To GzMB or not to GzMB
Protecting Extracellular Proteins
Taipei American School - TAS-Taipei

Abstract and Introduction

Granzyme B (GzMB) levels are associated with many chronic inflammatory conditions including asthma, autoimmune and allergic diseases. As a pro-inflammatory enzyme, its presence indicates that the immune system is activated. Therefore, regulating GzMB activity is of great importance. In this study, we aim to prevent tissue damage from chronic inflammation by limiting GzMB activity in the ECM without affecting its intracellular function.

Chronic Inflammation

- Neutrophil infiltration
- Increased blood flow
- Infiltration of immune cells into infected site
- Inflammation and scarring
- Causes heart, pain, stiffness, and swelling

Inflammation: "The Secret Killer" - Hypersensitivity of immune cells - Damages healthy cells and tissues

Figure 1: Inflammation is a "Secret Killer" - Time Magazine Feb. 2004.

Granzyme B

- Serum protein, essential part of immune system
- Extracellular Function: Cleaves extracellular matrix (ECM) proteins
- Overexpression during chronic inflammation results in tissue damage (Figure 2)

Excess ECM protein degradation leads to various diseases (Figure 3)
- Capsule production
- Rheumatoid Arthritis
- Psoriasis, Ulcerative, Desmosin, etc.
- Prolonged Wound Healing & Photaging

Figure 2: GzMB cleaves ECM proteins, such as decorin (green), which causes tissue damage. Individual cells shown in red.

Figure 2: GzMB overexpression leads to various diseases.

Policy and Practices

Outreach & Education

Without effective communication and collaboration, we fail to progress in GzMB and synthetic biology. We participated in numerous meets-ups with college and high school students in Taipei and held our own teaching sessions on synthetic biology.

Policy Brief

- Synthetizing a pharmaceutical agent
- Grappling with the challenges
- Staying ahead of the curve
- Navigating regulatory landscape
- Outline of the new policy

Figure 3: Flowchart of the GzMB inhibitor design and development.

Research & Change

Our team of medical experts focused on GzMB-related synthetic biology research. We developed a medical device on chronic inflammation and its application, policy changes necessary to the immune system that ensure proper function of GzMB. The device also reduces the number of GzMB molecules.

Figure 4: Diagram illustrating the GzMB inhibitor design and application.

Achievements

- 16 new discoveries added to the registry
- Characterization of GzMB and its role in inflammation
- Improved drug delivery system

Acknowledgments & References

Labs & Institutions

- NCTU
- NYMU
- Mingdao Laboratory
- Spring Fair
- Teaching Class
- Summer Camp

Dr. Phillips, J. Bird
Dr. Stephanie Hall
Dr. Sarah J. Carter

Survey

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Friends of TAS
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