

DISORDERS OF HAIR PIGMENTATION

ESSAY

**Submitted for fulfillment of master degree
In Dermatology & Andrology**

BY

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2008**

Acknowledgment

Without the help of Allah and support of my supervisors this assay would not have been accomplished.

It is pleasure to express my deep gratitude and thanks to prof . Dr . Mohsen Mohamed Soliman , Professor of Dermatology , Faculty of Medicine , Cairo University , for his very constructive and meticulous supervision of this work .No words can express my deep appreciation .

I am deeply thankful and indebted to . prof . Dr . Shahira Abd El-Rahman Ramadan , Assistant Professor of Dermatology , Faculty of Medicine , Cairo University , for her kind help , patience and support over the period of this research .

My thanks and gratefulness are also forwarded to . prof . Dr . Doaa Mohamed Mahgoub , Assistant Professor of Dermatology , Faculty of Medicine , Cairo University , for her support and real cooperation .

Abstract

Hair color is provided by pigments produced by cells called: "melanocytes" The pigments are called "melanin". Melanin is found in two forms: Eumelanin is the dark pigment which predominates in black hair and Pheomelanin is a lighter pigment, which is found in red and blond hair.

In humans, melanocyte cells are found diffusely scattered in the skin and also in little clusters in the hair follicles.

There are many factors affecting hair color e.g.: stem cell, aging, chemical, environment, weathering, and nutritional factors etc

The most common disorders of pigmentation of the hair are premature graying hair (canities), poliosis, green hair, blue hair and yellow hair.

Decreased hair pigmentation in which dark hair appears lighter may occur in the following condition: Waardenburg's syndrome, piebaldism , Albinism , Hutchinson-Gilford progeria type syndromes and Werner's syndrome

List of abbreviations

DP: Dermal papilla

MC1R: Melanocortin-1 receptor

OCA: Oculocutaneous albinism

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Introduction And Aim of work

Introduction

The total number of hair follicles for an adult human is estimated at 5 million, with 1 million on the head, of which 100,000 alone cover the scalp. In humans, the only external regions of skin devoid of hair follicles are the palms and soles.

Under normal circumstances all mature hair follicles undergo a cyclical process consisting of four phases - anagen (growth), catagen (regression), telogen (rest) and exogen (shedding).

Color is perhaps the most obvious characteristic of hair, but as far as we know it has no biological function in humans. It does not protect the hair from the harmful effects of sunlight, although hair itself protects the scalp. The color of hair is due to the presence in the cortex of granules of a pigment called melanin, which is formed in special pigment-producing cells (melanocytes) in the hair bulb during the growing phase (anagen) of each hair.

Melanin is found in two forms. Eumelanin is the dark pigment which predominates in black hair. Pheomelanin is a lighter pigment, which is found in red and blond hair.

Natural hair color is black, brown, blonde, or red, depending on a person's ethnic origins. Hair color is genetically associated with certain skin tones and eye colors. Blonde and red hair are sometimes associated with disorders such as skin cancer and albinism .

There are many factors affecting hair color namely : stem cell , aging , chemical , environment , weathering , and nutritional factors , some

diseases can cause changes of hair color e.g. Kwashiorkor, osteoporosis and acquired immune deficiency syndrome (AIDS).

The most common disorders of pigmentation of the hair are due to loss of melanin resulting in white hair which is called canities , if it is diffuse , or poliosis when it is localized , abnormal colors may be imposed on the hair like green hair , blue hair and yellow hair .

Decreased hair pigmentation in which dark hair appears lighter may occurs in the following condition : Waardenburg's syndrome , piebaldism , Albinism , Hutchinson-Gilford progeria type syndromes , Werner's syndrome , Rothmund-Thomson syndrome , Book's syndrome , Vogt-Koyanagi-Harada (VKH) syndrome , Vitiligo induced gray hair.

Aim of work

The aim of this essay is to provide a review of literature on hair structure, embryology and phases of hair growth cycle .This essay also highlights disorders of hair pigmentation and hair melanogenesis.

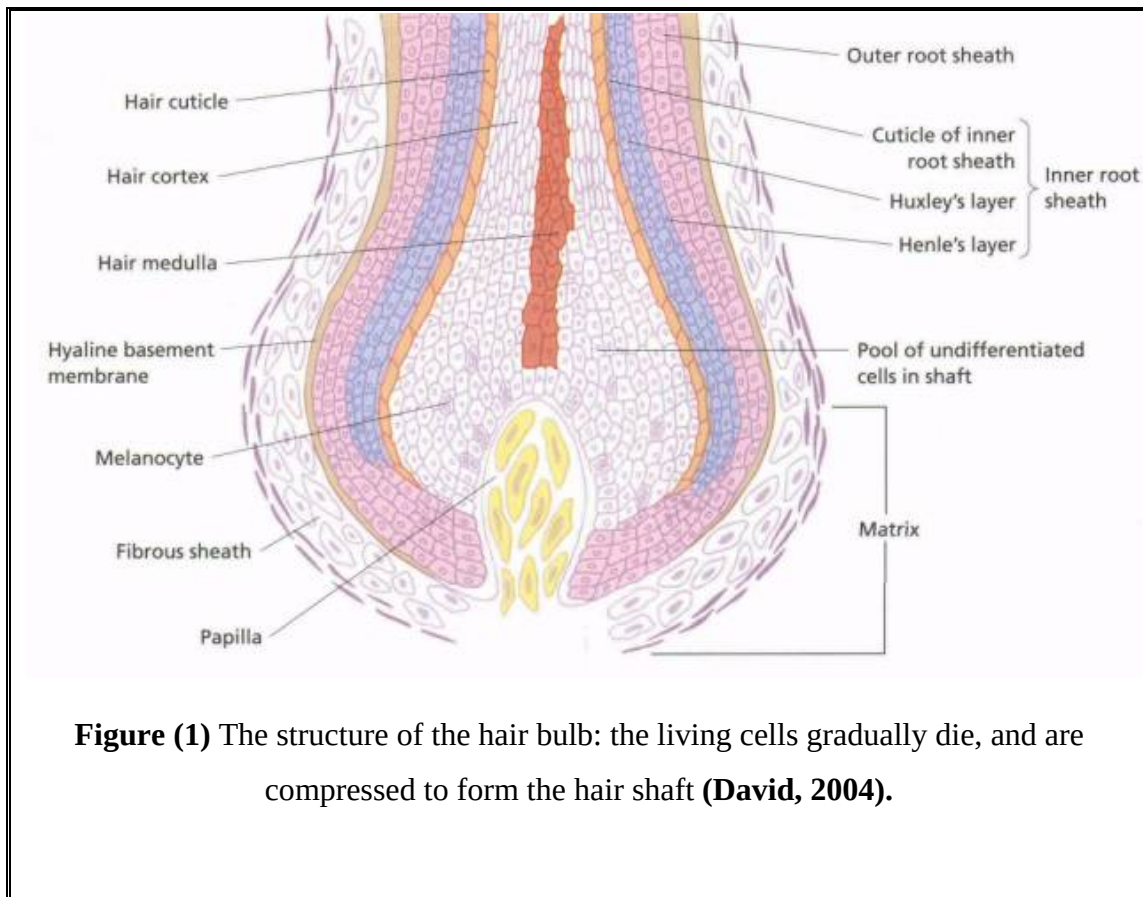
Chapter 1

Morphology of normal hair

Follicular structure

The total number of hair follicles for an adult human is estimated at 5 million with 1 million on the head of which 100,000 alone cover the scalp. In humans, the only external regions of skin devoid of hair follicles are the palms and soles. The hair follicle can be recognized as a separate entity within the skin with formation and maintenance based on interaction between dermal and epidermal components **(Hearle, 2000)**.

Under the influence of the dermal papilla, epidermal cell differentiation during anagen produces a keratinized hair fiber and associated products. The source of epidermal cells, called matrix cells, that lie in the immediate vicinity of the dermal papilla are a living, actively proliferating group of cells which differentiate and become keratinized to form the hair cortex (Co) and surrounding hair cuticle (Hc) of the hair shaft at the center of which is situated the medulla (M). Cells around the hair shaft comprise the inner root sheath (IRS) which can be divided into three layers the cuticle (Cu), Huxley layer (Hu) and Henle layer (He) based on structure, patterns of keratinization and incorporation of a product called trichohyalin. The IRS breaks down at the level of the sebaceous gland to leave only the hair cortex and surrounding cuticle to protrude above the epidermis **(Hutchinson and Thompson, 1997)**.



Dermal papilla

The dermal papilla (DP) directs and dictates the embryonic generation of a hair follicle and it also retains this instructive ability throughout the life of the hair follicle. The DP presents as a healthy "pear" shape in normal hair follicles. As the name suggests, derived from the dermis mesenchyme the DP consists of a highly active group of cells shown to be capable of inducing follicle development from the epidermis and production of hair (Peters et al., 2006).

The DP consists of a small group of fibroblast cells derived from the mesoderm. The cells are held close to the base of the epidermal derived cells that produce the hair fiber and root sheaths but there is a thin layer, called the basement membrane (or basement lamina, or glassy membrane) that separates the DP cells from the hair fiber/sheath cells. In other words,