

Study On Cartilage and Bone Formation Shows Promising Results

Kanpur, Uttar Pradesh: For patients of bone-related ailments, good news might be in the offing. Research undertaken by **Professor Amitabha Bandyopadhyay at Indian Institute of Technology**, Kanpur studying the mechanisms of cartilage and bone formation in fetuses and the maintenance of joint cartilage and bone in adults could have ground-breaking applications in the treatment of osteoarthritis and osteoporosis.

In early fetuses the elements of hand and leg skeleton are made of pure unsegmented cartilage. As the fetus grows, this cartilage element is branched and segmented, during which the majority of the cartilage gets converted to bone. Thus only a thin layer of cartilage remains, capping the bones at joint sites. When this joint cartilage is afflicted in adults, it is called osteoarthritis.

Going against the existing dogma, Prof Bandyopadhyay has shown through his work on mice and chicken embryos, that both permanent and transient cartilage (which later turns into the bone) are formed from the same cell, influenced by different genes. Going further, he has demonstrated in mice and chick embryos that permanent cartilage can be turned into transient cartilage under the influence of the same gene that is responsible for the formation of bones in an embryo.

Bandyopadhyay and his team propose that osteoarthritis is nothing but conversion of permanent cartilage to transient cartilage to bone in adults. He is now trying to study whether the gene that promotes formation of bones in fetuses can lead to development of osteoarthritis in adults. If true, he hopes to find means to block this gene which will be a huge leap forward in anti-osteoarthritis drug development research.

Similarly, his research also shows a way forward in osteoporosis treatments. Osteoporosis is a result of failure to maintain bone mass in adults and post-menopausal women are particularly susceptible to this condition. Until very recently, its treatment was exclusively focused on preventing deterioration of bones post diagnosis but it is only in the last few years that drugs helping in bone regeneration have been used as treatments, though there are adverse effects related to them as well. Bandyopadhyay's group, in collaboration with scientists of Central Drug Research Institute, is trying to understand the mechanism of action of this bone regenerating drug, Teriparatide, which is currently obscure. They have developed special patented cell lines which they plan to use for testing drugs with possible bone regeneration activity, paving way for better next generation bone regenerating drugs for treatment of osteoporosis.