Nanocomposite particles with improved microstructure for 3D culture systems and bone regeneration

Titre	Nanocomposite particles with improved microstructure for 3D culture systems and bone regeneration
Type de publication	Article de revue
Auteur	Cecoltan, Sergiu [1], Stancu, Izabella-Cristina [2], Dragusin, Diana Maria [3], Serafim, Andrada [4], Lungu, Adriana [5], Ţucureanu, Cătălin [6], Caraş, Iuliana [7], Tofan, Vlad Constantin [8], Sălăgeanu, Aurora [9], Vasile, Eugeniu [10], Mallet, Romain [11], Chappard, Daniel [12], Coman, Cristin [13], Istodorescu, Mircea [14], Iovu, Horia [15]
Editeur	Springer Verlag
Type	Article scientifique dans une revue à comité de lecture
Année	2017
Langue	Anglais
Date	31 Août 2017
Numéro	10
Pagination	153
Volume	28
Titre de la revue	Journal of materials science. Materials in medicine
ISSN	1573-4838
Résumé en anglais	Nano-apatite and gelatin-alginate hydrogel microparticles have been prepared by a one-step synthesis combined with electrostatic bead generation, for the reconstruction of bone defects. Based on the analysis of bone composition, architecture and embryonic intramembranous ossification, a bio-inspired fabrication has been developed. Accordingly, the mineral phase has been in situ synthesized, calcifying the hydrogel matrix while the latter was crosslinked, finally generating microparticles that can assemble into a bone defect to ensure interconnected pores. Although nano-apatite-biopolymer composites have been widely investigated, microstructural optimization to provide improved distribution and stability of the mineral is rarely achieved. The optimization of the developed method progressively resulted in two types of formulations (15P and 7.5P), with 15 and 7.5 (wt%) phosphate content in the initial precursor. The osteolytic potential was investigated using differentiated macrophages. A commercially available calcium phosphate bone graft substitute (Eurocer 400) was incorporated into the hydrogel, and the obtained composites were in vitro tested for comparison. The cytocompatibility of the microparticles was studied with mouse osteoblast-like cell line MC3T3-E1. Results indicated the best in vitro performance have been obtained for the sample loaded with 7.5P. Preliminary evaluation of biocompatibility into a critical size (3 mm) defect in rabbits showed that 7.5P nanocomposite is associated with newly formed bone in the proximity of the microparticles, after 28 days.
URL de la notice	http://okina.univ-angers.fr/publications/ua16413 [16]

DOI	10.1007/s10856-017-5966-8 [17]
Lien vers le document	https://link.springer.com/article/10.1007%2Fs10856-017-5966-8 [18]
Titre abrégé	J Mater Sci Mater Med
Identifiant (ID) PubMed	28861646 [19]

Liens
[1] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27466
[2] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=4565
[3] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=26734
[4] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=18135
[5] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27467
[6] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27468
[7] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27469
[8] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27470
[9] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27471
[10] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=26735
[11] http://okina.univ-angers.fr/romain.mallet/publications
[12] http://okina.univ-angers.fr/daniel.chappard/publications
[13] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27472
[14] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27473
[15] http://okina.univ-angers.fr/publications?f%5Bauthor%5D=27474
[16] http://okina.univ-angers.fr/publications/ua16413
[17] http://dx.doi.org/10.1007/s10856-017-5966-8
[18] https://link.springer.com/article/10.1007%2Fs10856-017-5966-8
[19] http://www.ncbi.nlm.nih.gov/pubmed/28861646?dopt=Abstract