

THE REVIEW ON NANOMATERIALS USED IN SHAMPOO FOR HAIR FOLLICLES AND HAIR GROWTH

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ABSTRACT :- Hair is an important indicator of health and can have a major effect on an individual's cosmetic appearance. Research within the cosmetics industry has let out that when nano materials are put together into hair care, they can enhance the benefits of active ingredients in order to improve hair cosmetics. Within the cosmetics arena, the unique size and intrinsic properties of nano particles can be tailored to target the hair follicle and shaft. Aims to provide an overview of cosmetic nano carriers that can be employed to increases the appearance of hair. Popular drug therapy allows for the delivery of substantial amounts of drug to the site of disease, though poor and erratic drug absorption and active ingredient stability often confound delivery. Recent progress in nanotechnology allows for the development of carriers with enhanced ability to penetrate and permeate the skin. While cosmetic products are not intended for systemic absorption, their efficacy depends on entry through this armor.

Keywords: Nanotechnology; nonmaterial's, hair follicle, hair shaft; hair cosmetics, hair cosmetics, hair color, hair growth

INTRODUCTION

Hair is a protein fiber that grows from follicles found in the dermis. Hair is one of the defining aspects of mammals. The human body, apart from areas of glamorous skin, is covered in follicles which produce thick terminal and fine hair. Most regular interest in hair is focused on hair growth, hair types, and hair care, but hair is also an important bio material primarily composed of protein, notably alpha-keratin. Angle towards different forms of hair, such as hairstyles and hair removal, vary widely across different cultures and historical periods, but it is often used to indicate individual personal beliefs as an alternative social position, such as their age, sex, or religion. Correspondingly, hair quality is considered to be a significant marker of health [2]. For example, rigid hair may be a marker for thyroid disease or nutritional deficiency, primary skin disease ranging from psoriasis to tine capitals, and thinning hair may signify hormonal imbalances. In view the impact of hair on quality of life, it is no surprise that consumers attempt to alter their hair for a variety of aesthetic reasons [3].

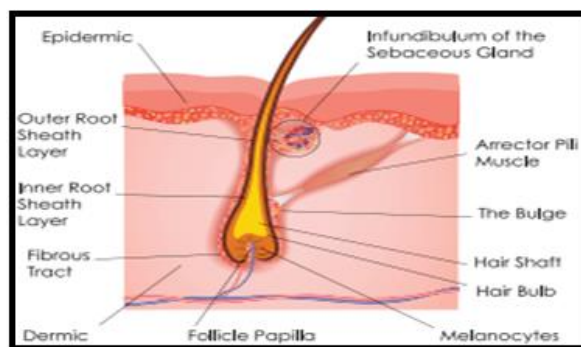


Figure.1.1.Hair Anatomy

1.2. HAIR ANATOMY

1.2.1 Dermal Papillae

Dermal papilla is manage for regulating the hair cycle and hair growth, and is also comprised of androgen receptors that are sensitive to the presence of DHT.

1.2.2Matrix

Matrix surrounds the dermal papillae and contains all the active cells needed for hair growth and for the development of the different parts of the hair, particularly the outer root sheath, the

inner root sheath and the hair shaft. Combined, the matrix and the dermal papillae make up the hair bulb.

1.2.3. Outward Root Sheath

The outward root sheath, or trichelemma, is the outermost part of the hair and is keratin. It protects the entire hair follicle inside the dermis and then transitions through to the epidermis, providing the hair follicle with an opening from which to surface from.

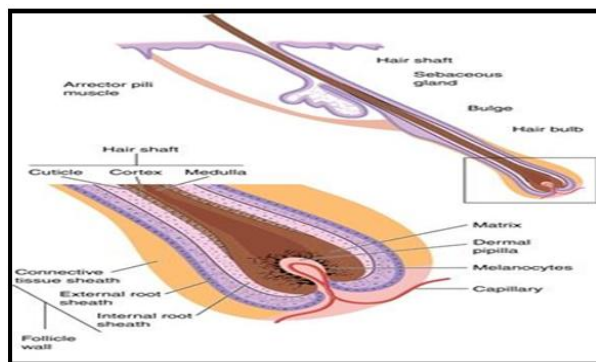


Figure.1.2. Part of Hair

2.1. HAIR FOLLICLE

Hair follicle is a tunnel-shaped structure in the epidermis (outer layer) of the skin. Hair starts expand at the bottom of a hair follicle. Tap root of the hair is made up of protein cells and is nourished by blood from nearby blood vessels (3).

The life of a follicle

On mode, hair grows about half an inch each month. Hair swelling rate can be affected by your age, hair type, and your overall health. Hair follicles aren't just responsible for how much your hair grows; they also influence what your hair looks like. The shape of your follicle determines how curly your hair is. Ring shaped follicles produce straight hair while oval follicles produce curlier hair. Hair follicles further play a part in determining the color of your hair. Your hair obtains its pigment from the presence of melanin.

2.2. Hair growth cycle

Hair grows out of the follicles in cycles. There are three different phases of this cycle:

Growth phase

The hair begins to grow from the root. This stage usually lasts between three and seven years.

Transitional phase

The swelling slows down and the follicle shrinks in this phase. This lasts between two and four months.

Resting phase

The matured hair falls out and new hair begins to grow from the same hair follicle. Consist lasts between three and four months.

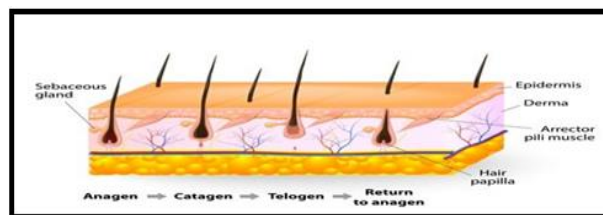


Figure 2.2. Hair growth cycle

2.3 Folliculitis

Folliculitis is an inflammation of the hair follicles. It can occur anywhere hair grows, including your Scalp legs armpits face arms Folliculitis again and again looks like a rash of small bumps on your skin. By accident when you are moving may be red, white, or yellow and they can contain pus. folliculitis is itchy and sore.

Folliculitis is repeatedly caused by a staph infections are caused by staphylococcus bacteria. Folliculitis can move away without treatment, but a doctor can diagnose you and give you medication to help manage it. It includes topical treatments or oral medications to treat the cause of the infection and soothe the symptoms (6).



Figure.2.3 Folliculitis of hair follicles

3.1. HAIR SHAFT

Hair shaft is the lonely part of the hair follicle that fully exits the surface of the skin. The hair shaft consist of three layers: the medulla, cortex, and the cuticle (5)

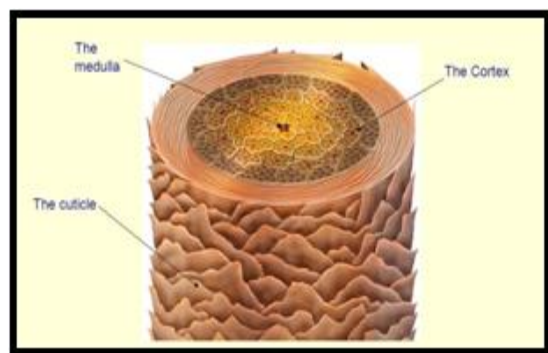


Figure 3.1. Hair Shaft

3.1.1 Medulla is described as an unsystematic and unstructured area located in the innermost region of the hair shaft and is not always present.

3.1.2 Cortex, in contrast to the medulla, is highly structured and organized. The cortex is powdered of keratin and is responsible for giving hair its strength and durability, as well as its water uptake. The cortex further contains melanin and determines the color of hair based on the number, distribution and types of melanin granules present.

3.1.3 Cuticle is the hair's outer protective layer and is connected to the internal root sheath. It is a complex structure with a single molecular layer of lipids that helps hair repel water.

4.1. FOLLICULAR TARGETING WITH NANOPARTICLES

That nanoparticles used for follicular delivery provide some advantages over conventional pathways, including improved skin bioavailability, enhanced penetration depth, prolonged residence duration, fast transport into the skin and tissue targeting.

Topical drug therapy permit for the delivery of substantial amounts of drug to the site of disease, though poor and erratic drug absorption and active ingredient stability often confound delivery. Now day's progress in nanotechnology allows for the development of carriers with enhanced ability to penetrate and permeate the skin. Cosmetic products are not intended for systemic absorption, their efficacy depends on entry through this armor. For all its efficient barrier function, some nanomaterials will be able to penetrate this obstacle, depending on their size and structure (2).

There are mainly consisting of which nanoparticles gain penetration:

- (1) Inter cellular
- (2) Tran cellular
- (3) Follicular

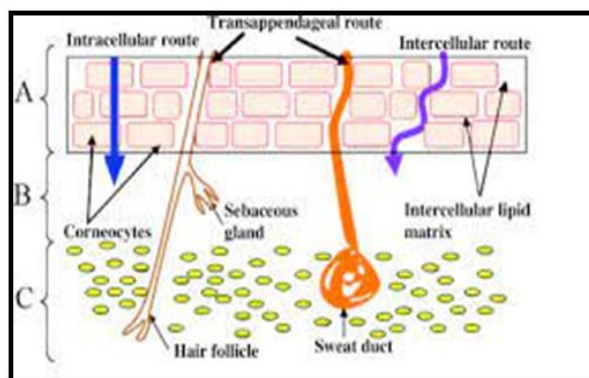


Figure.4.1 Routes of nanoparticles penetration

Inter cellular fill is very difficult and depends on the solutes ability to penetrate the hydrophilic pores of the skin, whose size is estimated to be less than 36 nm [9].

Tran cellular fill is also highly unlikely given the tight matrix of corneocytes.

Follicular presence of hair follicles significantly contributes to the penetration and permeation of topically applied man-sized particles. In the past, it was thought that appendage gel offices occupy 0.1% of the skin surface [8]. However, new evidence has suggested that follicular spread in body-region-dependent, with somebody regions (i.e., forehead) harboring a significantly increased number of follicular orifices [10].

This advice while follicular openings may serve as a gateway for nanoparticulate drugs to be transported into the hair follicle, there may be outstanding differences in percutaneous absorption of appendage-free and abundant areas. The hair follicle act for interruptions in the potent skin barrier that serve not only as an entry point for these topically applied compounds but also as an important reservoir, which outstandingly contributes to the transport of drugs and cosmetics into the skin [11].

5.1. Nan particles in Hair Cosmeceuticals

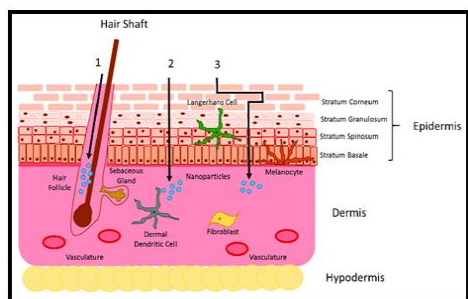


Figure.5.1. Nan particles in Hair Cosmeceuticals

Nanotechnology is considered as the most imminent technology of 21st century and is contemplated as a big boon in the cosmetic industry. The term nanotechnology is the combination of two words, technology and the Greek numerical “nano” which means dwarf. Nanotechnology is study as the science and technology used to develop or manipulate the particles in the size range of 1 to 100 nm [1, 2]. nanotechnology has appeared in different fields like engineering, physics, chemistry, biology, and science and it has been virtually 40 years since nanotechnology has intruded into the field of cosmetics, health products, and dermal preparations. Through the era of 4000BC, the use of nanotechnology has been recorded by the Egyptians, Greek, and Romans; with concept of hair dye preparation utilizing nanotechnology [3]. Cosmeceuticals are the cosmetic products which absorb biologically active ingredient having therapeutic benefits on the surface applied. These are used as cosmetics as they claim to enhance appearance [7]. Cosmeceuticals are glamour between pharmaceuticals and personal care products. Cosmeceutical products have quantifiable therapeutic efficacy on the skin, as drugs and formulations have diversified from skin to body to hair and they are used for the treatment of various disorders like hair damage, wrinkles, photo aging, skin dryness, dark spots, uneven complexion, hyper pigmentation, and so on [8]. Cosmeceuticals are observing as the fastest growing fragment of personal care industry and the market for personal care is increasing enormously [9]. For all enormous benefits of nanoparticles, little is known about the short-term and long-term health effects in the environment and organisms. Protection concerns have been raised due to the reported toxicity and possible dangers of the nanomaterials. The diverse classes of nanocarriers like liposomes, niosomes, and solid

lipid nanoparticles, nanostructure lipid carriers, nanoemulsion, and so on which are being used for delivery of nanocosmeceuticals, marketed products, and positive and negative aspects. There are some advantages of nanocosmeceuticals. It provides the controlled release of active substances by controlling the drug release from carriers by several factors including physical or chemical interaction among the components, composition of drug, polymer and additives, ratio, and preparation method(7). Very small size of the particles, the surface area is increased which allows the active transport of the active ingredients into the skin. Obstruction provides the enhancement in the penetration and skin hydration is increased. Cosmeceuticals have high capture efficiency and good sensorial properties and are more stable than the conventional cosmetics. The nanoparticles are appropriate for both lipophilic and hydrophilic drug delivery. Nanomaterials are commonly used in the preparation of anti wrinkle creams, moisturizing creams, skin whitening creams, hair repairing shampoos, conditioners, and hair serums [11, 12]. Nanotechnology is one such direction a scientifically diverse discipline that exploits the complex and remarkably unique properties of matter at the nanoscale. Nanomaterials have been extensively researched and used as a vehicle for the delivery of bioactive agents to the skin within the cosmetic arena [4, 5]. Nanotechnology gives out to small size ranging from 1 to 100 nm and a very large surface area-to-volume ratio, facilitating their interaction with the target organ the skin. Nanomaterials can also be designed to deliver established or developing formulations of drugs in a sustained, controlled and targeted manner to avoid adverse systemic side effects (10).

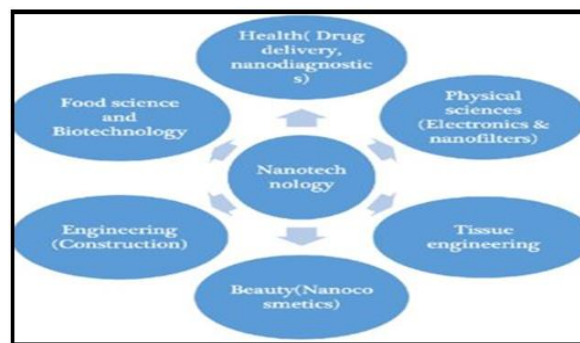


Figure.5.1.Application of nanotechnology

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