** 2.0%
- **Frequency of application:** Twice Daily
- **AC CytoSulf PF** worked 6% better than the base lotion after two weeks and 7% better than the base lotion after four weeks

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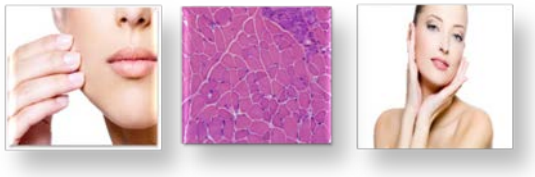
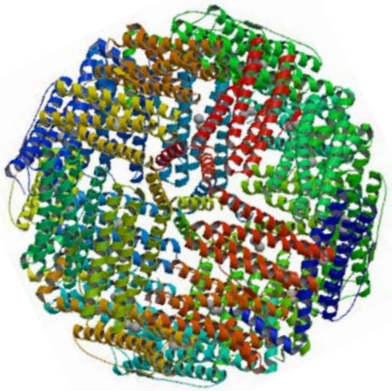


Toxicity

- Initial problems with utilizing sulfur as a method for inducing cell stasis is its assumed toxicity
- Harnessing sulfide donors from *Chlorobium tepidum*, successfully eliminates the characteristic odor and cytotoxicity associated with sulfur based actives
- Using the formulaic components of elemental sulfur (sulfide donors) naturally derived from *Chlorobium tepidum*
- Engineered to induce cellular cytostasis



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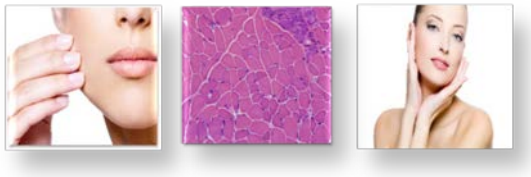

Product Recap

- **AC CytoSulf PF** is the cutting edge of age defying beauty
- Induction of cellular stasis through plankton derived sulfide donors
- Increases cellular cytostasis
- Does not induce cell death or overstimulate cell production
- Suspends cells in a semi-permanent, drawn out stage of rest
- Procedurally simplistic to formulate with

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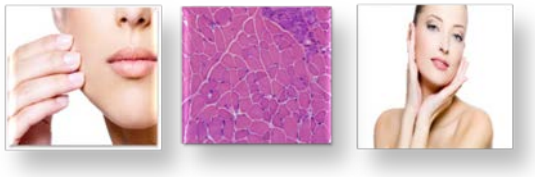

Technical Information:

Product Code: 20793PF

INCI Name: Plankton Extract

INCI Status: Conforms

Suggested Use Level: 1.0-5.0%

Suggested Applications: Anti-Aging, Slows Cellular Turnover, Next Generation Claim

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