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Tissue engineering: Then and now

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Organ transplantation has become a very common procedure in today’s world. Currently, diseases are increasing extensively and so are science and medicine. When the only way to save a patient is to transplant his/her organs, it is followed by several procedures from finding the right donor to successfully harvesting the required cells or tissue from the donor. This process is not as easy. A series of procedures exist behind every successful transplant surgery. Merely considering the last two decades, the number of organ transplants has increased substantially. Lifestyle diseases have taken over like wildfire and they have posed several problems for doctors and researchers all over the world. Finding the right donor is a vital step in the process. But the screening for donors and finding one may be cumbersome and time-consuming. That kind of time may not always be available for a patient, and the patient’s condition might be at risk. It is very important to get the materials in a short period. This is where the idea of engineering the required tissues arises. Tissue engineering is an engineering field that utilises cells, materials and suitable physicochemical and biochemical factors to improve, maintain, restore or replace tissue or an organ. Tissue engineering makes the whole process a lot easier by eliminating the need for a step of selection of donors. Lack of availability of organs to transplant has made organ transplantation limited. Around 2,000-3,000 surgeries are done annually to transplant liver, but the number of people who die from liver diseases is in the range of 25,000-30,000.

Techniques of tissue engineering date back to the early 1970s. Paediatric orthopaedic surgeons who tried to recreate cartilage tissue from chondrocytes using mice failed but predicted the possibility of regenerating tissues from existing cells. They voiced the need for better biomaterials capable of creating artificial tissue using engineering scaffolds. Several years later, the doctors successfully used keratin sheets to regenerate tissues for burn victims. Later on, collagen gels were employed with fibroblasts to regenerate skin. Keeping all these aside, we cannot neglect the fact that skin grafts have been a part of Sanskrit texts from the late 3000 BC. In Sushruta Samhita (600 BC), Sushruta mentioned the use of skin graft to repair irregularities of the nose using inserts from other parts of the body like the forehead. Evidence has been found about the extensive facial surgeries done by physicians from tissue obtained from the buttocks. Thus, applications of tissue engineering play a crucial role in organ transplantation by assembling functional constructs that help in maintaining, restoring, or improving the damaged tissues or whole organs. It is being a practice of ancient times and is so much evolving in recent times.

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