OsteoBiol® by Tecnoss

Xenogeneic bone filling materials modulate mesenchymal stem cell recruitment: role of the Complement C5a

LABORATORY TESTS

189

C Jeanneau[1]
C Le Fournis[1]
I About[1]

1 | Aix-Marseille Université CNRS, ISM, Inst Movement Sci, Marseille, France

ABSTRACT

At the cellular and molecular levels, bone regeneration requires mesenchymal stem cells (MSCs) recruitment at the injured site. When bone filling materials are applied onto the periodontal tissues in vivo, they interact with the injured periodontal ligament (PDL) tissue and modulate its activity, leading to the recruitment of mesenchymal stem cells (MSCs) from bone marrow and initiate bone regeneration. In bone fracture and remodelling, the recruitment of MSCs has been reported to be influenced by the complement C3a and C5a fragments. The hypothesis of the Authors was that the filling materials affect PDL cells and MSCs functional activities by modulating PDL C5a secretion and subsequent MSCs proliferation and recruitment. To evaluate this hypothesis, PDL cells were injured to mimic the PDL injury after tooth extraction and then incubated with bone-filling materials extracts to simulate the interaction between the injured PDL cells and the materials. C5 complement gene expression and C5a protein secretion by PDL cells was analysed. The biomaterials used were OsteoBiol® *Gen-Os*® (Tecnoss®, Giaveno, Italy) (FE: equine origin) and OsteoBiol® *Gen-Os*® (FS: swine origin) and Bio-Oss® (Geistlich, Wolhusen, Switzerland).
The outcomes of the analysis showed that MSCs proliferation significantly increased with OsteoBiol® *Gen-Os*® materials but significantly decreased with Bio-Oss®. C5a secretion slightly increased with Bio-Oss® while its level doubled with OsteoBiol® *Gen-Os*® materials. C5a fixation on MSCs C5aR and its phosphorylation significantly increased with OsteoBiol® *Gen-Os*® materials but not with Bio-Oss®. MSCs recruitment toward injured PDL cells increased with the three materials but was significantly higher with OsteoBiol® *Gen-Os*® materials than with Bio-Oss®. Adding C5a antagonist inhibited MSCs recruitment demonstrating a C5a-mediated migration.

CONCLUSIONS

Within the limits of this in vitro study, the authors concluded that "*Gen-Os® filling materials of equine and porcine origins have a higher potential than bovine Bio-Oss® on MSCs proliferation and C5a-dependent recruitment to the PDL injury site and the subsequent bone regeneration*".

ORIGINAL ARTICLE
Clinical Oral Investigations
2019, Oct 23

Material tested

BONE SUBSTITUTE
OsteoBiol® *Gen-Os*®

LAB