STUDYING THE EFFECT OF STRONTIUM IONS ON IN-VITRO BONE MINERALIZATION USING RAMAN SPECTROSCOPY

Charalambos Kallepitis [1], Kharissa Nitiputri [1], Martin Hedegaard [1], Helene Autefage [1], Molly M. Stevens [1,2,3]

[1]Department of Materials, Imperial College London, London SW7 2AZ, UK.
[2]Department of Bioengineering, Imperial College London, London SW7 2AZ, UK.
[3]Institute of Biomedical Engineering, Imperial College London, London SW7 2AZ, UK

*m.stevens@imperial.ac.uk

The use of strontium ions (Sr^{2+}) in the bone regeneration field has been popularized by an anti-osteoporotic drug, Strontium Ranelate (Protelos®, Servier). Since then, various strontium moieties have been included in several biomaterials used for bone regeneration[1,2,3]. Since Sr^{2+} ions have demonstrated positive effects on bone regeneration[4], it is of interest to clarify the details of their mechanisms of action. For this reason, we cultured bone-forming cells (pre-osteoblasts) to tease out the effect of Sr^{2+} supplementation in mineralizing media *in-vitro.*

In this study, the effect of long-term Sr^{2+} supplementation (using $SrCl_2$) in *in-vitro* pre-osteoblast cultures was evaluated using Raman spectroscopy. A range of concentrations of Sr^{2+} were studied in long-term *in-vitro* cultures, focusing on collagen production and mineralisation.

Raman spectroscopy revealed differences that arose solely due to the supplementation of Sr^{2+}, and not by Ca^{2+} supplementation nor by the increased presence of Cl^- counterions. Thus the differences observed could be attributed to Sr^{2+} ions alone. Further, by studying the averages of the Raman spectra from a large number of cells (~300) cultured with various Sr^{2+} concentrations, changes in both mineral and collagen production were detected. This study provides insight into the effect of Sr^{2+} in biomineralisation, which can be of great application in the design of new biomaterials.

References:

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