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Cell & Developmental Biology

Opinion Article

Structure and Types of Intestinal Mucosal Epithelial Cell: Goblet Cells

Khaled Gao *

Department of Physiology, Bioterra University of Bucharest, Bucharest, Romania

DESCRIPTION

Goblet cells develop from pluripotent stem cells and get their name from the goblet- or cup-like shape they take on. Goblet cells' main job is to secrete mucin and produce a layer of protective mucus. Goblet cells may possibly have a role in the regulation of the immune system. Cryopreservation can be used to preserve goblet cell samples, which can then be examined under a light microscope. Goblet cells also have a complicated cytoskeletal structure and could have various glycosylation patterns. As a result, the capabilities of various localised goblet cells may differ slightly. Clinically, inflammatory bowel disorders and respiratory conditions are linked to goblet cells.

Structure

Goblet cells, which are made of mucin granules, get their name from the way they resemble goblets or cups. Pluripotent stem cells release a variety of chemicals, including mucin and trefoil peptide, at the base of the intestinal crypt. These pluripotent stem cells give rise to goblet cells, which make up the intestinal mucus layer that shields epithelial cells. The colon's inner mucus layer is where goblet cells anchor. In a layered and structured filter, this mucus layer system separates bacteria from epithelial cells. All epithelial cells are essentially derived from stem cells. The intestinal surface epithelium's goblet cells are continually replenished by stem cells at the crypt base. The average cell cycle lasts 3 to 7 days. The main cell type in the enterocyte lineage is controlled by the notch signalling system. Gamma-secretase inhibition blocks notch signalling, which prevents the cytoplasmic component of the notch from entering the nucleus. This region alters differentiation in the secretory route and suppresses transcriptional signalling. If there are no more alterations in signalling, the default outcome of this transition is goblet cells. A transcription factor called Spdef is crucial for complete goblet cell development.

Function

Goblet cells are a type of intestinal mucosal epithelial cell, which acts as the major site for nutrient breakdown and mucosal absorption. Mucus synthesis and secretion are goblet cells' main tasks. The predominant macromolecular components of mucus, mucin glycoproteins, are secreted by goblet cells, which are the main secretory cell in the superficial epithelium of large airways. Depending on where they are and what they do, different kinds of goblet cells can be recognised. Goblet cells in the small intestine and colon secrete when activated. Responses to acetylcholine or endocytosis are examples of stimulation. Colonic goblet cells on the surface continuously secrete to keep the inner mucus layer intact. Goblet cells' main job is to secrete mucin and produce a layer of protective mucus. Goblet cells may possibly have a role in the regulation of the immune system. Cryopreservation can be used to preserve goblet cell samples, which can then be examined under a light microscope. Goblet cells also have a complicated cytoskeletal structure and could have various glycosylation patterns. As a result, the capabilities of various localised goblet cells may differ slightly. Clinically, inflammatory bowel disorders and respiratory conditions are linked to goblet cells. Contrast these goblet cells with the top portion of the intestinal crypt goblet cells, which have the ability to produce quickly by compound exocytosis. Goblet cells are crucial for maintaining intestinal homeostasis. Goblet cells can operate as antigen importers, and they may also regulate innate immune function, according to recent studies. Moreover, goblet cells play a common secretory function and can act as a line of defence at the gut mucosa. The muscarinic receptor 4 controls the cholinergic agonists that the small intestine goblet cells use to absorb antigens.

CONCLUSION

Mucus layer development serves as the primary innate host defence mechanism, and intestinal goblet cells primary secretory product, mucin, is responsible for this. The development of the commensal gut microbiota and defence against invasion and colonisation by the pathogenic bacteria depend heavily on the mucus layers. Intestinal inflammation and damage are caused by a compromised mucosal barrier, aberrant commensal bacteria, and a compromised host innate and adaptive immune response. Analysis of the impact of native and altered mucins on the ratio of protective/aggressive commensal microbes in the intestine, as well as identification of the specific epitopes in mucin glycoproteins as binding sites for commensal and pathogenic

Correspondence to: Khaled Gao, Department of Physiology, Bioterra University of Bucharest, Bucharest, Romania; E- mail: khale.gao@physio.ro

Received: 02-Jan-2023, Manuscript No. CDB-23-22257; **Editor assigned:** 03-Jan-2023, PreQC No. CDB-23-22257 (PQ);**Reviewed:** 17-Jan-2023, QC No. CDB-23-22257; **Revised:** 24-Jan-2023, Manuscript No. CDB-23-22257(R); **Published:** 31-Jan-2023, DOI: 10.35248/2168-9296.23.12.270

Citation: Gao K (2023) Structure and Types of Intestinal Mucosal Epithelial Cell: Goblet Cells. Cell Dev Biol. 12:270.

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microbes in health and disease, will significantly aid in the development of novel therapeutic approaches in the management of intestinal diseases. The prevention or treatment of intestinal disorders may benefit from techniques that enhance or strengthen the intestinal mucus layer or the presence of bioactive protective molecules.