2015-462 3D Scaffolds for Mesoderm Differentiation

Published date: Aug. 28, 2019

Technology description

SUMMARY
Researchers led by Benjamin Wu from the Departments of Bioengineering and Pathology & Laboratory Medicine have developed an implantable scaffolding that can create hematopoietic stem cells from pluripotent stem cellsin vivo.
BACKGROUND
Hematopoietic stem cells (HSC) produce all cell types of the blood, including immune cells, and can be found in the blood and bone marrow. Transplantation of HSC’ s from healthy donors can treat a variety of diseases that include: leukemia, sickle cell disease, organ rejection, and autoimmune diseases (multiple sclerosis, lupus). Mismatches between donor and recipient can cause an autoimmune response that require hospitalization and can be fatal. To circumvent this problem, the patient’ s own pluripotent stem cells (PSC) can be used to create HSC’ s. However, this has only been done in a dish with poor results. HSC’ s created this way do not proliferate very well and the engraftment does not integrate with the patient’ s body very well.
INNOVATION
Researchers led by Benjamin Wu from the Departments of Bioengineering and Pathology & Laboratory Medicine have developed an implantable scaffolding that can create hematopoietic stem cells from pluripotent stem cellsin vivo. Currentin vitroapproaches lack the microenvironment and timing of complex signals, especially mechanical signals due to blood flow, to produce stable HSC’ s. A proof of concept study has shown that HSC’ s can be derivedin vivoby tumors that developed from PSC’ s. These bioengineers have improved on this concept by using specialized PSC’ s that do not have the potential to form tumors and have seeded them onto an implantable 3D scaffold. These scaffolds can be 3D printed with unique shapes and biomaterials to tailor fit the needs of the individual patient. Preliminary data has shown that this approach can produce stable HSC’ s without the risks that stem from donor transplantation and with greater efficiency than currentin vitroapproaches.

Application area

Treatment of blood disorders like leukemia and sickle cell disease
Treatment of immune diseases (lupus, multiple sclerosis, and diabetes)
Treatment of organ transplant rejections

Advantages

In vivoapproach allows for stronger and more natural HSC production and integration
Use of patient’ s own stem cells prevent donor-recipient mismatches and complications
3D scaffolding can be customizable to the patient and his or her condition

Institution

University of California, Los Angeles

Inventors

Gay Crooks
Professor
PATH
Denis Evseenko
Asst Prof In-Res
ORTHO SURG
Chee Jia Chin
PATH
Eric Tsang
SURG
Benjamin Wu
Professor
Dentistry

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com