Editorial

Need of Biomaterials in Medicine

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The term bioengineering appears to have the most comprehensive meaning. Biomedical engineers apply electrical, chemical, optical, mechanical and other engineering principles to understand, modify or control biological (i.e human or animal) systems[1]. Biomaterial is a perspective of bioengineering. Biomaterials are conventionally being used in[2]:-

- Therapeutic and rehabilitation devices
- Devices for replacement (artificial organs)
- Development of medical imaging
- New material in implants (cochlear implants, cardiac stents and so forth)
- Development of new diagnostic instruments for blood analysis
- Design of instrumentation for sports medicine
- Development of new dental material
- Materials' uses in communication aids for individuals with disabilities

Biomaterials are usually considered with an emphasis on their use as artificial organs. Attention is now drawn to the importance of polymeric biomaterials like membranes, sorbents, blood tubing, ventricular diaphragms and cells culture substrate. Furthermore, implantable medical devices such as catheters are indispensable in the management of critically and chronically ill patients for the administration of electrolytes, drugs, parenteral nutrients, blood components of drainage of secretions and pus. Artificial heart-valves, prosthetics, ceramics, metals and bone cements are standard implants. All of these implants save human lives and enhance quality of life. At the same time, they are the leading cause for millions of primary nosocomial bloodstream infections with substantial morbidity and mortality[3]. A property common to all these biomaterials is the ease by which they are colonized by pathogenic and non-pathogenic microorganisms. A new technique for testing antimicrobial properties of biomaterials using a microplate system is underway.

Modern medicine is hardly imaginable without biomaterial, that is biocompatible materials. Biomaterials not only have the necessary mechanical characteristics, such as stability or elasticity. What is more important is that the body they are implanted into is less likely to reject them. The demand for implants and prostheses made from biomaterials is constantly growing, because people are getting older and wealthier. The materials need to be very robust and actively promote tissue regeneration especially in bones. Scientists have developed bone implants from metal alloys and ceramics which can take much more strain than a human body generally has to put up with. The most promising substances are made of either titanium, aluminum oxide or zircon oxide because they do not interact with biological processes in the body: Thus, they are not usually rejected.

The German Government has two programmes through which it is promoting the development of new biomaterials; that are "Intelligent implants" and "active implants". For example, special bioactive ceramics are used which stimulate bone reconstruction. Implants for bones are comparatively simple to manufacture. But many other organs are more difficult to produce. In Leipzig, researchers are currently working on a type of biological replacement of liver.

The researchers are developing and evaluating new platform materials and devices for applications in:-

- Biocompatible materials and scaffolds
- Cell and tissue repair, replacement and regeneration (therapies)
- Extended wear contact lenses
- Biostable Polymers
- Biodegradable Polymers
- Cell and matrix biology
- CoU tech (collagen processing)
- Molecular biology
- Polymer chemistry
- Protein and peptide chemistry
- Surface science

Nanotechnology has been developed in many areas over the decades, one of the most important areas of this technology is nanomaterials level which plays an innovative role in biomedical application. Nanbiomaterial is made of nanoparticles. Nanoparticles are compounds of polymeric material and are used as surface for molecular assembly with membrane or nan-vesicle enclosed configuration.

In brief, there is no limit to researcher's imagination in this field of research. These innovative technologies in biomaterials will impact positively on the health outcomes of the society by improving both quality of life and offsetting the rate of progression to more expen-

sive forms of healthcare. It is need of the hour that bioengineers, medical and biomaterial scientists of the country join together to have a demonstrable scientific track record of developing fit-to-function biomaterials to mitigate the suffering of ailing community.

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