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Towards clinical translation of regenerative medicine

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Abstract

Only in the last two decades regenerative medicine showed the potential for "bench-to-bedside" translational research in specific clinical settings. Progress made in cell and stem cell biology, material sciences and tissue engineering enabled researchers to develop cutting-edge technology which has led to the creation of tissue constructs, namely skin, bladders, vessels and upper airways, which were used to treat patients suffering from burns, myelomeningocele, end-stage renal failure and bronchomalacia, respectively. In all cases, autologous cells were seeded on either artificial or natural supporting scaffolds. The tissue constructs were implanted thereafter however; without the reconstruction of the vascular supply, and the nutrients and oxygen were supplied by diffusion from adjacent tissues. Bioengineering solid organs destined to clinical transplantation is more complex and challenging. These organs organized in functioning units referred to as modules and requiring the reconstruction of the vascular supply. Recent attempts to translate solid organ engineering into the clinical arena indicate that it holds the promise of providing a formidable therapeutic tool for a myriad of diseases. Creation of custom-made bioengineered organs, where the cellular component is exquisitely autologous and have an internal vascular network will theoretically overcome the two major hurdles in transplantation, namely the shortage of organs and the toxicity deriving from lifelong immunosuppression.

Biography

Shay Soker is a Professor of Regenerative Medicine at the Wake Forest School of Medicine. Among his contributions is the integration of molecular and cellular biology principles in regenerative medicine applications. Dr. Soker's research interests are in vascular biology, identification of stem and progenitors cells that are needed for tissue damage repair and regeneration, and natural materials that can be used for tissue engineering. Dr. Soker began researching alternatives for donor corneas to alleviate the shortage, as well as the price, of corneas for transplantation. His group developed several types of scaffolds to deliver corneal endothelial cells as well as methods to culture and expand these cells in the laboratory. Dr. Soker has published more that 100 research manuscripts in scientific journals. Some of Dr. Soker's projects are now being discussed with industry collaborators in order to create new regenerative medicine product.