

## NEW GENERATION OF ORTHOPAEDIC MATERIALS

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Orthopaedic biomaterial market is one of the fastest growing markets in healthcare industry with a turnover of €23.5 billion in 2012 and annual growth rate 7-15% over the last 10 years. However, the currently used orthopaedic implants do not address the patient's needs in terms of mechanical, electrochemical and biological properties and service life. Particularly, the currently used hip implants in the market are lacking in issues of biocompatibility, strength, wear and corrosion resistance and protection period. As a result patients requiring hip surgeries submit themselves to painful and expensive treatments that will have to be repeated after 8-12 years. In addition, the revision surgeries provide limited mobility to the limp affecting significantly the life quality of the patient. It is estimated that this type of musculoskeletal disorder is the most widespread human health problem that affects the 90% of European people after 40 and costs globally around €193.7 billion to society. The high cost and the deficiency of orthopaedic implants are mostly caused by the currently used raw materials and the production process. Most of hip and knee implants are made from Ti6Al4V alloy or its alternative Ti6Al7Nb which was specifically manufactured to replace the first due to Vorium's cytotoxicity. The NewBioGen procedure will develop biomaterials that will not be the subject of causing neurological diseases such as Alzheimer or use toxic materials. These implants will not create the stress shielding effect to the bones because they have pretty low modulus value as beta titanium alloys. Moreover the production process has been designed specifically to accommodate the restrictions of the new materials used and improve the mechanical properties of the products. Thus the NewBioGen biomaterials will have the best possible mechanical characteristics and be more biocompatible. Also the development of ZrO<sub>2</sub>/Zr coating will improve the tribological properties, wear and corrosion resistance on the bio implant parts that are prone to wear. Moreover by improving the majority of the properties and characteristics of the orthopedic biomaterials, the product's lifecycle will expand.