

SEMINAR

Thursday, 6.8.2026, 13:00 , MPŠ Lecture Hall

Engineering regeneration: nanostructured personalised biomaterials for musculoskeletal repair and stem cell rejuvenation in ageing

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The growing clinical need for effective strategies to repair critical-sized bone defects and restore tissue function is driven by an ageing population with reduced healing capacity. A major limitation of current regenerative approaches is the persistence of hostile, senescence-associated microenvironments that compromise stem cell function and therapeutic outcomes.

This presentation will describe our integrated engineering approach to overcoming these challenges through the development of advanced biomaterials and anti-senescence strategies. It will first present our platform of patented bio-ceramic scaffolds for the cell-free, personalised treatment of load-bearing bone defects. These materials are engineered to provide mechanical competence, bioactivity, and antibacterial functionality, while enabling precise control of scaffold architecture to meet patient-specific requirements.

It will then discuss emerging strategies to address cellular senescence as a critical barrier to regeneration. These include biomaterial-driven modulation of cell behaviour and targeted approaches to enhance stem cell resilience within hostile microenvironments. By integrating materials design with an understanding of senescence biology, we aim to improve the regenerative capacity of both endogenous and transplanted cells.

Finally, the presentation will highlight how these combined strategies open new avenues for musculoskeletal and soft tissue regeneration, with strong translational potential for orthopaedic and broader clinical applications.

I will also briefly introduce the BIOTech Challenge, an initiative for high schools that I founded in 2018 and which has since grown international.

Kindly invited.