

Bioceramic nanoparticles for bone regeneration

Citation for published version (APA):

Sutthavas, P. (2023). *Bioceramic nanoparticles for bone regeneration*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20231011ps>

Document status and date:

Published: 01/01/2023

DOI:

[10.26481/dis.20231011ps](https://doi.org/10.26481/dis.20231011ps)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

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Propositions

Bioceramic nanoparticles for bone regeneration

1. Osteogenic differentiation of human mesenchymal stem cells (hMSCs) is influenced by the shape of calcium phosphate nanoparticles deposited as coatings. (This thesis)
2. Mesoporous silica nanoparticles (MSN) can be used as effective multiple-ion delivery systems to stimulate stem cell differentiation towards osteoblasts and promote mineralization in vitro. (This thesis)
3. Zinc, strontium, calcium, and phosphate ions delivered using MSN are significantly more potent in promoting osteogenesis differentiation of hMSCs in vitro than ions added to the cell culture medium. (This thesis)
4. (In vitro) bioactivity of ion-doped MSN is dependent on the MSN degradability, ion properties, and doping location. (This thesis)
5. Multiple ion administration is a more efficient way of enhancing both osteogenesis and angiogenesis in vitro than single ion administration. (This thesis)
6. The network of MSN can be modified to alter their degradation rate, which in turn affects the release of the incorporated cargo. (Vallet-Regí et al. Chemical Society Review, 2022)
7. Ion composition of mesoporous bioglass nanoparticles affects their porous structure. (Schumacher et al. Bioactive Materials, 2021)
8. "A journey of a thousand miles begins with a single step". (Chinese proverb)
9. "A sweet melody can be achieved only when the strings of a lute are not too taut nor too loose." (Buddhism saying)