



## **CYCLE DE CONFÉRENCES DE CHIMIE**

*Avec le concours de : Manufacture Française des Pneumatiques MICHELIN  
SIGMA Clermont  
Institut de Chimie de Clermont-Ferrand (ICCF UMR 6296)  
U.F.R. de Chimie*

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**Vendredi 26 octobre à 14 h**

Salle C (site des Cézeaux)

**Pierre LAYROLLE**

Inserm UMR 1238, PHY-OS, Faculté de Médecine, Université de Nantes

### **Bone regeneration using mesenchymal stem cells and biomaterials**

Bone is the most transplanted tissue in human with about 1 million procedures annually in Europe. Autologous bone grafting is the gold standard in bone regeneration but it requires a second surgery, is limited in quantity and often associated with pain and complications. Synthetic calcium phosphate biomaterial in association with mesenchymal stem cells is a potent alternative to autologous bone grafting. Starting from a bone marrow aspirate, several hundred million of mesenchymal stem cells (MSC) are produced in 2 weeks in a culture medium containing human blood platelet lysate plasma. These cells are seeded on biphasic calcium phosphate (BCP) granules and then implanted in subcutis of nude mice where they produced mature bone tissue. The mixture of human mesenchymal stem cells and biomaterial is also effective in bone healing of critical size defects in calvaria and femurs of nude rats. The procedure has also proven efficacy in regenerating diaphyseal defects in metatarsis of sheep. In the European project REBORNE, bone regeneration was successfully achieved in several clinical trials. Patients suffering from non-union fractures were safely and effectively treated with their own stem cells and biomaterials. Consolidation was obtained 93% of cases. The on-going European projects ORTHOUNION and MAXIBONE will aim at demonstrating efficacy of stem cells and biomaterials over autologous bone grafting in bone regeneration. New strategies in the reconstruction of large bone defects will also be developed.

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