Milena Fini

NANO-VERTEBRA

Next generation Antibacterial Nanostructured Osseointegrated customized VERTEBRAl replacement

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Vertebral body replacement represents one of the most challenging and invasive procedures. Even though modern surgical techniques for en bloc resection of vertebral body are consolidating, this procedure is burdened by high complication rates (45.5%) as surgical site infections, that are critical and difficult to treat, poor bone regeneration and mechanical instability, also correlated with infections. NANO-VERTEBRA project proposes a breakthrough approach to realize customized prosthesis to replace vertebral bodies affected by tumors or major traumatic events, specifically engineered to reduce infections and increase patients' surgical options. The project proposes to implement personalized vertebral prosthesis, by combining nanostructured antibacterial and ceramic coatings to prevent infections and to promote fast and effective bone regeneration. An optimization of implant architecture by 3D modeling and additive manufacturing technologies will be also performed to maximize coverage of the prosthesis by nanocoatings, boost integration, and guarantee suitable mechanical properties and to be patient specific.