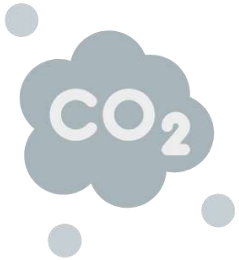
Active Concepts

AC Det'Ox Hair

INCI: Saccharomyces/Brassica Oleracea Acephala Leaf Ferment Filtrate & Lactobacillus Ferment Lysate

Background



Approximately 17% of croplands worldwide have been contaminated with "heavy metals" according to recent research. The distribution and movement of **heavy metals** in the environment are impacted by **global warming.** Heavy metals can be released from aquifers—geological formations that store groundwater—due to melting glaciers, rising CO_2 levels, and climate changes.

As a result, **heavy metal concentrations** in ecosystems have **increased**, potentially posing **harmful effects** on both the environment and human health.

The exposure to toxic metals

The main sources of **exposure** include **drinking water**, contaminated **food** (especially seafood from dirty locations), and **air pollution** (especially lead emissions from gasoline in high-traffic areas). Other causes include **tobacco smoke**, which contains cadmium and to a lesser amount, lead.

The **water** we use **to wash our hair** and body may include trace amounts of **heavy metals** such as lead, copper, iron, cadmium, or nickel. This can happen for a variety of reasons, including old tubes releasing particles into the water, industrial pollutants contaminating groundwater, or an ineffective filtration system.

How to reduce heavy metals intake & exposure?

Heavy metals cannot be metabolized by soil microorganisms or utilized as nutrients by plants. Heavy metals can **harm organs** and have a serious negative impact on health once they enter the body through water or other routes.

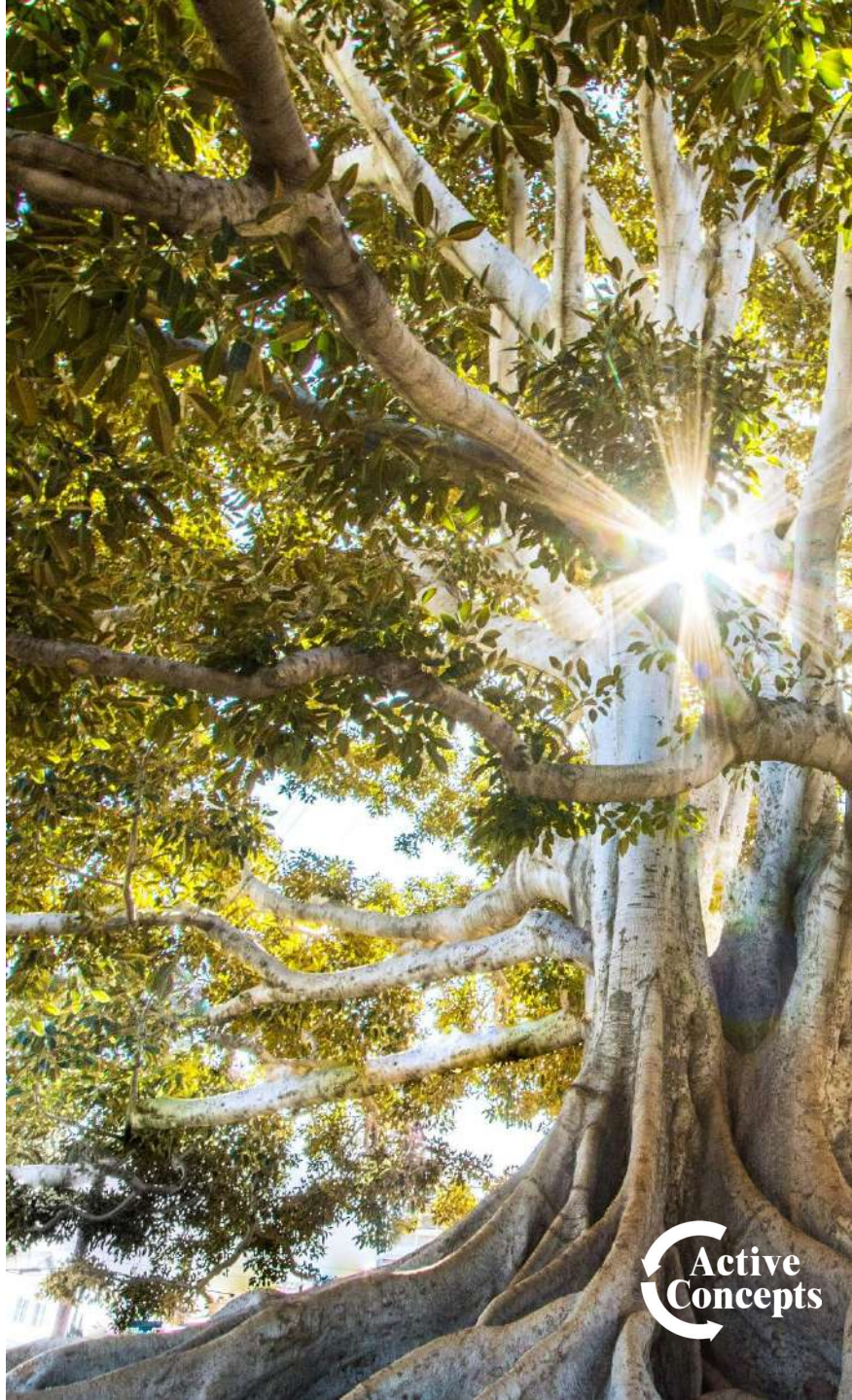
Therefore, it is crucial to **stop** soil and water **contamination** and to remediate these harmful chemicals.

Phytoremediation

Phytoremediation is an **environmental clean-up** technique, considered a sustainable, versatile, and low-cost method compared to chemical or mechanical clean-up.

Some plants (e.g. sunflowers, Indian mustard, mulberry, and many more) are used in phytoremediation to:

- **Absorb toxic metals** or contaminants and store them in their tissues.
- **Break down** organic **pollutants** through their enzymes.
- Support soil microorganisms that **transform pollutants.**
- Filter and **clean water** through their root systems.

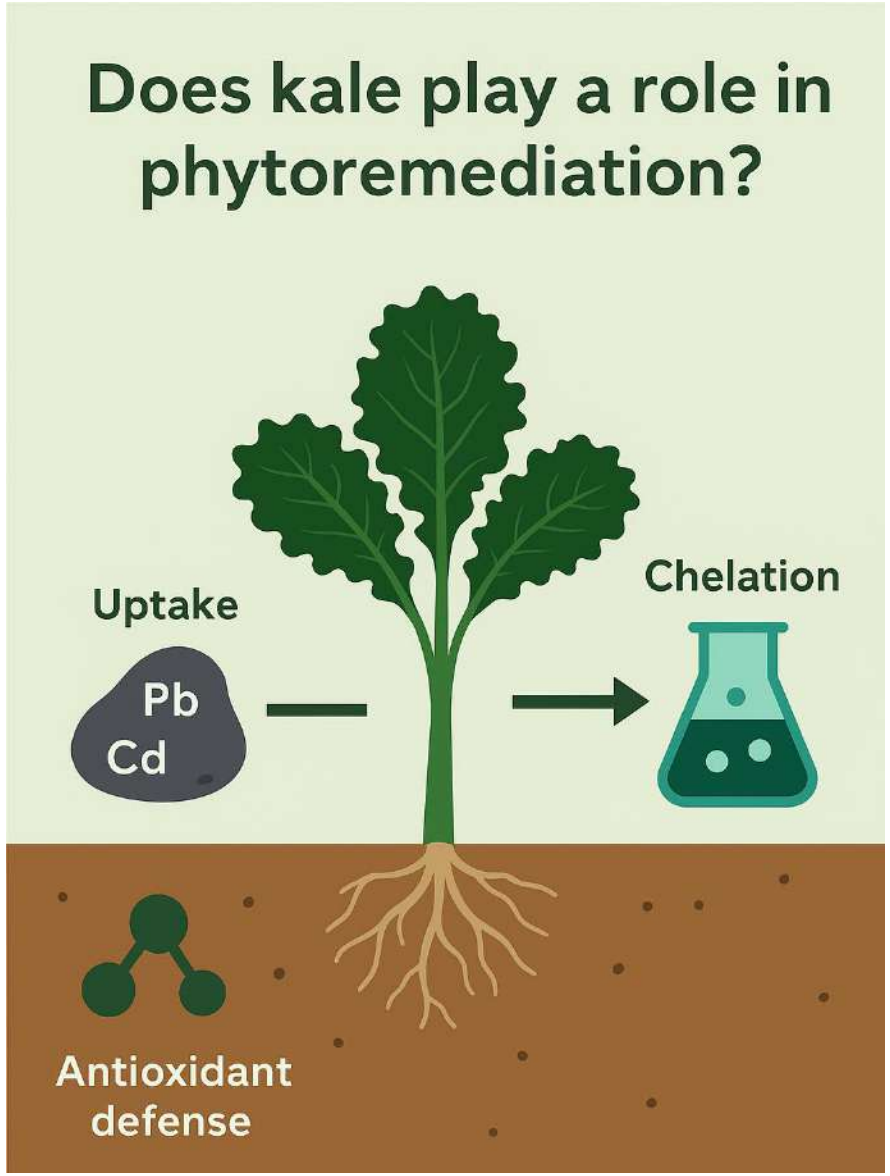


Kale – var. Acephala

Kale (*Brassica oleracea var. acephala*) is a leafy green vegetable belonging to the cabbage family. The term “acephala” means “without a head”, because unlike cabbage, it doesn’t form a compact head but grows in open, loose leaves. It is valued for being:

- Nutrient-dense – rich in vitamin C, minerals, and antioxidants;
- Hardy – tolerant to cold climates and adaptable to poor soils.

It is widely cultivated both as a food crop and in research, praised for its stress tolerance and its potential in phytoremediation.



Kale in phytoremediation

Kale has been investigated as a potential plant for phytoremediation, particularly in **soils contaminated** with lead (Pb) and cadmium (Cd) in metropolitan areas affected by industrial activities, gasoline, and pollution. Under Cd exposure, kale triggers a strong **antioxidant defense** involving enzymes such as superoxide dismutase (SOD) and catalase (CAT) that enables **efficient detoxification** of toxic metals, demonstrating its suitability for phytoremediation.

Recycled beer yeast for removing lead from water

MIT and Georgia Tech researchers developed a cost-effective method to **remove lead** from water using **repurposed beer yeast** encapsulated in hydrogel: **biosorption**. The yeast naturally absorbs lead, even at very low levels, and the hydrogel keeps it contained, making cleanup easy. This biodegradable approach could be used in household filters or large water treatment systems.

Active Concepts

Rethink how we care for our hair

Higher concentrations of metals in soil and water sources are a result of the discharge of heavy metals into our ecosystems. These particles can **build up** on the hair fiber with each wash, resulting in **discoloration**, breakage, dullness, and decreased treatment and coloring efficacy.

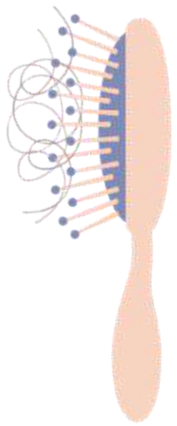
- **Calcium**: causes hair buildup, dullness
- **Magnesium**: causes hair buildup, dryness, dullness
- **Mangenese**: dryness, brittleness
- **Copper**: triggers free radicals and color fade

Hair breakage & heavy metals

Hard water, particularly its **calcium** (Ca) and **magnesium** (Mg) ions, can adversely **affect hair integrity** and contribute to **breakage**. Hair is primarily composed of keratin, a protein rich in cysteine residues that form disulfide bonds, conferring strength and elasticity. Calcium and magnesium ions **interact with negatively charged sites on keratin**, such as carboxylate groups, and deposit along the hair shaft. This results in the formation of insoluble mineral–protein complexes, producing a **rough surface** that decreases **hair elasticity**, impairs moisture retention, and **compromises mechanical resilience**.

The connection to hair loss

According to research, heavy metals can disrupt regular **hair growth cycles** and alter the integrity of hair follicles. The hair follicle is an intricate structure that is responsible for hair growth; any disturbance in its function might result in **hair loss**.



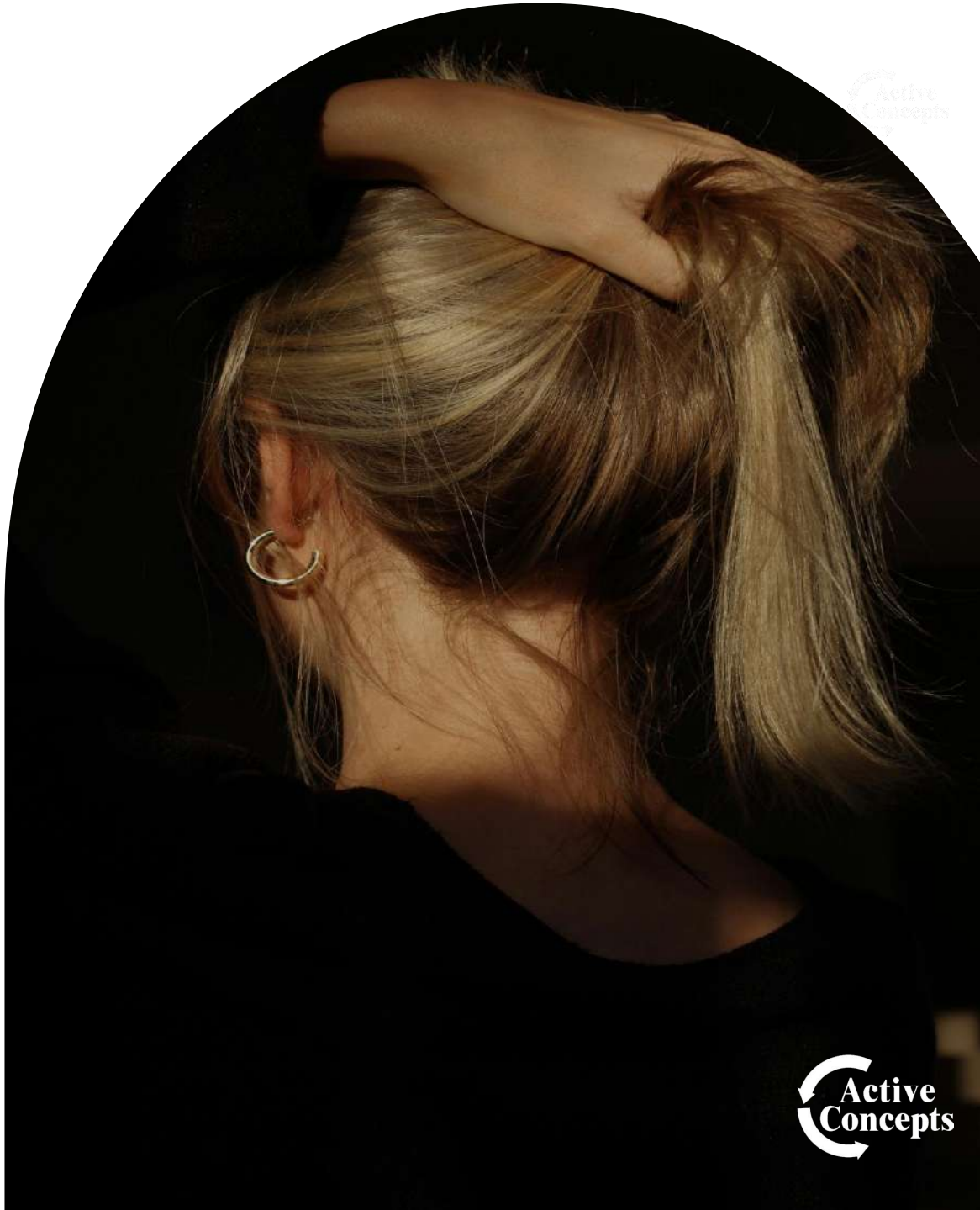
Heavy metals have been proven in studies to cause oxidative stress, inflammation, and cell death in hair follicles, resulting in **telogen effluvium**, a condition in which hair prematurely enters the resting phase and falls out.

Some studies show that **chronic telogen effluvium** may be **linked** not only to nutritional factors but also to **exposure to heavy metals**, especially cadmium (Cd) and lead (Pb). Cd and Pb can contribute to hair loss by disrupting the hair cycle, inducing oxidative stress, and interfering with iron and zinc metabolism.

A diet rich in antioxidants may help counteract toxic effects; reducing environmental exposure to heavy metals is also essential.

Fenton Reaction

Fenton reaction is a chemical reaction between hydrogen peroxide (H_2O_2) and metal ions, such as copper (Cu^{2+}) and iron (Fe^{2+}), that produces extremely reactive hydroxyl radicals (•OH). **Oxidative treatments** (hydrogen peroxide, bleaches) **can react with metal ions**. In hair, the Fenton reaction can theoretically happen when hydrogen peroxide is used (for example, in dyeing or bleaching) and there are metal ions such as copper present (e.g. hard water residues).

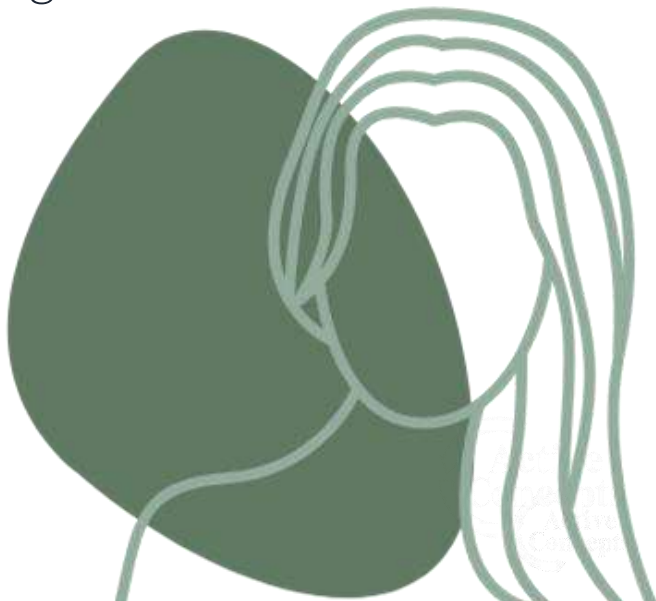


The effect of Fenton reaction on hair

Damage to keratin – hydroxyl radicals can break sulfur bonds in hair, weakening it.

Dryness and fragility – the protein structure is degraded.

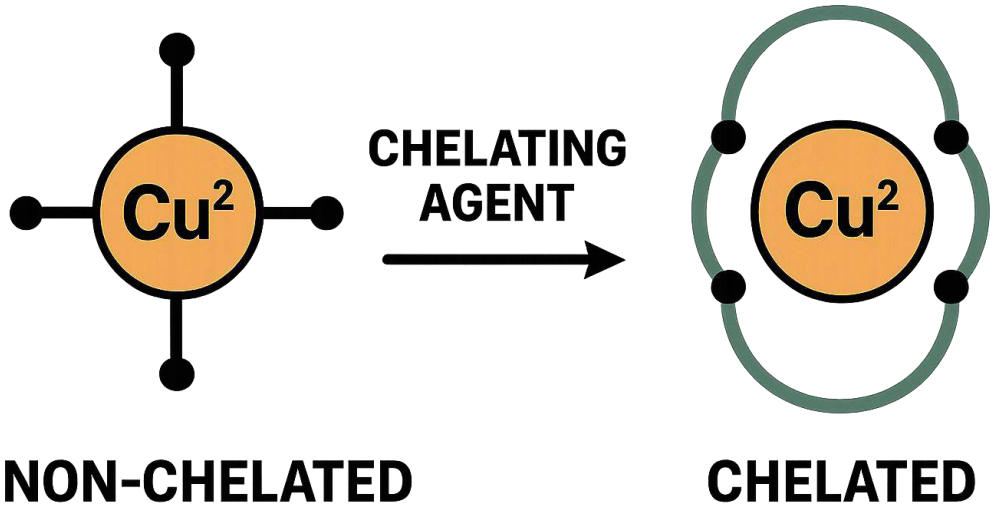
Color change – if there are residual metals, the color may change towards unwanted shades (green, deep yellow).



How to prevent Fenton reaction

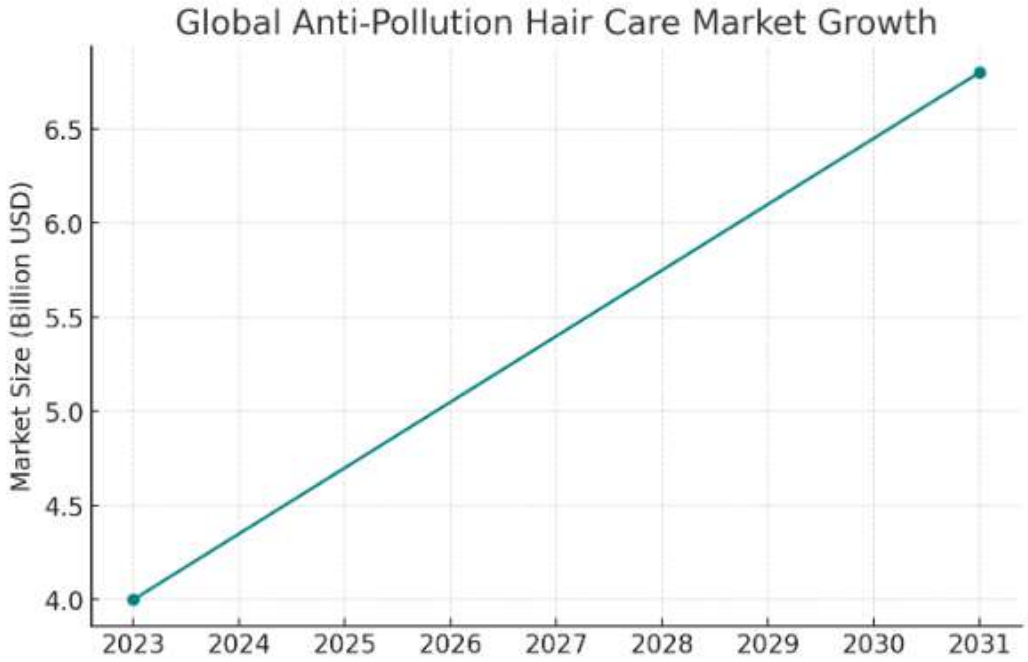
Natural chelating agents may offer an effective strategy to inhibit the Fenton reaction. Through chelation, metal ions are tightly bound, effectively rendering them chemically inactive. By preventing these transition metals from catalyzing the generation of reactive radicals we could potentially obtain:

- Less radical formation → less keratin breakdown.
- Better color stability → pigments less oxidized by residual metals.
- Better shine and hydration → less damaged cuticle.



Anti-pollution hair care market

According to the Customer Market Insights Research, the **global anti-pollution hair care market**, valued at USD $3.5 billion in 2024, is expected to reach USD $6.6 billion by 2033, growing at a 6.7% CAGR. Demand is driven by urban consumers and those with colored or chemically treated hair, who are increasingly **aware** of the damaging **effects of metals**.



The rise in chemical treatments and environmental metal exposure is fueling innovation and the launch of specialized hair products.

AC Det'Ox Hair

In order to meet the need for natural ingredients to counteract global warming and increased presence of heavy metals in our environment, body and hair, **AC Det'Ox Hair** represents a natural solution.

This ingredient can **counteract** the **negative action of heavy metals** by preventing their deposit on hair and removing these elements.

By diminishing the negative action of heavy metals on **hair**, it can also improve the hair's strength and resilience.

#Clarity #Color Protection #Strength

How does AC DetOx Hair work?

Our active ingredient combines the **fermentation** of *Saccharomyces cerevisiae*—which naturally produces **α-lipoic acid** (ALA)—with **kale extract**, a rich source of the same potent antioxidant and **ascorbic acid** (vitamin C). This formulation leverages yeast fermentation to enhance the **bioavailability** of natural ALA, while the presence of kale-derived vitamin C further strengthens its **detoxifying activity**.

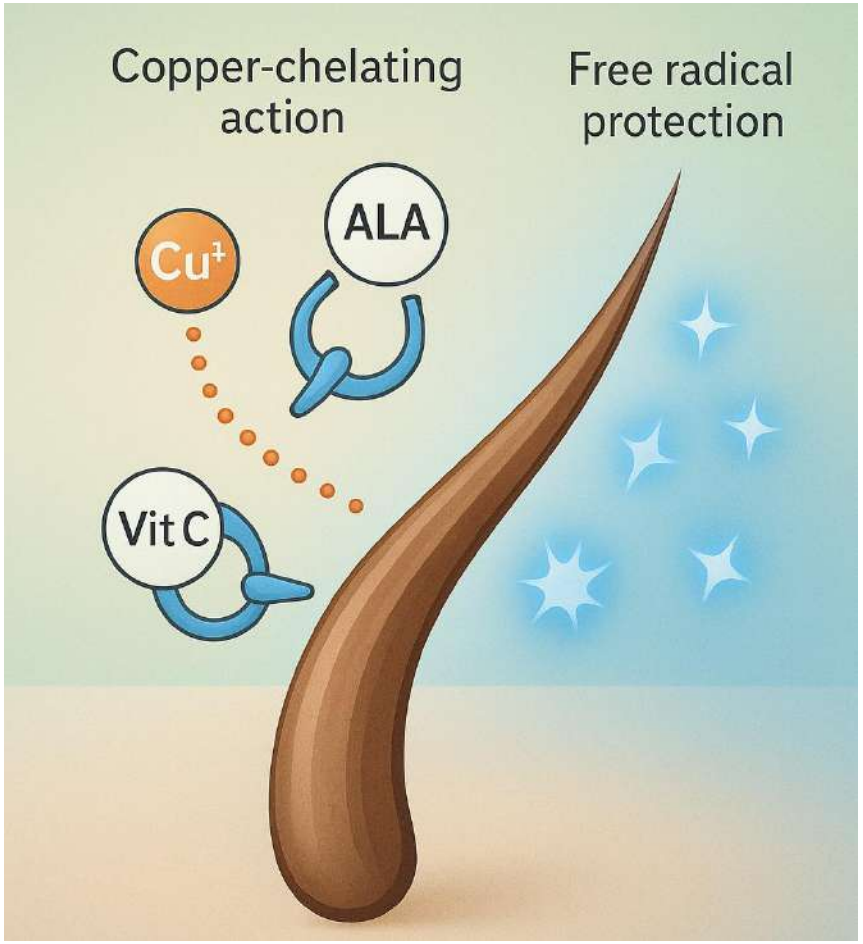
Chelating Action & Antioxidant Protection

Metal Binding:

AC Det'Ox Hair has been standardized for its **copper-chelating capacity,** demonstrating strong binding to metal ions.

Antioxidant Protection:

AC Det'Ox Hair counteracts free radicals. This prevents **oxidative damage** to hair proteins (keratin) and lipids, preserving hair strength, elasticity, and shine.



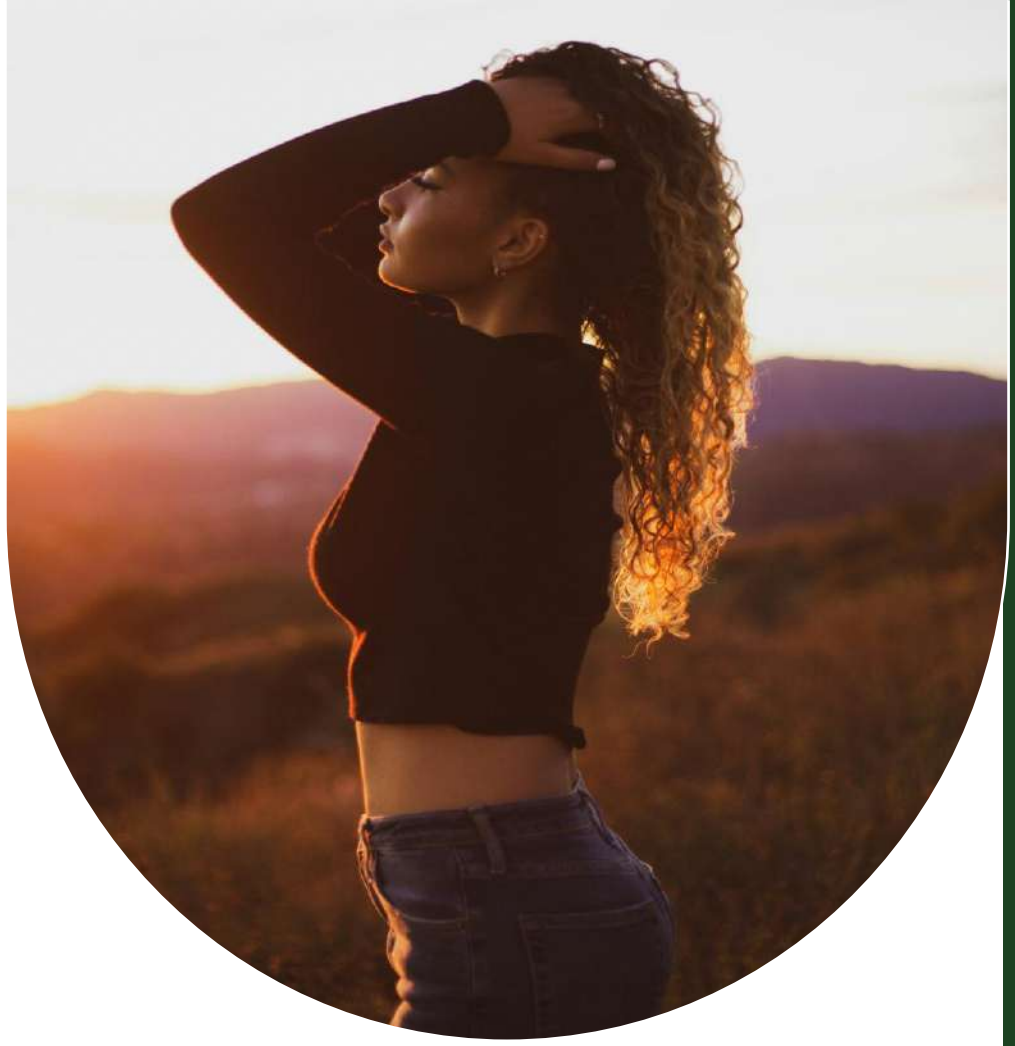
The **combination** allows for enhanced **metal capture** on the hair shaft and scalp.

Brewer's yeast

Brewer's yeast is commonly used in brewing and nutritional supplements. Yeast fermentation naturally produces **alpha-lipoic acid**, which help neutralize free radicals. Alpha-lipoic acid adds a natural **chelation/antioxidant** function, boosting the ability to reduce heavy metals and prevent oxidative damage.

α-lipoic acid is a potent antioxidant known for its metal-chelating and protective properties. It can form complexes with heavy metals, reducing their ability to damage proteins and lipids in the hair. It helps to **reduce free radicals** generated by metals and regenerates other natural antioxidants, such as vitamin C, **protecting keratin** and cuticular lipids.

It also supports scalp well-being by reducing local oxidative stress, potentially improving cellular metabolism.



Active Concepts

The role of α-lipoic acid in detoxifying hair

The role of vitamin C in detoxifying hair

Ascorbic acid (vitamin C) is a **well-known antioxidant** that can protect cells from oxidative stress induced by heavy metals. Metals generate **reactive oxygen species** (ROS) that **damage hair proteins and lipids**.

Vitamin C reduces ROS, protecting hair structure and color, and potentially reducing their ability to cause damage or discoloration.

It is ideal for **protecting hair**, preventing metal-induced dullness, and enhancing shine.

Active Concepts

Sustainable Sourcing

Kale is organically grown in the Arroyo Grande Valley in California, by farmers who began their agricultural tradition in the 1940s using the same low-impact methods they employed when they first planted crops. Owners and staff actively support local nonprofits, healthy eating, and health-related volunteering.

USA

Kale is organically grown in Asiago, Veneto region. The land, fresh mountain air, and rainwater are the key elements behind this sustainable product. Cultivation relies solely on natural phyto-treatments of natural origin. Each leaf is carefully hand-picked and selected to ensure the highest quality.

ITALY

Since the 1970s, the Australian supplier has nurtured a passion for herbs and gardening that gradually grew into a thriving business. Today, their nursery boasts over 400 plants, including organically certified kale. Guided by a devotion to sustainability, they continue to cultivate while sharing their love for gardening with the community.

AUSTRALIA

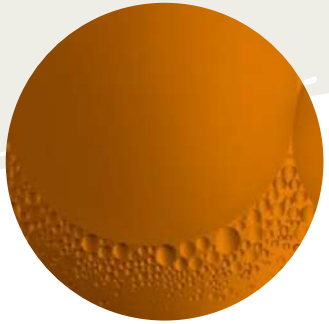
Manufacturing Process

Acquiring kale

Mechanical crushing of kale

Kale is fermented with *Saccharomyces cerevisiae*

Addition of *Lactobacillus* ferment lysate



AC DetOx Hair

Benefits

AC Det'Ox Hair is ideal for anyone seeking shinier, stronger, and healthier-looking hair, especially if their hair is colored, fragile, or exposed to environmental stressors:

- Chemically treated or dyed hair – Hair that has been bleached, colored, or chemically straightened can accumulate metals, which may dull color or weaken strands.
- Fine or fragile hair – Heavy metals can weigh down delicate hair and make it prone to breakage.
- Hair exposed to pollution or hard water – Environmental pollutants and minerals in hard water can build up on the scalp and hair, leaving it looking dull and lifeless.
- Dry or damaged hair – Removing metal deposits can improve manageability, softness, and overall health.

Available Efficacy Studies

Ex Vivo.

- ICP Elemental Analysis
- Tensile Strength
- Cationic Substantivity
- Color Protection Assay
- Hair Airborne Pollution Protection Assay
- Ex Vivo Hair Shaft Elongation

In Vivo.

- Salon Half-Head Study
- Scalp Care Study

In Vitro.

- Cellular Detoxification
- ROS (Heavy Metals)
- ROS (Antimycin A)
- SA-β-gal
- Heavy Metal Protection
- Airborne Pollution Protection
- Competitive Product Summary

Available Efficacy Studies

Tox & Safety

- AMES
- Cellular Viability
- Dermal & Ocular Irritation
- Phototoxicity Assay
- OECD 201 Fresh Water Algae Growth Inhibition
- OECD 301B Ready Biodegradability Assay
- OECD TG 442C – Direct Peptide Reactivity Assay
- OECD TG 442D – In Vitro Skin Sensitization Report
- OECD 456 H295R Steroidogenesis Assay

ICP Elements Analysis Report

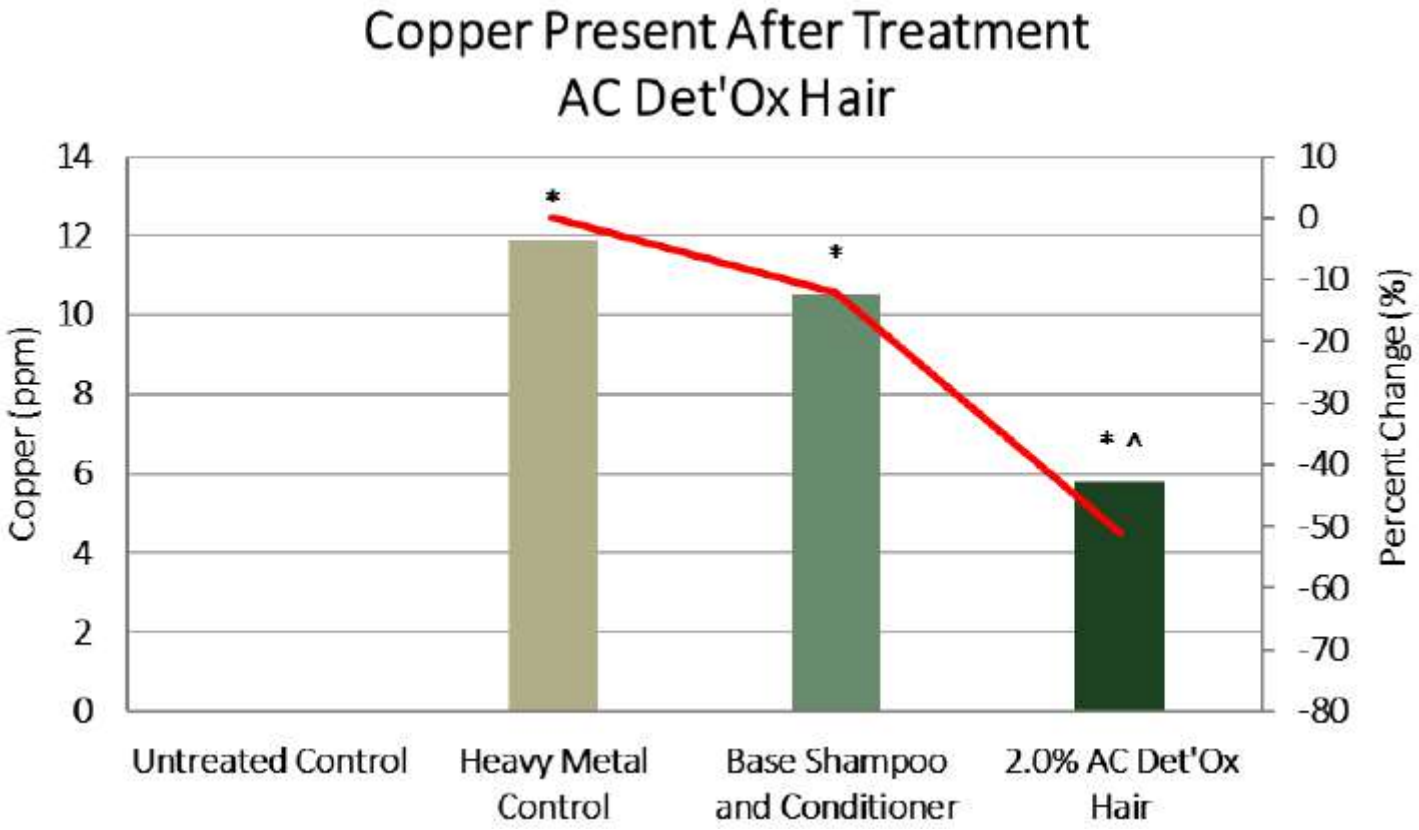


Figure 1. Copper Present on Brunette Hair After Treatment.
* indicates significance ($p \leq 0.05$) compared to Untreated Control.
^ indicates significance ($p \leq 0.05$) compared to Heavy Metal Control.

Three human virgin hair tresses were collected and soaked for thirty minutes in a metal solution containing 13 ppm copper. After soaking, one tress was rinsed with water as the Heavy Metal Control, one was washed with Base Shampoo and Conditioner, and one was washed with base shampoo and conditioner containing 2.0% AC Det'Ox Hair. All three tresses were hung to airdry completely. A fourth tress was left as an untreated control for baseline copper content.

AC Det'Ox Hair experienced a decrease in copper compared to the Heavy Metal Control

-51%

Benefits

AC Det'Ox Hair removes copper deposits in hair after one wash, demonstrating that chelating properties which protect hair against damage from hard water and heavy metal buildup.

Active Concepts

Tensile Strength After Repeated Washes

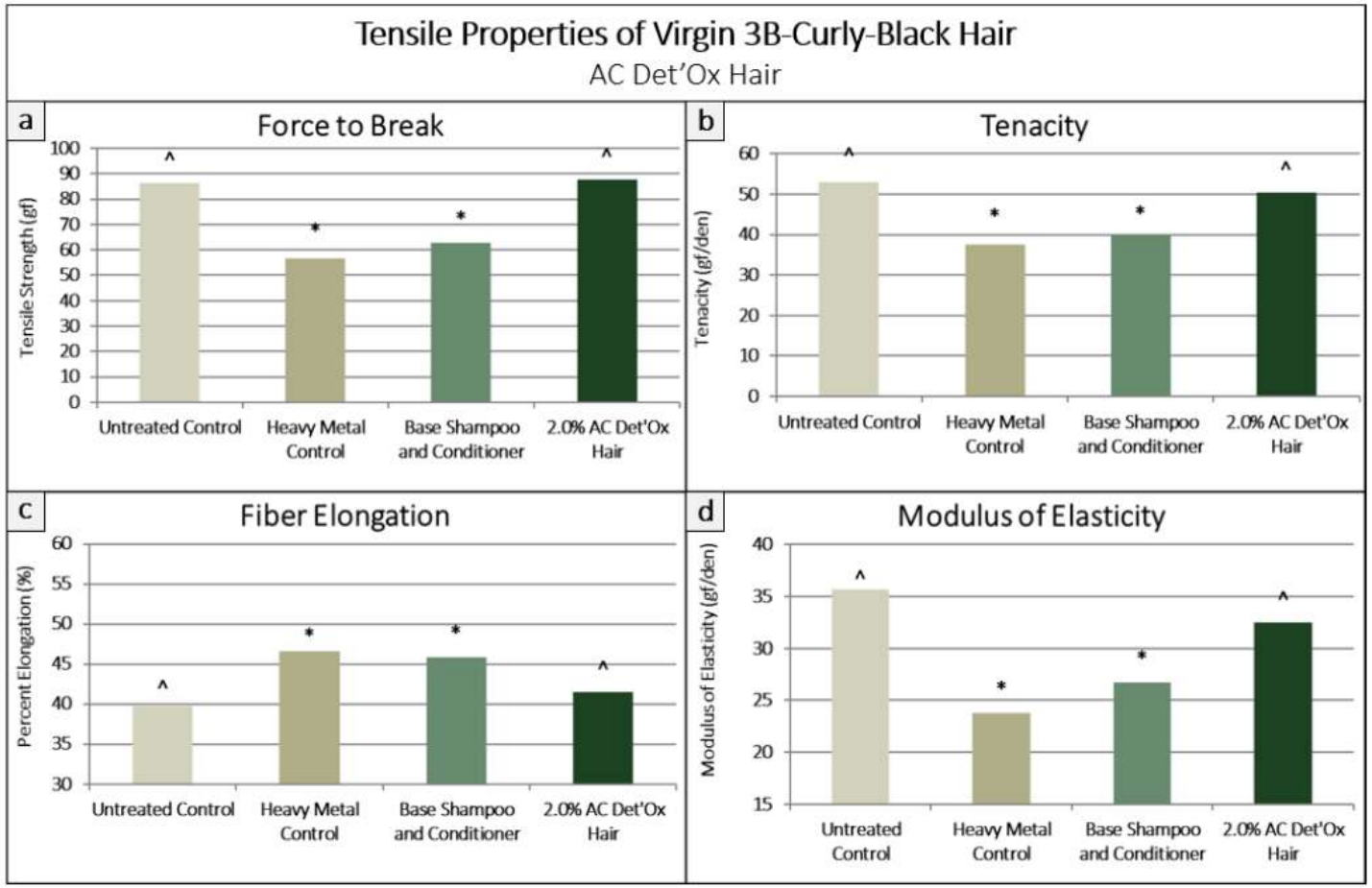


Figure 2. Average tensile properties of 2B-Wavy-Brunette hair tresses after seven washes. * indicates significance ($p \leq 0.05$) compared to untreated control. ^ indicates significance ($p \leq 0.05$) compared to heavy metal contro.-

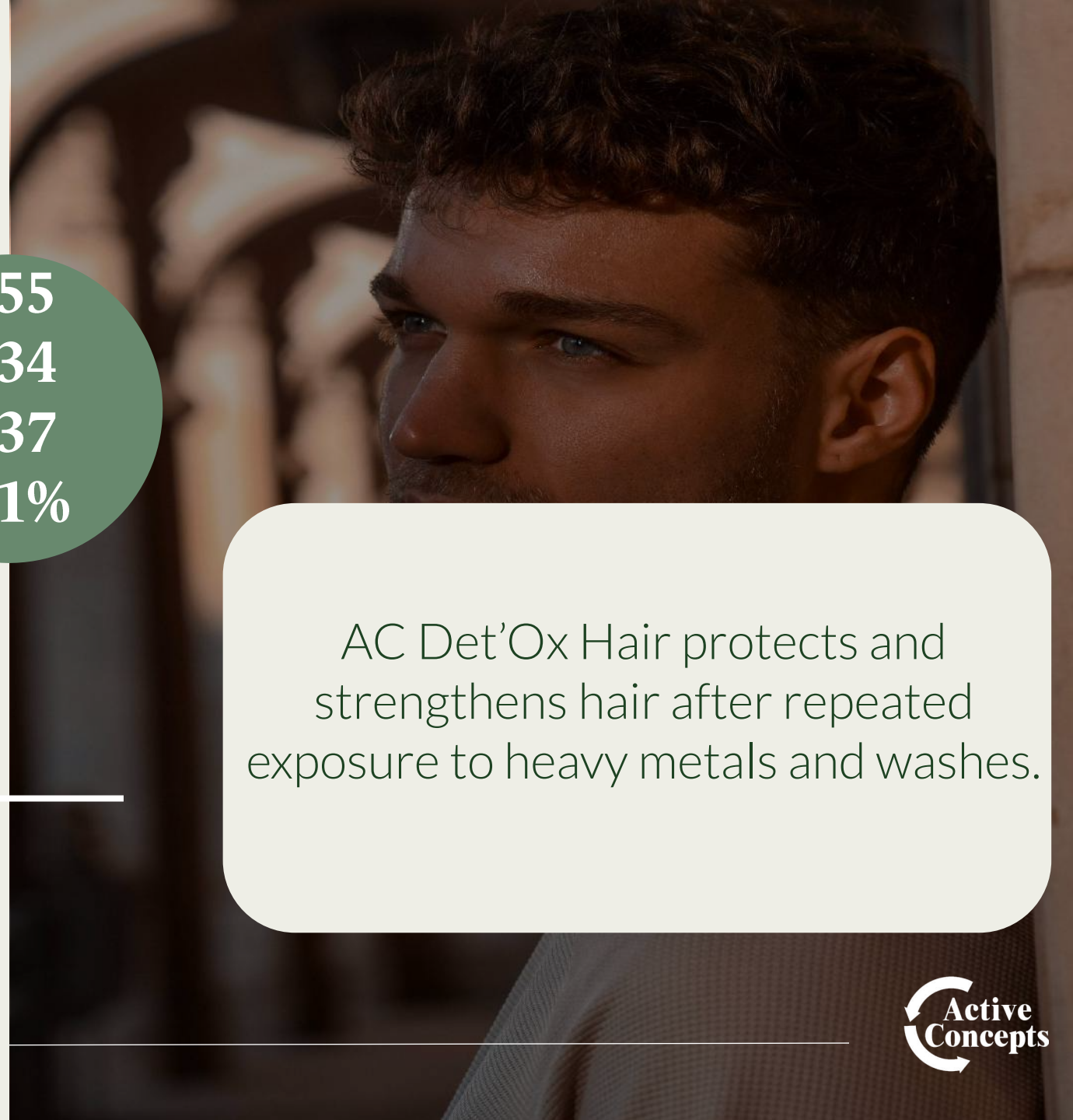
AC Det'Ox Hair was tested for following parameters: (i) force to break: maximum force required to break each fiber, (ii) tenacity: the break strength of each fiber where an increase indicates fiber protection, (iii) fiber elongation: illustrated fiber deformation before breaking where lower values indicate stronger fibers, and (iv) modulus of elasticity: the ratio of change in stress to change in strain as a fraction of the original hair fiber where an increase indicates stronger hair fibers.

Data available also for 1C-Straight-Black, 1B-Straight-Blonde, and 2B-Wavy-Brunette hair tresses.

AC Det'Ox Hair increased the force to break, tenacity, and the modulus of elasticity, while simultaneously reducing fiber elongation, compared to the heavy metal control by

+55
+34
+37
-11%

Benefits



AC Det'Ox Hair protects and strengthens hair after repeated exposure to heavy metals and washes.

Active Concepts

Cationic Substantivity Hair Conditioning

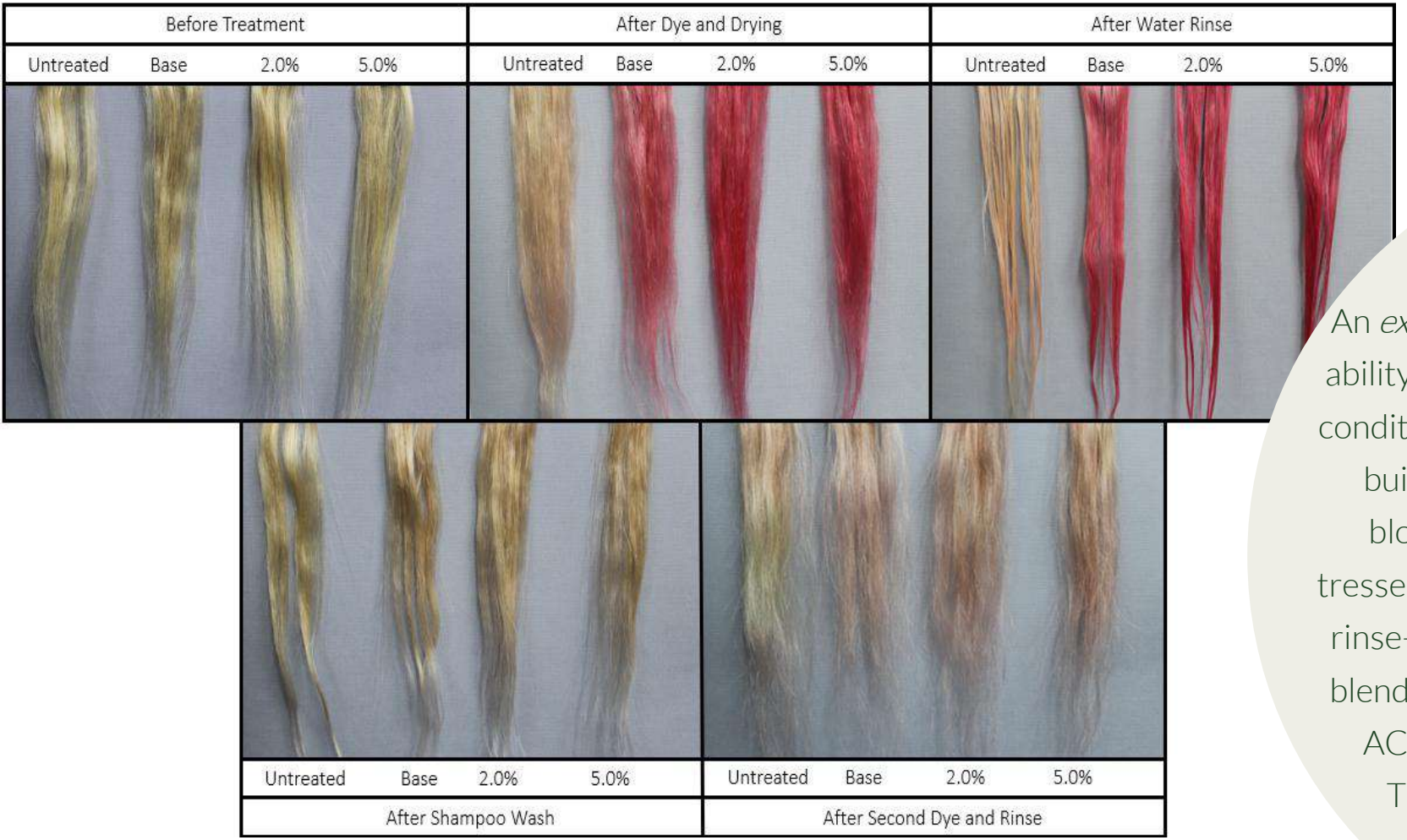


Figure 3. Comparison chart demonstrating the influence of AC Det'Ox Hair on hair. Each image left to right: untreated control, base conditioner, 2.0% AC Det'Ox Hair in base conditioner, and 5.0% AC Det'Ox Hair in base conditioner.

An *ex vivo* study was conducted to evaluate the ability of AC Det'Ox Hair to provide substantive conditioning benefits without producing product build up on human hair tresses. Four virgin blonde hair tresses were used. All the hair tresses were washed using a base shampoo and a rinse-off conditioner. The base conditioner was blended with either 2.0% AC Det'Ox Hair, 5.0% AC Det'Ox Hair, or used alone as a control. The tresses were dipped into a solution of Direct Red 80 Dye.

When present at 2.0%
AC Det'Ox Hair significantly
increased conditioner
substantivity by

+26%

Benefits

AC Det'Ox Hair is an ideal active to use in hair conditioning products designed to withstand rinses and not build-up on the hair.

Active Concepts

Color Protection Assay

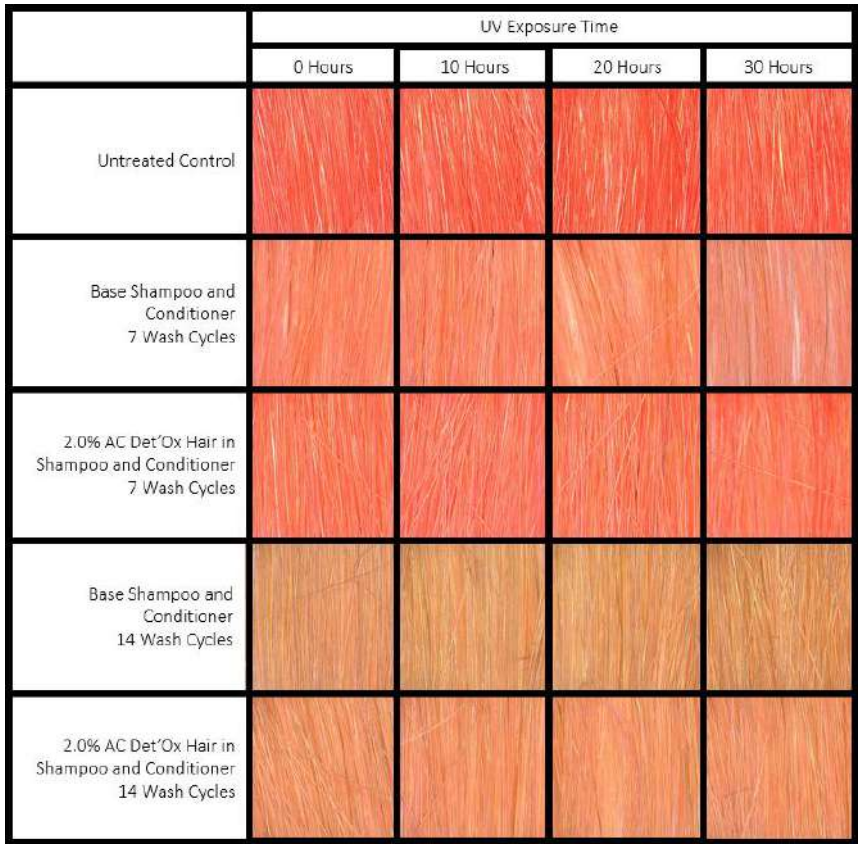


Figure 4. Representative microscopy images of color-fade demonstrating the influence of UV exposure and number of wash cycles on hair colorfastness.

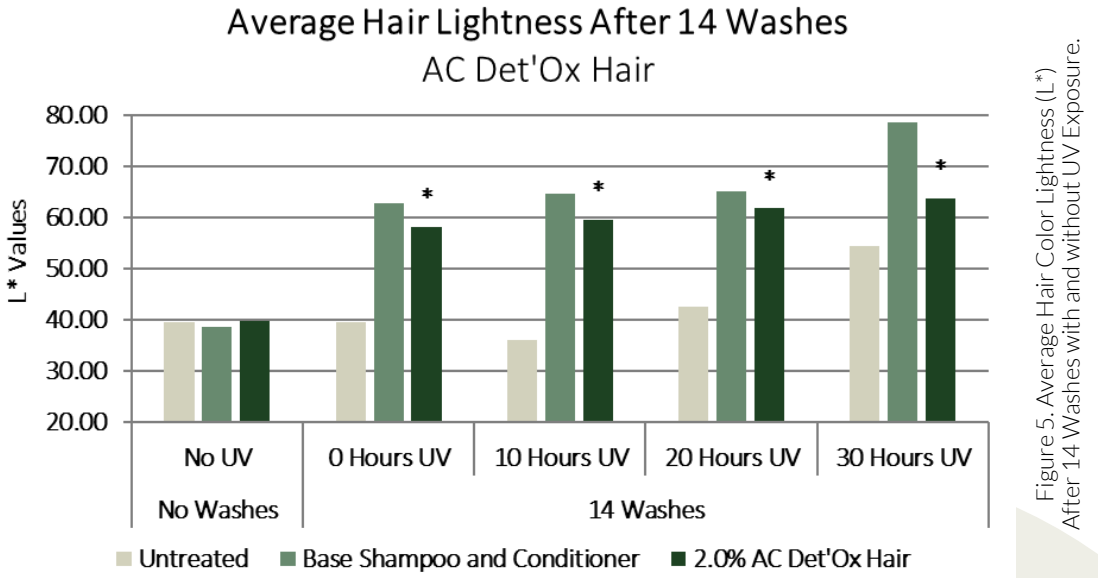


Figure 5. Average Hair Color Lightness (L*) After 14 Washes with and without UV Exposure.

Permanently dyed hair is susceptible to color fade and damage via wash-out, UV irradiation, and heat styling appliances. These cause shifts in the dyed-hair color tone resulting in dull, flat, and brassy hair. Blonde human hair tresses were dyed red and an *ex vivo* Color Protection Assay was performed to determine color fade benefits of AC Det'Ox Hair on hair.

Hair tresses washed 14 times with base shampoo and conditioner experienced dramatic color difference compared to baseline, while tresses washed with 2.0% AC Det'Ox Hair experienced less color difference

-54%

vs

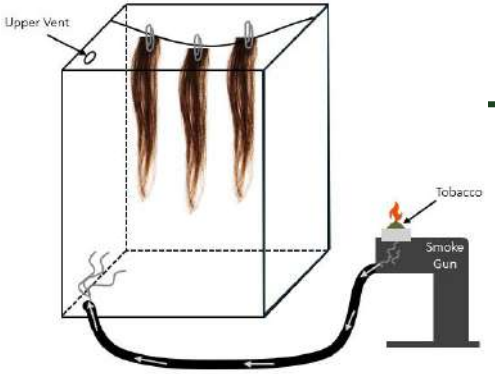
-24%

Benefits

AC Det'Ox Hair, compared to the base shampoo and conditioner, attenuates the loss in color intensity and color difference in dyed hair associated with repeated washing and UV exposure.

Active Concepts

Airborne Pollution Hair Protection Assay



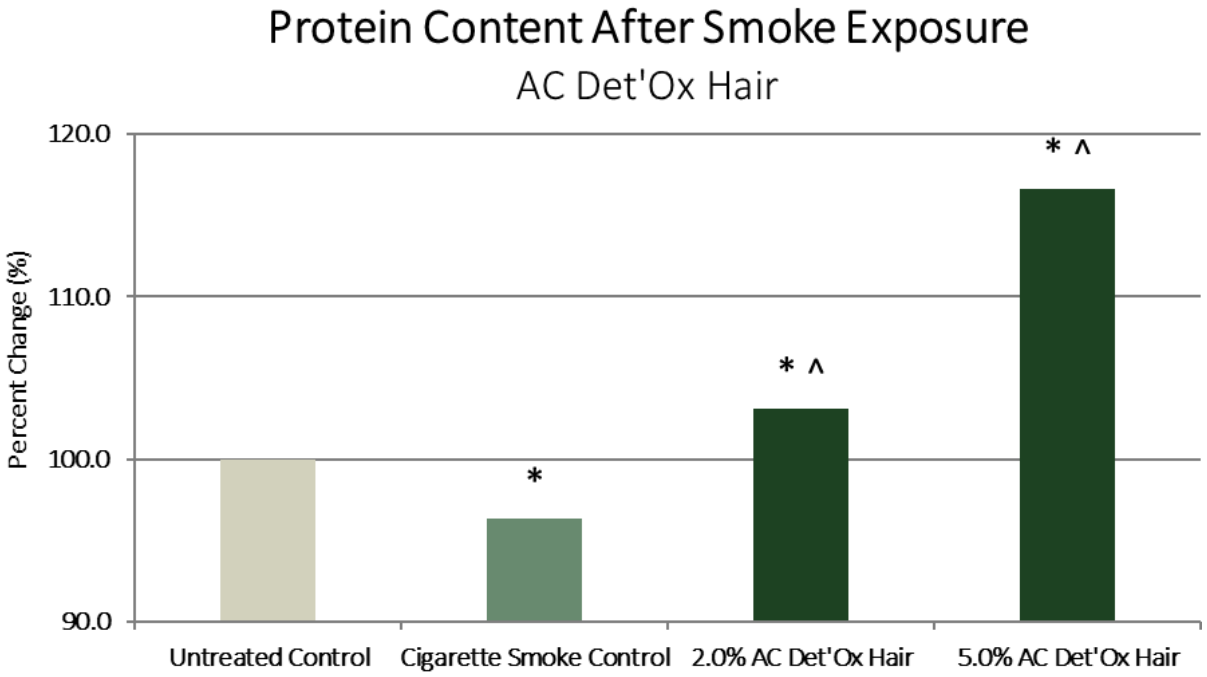


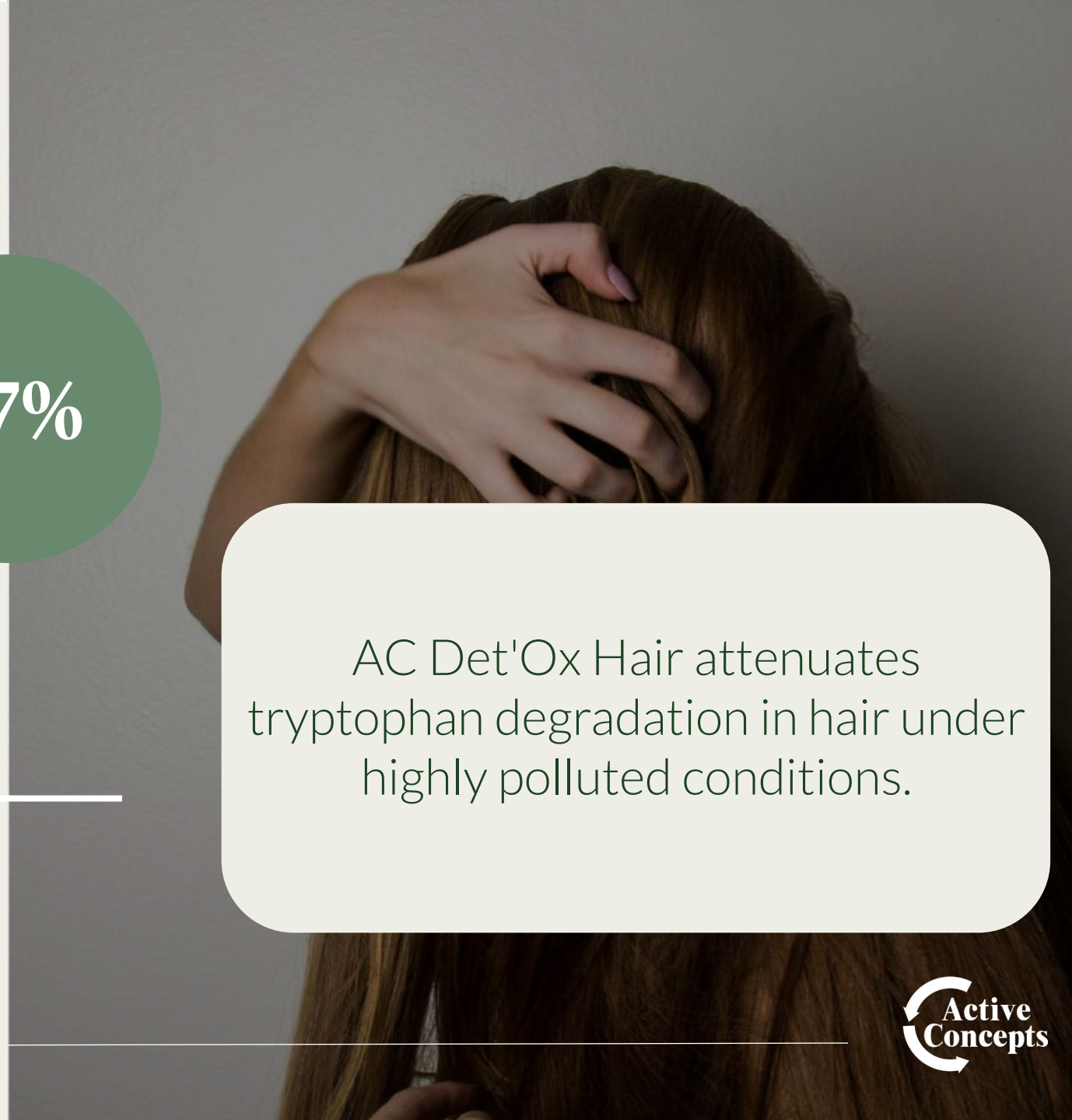
Figure 6. Percent change in tryptophan after smoke exposure relative to untreated control hair tresses. * indicates significance ($p \leq 0.05$) compared to untreated control. ^ indicates significance ($p \leq 0.05$) compared to cigarette smoke control.

Hair lacks self-protection mechanisms and is vulnerable to airborne pollutants. Tryptophan, a sensitive amino acid and chromophore, degrades when exposed to environmental stressors such as pollutants and is utilized *ex vivo* as a proxy for hair damage. An airborne pollution hair protection assay was conducted to assess the ability of AC Det'Ox Hair to protect hair from airborne pollutants.

2% AC Det'Ox Hair-treated hair tresses demonstrated more tryptophan content compared to the cigarette smoke control hair tresses

+7%

Benefits



AC Det'Ox Hair attenuates tryptophan degradation in hair under highly polluted conditions.

Active Concepts

Hair Shaft Elongation Assay

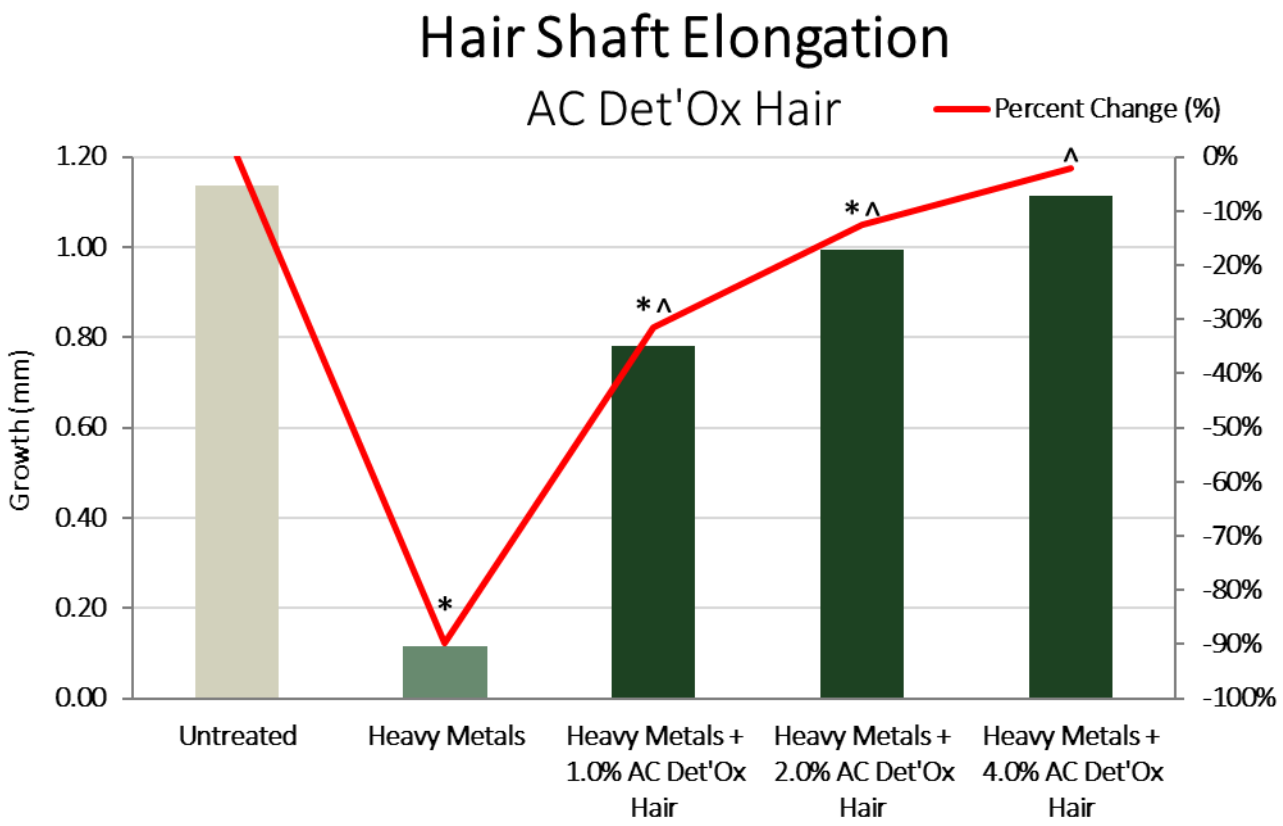


Figure 7. The effect of heavy metals and AC Det'Ox Hair on plucked hair follicle growth after 10 Days. * indicates significance ($p \leq 0.05$) compared to untreated hair follicles. ^ indicates significance ($p \leq 0.05$) compared to heavy metals-treated hair follicles. Heavy Metals: Lead, Cadmium, Manganese, Chromium, Nickel, Zinc, Copper, Fluoride, Selenium, Thallium, Calcium.

Hair follicles in the anagen phase are plucked from the scalps of male volunteers and cultured, after which hair follicle length is assessed. Culturing plucked hair follicles is a reproducible and quantifiable *ex vivo* method to assess hair follicle growth rate that mimics *in vivo* hair growth.
Heavy Metal exposure was utilized as a model to exert deleterious effects on normal hair shaft growth.

Hair follicles exposed to heavy metals and treated with 2.0% AC Det'Ox Hair show 13% reduction in hair shaft length compared to untreated follicles, demonstrating hair growth retention by

+87%

Benefits

AC Det'Ox Hair helps maintain healthy lengths, promoting strong, beautiful hair with optimal growth retention.

Active Concepts

Salon Half-Head Study

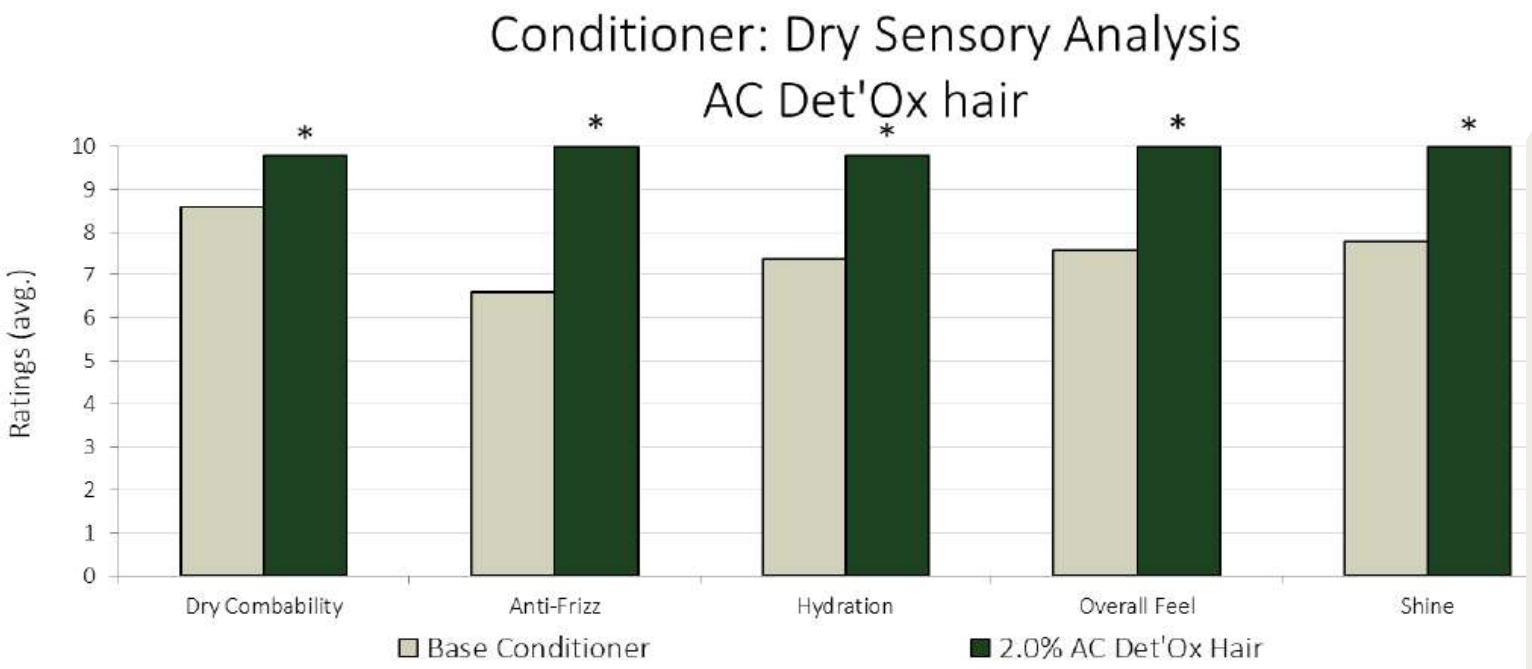


Figure 8. Participant images before shampoo and conditioner application and after blow drying.

A Salon Half-Head Study was conducted to evaluate the perceived hair benefits of AC Det'Ox Hair in a shampoo and conditioner on wet and dry hair. Participants had half of their hair washed with a control base shampoo and base conditioner, while the other half of their hair was washed with the test material, 2.0% AC Det'Ox Hair, in a base shampoo and base conditioner.

The addition of 2.0% AC Det'Ox Hair to the base conditioner significantly improved perceived benefits of hydration and overall feel by

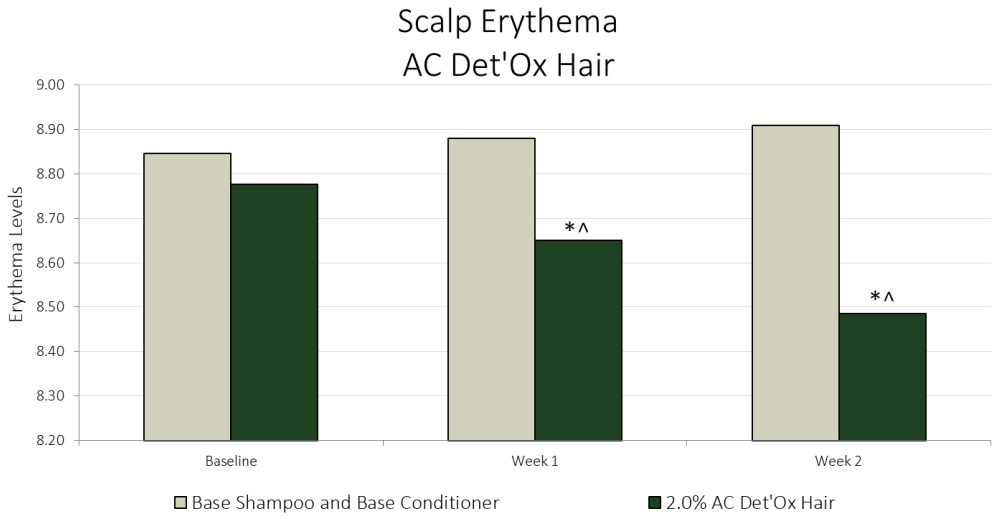
+32%

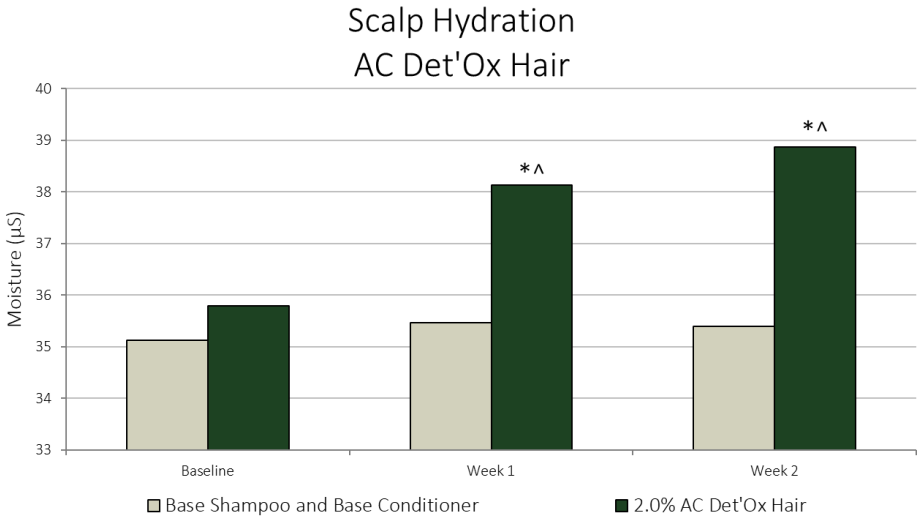
Benefits

AC Det'Ox Hair improves the perceived benefits with wet and dry hair when added to shampoo and conditioner at recommended use levels.

Active Concepts

Scalp Care Study





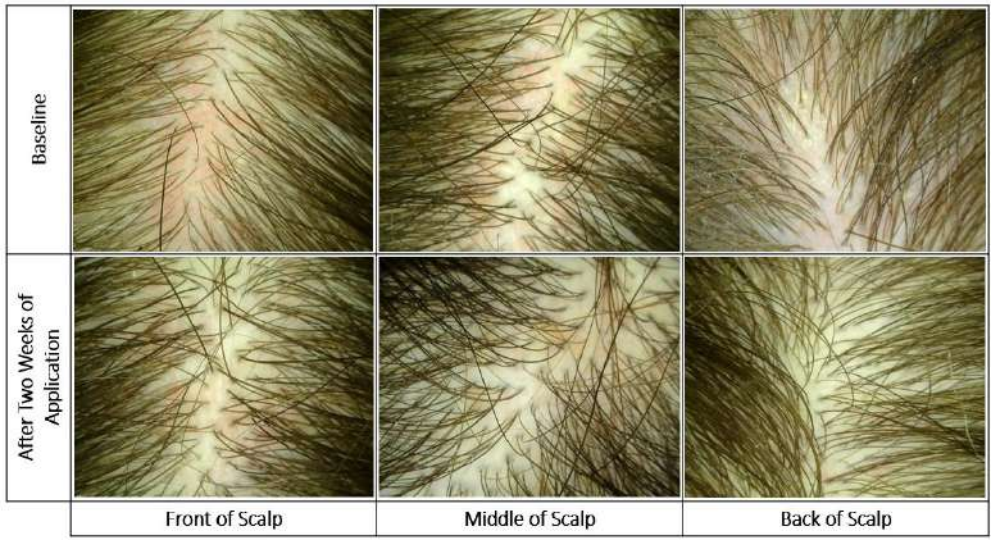


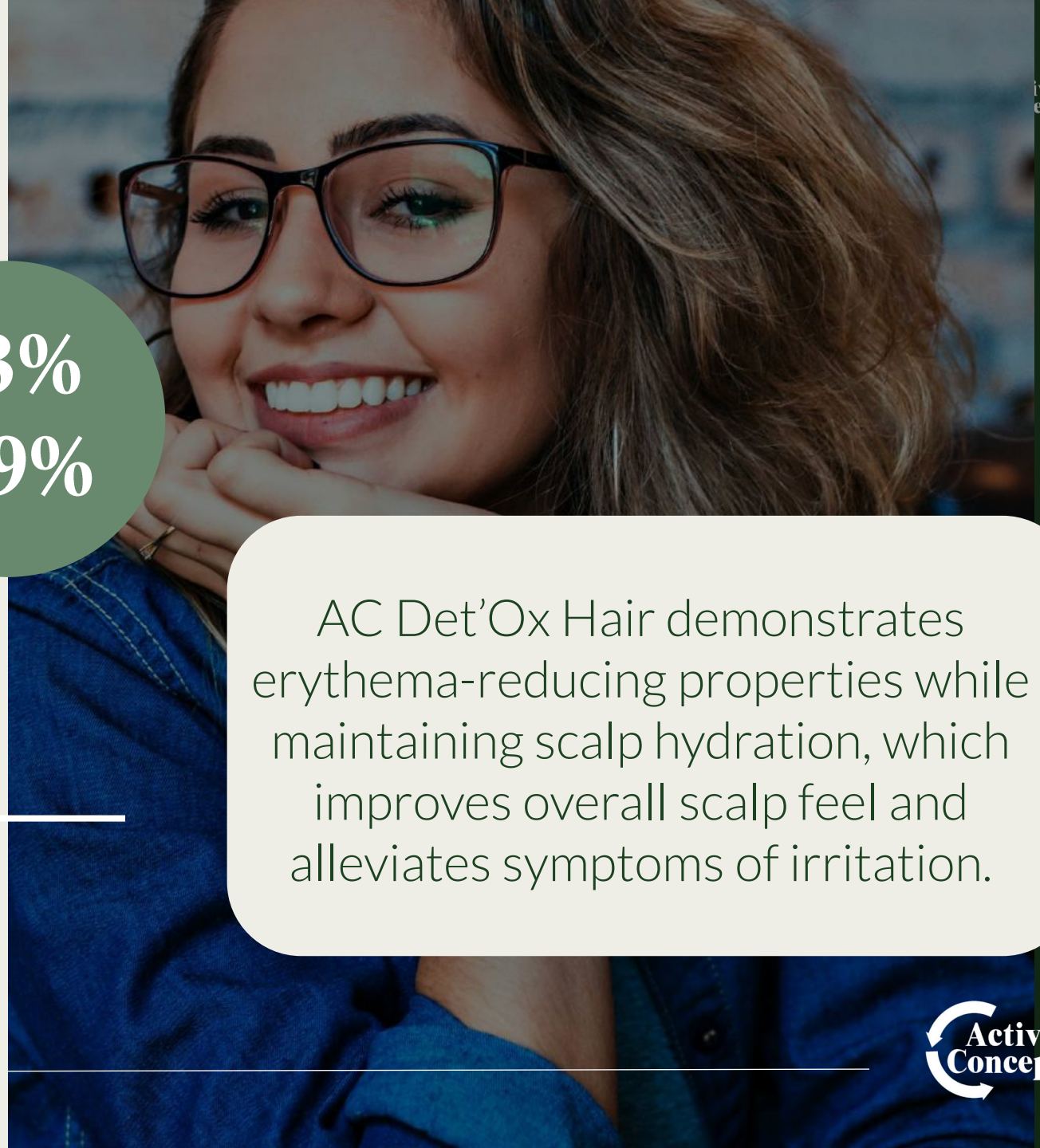
Figure 9. Representative scalp images of a participant at baseline and after two weeks of 2.0% AC Det'Ox Hair application.

Irritation of the skin and scalp are often associated with increased erythema levels. As a result of erythema on the scalp, consumers may experience a tightening sensation, scalp flakiness, and poor scalp hydration. Accordingly, a Scalp Care Study was conducted to assess the ability of AC Det'Ox Hair to reduce scalp erythema while maintaining moisturization and barrier function.

AC Det'Ox Hair significantly reduced erythema levels on the scalp and increased hydration levels on the scalp after two weeks of application

-3%

+9%



Benefits

AC Det'Ox Hair demonstrates erythema-reducing properties while maintaining scalp hydration, which improves overall scalp feel and alleviates symptoms of irritation.

Active Concepts

Cellular Detoxification Assay

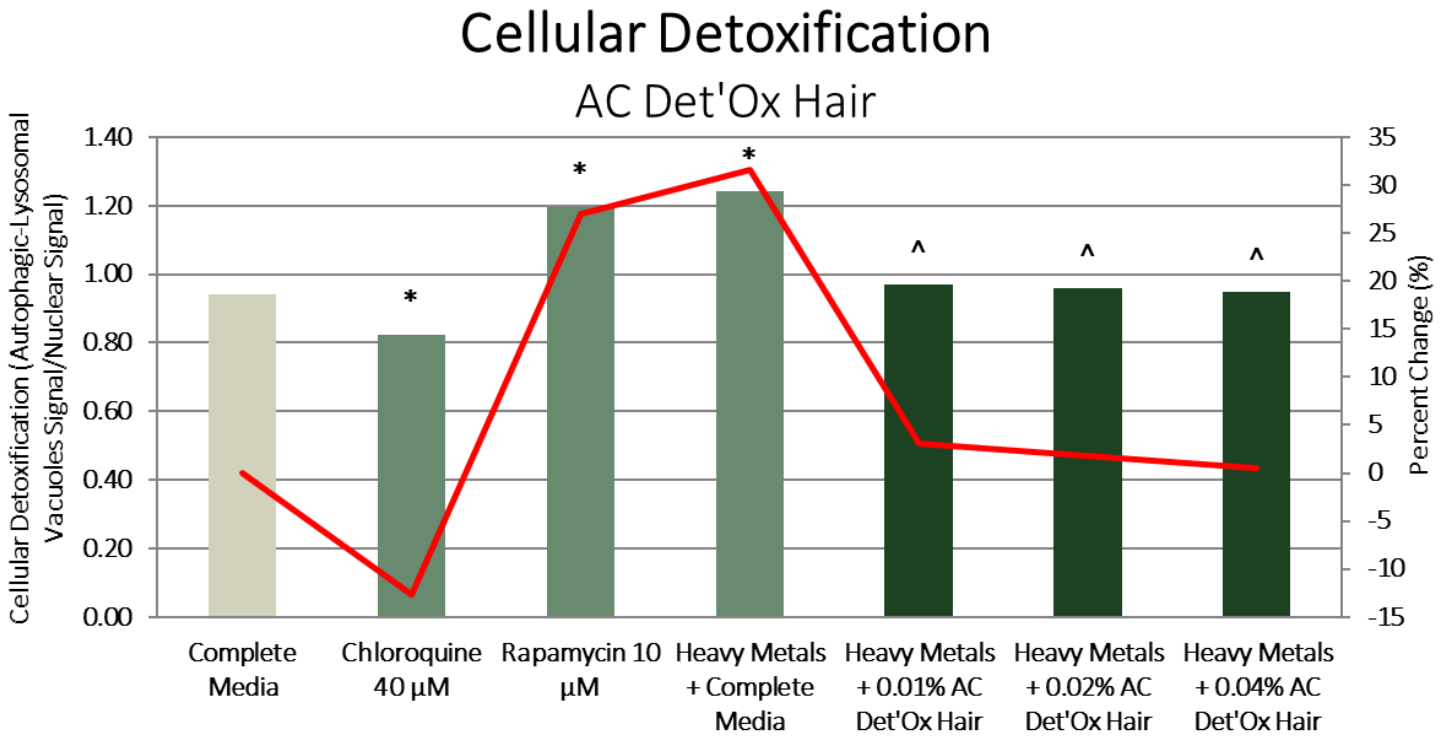


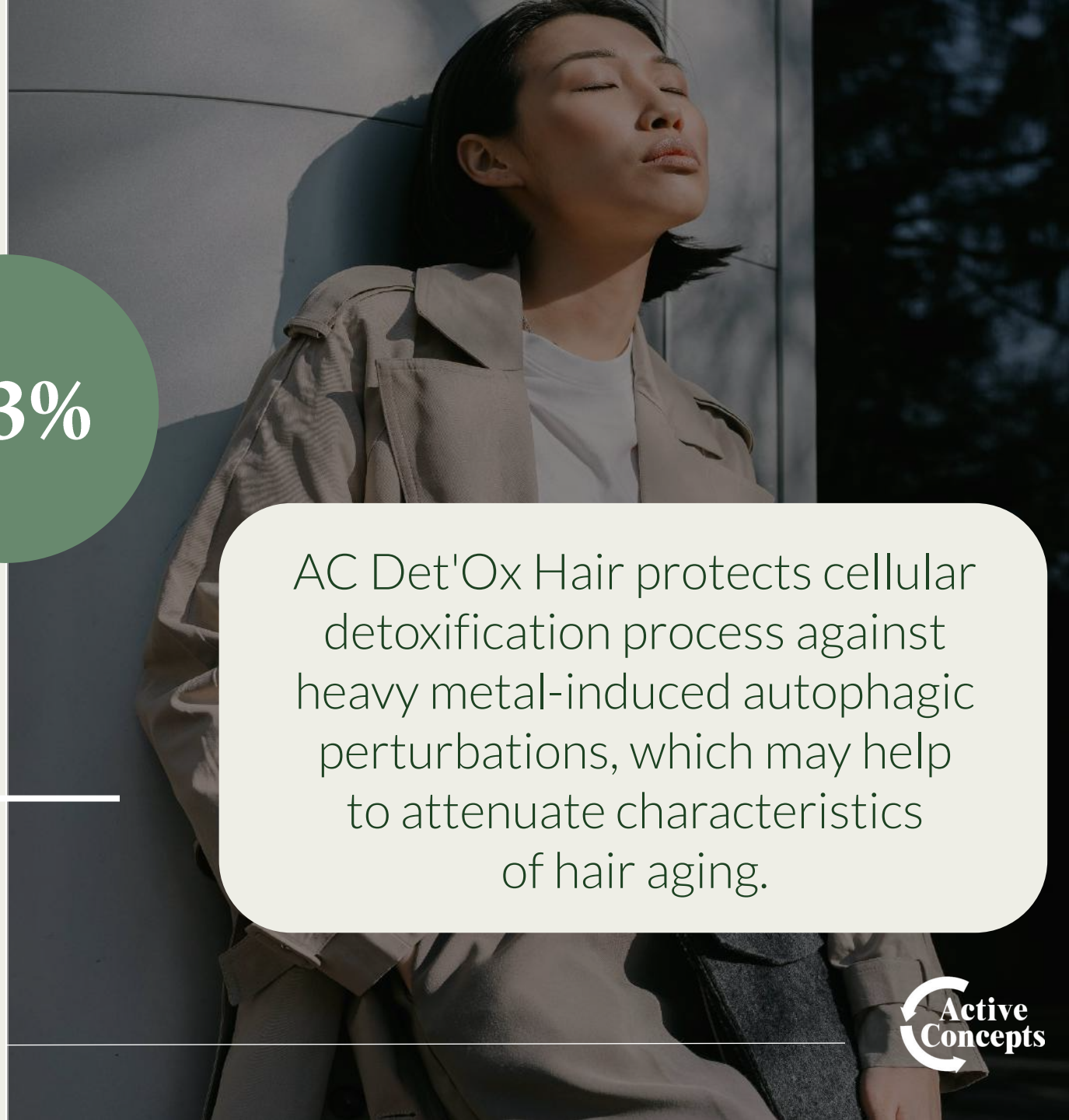
Figure 10. The effect of AC Det'Ox Hair on hair follicle dermal papilla cells cellular detoxification with and without heavy metals exposure.
* indicates significance ($p \leq 0.05$) compared to complete media.
^ indicates significance ($p \leq 0.05$) compared to heavy metals.
Heavy Metals: Lead, Cadmium, Manganese, Chromium, Nickel, Zinc, Copper, Fluoride, Selenium, Thallium, Calcium

An Autophagy Detection Assay was conducted to assess the *in vitro* effect of AC Det'Ox Hair to restore normal autophagy in hair follicle dermal papilla cells in the presence of heavy metals. Exposure to heavy metals disrupts this biological detoxification process that maintains cellular homeostasis and accelerates the age-related decline in hair follicle cell function.

Hair follicle dermal papilla cells treated with heavy metals and AC Det'Ox Hair at 0.02% demonstrated a reduction in autophagic-lysosomal vacuoles compared to hair follicle dermal papilla cells treated with heavy metals

-23%

Benefits



AC Det'Ox Hair protects cellular detoxification process against heavy metal-induced autophagic perturbations, which may help to attenuate characteristics of hair aging.

Active Concepts

ROS Assay – Antimycin A

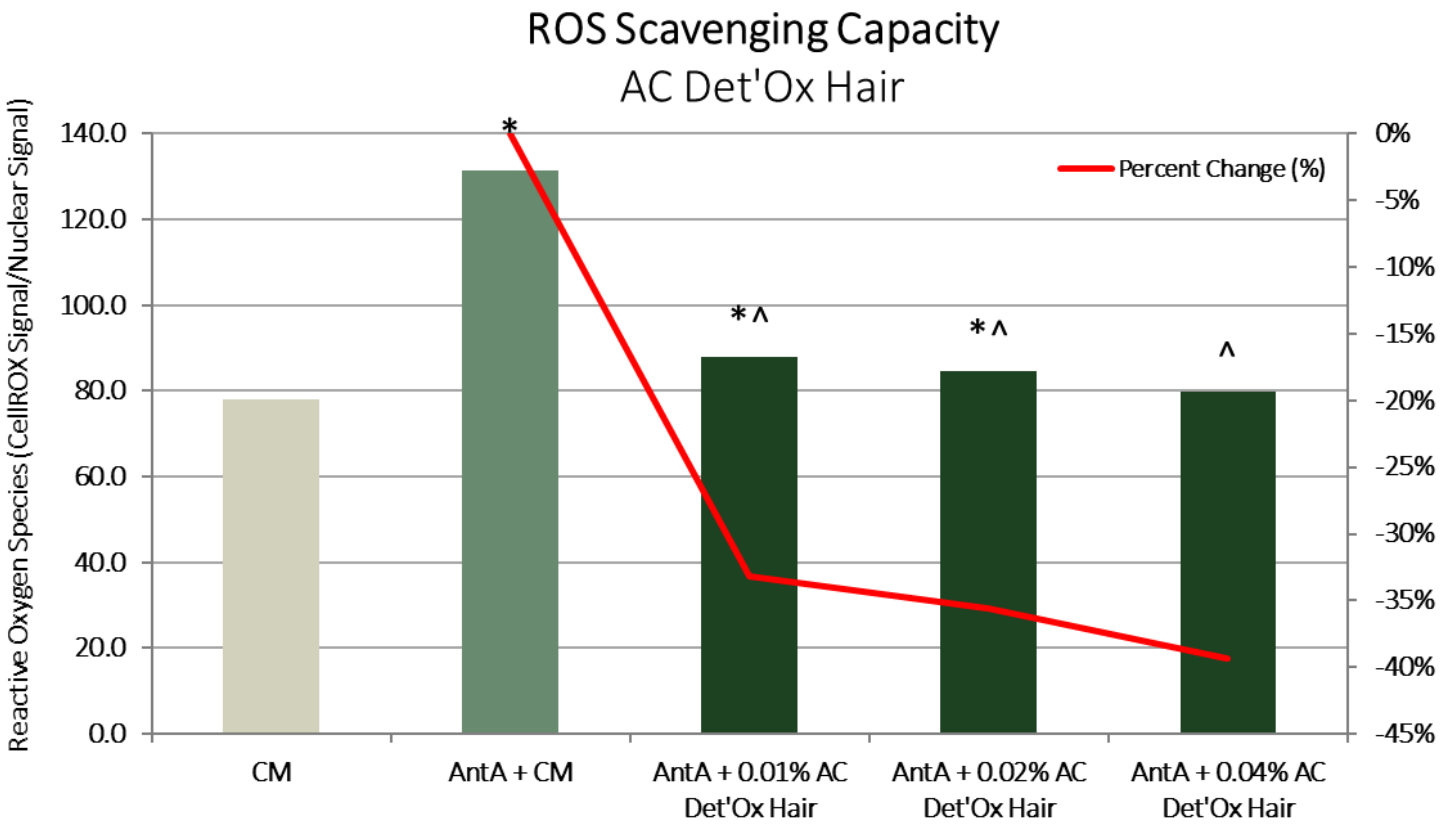


Figure 11. The effect of AC Det'Ox Hair on ROS scavenging. * indicates significance ($p \leq 0.05$) compared to untreated HFDPCs. ^ indicates significance ($p \leq 0.05$) compared to AntA-treated HFDPCs.

A ROS Scavenging Assay was conducted to assess the *in vitro* effect of AC Det'Ox Hair to scavenge unnecessary oxidative stress in hair follicle dermal papilla cells. Attenuating excessive ROS preserves cellular homeostasis and blunts intrinsic and extrinsic age-related declines in hair cell function.

Hair follicle dermal papilla cells treated with AC Det'Ox Hair at 0.02% demonstrated a significant reduction in ROS levels compared to hair follicle dermal papilla cells treated with AntA

-36%

Benefits

AC Det'Ox Hair attenuates excessive oxidative stress, which may help to attenuate characteristics of hair aging.

Active Concepts

ROS Assay – Heavy Metals

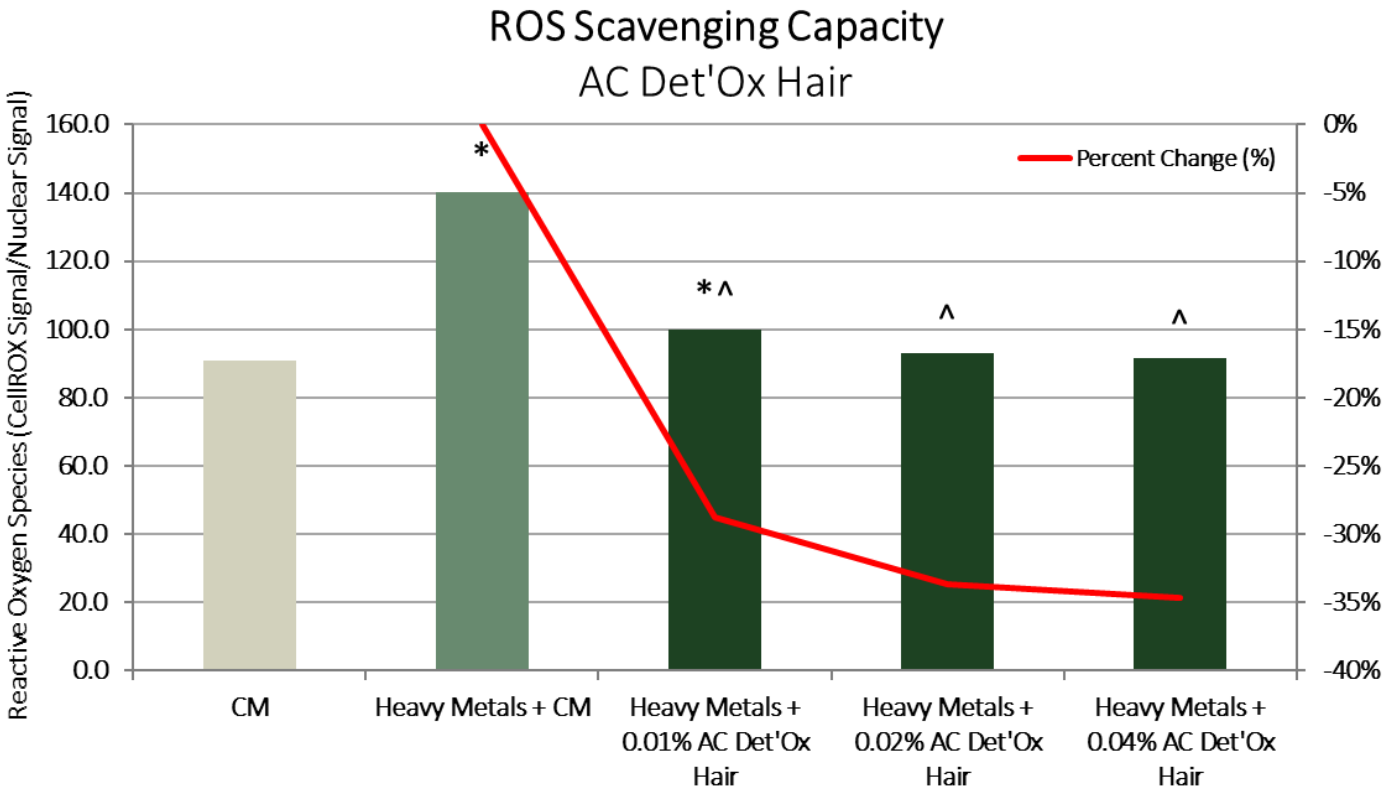


Figure 12. The effect of AC Det'Ox Hair on ROS scavenging.
* indicates significance ($p \leq 0.05$) compared to untreated HFDPCs.
^ indicates significance ($p \leq 0.05$) compared to heavy metal-treated HFDPCs.
Heavy Metals: Lead, Cadmium, Manganese, Chromium, Nickel, Zinc, Copper, Fluoride, Selenium, Thallium, Calcium

A ROS Scavenging Assay was conducted to assess the *in vitro* effect of AC Det'Ox Hair to scavenge heavy metal-induced oxidative stress in hair follicle dermal papilla cells. Exposure to heavy metals elicits an overproduction of oxidative stress and attenuating this excessive ROS preserves cellular homeostasis and blunts intrinsic and extrinsic age-related declines in skin cell function.

Hair follicle dermal papilla cells treated with AC Det'Ox Hair at 0.02% demonstrated significant reduction in ROS levels compared to hair follicle dermal papilla cells exposed to heavy metals

-34%

Benefits

AC Det'Ox Hair attenuates excessive oxidative stress, which may help to attenuate characteristics of hair aging.

Active Concepts

SA-β-gal Activity

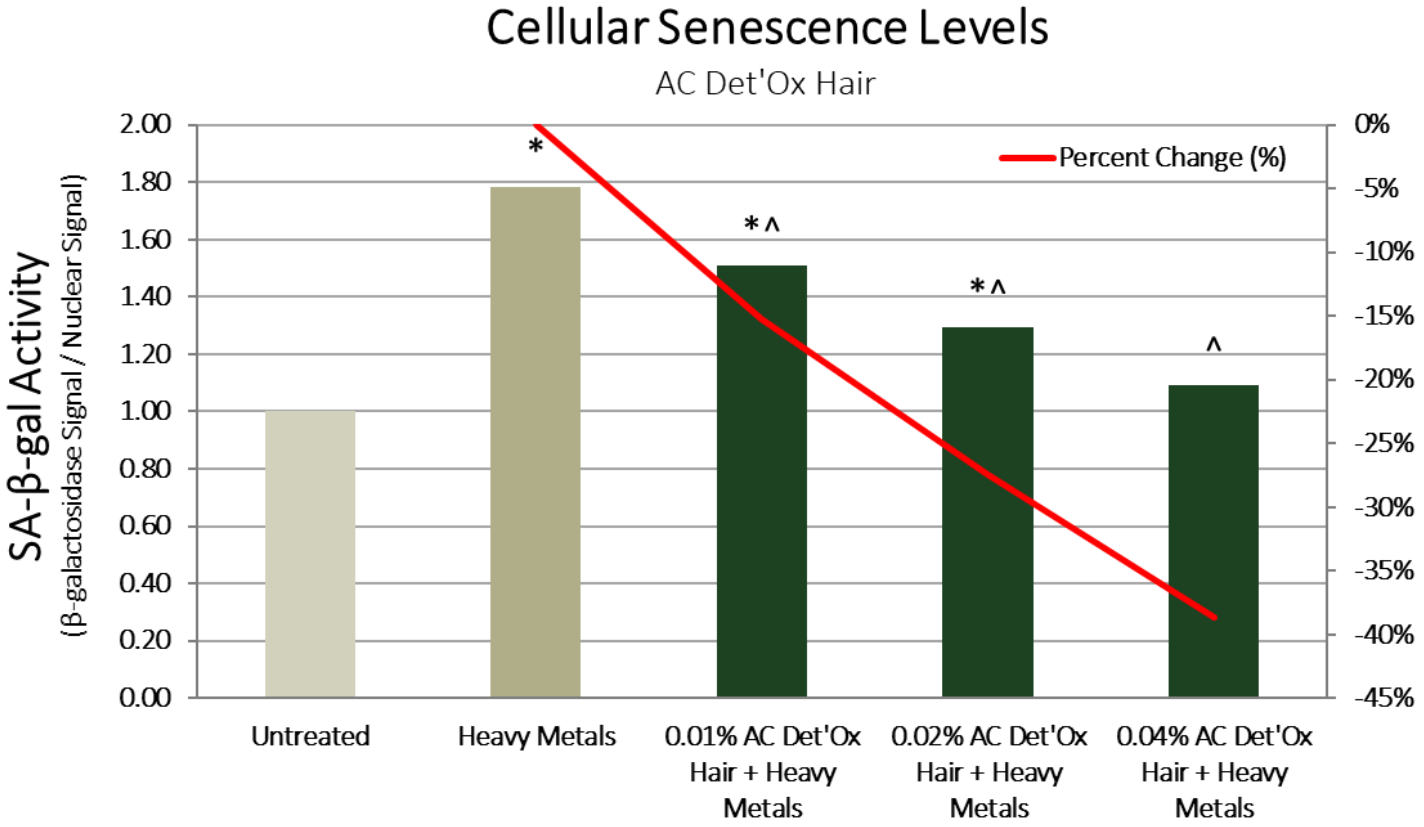


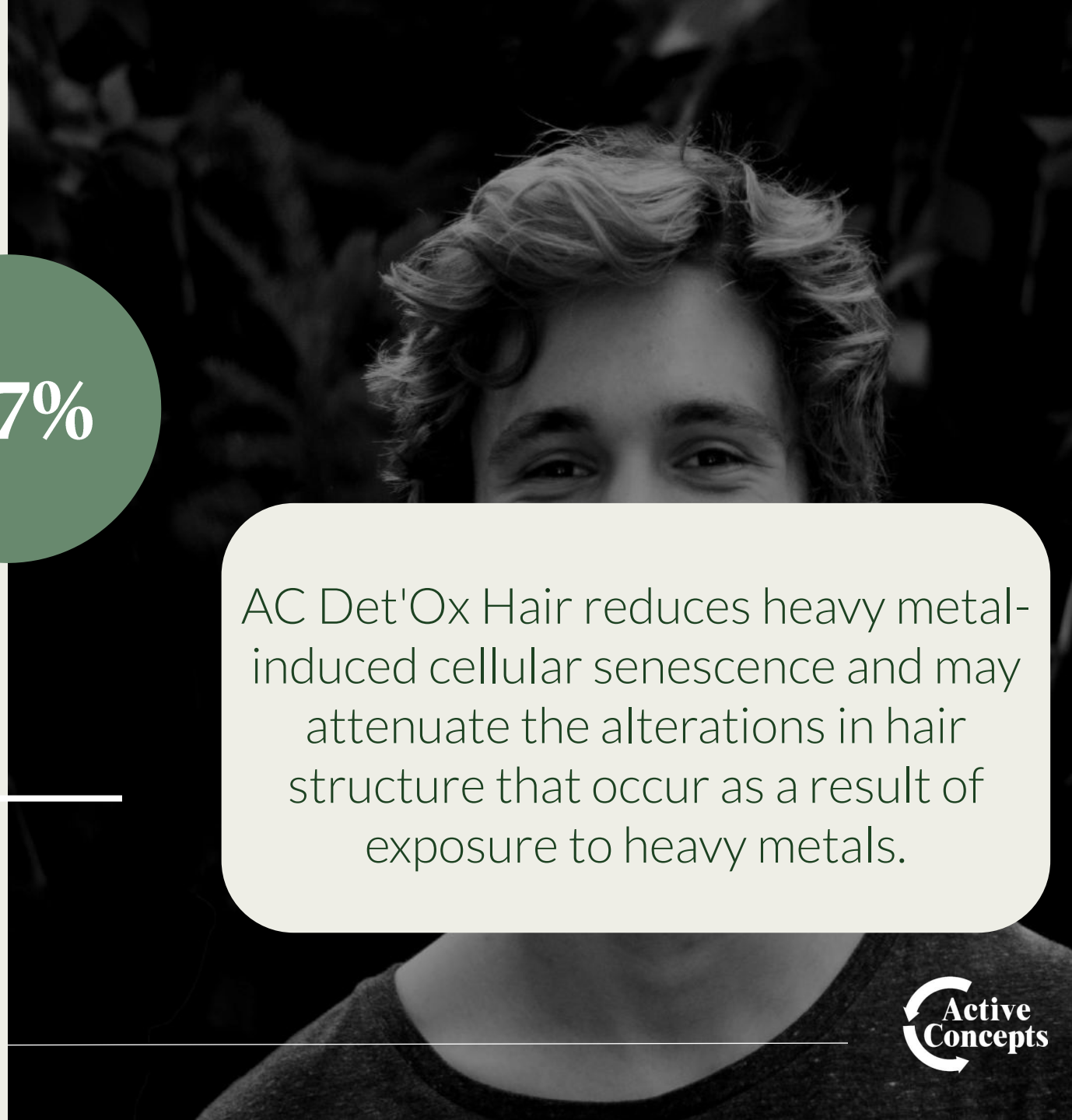
Figure 13. The effect of AC Det'Ox Hair on cellular senescence levels in Human Hair Follicle Dermal Papilla Cells (HFDPCs). * indicates significance ($p \leq 0.05$) compared to Untreated. ^ indicates significance ($p \leq 0.05$) compared to heavy metals. Heavy Metals: Lead, Cadmium, Manganese, Chromium, Nickel, Zinc, Copper, Fluoride, Selenium, Thallium, Calcium

Exposure to heavy metals enhances cellular senescence and facilitates a decline in skin cell function. SA-β-Gal activity is a key hallmark of cellular senescence in hair follicle dermal papilla cells (HFDPCs) , indicating their age and functional capacity. Accordingly, a SA-β-gal Activity Assay was developed to assess the *in vitro* effect of AC Det'Ox Hair to reduce SA-β-gal activity in HFDPCs exposed to heavy metals.

Hair follicle dermal papilla cells treated with AC Det'Ox Hair at 0.02% demonstrated a significant reduction in SA-β-gal activity compared to hair follicle dermal papilla cells exposed to heavy metals

-27%

Benefits



AC Det'Ox Hair reduces heavy metal-induced cellular senescence and may attenuate the alterations in hair structure that occur as a result of exposure to heavy metals.

Active Concepts

Heavy Metals Protection Assay

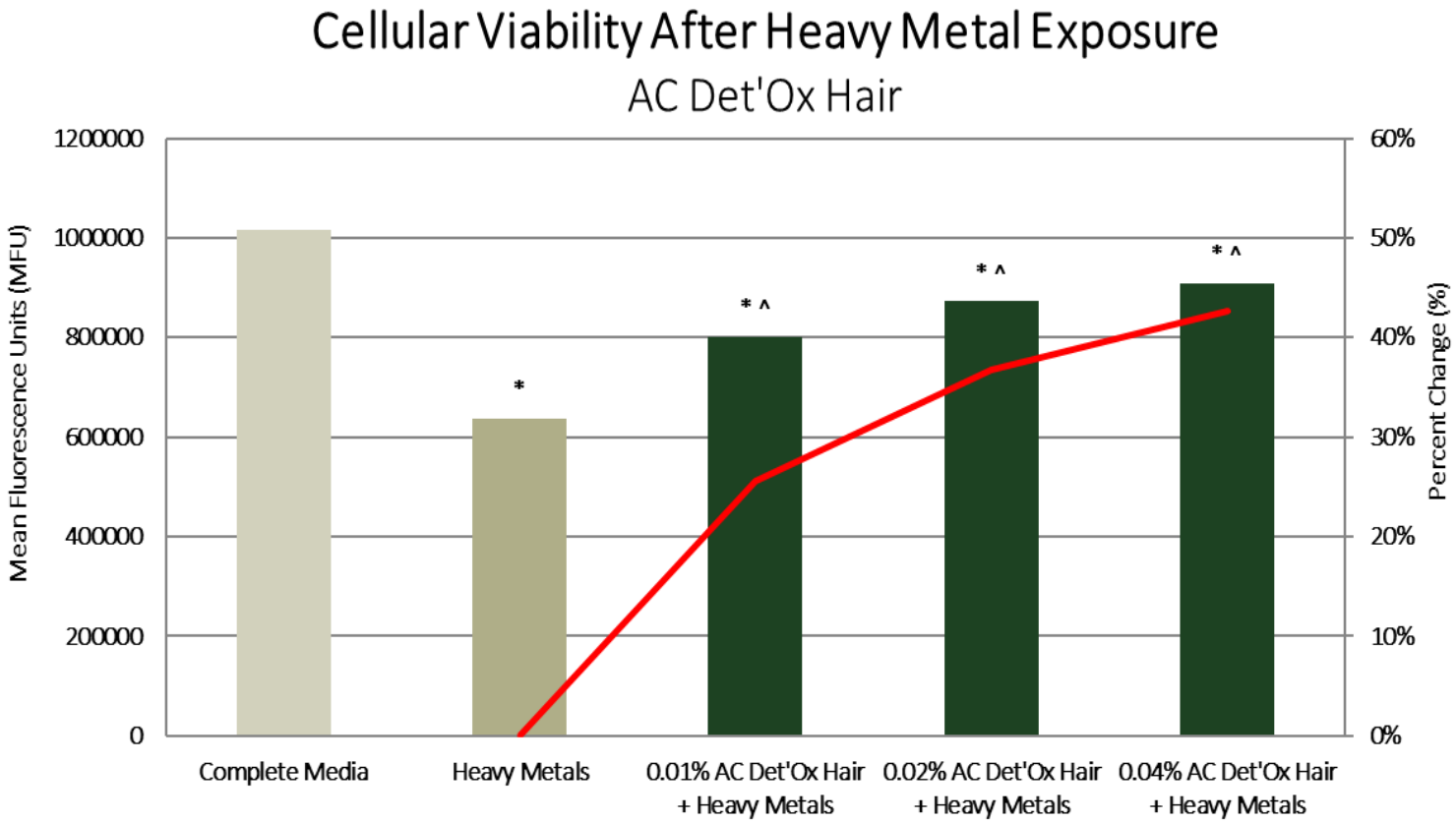


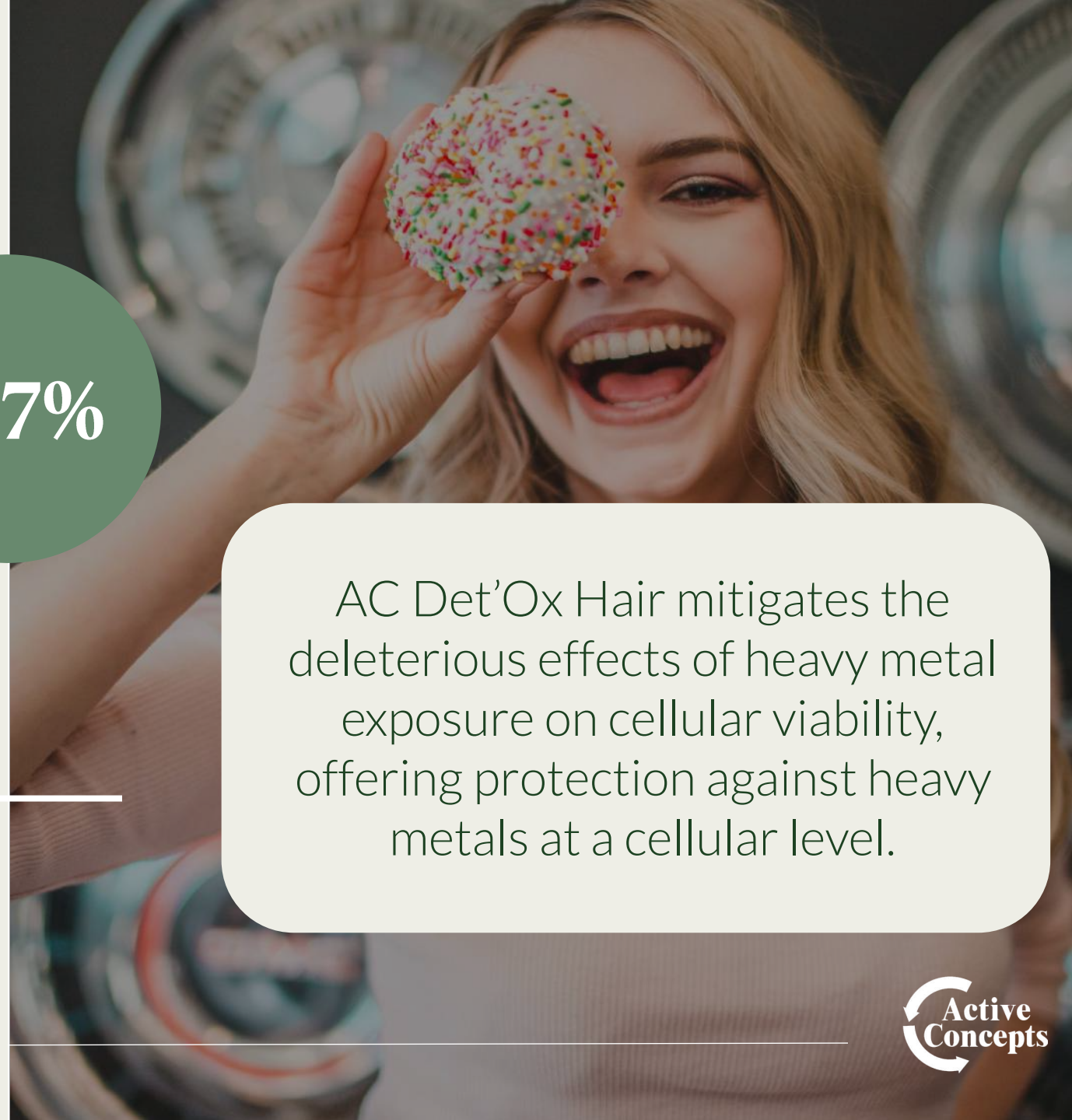
Figure 14. Cellular viability of human hair follicle dermal papilla cells (HFDPCs).
* indicates significance ($p \leq 0.05$) compared to untreated HFDPCs.
^ indicates significance ($p \leq 0.05$) compared to heavy metals-treated HFDPCs.
Heavy Metals: Lead, Cadmium, Manganese, Chromium, Nickel, Zinc, Copper, Fluoride, Selenium, Thallium, Calcium.

Acute and chronic exposure to heavy metals is a threat to hair health as they disrupt natural biological processes. Topical cosmetic products may offer protection from heavy metals at the cellular level, by maintaining cellular viability and homeostasis. Human hair follicle dermal papilla cells (HFDPCs) are incubated with test articles before exposure to heavy metals. After exposure to heavy metals, cellular viability is assessed.

Human hair follicle dermal papilla cells treated with AC Det'Ox Hair at 0.02% increases in viability by

+37%

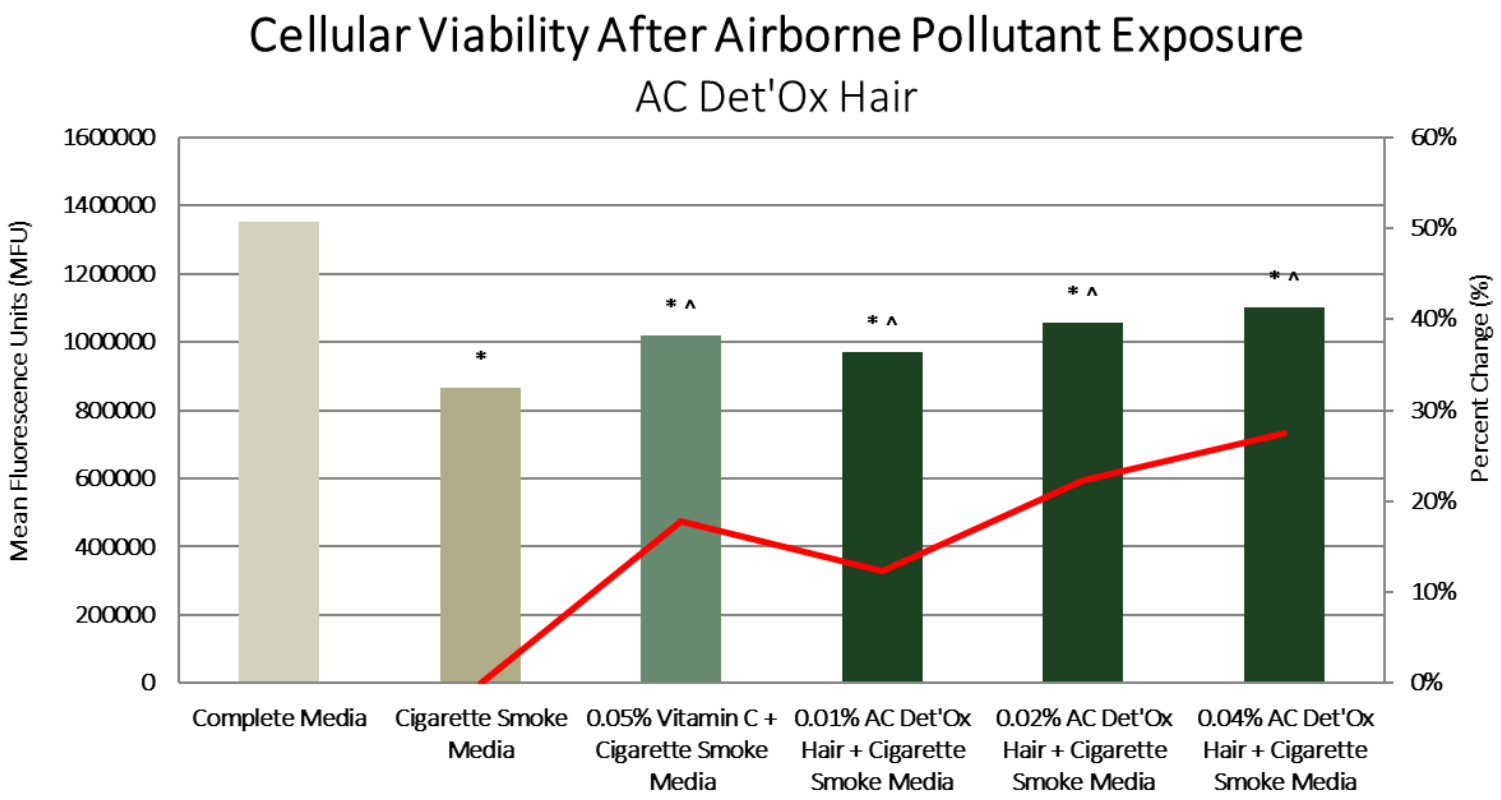
Benefits



AC Det'Ox Hair mitigates the deleterious effects of heavy metal exposure on cellular viability, offering protection against heavy metals at a cellular level.

Active Concepts

In vitro Airborne Pollution Protection



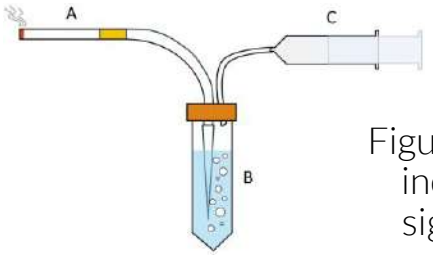


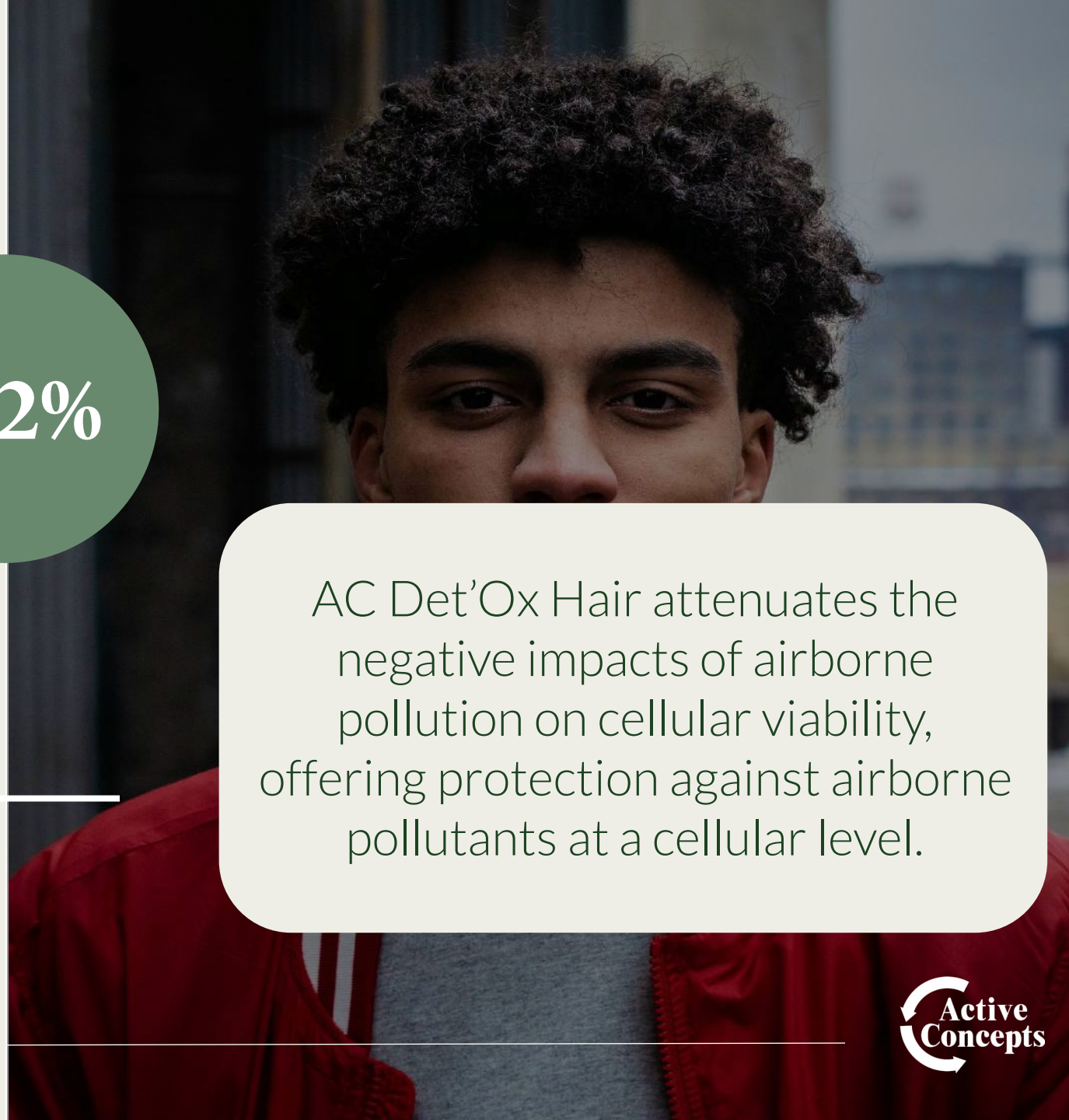
Figure 15. Cellular viability of human hair follicle dermal papilla cells (HFDPCs). * indicates significance ($p \leq 0.05$) compared to untreated HFDPCs. ^ indicates significance ($p \leq 0.05$) compared to cigarette smoke media-treated HFDPCs.

Airborne pollutants, such as cigarette smoke and secondhand smoke, are a threat to skin health as they disrupt natural biological processes. Accordingly, an *in vitro* airborne pollution protection assay was conducted to assess the ability of AC Det'Ox Hair to protect cellular homeostasis against exposure to soluble cigarette smoke pollutants.

Hair follicle dermal papilla cells pre-treated with 0.02% AC Det'Ox Hair showed increased viability after pollution exposure, compared to cells exposed only to cigarette smoke media

+22%

Benefits



AC Det'Ox Hair attenuates the negative impacts of airborne pollution on cellular viability, offering protection against airborne pollutants at a cellular level.

Active Concepts

AC Det'Ox Hair vs competitive products

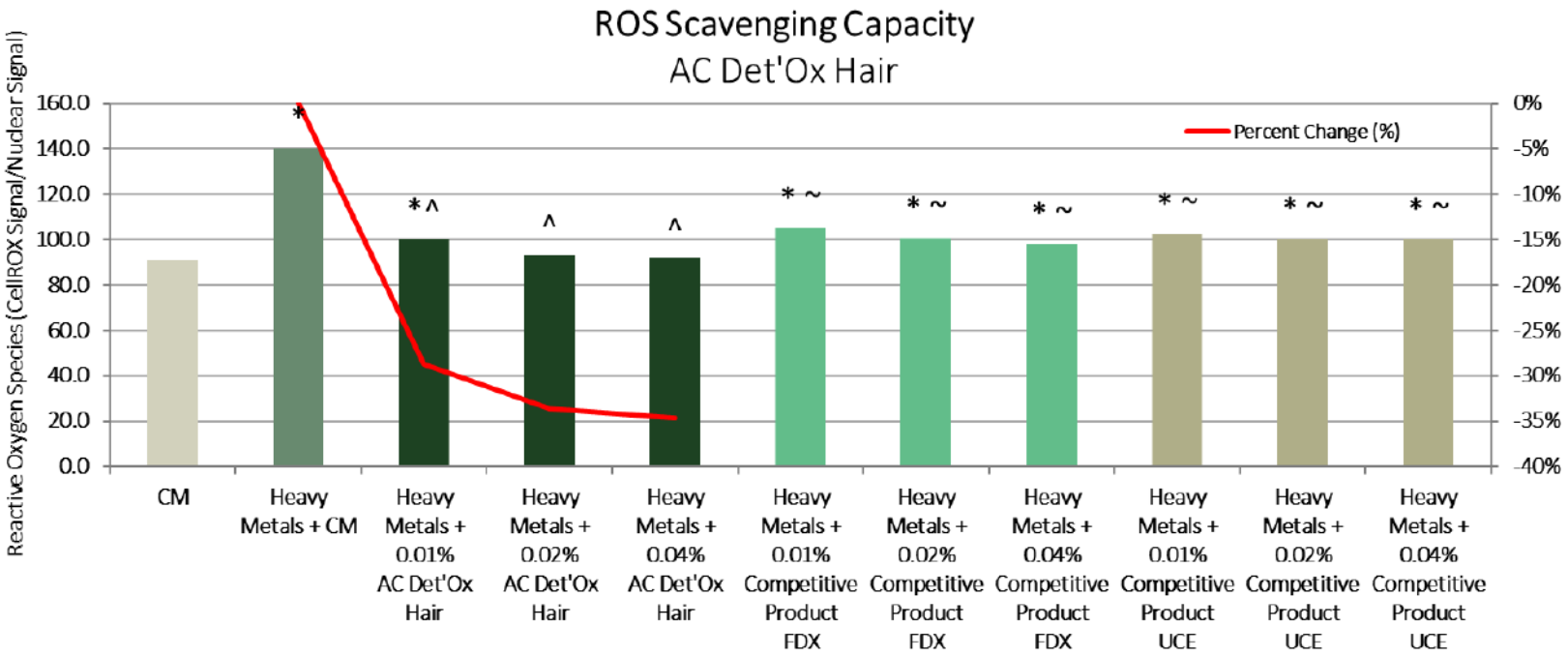


Figure 16. The effect of AC Det'Ox Hair on ROS scavenging. * indicates significance ($p \leq 0.05$) compared to untreated HFDPCs. ^ indicates significance ($p \leq 0.05$) compared to Heavy Metal treated HFDPCs. ~ indicates significance ($p \leq 0.05$) compared to same concentration of AC Det'Ox Hair.

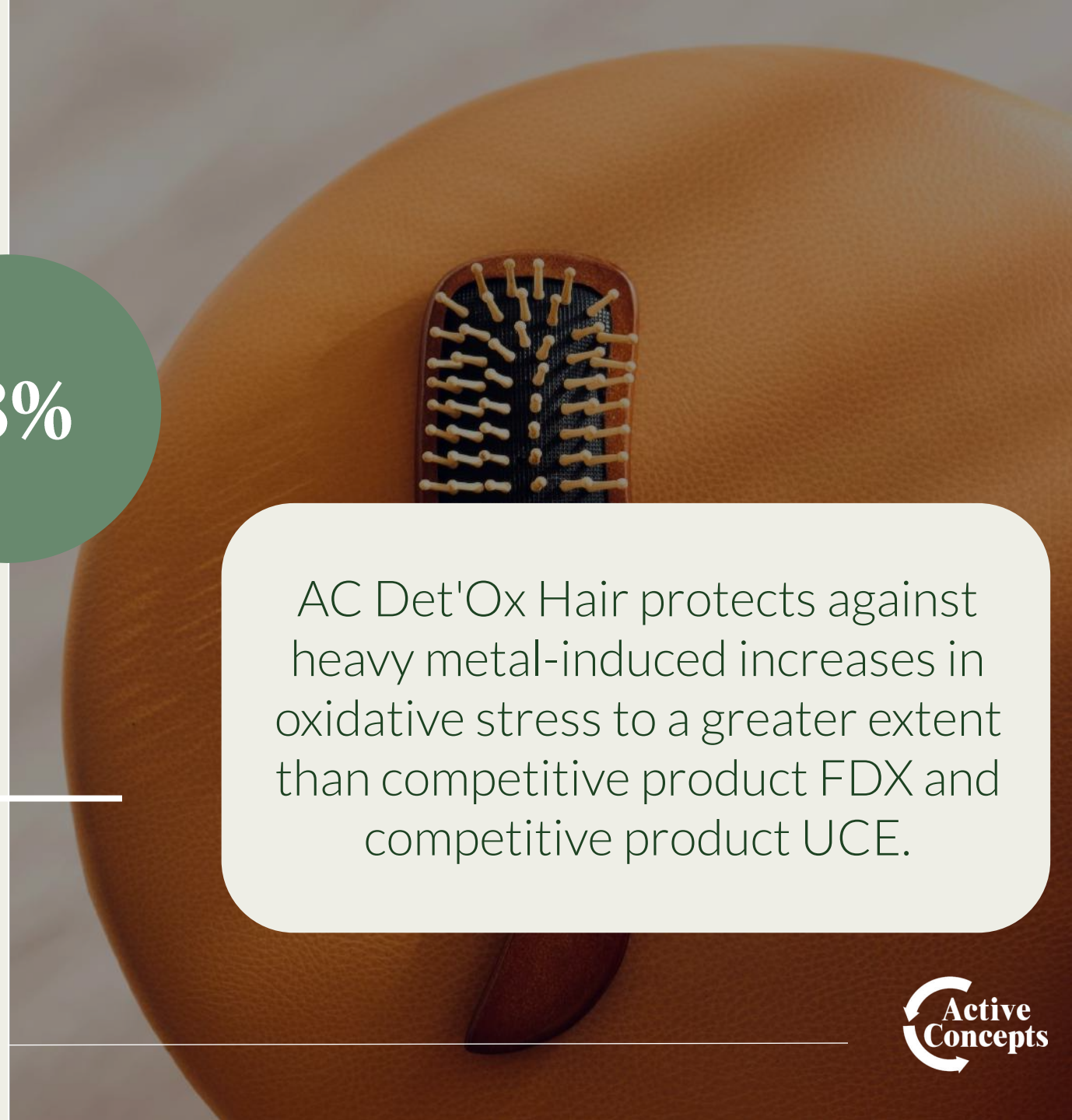
A ROS Scavenging Assay was conducted to assess the in vitro effect of AC Det'Ox Hair to scavenge heavy metal-induced oxidative stress in hair follicle dermal papilla cells. Competitive Product FDX from Competitive Company A and Competitive Product UCE from Competitive Company S were tested to demonstrate the superior nature of AC Det'Ox Hair.

Hair follicle dermal papilla cells treated with AC Det'Ox Hair at 0.02% demonstrated more reduction in ROS compared to hair follicle dermal papilla cells treated with competitive product FDX and UCE

-8%

Benefits

AC Det'Ox Hair protects against heavy metal-induced increases in oxidative stress to a greater extent than competitive product FDX and competitive product UCE.



Active Concepts

AC Det'Ox Hair vs competitive products

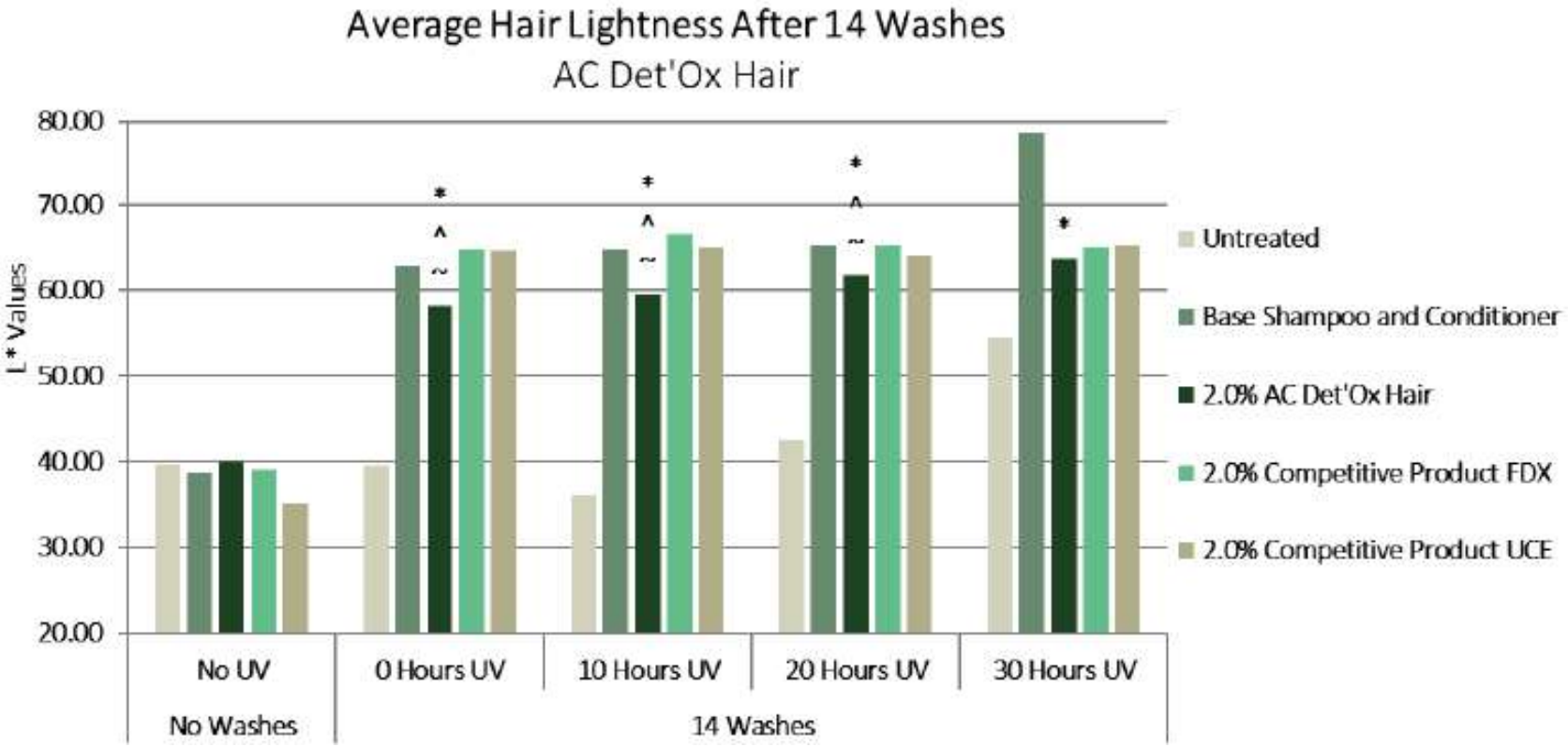


Figure 17. Average Hair Color Lightness (L*) after 7 washes with and without UV exposure. * indicates significance ($p \leq 0.05$) compared to base shampoo and conditioner. ^ indicates significance ($p \leq 0.05$) compared to competitive product FDX. ~ indicates significance ($p \leq 0.05$) compared to competitive product UCE.

An *ex vivo* Color Protection Assay was performed to determine qualitative and quantitative color fade benefits of AC Det'Ox Hair on hair. Competitive product FDX from competitive company A and competitive product UCE from competitive company S were tested to demonstrate the superior nature of AC Det'Ox Hair.

Hair washed with 2.0% competitive product FDX and UCE demonstrated more lightness after 14 washes at each UV treatment level compared to 2.0% AC Det'Ox Hair

+11%

Benefits

AC Det'Ox Hair protects color and reduces color fade to a greater extent than competitive product FDX and UCE after 14 washes and increasing amounts of UV exposure.

Active Concepts

Product Inspiration

“Protective MetalCream” with AC Det’Ox Hair

Concept

A silky cream enriched with AC Det’Ox Hair, designed to shield hair from daily aggressors. Its unique formula helps neutralize and block the harmful effects of heavy metals, while providing powerful antioxidant protection against oxidative stress.

Target

Consumers living in urban or polluted environments. People with weak, brittle, or chemically treated. Individuals concerned with hair aging and loss of vitality. Health and wellness-conscious consumers. Professional salon clients.

Trend Tie-In

Urban protection and lasting strength.

Summary

WHAT.

Human hair can serve as a bio-accumulative matrix for heavy metals, such as copper, magnesium, manganese, and calcium, particularly in regions with environmental contamination and in areas characterized by hard water.

WHY.

On hair, metals from hard water and air pollution can stick to the cuticle, making hair rough and dull.

MADE OF.

AC Det'Ox Hair harnesses the natural power of *Saccharomyces cerevisiae* fermentation, which produces **α**-lipoic acid (ALA), combined with kale extract, a rich source of both ALA and vitamin C (ascorbic acid).

ACTION.

AC Det'Ox Hair displays metal-chelating activity, improving the removal of metal ions from hair fibers and enhancing antioxidant protection to prevent structural weakening, loss of shine, and reduced elasticity.

Patents around heavy metals claims

These technologies are designed to address the adverse effects of metal accumulation in hair, by employing unique patented ingredients and formulations:

- L'Oréal Professionnel™ has developed an advanced technology called Metal Detox™, designed to neutralize metals in the hair, reducing breakage, and improving color longevity. This technology is based on a patented molecule called Glycoamine, which acts as a chelating agent, penetrating the hair fiber to bind with metals and neutralize them.
- Wella™ has developed the Metal Purifier Technology™, a patented technology designed to remove harmful metals from the hair fiber by incapsulating them and preventing the formation of free radicals.

Claims allowed

- Counteracts metal-induced buildup
- Helps remove harmful metal residues from hair
- Maintains hair color by reducing metal-related fading
- Prevents metal-induced hair damage
- Infused with metal-binding actives

Metal Detox, Metal Purifier

AC DetOx Hair

Code: 21030

INCI: Saccharomyces/Brassica Oleracea Acephala Leaf Ferment Filtrate & Lactobacillus Ferment Lysate

***21030CHI:** Saccharomyces Ferment & Brassica Oleracea Acephala Leaf Extract & Lactobacillus Ferment Lysate

Standardization: Copper Chelation > 40%

Appearance: Opaque Liquid, Light Beige to Tan

Suggested Use Level: 1-5%

Suggested Applications: Heavy Metals Protection. Color Protection . Antioxidant. Hair Strength . Scalp Care

In Vivo
Ex Vivo
In Vitro
ISO 16128 NI & NOI
Vegan Compliant
COSMOS Compliant
Product Passport
China Compliant *

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