Vaterite-loaded cellular spheroids for bone tissue engineering application

Abalymov A.A.[1]

Saratov State University

The use of vaterite particles is widespread in various fields of science, including drug delivery and tissue engineering. Vaterite are nanometer and micrometer sized unstable porous calcium carbonate particles that release calcium ions and can be loaded with drugs.[1] The use of such particles is especially promising in bone tissue engineering, since the constant release of calcium ions has a positive effect on the formation of hydroxyapatite crystals on the cell surface and the formation of the extracellular matrix.[2] However, the study of biomaterials on two-dimensional structures is always not relevant, since tissues have a three-dimensional structure. The most interesting is the use of such materials for 3D tissue engineering.[3] For this purpose, we created composite cellular spheroids, the cells of which contained various amounts of vaterite particles. Such mineral "organelles" change the mechanical properties of spheroids and accelerate the synthesis of hydroxyapatite, which are paramount parameters in bone engineering.

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[3] Parfenov V A, Koudan E V, Bulanova E A, Karalkin P A, DAS Pereira F, Norkin N E, Knyazeva A D, Gryadunova A A, Petrov O F, Vasiliev M M, Myasnikov M I, Chernikov V P, Kasyanov V A, Marchenkov A Y, Brakke K, Khesuani Y D, Demirci U and Mironov V A 2018 Scaffold-free, label-free and nozzle-free biofabrication technology using magnetic levitational assembly *Biofabrication* **10** 034104