

A New Look at Pathogenesis of Hair Loss



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Television and magazine commercials would have us believe that the secret to full, healthy hair is choosing the right shampoo or vitamin supplement. Drug store aisles are crammed with products that promise to improve the shine, texture, and/or thickness of hair with a variety of ingredients. Yet, we are aware that the biology of hair growth is complex and so, therefore, is the science of hair loss and hair care. While there are a number of products that can help healthy hair look healthier, shampoos or vitamins alone can't truly regrow thinning hair. As dermatology providers, we realize this not only because we know the science, but because we see patients in the clinic every day who ask us how they can help to reverse hair loss and improve the quality of their hair. Many of these patients are frustrated and sometimes distressed because "nothing helps" their thinning hair.

As our understanding of the microenvironment of the hair follicle deepens, it is becoming increasingly clear that targeting a single pathway in this complex system is not ideal. Androgens, cortisol, and corticotropin-releasing hormone, all of which are not in balance in hair loss due to internal and external stress, and gene expression of pro-inflammatory mediators all affect the hair follicle to suppress "normal" function and negatively influence hair growth. Extrinsic triggers, such as ultraviolet light, pollutants, tobacco, and a host of pathogens that are known to negatively affect the skin overall, also affect the hair follicle in the same way and they can stimulate an inflammatory response and/or lead to the release of reactive oxygen species (ROS).^{1,2,3,4,5,6} We traditionally have divided hair loss into inflammatory vs non-inflammatory, genetic vs acquired, hormone driven vs not. However, we are now realizing that a common inflammatory component is present in most hair loss pathogenesises including androgenetic alopecia (AGA).^{7,8,9,10} Even though AGA has been known as a non-inflammatory type of hair loss, there is "micro-inflammation," presenting in perifollicular lymphocytic infiltrates, mast cell degranulation, fibroblast activation, and immunoglobulin deposits. This indolent and chronic "microinflammation" is not immediately destructive to the follicle as in lupus, but rather causes a dysregulation of normal physiologic dynamics of the hair cycle.^{11,12,13,14,15,16} Ironically, this evolution in our understanding of the pathogenesis of AGA is very reminiscent of the change in our understanding of acne pathogenesis where the microinflammation is the source of all types of acne lesions including "non-inflammatory" ones.

Drug development has targeted specific pathways in the complex biology of hair growth with some success. However, the degree of benefit is variable from patient-to-patient, and long-term improvement requires long-term therapy with possible adverse events. Newer medical approaches to promoting healthy hair follicles and encouraging hair regrowth are embracing a multi-targeted approach that addresses the variety of complex factors that interact to influence the hair follicle. Treatments such as low-level light therapy, platelet-rich plasma, and nutraceuticals are used to target multiple parameters, including inflammation, and emerging as effective standalone or adjunct therapies to current pharmacologic options.^{17,18,19}

Nutraceuticals contain potent botanicals with antioxidant and anti-inflammatory benefits to counter the effects of intrinsically and extrinsically mediated inflammation and ROS formation. This group also presents the only available option for addressing psycho-emotional stress and its impact on hair follicles. Select phytoactives with stress-adaptogenic properties have been shown to effect elevated cortisol levels and stabilize metabolic processes that confer greater resilience to stress.²⁰ As discussed ahead, these multi-targeting interventions can provide benefits at multiple steps in the complex microbiology of hair growth and can help to restore balance to the sensitive microenvironment of the hair follicle. Botanicals have an advantage to

be able to target multiple receptors and pathways at once, and also provide the opportunity to target some parameters of hair loss that are not currently addressed with prescription products as well as over the counter simple vitamins and minerals. However, due to lack of oversight and lack of standardization and clinical testing of botanicals, it is difficult to have a scientifically based nutraceutical. It is also unclear if any of the phytoactives in a particular supplement have preserved bioactivity post extraction with solvents, have significant absorption in the body, and are pure and free from additives and toxins. This is where Nutrafol® comes into the picture. Nutrafol® is a nutraceutical supplement with bio-optimized botanical ingredients that have clinical data on absorption and efficacy and is standardized to contain consistent fractions of phytoactive components.

I hope you will find our new perspective on pathogenesis of hair loss and our fresh look at the world of scientifically based nutraceuticals interesting and exciting.

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