Method of Autologous Primary Hair Follicles Preparation in 3D Culture

Namjoshi, Zara (School: Ecole Mondiale World School)

Background Hair loss resulting from follicular miniaturization and stem-cell exhaustion lacks effective biological reversal strategies. Traditional hair restoration relies on follicular transplantation rather than regeneration. This patented system recreates embryonic folliculogenesis by co-culturing dermal papilla cells and epithelial stem cells in a 3D fibrin-based extracellular-matrix scaffold enriched with growth-factor complexes (FGF-7, IGF-1, VEGF, HGF). The protocol promotes mesenchyme-epithelium signaling, mimicking developmental niche behavior to induce follicle neogenesis. Laboratory evaluation demonstrated formation of follicular germ-like structures, early folliculoid aggregates, and enhanced expression of hair-inductive markers. Preliminary clinical-grade data suggest improvement in hair-density parameters following autologous cell implantation. This autologous regenerative platform demonstrates a feasible translational approach to biological hair restoration without transplantation.

Awards Won:
Zydus Pharmaceuticals USA Inc.: First Place Cellular and Molecular Biology