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Do we need hair follicle stem cells and hair follicle neogenesis to cure common hair loss disorders?

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Few concepts have ingrained themselves as quickly with physicians who treat hair loss as the vague notion that to cure the common causes of alopecia and effluvium, somehow, one needs to be able to manipulate hair follicle stem cells, either by forcing them to "behave" in a manner that clinically and cosmetically desired hair growth results are obtained, or by injecting them so as to induce the formation of new hair follicles. It has attained almost the status of conventional wisdom that injecting just the right kind of stem cells will usher in a brave new age of iatrogenic hair follicle neogenesis, where newly created hair follicles (either generated directly in adult skin or even *in vitro* from autologous cells, which are then re-transplanted), at long last, will produce the youthful, fully pigmented terminal scalp hairs that had fallen victim, for example, to the baldness-promoting activities of androgens.

Based on these beliefs, on the one hand, biotech companies with a focus on hair follicle neogenesis or stem cell–based hair loss therapy have been founded. On the other hand, hair transplant surgeons increasingly worry that their time-honored and effective surgical procedures for predictable hair restoration will soon become outdated, with hair transplant surgery slowly sliding down a relentless path towards ultimate extinction. The lay public, in turn, especially if aggrieved by a personal hair loss problem, and encouraged in this perception by mass media infatuation with anything that rings of stem cells and organ regeneration, is getting increasingly impatient with us physicians: "Why does it take you guys so long to just make new hair follicles pop up in the balding plate…?!"

"Hair follicle–associated stem cells undoubtedly hold a lot in store for regenerative medicine—well beyond skin and the hair follicle—but they are not going to put hair transplant surgeons predictably out of business any time soon."

Yes, the pressure is on. Just the right time to lean back and to reflect, calmly and carefully: What are these much-reverberated views really based on? Do we actually need hair follicle stem cells and/or hair follicle neogenesis to successfully treat (or even cure) common hair diseases? Will hair restoration surgery really become replaceable in the foreseeable future?

In the following lines, I shall develop some personal, quite possibly controversial and provocative, arguments in response to these pertinent questions (for more background and some relevant references see, for example, Paus, R., *Drug Discov Today* 2006). The underlying views are those of a clinical dermatologist with roughly two decades of experience both in basic hair research and in treating patients with hair growth disorders.

Basic Facts of Hair Loss

For starters, let us recall a few simple facts about hair loss that must serve as the cornerstone for the discussion at hand:

1. By far, the far most common hair loss disorders in daily practice as well as in specialized alopecia clinics are androgenetic alopecia (of the male or female pattern variant), various causes of effluvium (the majority of which may represent telogen effluvium associated with androgenetic alopecia and/or thyroid abnormalities), and alopecia areata.

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