

PROPERTIES OF HAIR & SCALP

Structure. Growth. Disorders & Diseases

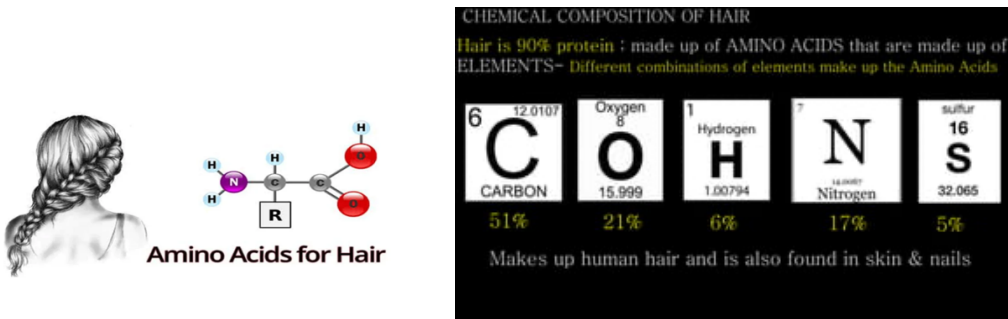
CROWNING GLORY is the importance of hair, how good we feel when our hair looks great, and just how distressing a bad hair day can be:

- Hair stylists play an essential role in many people's lives
- All hair services need an understanding of the growth, structure & composition of hair
- What creates natural color & texture leads to successful chemical services
- Identifying scalp condition

What is Trichology?

- Study of hair, it's disease & care. Derived from Greek words TRICHOS (hair) & OLOGY (study of)
- Part of the integumentary system, the largest & fastest-growing organ

What is hair made up of?

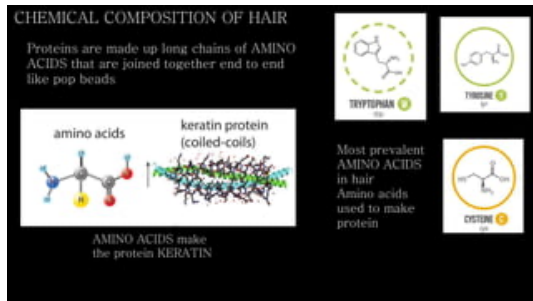


Amino Acids for Hair

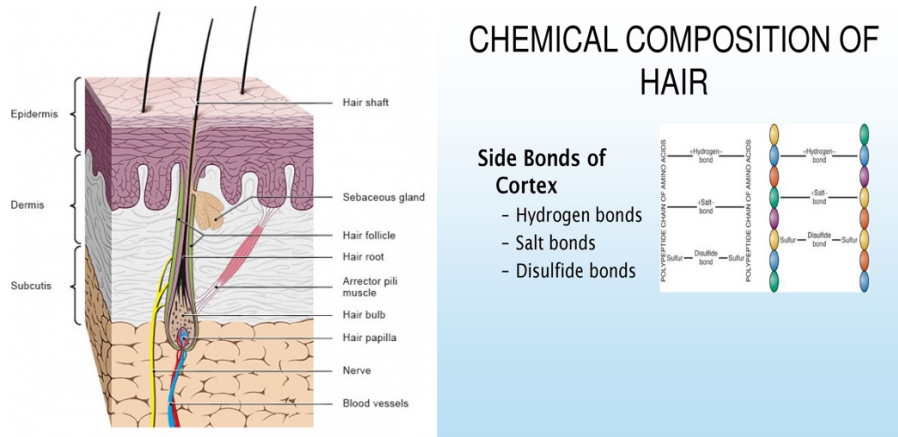
20 in the body; 18 related to hair. The body produces 11 of 20; the rest must come from the diet.

Hair is made up of protein that grows from cells within the hair follicle. When these cells form, they begin the journey up through the follicle and mature in a process called KERATINIZATION.

Hair is 90% protein; made up of AMINO ACIDS are made up of ELEMENTS- Different combinations of elements make up the Amino Acids



DISCOVER THE STRUCTURE OF HAIR



Hair, we see, is divided into two main parts:

HAIR SHAFT- projects above the epidermis

HAIR ROOT- below the surface of the Epidermis

5 MAIN STRUCTURES OF THE HAIR ROOT!!!!!!

- Hair follicle
- Hair bulb
- Dermal papilla
- Arrector pili muscle
- Sebaceous (oil) gland

HAIR FOLLICLE is a tube-like depression in the skin/scalp that contains the root

- All over the body except for the palms & soles
- Extends down from epidermis to dermis
- Surrounds dermal papilla
- More than one hair can grow out of a single follicle

HAIR BULB- lowest area; thickened club shape that forms the lower part of hair root; fits over and covers dermal papilla

DERMAL PAPILLA- Small, cone-shaped elevation at the base of the hair follicle that fits into hair bulb; has blood & nerve supply that provides nutrients for growth;
Known as the Mother of the hair

ARRECTOR PILI MUSCLE- tiny, involuntary muscle fibers at the base of the hair follicle; fear or cold allows them to contract, making the hair stand up (goosebumps)

SEBACEOUS GLANDS- oil glands of the skin that are connected to hair follicles secrete an oily substance called **SEBUM** that lubricates the hair & skin

Three main layers of the hair shaft

- **CUTICLE**
- **MEDULLA**
Fine and blond hair may not have one.
Full, fragmented, missing
- **CORTEX**
 - Melanin
 - 90 % weight
 - Chemical changes

Protein in the cortex provides elasticity



THE SCIENCE BEHIND HAIR POROSITY: HOW CUTICLE STRUCTURE AFFECTS ABSORPTION

Hair porosity is crucial in understanding how well hair absorbs and retains moisture and nutrients. It is influenced by the structure of the hair cuticle, which is the outermost layer of the hair strand. The cuticle consists of overlapping scale-like cells that can open and close, affecting the hair's ability to interact with external substances.

There are three primary levels of hair porosity: low, normal, and high. The cuticle's condition determines each level and how open or compact its structure is.

1. Low Porosity Hair:

- **Cuticle Structure:** The cuticle is tightly packed and flat, making it difficult for moisture and products to penetrate.
- **Characteristics:** Low porosity hair often repels water, takes longer to wet, and can feel resistant to styling products.
- **Absorption:** Because the cuticle is mainly closed, it's challenging for moisture and nutrients to enter the hair shaft.
- **Care:** Low-porosity hair benefits from lightweight, water-based products that can penetrate the cuticle. Heat can be used temporarily to lift the cuticle and allow better absorption.

2. Normal Porosity Hair:

- **Cuticle Structure:** The cuticle has a balanced structure, with overlapping cells that are neither tightly compacted nor open.
- **Characteristics:** Normal porosity hair usually retains moisture well and is versatile in styling.
- **Absorption:** This type of hair allows moisture to penetrate and be retained without excessive difficulty.
- **Care:** A balanced hair care routine with regular moisturizing and occasional deep conditioning is generally sufficient for maintaining normal porosity hair.

3. High Porosity Hair:

- **Cuticle Structure:** The cuticle has gaps and raised scales, exposing the hair shaft more.
- **Characteristics:** High porosity hair tends to absorb moisture quickly but loses it just as fast. It can feel dry and prone to frizz.
- **Absorption:** The gaps in the cuticle allow moisture and products to penetrate easily, but the hair struggles to retain them.

- Care: High-porosity hair benefits from richer, thicker products that help seal and fill in the gaps in the cuticle. Protein treatments can also strengthen the hair structure.

The science behind hair porosity is closely tied to the structure of keratin, the protein that makes up the hair shaft. The arrangement of amino acids in keratin gives rise to the structure of the cuticle. Chemical treatments, heat styling, and environmental factors like sun exposure and humidity can all impact the cuticle's condition over time, potentially altering your hair's porosity.

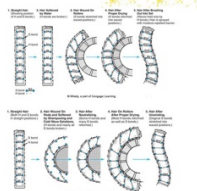
Understanding your hair's porosity level can help you choose the right products and treatments that cater to its specific needs. Experimenting with different products and observing how your hair responds can guide you in creating a hair care routine that optimally nourishes and moisturizes your hair.

- **HYDROGEN BONDS** are weak, physical bonds that are easily broken by water or heat
 - Accounts for 1/3 of hair strength
 - Weakest but most abundant
 - **SALT BONDS** are a weak, temporary bond that can be broken by change in pH
 - 1/3 hairs strength
 - **DISULFIDE BONDS** are a robust, chemical bond
 - Joins two sulfur atoms from the **CYSTEINE** amino acid
 - Forms a covalent bond
 - Strongest but fewest in the hair
 - 1/3 hairs strength
 - Broken by chemical changes like perming/ relaxing
 - **LANTHIONINE BONDS** are made when hydroxide relaxers break and then convert disulfide bonds when rinsed
- Lanthionine is 1 SULFUR ^[1]_{SEP} ATOM: Disulfide is 2

Bonds of the Hair

Side Bonds of the Cortex

- Hydrogen bonds
- Salt bonds
- Disulfide bonds



BONDS OF THE HAIR				
BOND	TYPE	STRENGTH	BROKEN BY	REFORMED BY
HYDROGEN	side bond	weak, physical	water or heat	drying or cooling
SALT	side bond	weak, physical	changes in pH	normalizing pH
DISULFIDE	side bond	strong, chemical	1. thio perms and thio relaxers 2. hydroxide relaxers 3. extreme heat	1. oxidation with neutralizer 2. converted to lanthionine bonds
PEPTIDE	end bond	strong, chemical	chemical depilatories	not reformed; hair dissolves

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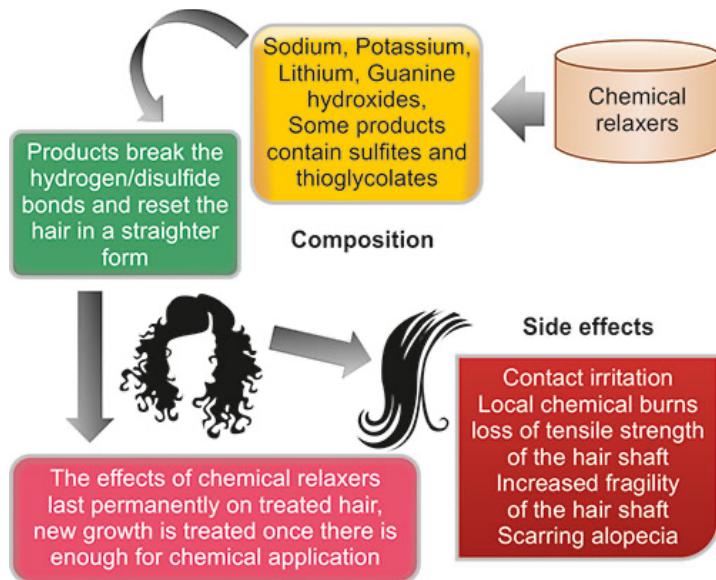
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MYTHS & FACTS ABOUT HAIR GROWTH MYTH- Shaving, clipping & cutting makes hair grow back faster, darker & coarser
 MYTH- Scalp massages increase hair growth
 MYTH- Gray hair is coarser & more resistant
 MYTH- The amount of curl is determined by racial background. MYTH - Cross section of hair directly relates to the amount of curl or shape of follicle

UNDERSTANDING HAIR LOSS CAUSES & TREATMENTS

DHT - Dihydrotestosterone
 Thinning hair- antibiotics or medication
 Heart disease
 Diabetes
 Thyroid
 Chemo
 High Cholesterol

MALE & FEMALE

HAIR LOSS: Anything that affects B5 and Hemoglobin will affect how the hair follicle thrives (B5 regulates testosterone; Hemoglobin transport oxygen in the blood)
 Birth Control- suppresses Estrogen

MEN

- Experience more negative social & emotional effects
- More preoccupied with their baldness
- Conceal or compensate for hair loss

WOMEN

- Greater investment in their appearance
- Feel anxious, helpless& less attractive

TYPES OF ABNORMAL HAIR LOSS

Abnormal hair loss is ALOPECIA and falls into three categories.

ANDROGENIC^[1]_[SEP] ALOPECIA:

ALOPECIA^[1]_[SEP] ARETA^[1]_[SEP] :

Autoimmune disease causes hair follicles to be mistakenly attacked by your own immune system White blood cells stop hair growth during ANAGEN

It affects 5 million in the U.S

(ALOPECIA TOTALIS-Total scalp hair loss), (ALOPECIA UNIVERSALIS- Complete body hair loss)

POSTPARTUM^[1]_[SEP]ALOPECIA:

Temporary hair loss after pregnancy

Generally, the growth cycle returns to normal within a year after the baby is delivered.

DISORDERS OF THE HAIR

CANITIES- gray hair Congenital Acquired

RINGED HAIR- alternating bands of gray & pigmented hair

HYPERTRICHOSIS-

TRICHOPTILOSIS-split ends

TRICHORRHEXIS NODOSA- knotted hair; modular sweeping along hair shaft; breaks easy

MONILETHRIX- beaded hair

FRAGILITAS CRINIUM -brittle hair; splitting

DISORDERS OF THE SCALP

- Your skin is in a constant state of renewal
- The outer layer is constantly being shed & replaced
- Shed 9 lbs of dead skin a year
 - Skin cells of a normal, healthy scalp fall off as small, dry flakes without being noticed
 - DANDRUFF – PITYRIASIS Dry, flaky, loose
 - FUNGAL INFECTIONS (TINEA – ringworm, TINEA CAPITIS- ringworm of the scalp, TINEA FAVOSA- sulfur yellow crusts (scutula); odor
 - PEDICULOSIS CAPITIS- head lice
 - SCABIES- itch mite