

Regeneration of Human-Mouse Chimeric Follicles in a Hybrid Patch Assay

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Previously we have reported a highly efficient and reliable method to regenerate hair follicles *in vivo* from dissociated mouse cells in a hair regeneration system, the "Patch assay". We adapted this method to examine if human and mouse cells could generate human-mouse chimeric follicles in the *nu/nu* mice. Cultured human dermal or epidermal cells were combined with C57/Black mouse neonatal epidermal or dermal cells and injected intradermally into immunoincompetent (*nu/nu*) mouse skin. Chimeric follicles formed in 3-4 weeks. A histological time course study revealed that the human dermal/mouse epidermal or the human epidermal/mouse dermal cells in the patch assays formed chimeric follicles in a manner similar to that seen in mouse-mouse cells. In this system epidermal cells form aggregates at 2-3 days after injection; at this stage dermal cells surrounding these aggregates show no obvious dermal condensate structures. The epidermal aggregates then form cysts by an apoptotic mechanism at the center of the aggregates. The cysts fuse with each other to form an epithelial platform with placode-like structures. Dermal condensates, suggestive of follicular papilla formation occur at around 10 to 15 days with down-growth of epithelial cells, and mature follicles form in 17 to 22 days. Staining with human or mouse-specific centromere probes showed a dynamic interaction between human and mouse cells. This hybrid patch assay is an effective tool to study trichogenicity of human cells and mesenchymal-epithelial interaction during hair follicle formation.