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IN THIS ISSUE

The Evolution of the Promise of Hair Cloning: How Hair Cell Cloning Will Fit Into Your Practice

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ABSTRACT

Successful work in mice in the 1980s using cultured dermal papilla cells to form brand-new hair follicles led to the hope that a human version could be developed to treat androgenic alopecia. This could potentially provide a system to create unlimited amounts of cosmetically useful hair follicles in bald areas of scalp. However, clinical studies by biotech companies Intercytex and subsequently Aderans Research showed that although new hairs could be produced, the cosmetic effect was not sufficient. It was discovered that actively miniaturising follicles appeared to be rejuvenated and returned to the dimensions of terminal hairs. This led to a potentially new, long-term treatment plan for patients based on mapping the scalp to determine DHT-resistant areas and DHT-sensitive areas. Once areas of future miniaturisation are determined, a small number of hair follicles from DHT-resistant areas could be excised, transported to a tissue bank, and cryopreserved. These could then be utilised, when needed, to produce cultured dermal papilla cells to rejuvenate and rebuild miniaturising follicles as the wave of miniaturisation proceeded, thus resulting in the maintenance of hair throughout life.

Keywords: androgenic alopecia, cloning, dermal papilla cells, hair rejuvenation

BACKGROUND

In 1984, groundbreaking research was published by Jahoda et al entitled, "Induction of Hair Growth by Implantation of Cultured Dermal Papilla Cells."[1] Their study showed that intra-dermal injections of cultured rat dermal papilla (DP) cells from vibrissae follicles could interact locally with epithelial cells of the epidermis to produce brand-new hair follicles (HF). This occurred through a process Jahoda termed "follicle neogenesis." These results heralded the promise that new hairs could be generated (HF regeneration) almost at will in bald areas of the human scalp, and some predicted the possible end to hair transplantation. However, almost 40 years later, the number of hair transplant procedures continues to increase and human follicle neogenesis still has not been demonstrated to be possible to a level that would provide an aesthetic benefit to the patient.

Much has been learned over the intervening years concerning the biology of the human HF that indicates that cell therapy does have a promising future in hair restoration, and it could well become a valuable option for the hair restoration clinician.

First Clinical Studies to Investigate Production of New Hair Follicles

Following the 1984 paper, work in the Jahoda lab and in start-up biotechnology companies, such as Intercytex, demonstrated that cultured dermal papilla and dermal sheath cells isolated from human HFs could also induce follicle neogenesis in rodent skin.[2]

This led Intercytex in 2007 to carry out the world's first clinical trial using using cultured human DP cells to generate brand-new HFs when injected into a single small 1cm^2 area of bald scalp in patients suffering from androgenic alopecia. The results showed that the total HF count in these treated areas increased in around 50% of the patients treated by approximately 100 follicles per square centimetre. These new follicles were generally fine in diameter and the cosmetic appearance was not significantly improved. Intercytex was backed by venture capital, but these clinical results were not convincing enough to raise additional funds to carry out further work. So, the technology was sold to the Aderans Research Institute, who in turn carried out additional studies using various combinations of DP and dermal sheath (DS) cells,

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