INSPIRE RECOMBINANT HUMAN™ TYPE-I COLLAGEN WOUND DRESSING, A NOVEL SCAFFOLD FOR REGENERATIVE MEDICINE.

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Collagen deposition by fibroblasts is an essential stage during the cutaneous wound healing process. Type-I Collagen scaffolds dominate the medical device market, providing an optimal environment for cell proliferation and tissue repair. To date, the collagen used is of animal origin, entailing several risks including pathogens and allergic reactions. The purpose of this study was to produce a safe and efficient scaffold based on novel human recombinant type-I collagen. Using genetic engineering and traditional breeding techniques, we have successfully expressed five human genes in tobacco plants that operate in an orchestrated manner to produce fully functional triple helical recombinant human type-I collagen, **Collage-rh™**, identical to human collagen. A wound dressing sheet, "**Inspire-rh™**" was fabricated by fibrillogenesis and freeze drying. Thermal dehydration treatment was applied to physically cross-link the collagen monomers in order to increase chemical and mechanical stability. A highly porous cohesive structure was obtained, capable of absorbing large quantities of fluids, up to 40 times its own weight, in a few seconds. This characteristic is particularly important and highly desirable for wound dressing products, due to the need to absorb exudates. **Inspire-rh™** wound dressing sheets demonstrated denaturation temperature higher than 60^{o}C and pore size of average 100µm, comparable to commercial products. In studies with the key cells participating in wound healing, dermal fibroblasts and endothelial cells, proliferation of cells on **Inspire-rh™** scaffolds was compared to commercially available products. **Inspire-rh™** sheets showed superior biological performance in supporting fibroblasts and endothelial cell proliferation, expected to jump start tissue repair and wound healing. **Collage-rh™** will be used to produce additional safe and efficient scaffolds for soft tissue and bone regeneration, such as bone grafts, tendon and nerve wraps, leading to a new era in regenerative medicine.

Stein, H., Dgany O., Wilensky M., Tsafrir Y., Rosenthal M., Amir R., Avraham T., Ofir K., Yayon A. and Shoseyov O. (2009) Production of bioactive, post-translationally modified, heterotrimeric, human recombinant type-I collagen in transgenic tobacco. *Biomacromolecules* 14;10(9):2640-5.