



# Bone Grafting Technology

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## Why in News?

Recently, the **Indian Institute of Technology (IIT) Kanpur** signed a **Memorandum of Understanding (MoU)** with **Canada based biotechnology company (Conlis Global)** for licensing of an innovative and indigenously developed technology that promotes **bone healing and regeneration**.

## What are Nano Hydroxyapatite-based Porous Composite Scaffolds?

### ▪ About:

- The **Nano Hydroxyapatite-based Porous Composite Scaffolds** are biodegradable and have **osteoinductive** and **osteopromotive** properties for bone regeneration.
- It is highly biocompatible ensuring good cell material interaction with **osteoblast cells** exhibiting a high mechanical strength and interaction between the polymer network and the solvent.

### ▪ Characteristics:

- It has **osteoinductive** and **osteopromotive** properties due to which it has **bone healing** and **bone growth** characteristics.
- They are highly biocompatible, resulting in good cell material interaction with **osteoblast cells** exhibiting a high mechanical strength and interaction between the polymer network and the solvent.
  - Osteoblast cells are responsible for **mineralisation of bone** during **bone formation** and **bone remodelling**.

### ▪ Applications:

- It is commonly used in **orthopaedic and dental implants, bone graft substitutes, coatings for prosthetic devices, and tissue engineering scaffolds**.
- Functionalized scaffolds can be used as fillers in **large-size bone defects**, without compromising the **connectivity** and **structural defects, oxygen, and blood circulation**.
- It enhances **tissue formation, mineralization, and rapid defect healing**.

## What is Bone Grafting?

### ▪ About:

- **Bone grafting** involves a **surgical technique** where transplanted bone is utilised to **repair** and **reconstruct bones** affected by **disease** or **injury**.
- This procedure is applicable for **repairing bones** throughout the body.
- Surgeons may harvest bone from various sources such as the **hips, legs, or ribs** for grafting purposes.

### ▪ Objective:

- The primary objective of the invention is to **overcome the drawbacks** of the existing remedies.
  - Other alternatives have been associated with **infection** and **immune** related complications.
- This technology provides the delivery of **bone active molecules, antibiotics** or any other

drug for combating bone pathologies, reconstruction of irregular bone defects and for dental applications as well.

▪ **Functions:**

- The technology facilitates bone regeneration in a biocompatible manner by acting as a carrier for **bone- active biomolecules**, delivering them directly to the site of an implant.
- The material is a promising approach for reconstructing and repairing bone defects while addressing the drawbacks and complications associated with technologies that are available in the market at present.
- The functionalized scaffolds can be used as fillers in large size bone defects, without compromising the connectivity and structural defects, oxygen and blood circulation thereby enhancing tissue formation, mineralisation, and rapid defect healing.
- It can also be used as a **bone substitute**, overcoming autograft limitations.

### UPSC Civil Services Examination Previous Year Question (PYQ)

**Q. Which of the following diseases can be transmitted from one person to another through tattooing? (2013)**

1. Chikungunya
2. Hepatitis B
3. HIV-AIDS

**Select the correct answer using the codes given below:**

- (a)** 1 only  
**(b)** 2 and 3 only  
**(c)** 1 and 3 only  
**(d)** 1, 2 and 3

**Ans: (b)**

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