

Review

Bioengineering the Hair Follicle

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The hair follicle develops from the primitive embryonic epidermis as a result of complex epithelial-mesenchymal interactions. The full follicle, consisting of epithelial cylinders under control of a proximal lying mesenchymal papilla, grows in cycles giving rise to a new hair shaft during each cycle. The ability to cycle endows the follicle with regenerative properties. The evolution of hair follicle engineering began with the recognition in the early 1960's that hair follicles could be transplanted clinically into a foreign site and still grow a shaft typical of the donor site. Since that time, it has been found that the follicular papilla has hair follicle inducing properties and that the hair follicle houses within it epithelial stem cells that can respond to hair inductive signals. These findings have laid the foundation for isolating hair-forming cells, for expanding the cells in culture, and for forming new follicles in vivo.