

Multi-Needle Roller for Cell Seeding (2018-032)

A Multi-Needle Roller Device Used to Seed Cells into Dense Tissues and Scaffolds.

Market Overview

Seeding cells within scaffolds or tissues hold great potential for regenerative medicine projects. Until now, cells have been either placed on top of scaffolds, creating multiple layers of superficial cells, or injected manually with a syringe inside the tissues, generating large boluses of cells. None of these approaches generated the homogenous, high cells density constructs with cells distributed in 3D that could be used as tissues for patients. Therefore, there is a need for a device capable of efficiently seeding cells into scaffolds or tissues at multiple locations with high efficacy. Clemson scientists have developed a device that delivers a controlled volume of cell suspensions via a roller which concomitantly delivers cells within multiple areas through the hollow needles.

Technical Summary

The device described herein comprises a handle to which a cylindrical fluid holder is attached, and a rotating drum which slides over the fluid holder. The rotating drum has multiple hollow needle tips attached to its surface. The lumen of the hollow needle tips communicate with the internal surface of the rotating drum. The cylindrical fluid holder is adapted with a fitting allowing for cell suspensions to be infused into the fluid holder using a syringe. The fluid holder has one or more rows of holes which align with the lumen of the needles when the device is rolled, allowing fluids to flow from the cylindrical fluid holder through the lumen of the hollow needles and be injected into the tissue on which it is being rolled. The action of rolling the device while applying pressure over a surface such as a living tissue or a scaffold pierces the substrate and delivers the cells via the multiple needle tips.

Application

Regenerative Medicine, Cellular Therapies

Development Stage

Preliminary Prototype

Advantages

- Features hollow needles which allow for the transfer of fluid from the inside reservoir via the drum and directly to the inside layers of tissues
- Uses pressure to ensure the infiltration of cells into desired locations
- The roller is designed to inject the cells into dense scaffolds and tissues, not just superficial skin

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Provisional	United States	62/753,177	NA	2018-032	Dan Simionescu, Benjamin Fisher, Harrison Smallwood

About the Inventor



Dr. Dan Simionescu

Professor of Bioengineering at Clemson University

Dr. Dan Simionescu is a Professor of Bioengineering at Clemson University. He earned his Ph.D. in Biology from the Institute of Cellular Biology and Pathology, Bucharest, Romania. Dr. Simionescu currently serves as the Director of the Laboratory for Regenerative Medicine at Greenville Hospital System and also the Biocompatibility and Tissue Regeneration Laboratory at Clemson University. He holds over 10 issued patents and several applications. His research interests focus on minimally invasive therapy and tissue regeneration.

For more information
about this technology,
please contact:

curf@clemson.edu

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