# NYSCF BONE PROGRAM

NYSCF The New York Stem Cell Foundation Research Institute

## SATE: SEGMENTAL ADDITIVE TISSUE ENGINEERING

TISSUE GRAFTS AND METHODS OF MAKING AND USING THE SAME

**PATENT PROTECTION**

Nationalized PCT Pending in: Australia (AU), Canada (CA), Europe (EP), Hong Kong (HK), Japan (JP), and the U.S.

**DEVELOPMENT STAGE**

*In-vivo Bone Stability*: Established *in-vivo* stability of NYSCF engineered bone through subcutaneous implantation in immunocompromised mice (Completed).

*Animal Model Testing*: Establish proof of principle in animal models (12-24 Months).

**NYSCF PAPER**

*Segmental Additive Tissue Engineering* Nature. 2018.

**LEARN MORE**

WO/2015/103149 (WO)

**CONTACT US**

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## Overview

With U.S. life expectancy trending upward, people are living longer with musculoskeletal disease. As a result, this group of patients accounts for ~ $900B in aggregate direct medical costs per year. There is a need for improved methods and applications for treating bone deficiencies. Interventions utilizing stem cells hold great promise in treating bone deficiencies and improving the lives of patients.

Orthobiologics, a product segment of the larger orthopedics market, represent a large and growing niche within the orthopedic landscape and include stem cell-based treatment approaches. In 2017, the global orthobiologics market was valued at $3.7B and is anticipated to grow to over $5B by 2024. Stem cell-derived bone grafts, which are under development at NYSCF, are key to creating personalized reconstructive treatments and would further catalyze market growth while greatly advancing patient health.

NYSCF's bone program features novel strategies for treating bone deficiencies and improvements for current methods of treatment. NYSCF's research is heavily focused on the unmet needs within (1) bone regeneration and (2) implant success rate. Current initiatives include: SATE: Segmental Additive Tissue Engineering; Cell-mediated Functionalization of Prosthetic Implants; In-Situ Bone Engineering; an in-vitro Testing Platform; and Hybrid Bone-Implant Graft Engineering.

## Technology Summary

The present technology provides tissue grafts, such as segmented vascularized bone grafts, and methods for preparing and using graft segments by creating and partitioning digital three-dimensional tissue models to produce, repair, or replace affected tissue portions. In some embodiments the grafts are made using pluripotent stem cells, such as autologous pluripotent stem cells. Researchers at NYSCF have developed fully-viable, functional, three-dimensional bone substitutes from induced pluripotent stem cells. These results serve as a major advancement to developing the most promising treatments for patients.

## Inventor Profile

Dr. Giuseppe Maria de Peppo, Ph.D., a NYSCF Senior Research Investigator, received his B.Sc. in Biotechnology at La Sapienza University and his M.Sc. in Medical Biotechnology at Bicocca University. Dr. de Peppo earned his Ph.D. in Tissue Engineering at the University of Gothenburg in Sweden. Dr. de Peppo leads NYSCF's Tissue Engineering Group focusing on engineering patient specific bone grafts for basic and applied research, biomaterial scaffolds manufacturing, bioreactor design and testing, prosthetics and implantology research, drug delivery, and stem cell-based therapies.