CHAPTER 11

Future Trends in Hair Transplant Surgery

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INTRODUCTION

Natural-appearing improvements in hair density and scalp coverage frequently achieved in hair restoration surgery (HRS) today have advanced in ways that barely resemble the initial attempts of J Dieffenbach and his contemporaries from the 1820s. Great strides have also been made in our field regarding perioperative patient comfort as well as heightening societal awareness of the success of hair transplantation. Building on our specialty's current foundation is inevitable. The specific direction in which our field will advance, however, invites speculation and imagination.

Hair transplantation has benefited from innovations in the form of both medical therapies and surgical devices. Innovation often requires outside financial investment, and the more recent advancements described herein may herald an overall increase in biotech venture capital dedicated to our specialty. Three favorable characteristics encourage outside investment in HRS as compared to other medical fields: (1) the method of physician reimbursement, (2) the regulatory restrictions, and (3) the intellectual property landscape. Most fields of medicine require physician reimbursement through restrictive insurance regulations, a practice that can delay pharmaceutical venture or thwart clinical adoption of a new biomedical device. Next, the relatively noninvasive nature of hair procedures often affords a Class I designation with the United States Food and Drug Administration (FDA). The classification of I versus the more stringent II or III can shave months or even years off the time required to realize a physician's promising idea. Finally, the relatively untapped frontier of intellectual property in our field invites creative investment. For example, a search on the United States Patent and Trademark Office website listing patents filed since 1976 reveals significantly more restrictive patent filings for skin (n = 291,959) and bone (n = 141,725) than claims on hair follicle (n = 2,935).

LOW-LEVEL LIGHT THERAPY

It was four decades after Dr Endre Mester's initial work suggesting lasers' stimulation of hair follicle growth in mice before the first laser received 510K FDA clearance to treat androgenetic alopecia (AGA) in 2007. Stimulating the shaved backs of mice with a ruby laser beam of 694 nm to elucidate any carcinogenic effects, this Hungarian physician instead discovered more rapid regrowth of murine hair.[1] Since that experiment, over 100 randomized and controlled studies have been performed, also confirming a photomodulating effect of low-level light therapy (LLLT). Nevertheless, a clear consensus regarding the efficacy and best clinical protocol of LLLT for hair growth has yet to emerge.

Biostimulation resulting from LLLT has been suggested to occur within the cellular mitochondria: specifically, targeting cytochrome c oxidase at the final stage of the electron transport system.[2] By relieving the inhibitory effect of nitric oxide (NO) on this chromophore (the photoacceptor that absorbs light photons), photons enable cytochrome c oxidase to