

T-Blocks: Mass Production of Adult Stem Cells

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Industry:

Biotechnology
Medical

Researchers:

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Status of Intellectual Property:

Patent pending.

Next Steps:

Partner with investor or business
leader to license technology into
Ronawk LLC for further technological
development to take to market

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Wanted

Seeking partners to further development and commercialization of the invention and ancillary technologies.

Customer Problem

Regenerating and repairing individual organs and tissues for a single patient requires mass quantities of the patient's own adult stem cells. Mass production of adult stem cells for therapeutic applications is highly limited due to the fact that adult stem cells have a limited shelf life when isolated from primary tissues of humans and animals. The act of removing adult stem cells from their original environment is traumatic and has the potential to induce changes or negative effects. Furthermore, the ability to grow adult stem cells in environments that mimic the original host tissue are limited. Adult stem cells lose "stemness" characteristics and the ability to divide and differentiate as adult stem cells are maintained and dissociated (passaged) from growth substrates, as is current practice.

Potential Market Uses

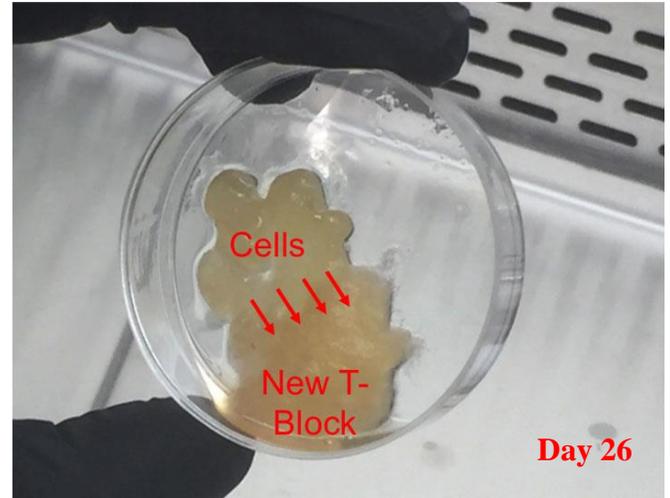
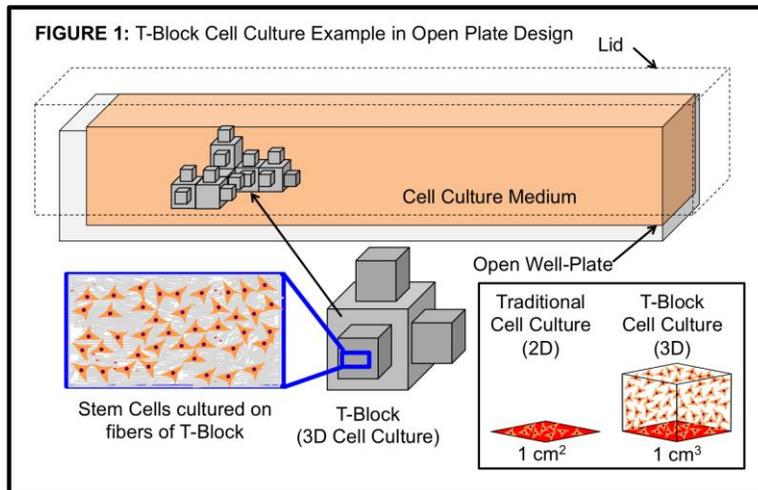
The T-Block technology provides a simple and inexpensive method for medical facilities and biotechnology industries to isolate and mass-produce primary stem cells from patients. T-Blocks provide an expandable substrate that enables stem cells to grow indefinitely without losing key stem cell characteristics. T-Blocks can be fabricated with varying geometries, which are (1) simple to use, (2) provide multiple options (different materials) for different users, and (3) drastically reduces both cost of consumables and time required for stem cell maintenance and expansion.

Market Size

According to Grand View Research, the global stem cell market size was valued at just under \$38 billion in 2013, with an expected compound annual growth rate of 20% up to 2020. Initiatives to develop therapeutic treatments for chronic diseases and regenerative medicine are the main industry driving forces. Adult stem cells constituted the largest product segment (\$32.56 billion) of the stem cell market in 2013. The primary focus of technologies is on *cell production, acquisition, cryopreservation, sub-culture, and expansion.*

Innovation

The invention utilizes both synthetic and natural materials to form interlocking blocks into which cells can be seeded. As cells require more substrate, additional T-Blocks are added on in the X, Y, or Z axial directions. The invention leverages a combination of different biomaterials and geometries to enable stem cells to proliferate, migrate, and secrete matrix in 3D to create a growth environment reminiscent of the original tissue. The T-Block technology enables adult stem cells to grow indefinitely, and allows for end-users to orchestrate how stem cells grow for a variety of research and diagnostic applications.



Stage of Development

The University of Kansas has filed a provisional patent and a few basic T-Blocks have been fabricated using non-woven polymer fibers. Preliminary studies showed that adult stem cells thrived in a single T-Block for 18 days before an additional T-Block needed to be added. A single culture of stem cells has been maintained for 57 days using only 3 T-Blocks. In contrast, healthy stem cells require sub-culturing every 4-6 days in 2D culture. The next stage of T-Block development involves expanding functionality before T-Blocks are ready for translational applications. Engineering T-Blocks to accommodate fluid flow and exposure to dynamic mechanical forces could stimulate complex tissue development such as nerve formation.

Competitive Advantages

- T-Blocks provide stem cells with the potential to grow indefinitely without the need for dissociation
- T-Blocks allow stem cells to maintain “stemness” and differentiation potential longer than current methods
- T-Blocks enable the option for stem cells to be grown in the X, Y, or Z axial directions depending on the desire of the end-user
- T-Blocks provide a mechanically dynamic substrate unlike static plastic or glass surfaces
- T-Blocks reduce time, labor and consumables needed for stem cell maintenance
- T-Blocks are customizable

Competitors:

- 3D Biomaterials for cell culture
 - Corning Inc. Matrigel
- Cell culture plastic and glass manufacturers
 - Techno Plastic Products (TPP)
 - Corning Inc.
 - Nunc
 - IBIDI
- Several technologies are utilizing 3D materials for 3D cell culture; however, none of the current products are expandable without dissociating stem cells, which reduces stemness and differentiation potential.