

The Extracellular Matrix

A short introduction to the Extracellular Matrix (ECM)

November 2, 2014 · Biology

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Guruswamy M. The Extracellular Matrix: A short introduction to the Extracellular Matrix (ECM). Young Scientists Journal. 2014 Nov 2 [last modified: 2015 Jan 22]. Edition 1.

Abstract

The Extracellular Matrix (ECM) is the fluid, containing tissue and extracellular molecules, that surrounds cells in inter-cellular spaces. Once thought merely to serve the purpose of supporting tissues and acting as scaffolding in the human body, the ECM has recently made a promising appearance in regenerative medicine. It is important to note that there are many types of ECM, and the ECM is contained in most living organisms. This fundamental substance is secreted by specialised cells in the body called fibroblasts, and certain types of ECM are secreted by particular fibroblasts, e.g. chondroblasts secrete cartilage ECM and osteoblasts secrete bone ECM.

The Role of the ECM in Regenerative Medicine

The ECM is a highly sophisticated substance that has shown promising potential in the field of regenerative medicine. This branch of medicine looks into the “process of replacing or regenerating human cells, tissues or organs to restore or establish normal function”, and the ECM has proven to do just this. ECM used in regenerative medicine is commonly extracted from pig bladders. It is also removed from other body parts, such as pig small intestine submucosa, and other parts that are commonly unused and freely available. When harnessed to its full potential, the ECM could maybe even open up the possibility of creating a whole new human being.

The ECM has been used so far for the regrowth and repair of cells and tissue, and is currently being used in hernia repair and breast reconstruction. There have been many reported cases of ECM grafts helping close and heal wounds. One such case was of a soldier who had been fighting in Afghanistan, and had been harmed in an explosion, leaving a large wound on his thigh. Considerable muscle mass had been torn from his leg, leaving him unable to walk. He was then treated with extracellular matrix extracted from pig bladder, and soon enough, muscle was rebuilding in his thigh, and he soon regained the ability to walk. The way in which the ECM works in order to build and repair tissue is highly intelligent. The ECM ensures the immune system does not attack it and then attracts stem cells to the location in which tissue regeneration is required.

This remarkable research that has been made into the extra cellular matrix is very exciting, and gives us reason to believe that if we can regenerate many tissue types, therefore various different organs, we can help treat victims of tissue damage, burns. We could also help grow organs for individuals waiting for organ transplants, help amputees re-grow missing limbs, the list continues. Finally, this leads to an interesting question: could we create a whole new, sentient human being just from the extra cellular matrix?

APPENDIX 1

References

New Scientist, 14/09/2013

Regenerative Medicine, 2008, 3(1), 1-5[47]

<http://www.examiner.com/article/regenerative-science-growing-body-parts-with-extracellular-matrix>

<http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/E/ECM.html>

http://en.wikipedia.org/wiki/Extracellular_matrix

<http://www.techtimes.com/articles/6356/20140504/extracellular-matrix-from-pigs-helps-regenerate-muscles-of-injured-soldiers.htm>