Successful transplantation of three tissue-engineered cell types using capsule induction technique and fibrin glue as a delivery vehicle.

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Abstract:

Recent advances in cell biology and tissue engineering have used various delivery vehicles for transplanting varying cell cultures with limited success. These techniques are frequently complicated by tissue necrosis, infection, and resorption. The purpose of this study was to investigate whether urothelium cells, tracheal epithelial cells, and preadipocytes cultured in vitro could be successfully transplanted onto a prefabricated capsule surface by using fibrin glue as a delivery vehicle, with the ultimate goal for use in reconstruction. In the first step of the animal study, tissue specimens (bladder urothelium, tracheal epithelial cells, epididymal fat pad) were harvested for in vitro cell culturing, and a silicone block was implanted subcutaneously or within the anterior rectus sheath to induce capsule formation. After 6 to 10 days, when primary cultures were confluent, the animals were re-anesthetized, the newly formed capsule pouches were incised, and the suspensions of cultured urothelia cells (n = 40), tracheal epithelial cells (n = 32), and preadipocytes (n = 40) were implanted onto the capsule surface in two groups, one using standard culture medium as a delivery vehicle and the second using fibrin glue. Histologic sections were taken, and different histomorphologic studies were performed according to tissue type. Consistently in all animals, a highly vascularized capsule was induced by the silicon material. In all animals in which the authors used fibrin glue as a delivery vehicle, they could demonstrate a successful reimplantation of cultured urothelium cells, tracheal epithelial cells, or preadipocytes. Their animal studies showed that capsule induction in combination with fibrin glue as a delivery vehicle is a successful model for

transplantation of different in vivo cultured tissue types.