DOSSIER

Why the blood supply to the scalp is so important and effective

-Physiological motivation-

September 2021

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1. PHYSIOLOGY OF THE SCALP

Hello, I am Aristónico Casas Gálvez (Madrid, 1963. Spain). First of all I want to apologize for my poor English, I am not a native speaker and I use an online translator. I am going to explain the reasons that have led me to understand why the blood flow in the scalp is very important for the growth and maintenance of hair, which has me led to the invention of the Primal Flow S01 hair massager and to recover my hair years after having lost it.

The scalp is the skin that lines the skull of the human being and has hair. It is different from the other skins for the reason that under this skin there is a very vascular structure, formed by a huge branch of blood vessels and that is responsible for the large hemorrhages that cause the wounds that occur here. This thin, fragile and highly vascularized tissue is called the aponeurotic galea.

The scalp is composed of skin and subcutaneous tissue. It covers the upper part of the cranial vault, from the upper nuchal lines of the occipital bone to the supraorbital edges of the frontal bone. It is considered as a unique structure, independent of the skin and consists of four layers that are::

Skin: the thickness of the epidermis and dermis varies between 3 and 8 mm.

Epicranium and aponeurotic galea: the occipital and frontal muscles are connected at the apex of the skull by the so-called aponeurotic galea, which constitutes the firmest and most resistant lamina of the scalp and is also responsible for the scarce possibility of distension of the scalp.

Subepicranium (aponeurotic galea or Merkel space): It is the space between the galea and the epicranium occupied by a thin and straight tissue with few blood vessels. Its laxity allows the mobility of the upper layers.

Pericranium: It is the deep layer, intimately attached to the external table of the skull.

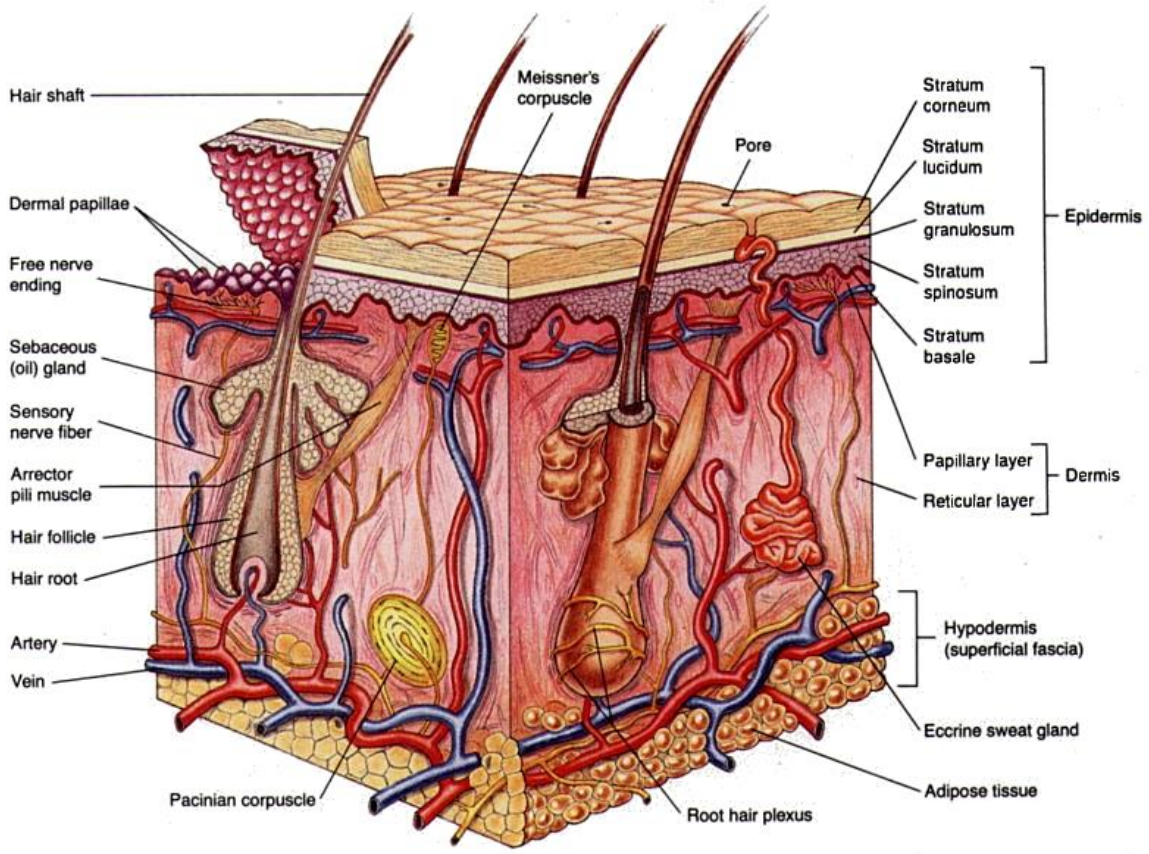
Dermal papillae

The dermal papillae also play a central role in the formation, growth and hair cycle. It is formed by the fibroblastic cells and is responsible for the control of the hair cycle.

It is each of the small structures shaped like finger or nipple formed by the interdigitation of the dermis in the epidermis. (On the surface of the skin of hands and feet, these interdigitations appear forming the epidermal or papillary crests known colloquially as "fingerprints").

Blood vessels in the dermal papillae nourish all hair follicles and carry oxygen and nutrients to the deeper layers of the epidermal cells.

The dermal papillae are part of the outermost layer of the dermis, the papillary dermis, and the crests that form greatly increase the contact surface between the dermis and the epidermis. Because the main function of the dermis is to support the epidermis, this greatly increases the exchange of nutrients, oxygen and waste products that circulate through the blood vessels between the two layers.



Hair follicle

The hair follicle is the part of the skin that gives growth to the hair by concentrating stem cells, forming from a tubular invagination. It is a bag whose base is the bulb. This follicle has two layers, epidermal and dermal, which is well vascularized and innervated. So each hair rests on a hair follicle, being this the most dynamic cutaneous structure and one of the most active of the whole organism.

The hair follicle is the part of the skin that gives hair growth by concentrating stem cells. At the base of the hair, a thin network of blood vessels forms the root of the hair. Around this there is a white structure

called bulb, visible when plucking healthy hair. Next to the follicle there is a tiny muscle group called musculus erector pili, which is responsible for the perpendicularity of the hair to the surface of the skin and causes the projection of the follicle slightly above the cutaneous surface, a phenomenon known as goose bumps.

Hair

The hair is a keratinized filament that emerges from the hair follicle. It is formed by dead cells due to the formation of keratin. Its growth is due to the rapid production of cells inside the matrix.

At the base of the hair, a thin network of blood vessels forms the root of the hair, around which there is a white structure called the bulb, which is the proliferative region -where specialized cells are born and reproduced.

The hair grows in cycles of several stages: anagen (growth), catagen (involution) and telogen (rest). Normally, up to 90% of the hair follicles are in the anagen stage, while the remaining 10-14% is in telogen and up to 1-2% in catagen. The length of these cycles varies according to the area of the body. The growth or anagen phase lasts 2-5 years, but varies according to the body region: in eyebrows only 2-4 months, in eyelashes 100-150 days.

Irrigation

The main circulation is based on the external carotid artery through three branches.

• Surface temporal artery

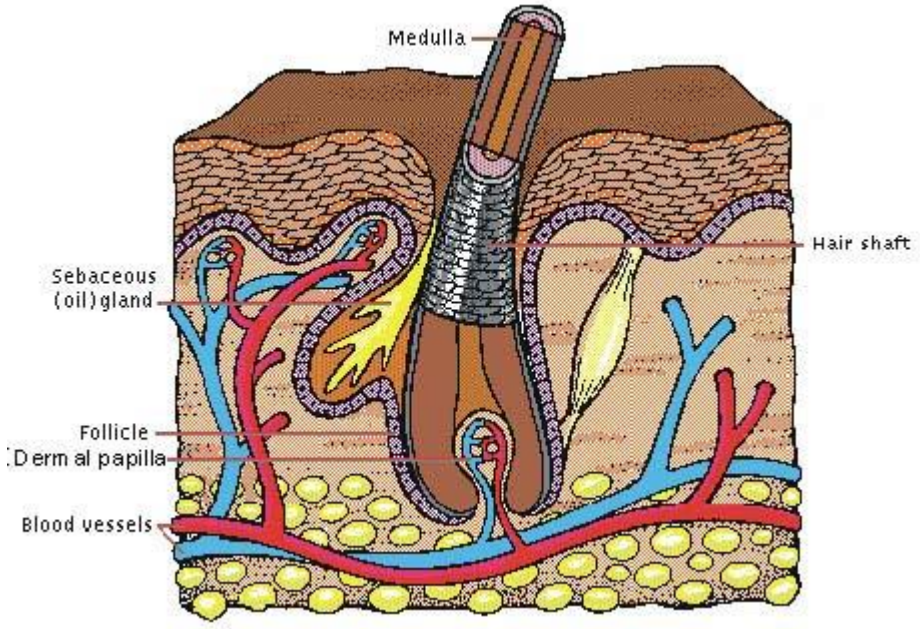
• Occipital artery

• Posterior auricular artery.

The frontal area of the scalp is irrigated by two other arteries, dependent on the internal carotid, which are the supratrochlear, and supraorbital artery.

The venous Irrigation that accompanies the arterial roots is emptied into the external jugular, and the frontal and supraorbital veins drain into the ophthalmic veins and then into the cavernous sinus.

It is clear, then, that vascularization -and, logically, its irrigation- is an inherent quality of the scalp, so blood plays a key role in its functioning. In fact, and as you can see in the following image, the base of the hair follicle - in the hypodermis - is directly irrigated by blood vessels and also the dermal papilla - in the dermis - has many of them that provide the necessary inputs for its operation.



Obviously, it is clear that blood circulation is essential for hair.

LAYERS AND INTERCONNECTION

EPIDERMIS

The epidermis is, in humans and in the rest of the vertebrate species, the superficial layer of the skin. It is possible to distinguish different strata in the epidermis, such as the germinative, the spiny, the granular, the lucid, the corneal and the disjunct.

DERMIS

The dermis is the layer of skin located under the epidermis and firmly connected to it. The inner face of the basement membrane of the epidermis joins the dermis. It performs various functions:

-Protective (its thickness is between 20 and 30 times greater than that of the epidermis).

-Nutrir to the epidermis, since this layer lacks blood capillaries so it depends on the blood supply of the dermis.

-Termoregulatory: the irrigation of the dermis can be contracted by vasoconstriction if it is cold and expand by vasodilation in hot weather. Sweat also starts in the sweat glands that it contains.

-Structural: gives support to the epidermis thanks to the dermal papillae and to contain collagen fibers of structure (density and strength) to this layer. Its high concentration in collagen and elastic fibers (collagen and elastin) also provides elasticity to the entire skin.

-Sensitive, since in this layer are the cells and nervous structures responsible for feeling: pressure, heat, cold, softness, pain, tickling, tempering ...

The dermis is formed by 2 layers:

The papillary, or upper dermis: is a superficial area of loose connective tissue, which contacts the basement membrane

The reticular, or deep dermis: contains most of the annexes of the skin. It consists of connective tissue with elastic fibers that are arranged in all directions and ordered in a compact, giving resistance and elasticity to the skin.

HYPODERMIS

The hypodermis, also called subcutaneous tissue, or superficial fascia, is the lowest layer of the integumentary system (the skin and the faneras, that is its complementary structures: hair, scales, feathers, horns, nails, exocrine glands and their products: sweat and secretions) in vertebrates. Its collagen and elastic fibers connect directly with those of the dermis and run in all directions although mainly parallel to the surface of the skin. This subcutaneous layer is crossed by numerous blood vessels, and nerve trunks; They contain many nerve endings. The hypodermis consists of two layers:

Areola coat

It is the outermost layer and is in contact with the dermis, it is formed by adipocytes.

Lamellar coat

It is the deepest, the cells are spindle-shaped (spindle-shaped), small and distributed horizontally; This layer increases when people gain weight, due to the increase in volume of adipocytes able to invade the most superficial layer of the skin.

Functions of the hypodermis

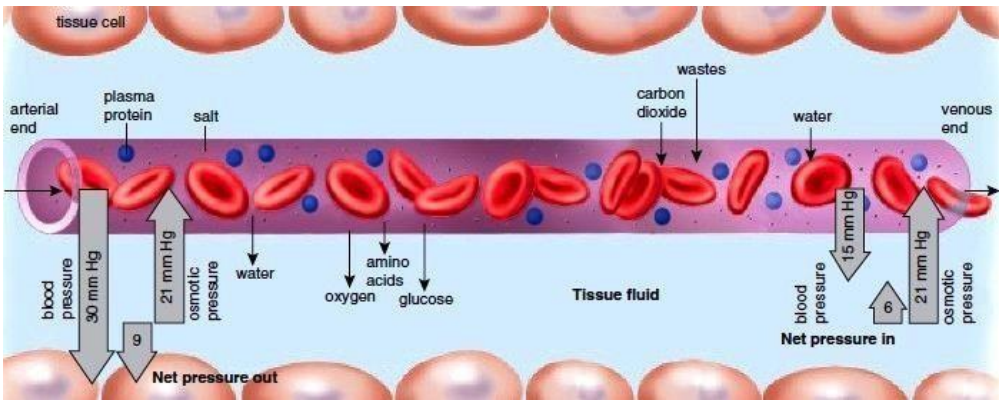
Helps maintain body temperatura - due to its blood flow-, provides shape to the body contour and gives mobility to the entire skin. Its thickness may change depending on the parts of the body and may be different between people. The lymphatic system plays an important role in the self-cleaning of the skin. Their articulated vessels run parallel to the blood circulating lymph between the skin and muscles.

As you can see, the different layers that make up the scalp are connected and interconnected, a fundamental characteristic to understand my proposal since the therapy we are going to apply is based on considering these differentiated parts holistically, integrally, as a whole.

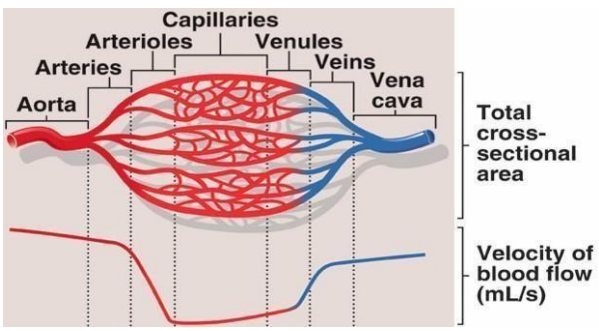
2. FACTORS INVOLVED

A. THE BLOOD CIRCULATION

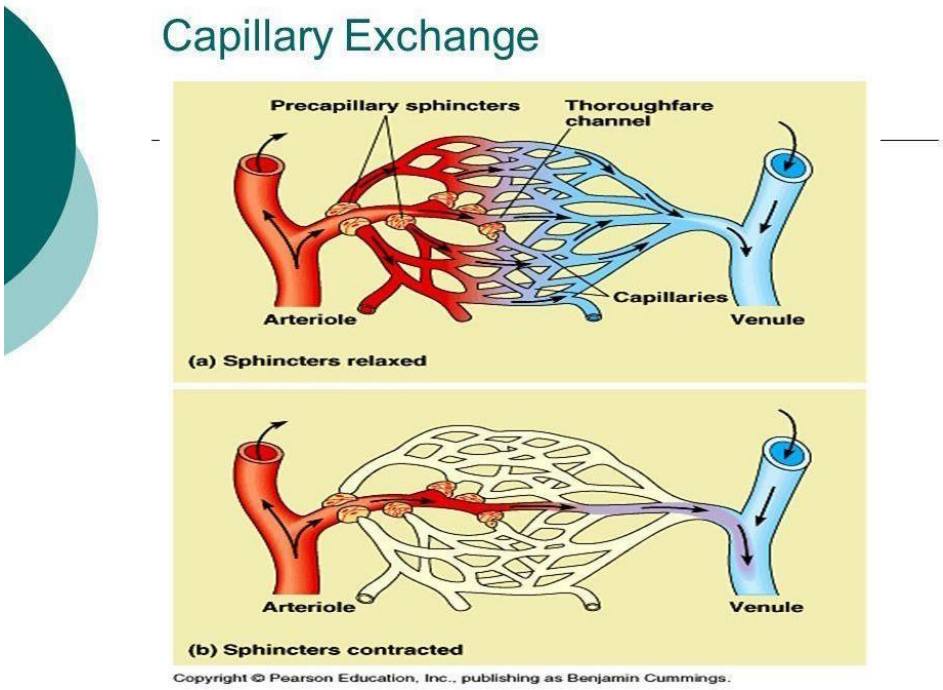
Due to their contributions: it is estimated that one milliliter of blood contains four to five million red blood cells, from 6,500 to 7,000 white blood cells and from 200 to 300,000 platelets. And considering that one drop is sufficient for any analysis / diagnosis, I thought, it makes sense ... Blood is a life flow.



…Makes sense. The thinnest blood vessels (capillaries) become thinner as they branch in the body. Established by a single layer of endothelial cells, this extremely thin network acts as a gas exchange between blood and tissues or between blood and air in the lungs. It is estimated that there are more than 60,000 kilometers of these capillaries around the body, being the furthest point from the path that the blood makes and the supply of all the tissues and organs, because each of the cells of the body is at a lower distance 0.2 mm from a capillary, so blood is essential in its operation.



At the entrance of these small vessels called capillaries there are some bands that stretch or contract as valves to allow or prevent the passage of blood, called precapillary sphincters. As a result of stress and emotionality (surprise, joy, love, anger, etc., etc.) we constrict, wrinkle the face hundreds of times a day, which is reflected as so many hundreds of contractures in the scalp against the lid of the skull, and this compresses the bands that function as valves.



B. STRESS

When we are stressed, we automatically tighten the muscles of the jaw and those around the eyes and mouth, as well as the muscles of the neck and back, which also pulls the scalp. These muscles tense at the same time to prepare the body to react and then relax when the stressful situation has disappeared. It is so conditioning that it has been proven that people subjected to a chronic stress level over time suffer a shortening of the muscles of the neck and shoulders. The muscle tension, due to the compression it exerts on the blood vessels, decreases blood flow to the affected area, which reduces the supply of oxygen, favoring the accumulation of lactic acid and toxic metabolites. For this reason, stress is undoubtedly one of the main causes of hair loss.

C. AMINO ACIDS

They represent, neither more nor less, the body's self-regenerative capacity: amino acids are extraordinary molecules that make up one of the three great macronutrients: proteins, which are what allow us to be in a process of constant growth and repair.

Proteins are one of the bases of any vital process, since they are absolutely necessary for our organism and their functions are several: they allow cells to defend themselves from external agents, control and regulate functions inside our body and repair damages.

In the stomach begins the digestion of proteins to facilitate the body absorption and assimilation of essential nutrients, which are the units with which proteins or amino acids are built.

It consists of its degradation by means of proteolytic enzymes (or proteases) through a hydrolysis process that helps to break down proteins into polypeptides, tripeptides and dipeptides. These are hydrolyzed to amino acids by the action of the enzymes of the intestinal cell membranes. They are absorbed by the portal vein and transported to the liver. From here they enter the bloodstream and through it reach all the cells of the body. These extraordinary molecules fulfill different functions depending on the tissue and the cellular location. This is the way how we grow and repair ourselves, we renew ourselves, through the dispersion by the blood and the absorption of amino acids by the cells present in the tissues of organs.

So and for the reasons cited it is common sense to consider that the deterioration of blood circulation in the scalp is behind a large number of alopecias, and after studying the presence of capillaries and blood flow intervening in the scalp and in the hair process I was convinced of this and began to think about how to reactivate it, and the massage convinced me because it makes sense: the massage in any part of the body reactivates the blood circulation –it is why the areas where it is applied become red- and it is the blood that provides the oxygen and nutrients.

It is inferred then that in many cases of alopecia it is not a question of the hair bulb being the hair root being atrophied or damaged, but the capillaries, that is, the small blood vessels that supply blood to the hair bulbs; and when applying massage, movement or traction, these capillaries behave like any rubber tube that, crushed, prevents the passage of water: the pumping produced by this massage, movement or traction, pushes the fluid it contains and gradually opens until it flows back inside.