

Vascularized immunomodulatory scaffold for allogenic cell transplantation

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Technology

Allogeneic transplants have emerged as the most valued products in this market and are expected to remain to do so over the next few years, notes the study. A major challenge is how to deal with allogeneic immunity both locally and in the periphery with a minimal need for immunosuppressive medications. Another major need is maintaining cell viability *in-vivo* since poor vascularization with insufficient oxygen and nutrient transfer leads to necrotic transplant. Therefore, enhancing vascularization of cell-transplantation devices is necessary for maintaining cell viability and integration within the host, but it also increases the risk of allograft rejection. Prof. Cohen and Prof. Monsonego, developed a vascularized immunomodulatory scaffold based on macroporous alginate scaffold that has a number of key characterizations: (1) ability for affinity bound growth factors (Heparin-binding) that are presented by the matrix, similar to the presentation by ECM; (2) a longer activity of the factors; (3) scaffold that is highly porous with a pore size 50-150µm that fits capillary formation and different cells but is also Hydrophilic, Bio erodible, and biocompatible. They investigated the feasibility of generating immunoregulatory environment using TGF-β affinity-bound to the microporous alginate scaffold. Using this device to transplant allofibroblasts under the kidney capsule resulted in the induction of local and peripheral TGF-b-dependent immunotolerance, characterized by higher frequency of immature dendritic cells and regulatory T cells within the device and by markedly reduced allofibroblast-specific T-cell response in the spleen, thereby increasing the viability of the transplanted cells. Culturing whole splenocytes in the TGF-b-bound scaffold indicated that the regulatory function of TGF-b is IL-10-dependent.

Application

The primary markets for this technology is cell therapy with a focus on stem cell transplantation for a variety of indications including diabetes.

Advantages

- Combination of skills and experience in scaffold/nanoparticles and cell therapy/immunology
- A novel multicomponent approach for inducing both local and peripheral immune tolerance
- The alginate sulfate scaffold was shown to be safe in other applications including in human
- Proof of concept validation was already achieved in preclinical animal studies

Patent

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