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Designing Ti6Al4V doped hydroxyapatite structures for dental applications

Georgina Miranda, S Madeira, F S Silva and O Carvalho
University of Minho, Portugal

Dental implants osseointegration is a current topic that is known to be influenced by several factors like the surgical procedure, the loading upon implantation, the implant surface and coatings and also the implant design. Ti6Al4V alloy chemical stability, mechanical properties and biocompatibility explain the great use of this alloy in dental implants. Additionally, these implants surfaces can be coated with bioactive materials like hydroxyapatite, β -TCP or bioactive glass in order to increase the cell attachment to the metal implant surface. Traditional hydroxyapatite coatings (e.g. by sol-gel dip coating) are proven to be adequate for obtaining high quality coatings on metal substrates, however when used in dental implants, due to the implantation process these coatings can be detached from the metal surface. In this context, a surface design that could avoid this scenario can bring advantages when regarding dental implants. Laser technology can be used for the production of a designed machined metal surface, where bioactive material can be allocated and afterwards used to sinter the hydroxyapatite powders. This work presents a new design approach for the production of Ti6Al4V doped hydroxyapatite structures for dental applications by using laser technology.

gmiranda@dem.uminho.pt

Cutting edge concepts in the use of stem cell and PRP injections in an office setting

Joseph Purita
The Institute of Regenerative and Molecular Orthopedics, USA

The presentation concerns PRP and Stem Cell (both bone marrow and adipose) injections for musculoskeletal conditions in an office setting. Indications are given as to which type of cell and technique to use to accomplish repair. Stem cells, both bone marrow-derived (BMAC) and adipose are used for the more difficult problems. PRP injections are utilized for the less severe problems. Indications are given when to use Stem Cells verses PRP and when to use both. The newest concepts in stem cell science are presented. These concepts include the clinical use of MUSE cells, exosomes and Blastomere like stem cells. Basic science of both PRP and stem cells are discussed. This presentation defines what constitutes an effective PRP preparation. Myths concerning stem cells are dispelled. One myth is that mesenchymal stem cells are the most important stem cell. This was the initial interpretation of Arnold Caplan the father of mesenchymal stem cell science. Caplan now feels that MSCs have an immunomodulation capacity which may have a more profound and immediate effect on joint chemistry and biology. We now learn in the talk that the hematopoietic stem cells are the drivers of tissue regeneration. Also discussed are adjuncts used which enhance the results. These therapies include supplements, LED therapy, lasers, electrical stimulation and cytokine therapy. The scientific rationale is presented for each of these entities as to how they have a direct on stem cells.

jpurita@aol.com