浙江大学医学院学术报告

There will be blood? A tissue engineer's fantasy, dilemma, and bio-inspired approaches

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报告简介：

Globally, musculoskeletal diseases and trauma have an estimated cost of US$950 billion annually, placing a significant economic burden on national healthcare systems. Musculoskeletal ailments severely impact mobility, dramatically reducing the quality of life for patients, especially the elderly. Regenerative medicine and tissue engineering hold great promise to improve the treatment of these diseases and trauma as well as to restore lost functions. Despite great progress in the past twenty years, we have gradually come to the consensus that the great complexity of tissue regeneration requires we approach problems in a systematic way in order to make breakthroughs. Currently, there are still three fundamental questions in tissue engineering that hinder translation and clinical success, including how to recreate microenvironments to control cell fate, how to promote vascularization for cell viability, and how to harness stem cells as cell source. More specifically, regarding microenvironments, how do we engineer a microenvironment to include both scaffold and signals, or accurately manipulate 3D biochemical, biophysical, biomechanical, bioelectrical and biomagnetic cell cues in a temporal and spatial manner to accelerate tissue regeneration and healing? Second, regarding vascularization, how do we meet the functional microvasculature requirement in which the distance between an individual cell and the nearest capillary vessels cannot be more than 100-300 μm or else the cell will suffer from insufficient nutrition and oxygen? Third, regarding stem cells, what is the origin of stem/progenitor cells and how fast and how many stem/progenitor cells can grow in a clinically relevant setting? In this presentation, I will introduce and discuss our bio-inspired approaches to integrate materials science and engineering, bone and stem cell biology, and orthopedic surgery to systematically address these challenges.

个人简介：

Associate Professor with tenure of Departments of Orthopedic Surgery, (by courtesy) Materials Science and Engineering, and Bioengineering at Stanford University. He was also an Associate Professor with Tsinghua University from 1999 to 2001.

Yang's research interests are in the areas of bio-inspired biomaterials, medical devices, and approaches for re-creating a suitable microenvironment for cell growth and tissue regeneration, including enabling technology for musculoskeletal tissue regeneration, nanotechnology for implant devices, and novel biomaterials for cancer treatment. He has pioneered on functionally graded biomaterials for bone and tendon regeneration, and vascularized constructs with biomimetic complexity. One of his recent interests is in the area of 3D bioprinting. He has received numerous research and teaching awards including the March of Dimes Birth Defect Foundation Award, the Wallace H. Coulter Foundation Translational Award, the NIH Star Award, and the NIH Transformative Award finalist. His research program has been funded by US federal government, private foundations, and global industry leaders. Yang's publications include 100 peer-reviewed journal papers, 11 book chapters, 18 peer-reviewed proceeding papers and 166 conference abstracts. His innovative work generated eight U.S. and international patents, two technology licensing, and one commercial product. He also serves on four prestigious journal editorial boards.

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