3-D Scaffold Matrix for Bone Reconstruction

Problem Statement: Surgeons often report several shortcomings in the currently available bone grafting products. The drawbacks prevent them from providing adequate care to treat bone damage. Most of the available bone grafts are in the form of powder, blocks or putty and lack membranes. They do not allow the surgeon to fill the defect wholly, leaving voids that prevent bone from growing. Several products are poorly handled, accounting for the loss of material, time and difficulty in insertion during the preparation on the surgery table. These materials on implantation and over time break free and move out from the defect site. Thereby bone formation is inadequate and of poor quality. IIT Bombay researchers developed a 3-D scaffold matrix for bone grafting and reconstruction, considering these drawbacks.

Uniqueness of the Solution: Membranes hold the materials stably and prevent infection post-surgery. The 3-D scaffold matrix (bone graft) helps surgeons grow bone faster in any type of irregular defect, with reduced surgery time and no membrane conditions, by completely filling the defect and increasing the stability at the graft site. The unique fabrication process offers a nano-surface on the walls of the micropores for higher cell attachment and migration.

Current Status of Technology: The researchers have completed a pilot clinical investigation using the 3-D scaffold matrix for treating alveolar ridge augmentation in 20 patients at AIIMS, New Delhi.

Societal Impact: Bone grafting is of great importance, and social relevance since most of the effective grafts are biologics and are imported, and the cheaper grafts are very inefficient. Imported grafts are inaccessible for Indian patients as biologics and incorporated grafts are costly. With the interest of equipping the doctors to deliver effective, competitive and affordable bone reconstruction treatment, the team envisages building competitive medical devices and products based on novel materials. It also revolutionises the healthcare system in India and other low-income countries and adds socio-economic values to society.

Patent(s): Under Progress

Relevant Industries: Healthcare, Manufacturing; Medical Devices

Faculty: Prof. Jayesh Bellare, Chemical Engineering.