Effect of extracellular matrix in the process of intestinal anastomosis in the murine model

Efren Mireles Sandoval[1], **Karim Chafee**[2], and **Angélica de Jesús Mireles Carlos**[1]
[1]Autonomous University of Zacatecas, Mexico
[2]Alexandria University, Egypt.

The Extracellular Matrix (ECM) is a non-cellular, three-dimensional network that provides structural and biochemical support to surrounding cells. Resident cells secrete ECM components intracellularly via exocytosis. This process produces an interlocking web of fibrous proteins and Glycosaminoglycans (GAGs). These polymers attach to ECM proteins to form negatively charged proteoglycans which attract sodium ions and water.

This process hydrates the ECM. Examples of GAGs are heparan sulfate and chondroitin sulfate. Heparan sulfate regulates angiogenesis, blood coagulation, and tumor metastasis while chondroitin sulfates help cartilage, tendons, ligaments, and aorta walls to maintain tensile strength. Furthermore, the most prevalent protein in the ECM is collagen, which provides structural support to the cell. Elastins are synthesized by fibroblasts, and in smooth muscle cells provide tissue elasticity. Attachment proteins, such as fibrin and fibronectin, link the ECM through binding to cell surface integrin receptors.

The ECM undergoes constant remodeling during normal and pathological states which is driven by various matrix-degrading enzymes. These enzymes are vital for maintaining normal homeostasis. Growth factors up regulate the expression of integrin receptors in fibroblasts, making cell-matrix interactions easier. Variations in the composition of the ECM affect cytokine control of fibroblast responses. After cytokine stimulation of fibroblasts, the expression of matrix-degrading enzymes, such as MMPs, is elevated. Then TGF- inhibits collagenolytic MMP-1, which is caused by IL- Activating plasminogen.

This results in matrix degradation and facilitates cell migration. Modulation of these processes opens up new avenues for controlling the cell-matrix interaction during wound healing. In intestinal anastomosis, the ECM has been used to improve adherence and prevent dehiscence in the murine model. The use of ECM as an adjuvant in intestinal anastomosis improves the outcome and is an option to enhance surgical anastomosis significantly.

Biography

Efren Mireles Sandoval has completed his MD from the Autonomous University of Zacatecas and is now part of the first generation of a select group of doctors to carry out the Professional Master in Medical Consultation of Excellence by Harvard University. He was also a participant of the Professional Master in Neoconcepts in Endocrine Metabolism with the Japanese Medical Institute. He has done multiple internships in general, maxillofacial and plastic surgery in Italy and Mexico. Currently has homologated his title in Spain and in the process of the United States Medical Licensing to continue Post Graduate studies and a fellowship in surgery. Recently with the pandemic he forms part of a medical network that provides distance consultation to patients in need of assistance in Mexico.

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