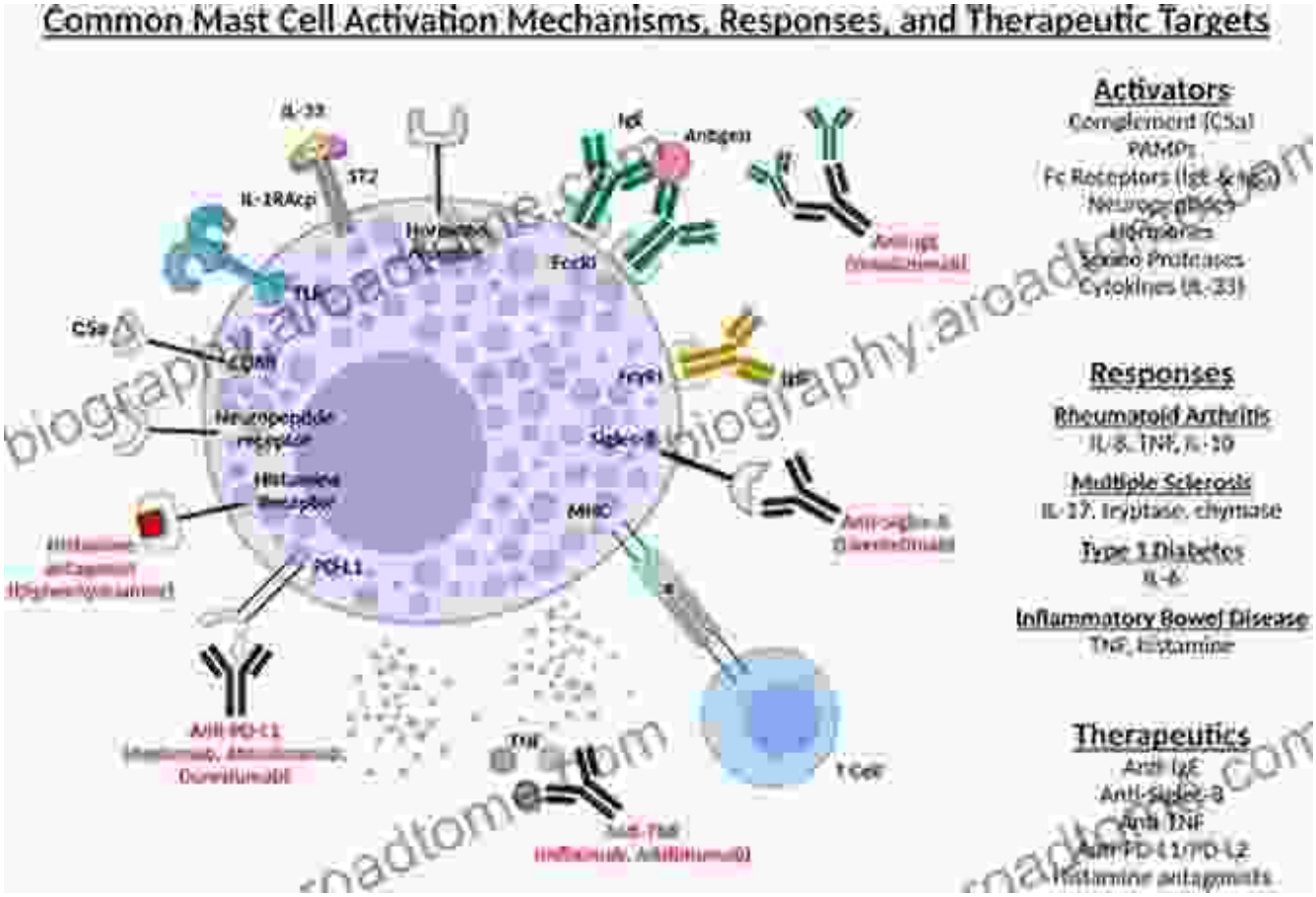
Unlock the Secrets of Inflammation: Proteases and Their Receptors in Inflammation Progress in Inflammation Research

Inflammation is a complex biological process that plays a crucial role in the body's response to injury, infection, and disease. It involves the recruitment of immune cells, the release of inflammatory mediators, and the activation of signaling pathways that lead to tissue repair. Among the key molecules involved in inflammation are proteases and their receptors.



Proteases and Their Receptors in Inflammation (Progress in Inflammation Research)

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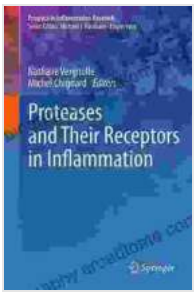

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Proteases in Inflammation

Proteases are enzymes that catalyze the hydrolysis of peptide bonds. They are involved in a wide variety of physiological processes, including inflammation, coagulation, and fibrinolysis. In inflammation, proteases are released by immune cells and tissue cells in response to inflammatory stimuli. These proteases can cleave and activate other inflammatory mediators, such as cytokines and chemokines, thereby amplifying the inflammatory response.

- **Serine proteases:** These proteases are characterized by a serine residue in their active site. They are involved in the activation of complement components, the generation of anaphylatoxins, and the cleavage of fibrinogen.
- **Cysteine proteases:** These proteases contain a cysteine residue in their active site. They are involved in the activation of pro-inflammatory cytokines, such as interleukin-1β and interleukin-18.
- **Aspartic proteases:** These proteases have an aspartic acid residue in their active site. They are involved in the activation of the complement cascade and the generation of bradykinin.

Receptors for Proteases

The activity of proteases is regulated by a family of receptors known as protease-activated receptors (PARs). PARs are G protein-coupled receptors that are activated by the cleavage of their extracellular N-terminal domain by specific proteases. This cleavage exposes a tethered ligand that binds to the receptor and triggers intracellular signaling events.

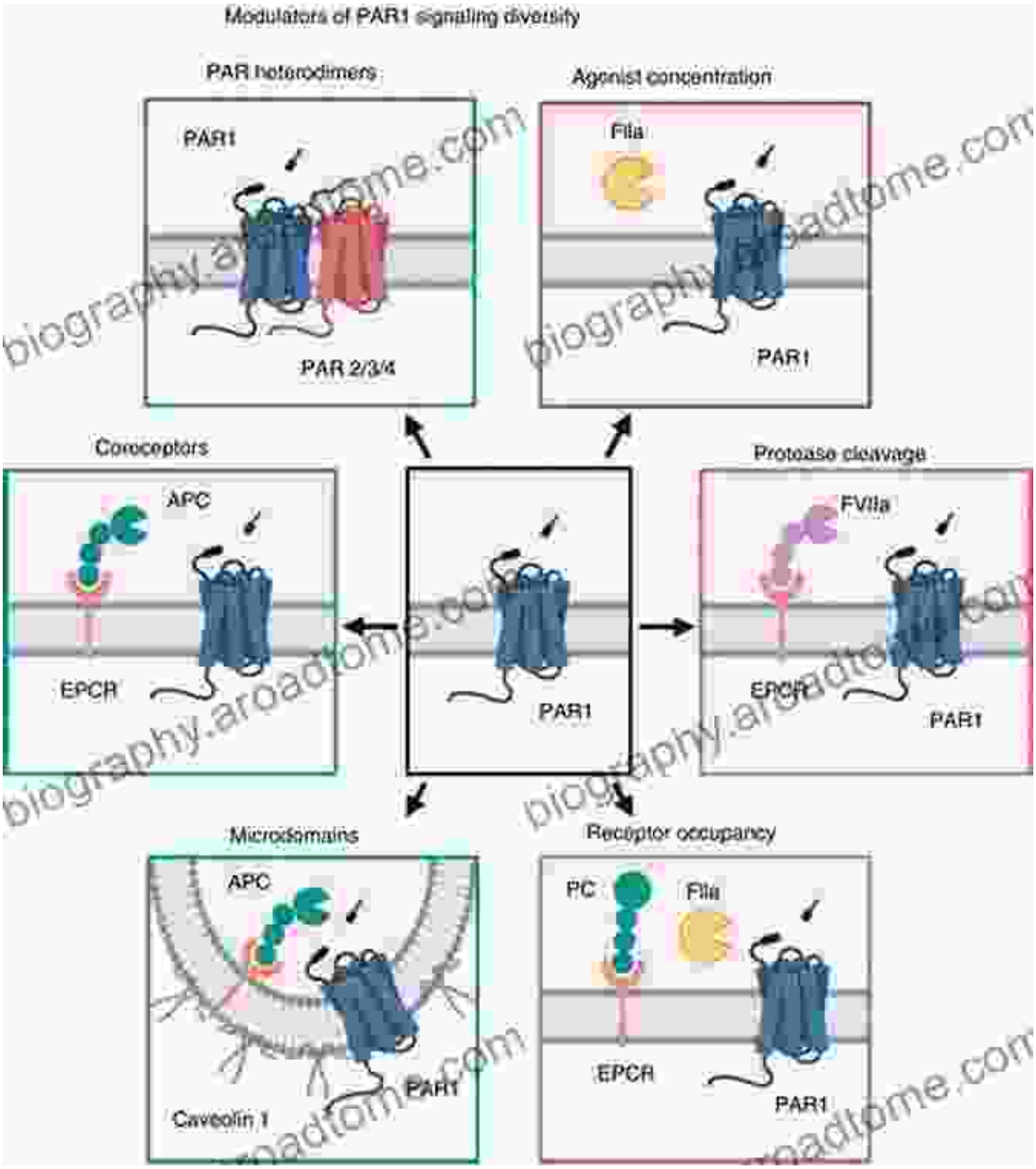


Figure 2: PAR Signaling

There are four known PARs: PAR1, PAR2, PAR3, and PAR4. Each PAR is activated by a specific set of proteases. For example, PAR1 is activated by thrombin, PAR2 is activated by trypsin, PAR3 is activated by thrombin and trypsin, and PAR4 is activated by cathepsin G.

PAR Signaling in Inflammation

PAR signaling plays a crucial role in inflammation. PAR1 is expressed on endothelial cells, platelets, and neutrophils. Its activation leads to the release of inflammatory mediators, such as IL-1β, IL-6, and TNF-α. PAR2 is expressed on endothelial cells, macrophages, and dendritic cells. Its activation leads to the recruitment of leukocytes and the production of pro-inflammatory cytokines.

PAR3 is expressed on endothelial cells and smooth muscle cells. Its activation leads to the release of vasodilators and the inhibition of platelet aggregation. PAR4 is expressed on endothelial cells, macrophages, and keratinocytes. Its activation leads to the production of pro-inflammatory cytokines and the induction of apoptosis.

Therapeutic Potential of Targeting Proteases and PARs

The involvement of proteases and PARs in inflammation makes them attractive targets for therapeutic intervention. Several strategies are being developed to inhibit the activity of proteases or to block PAR signaling.

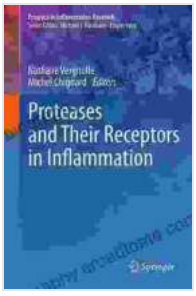
- **Protease inhibitors:** These molecules bind to and inhibit the activity of specific proteases. They can be used to reduce the production of inflammatory mediators and to prevent tissue damage.

- **PAR antagonists:** These molecules bind to and block the activation of specific PARs. They can be used to inhibit the inflammatory response and to promote tissue repair.

Several protease inhibitors and PAR antagonists are currently in clinical development for the treatment of inflammatory diseases, such as rheumatoid arthritis, asthma, and inflammatory bowel disease.

Proteases and their receptors play a crucial role in inflammation. By understanding the mechanisms of protease and PAR signaling, we can develop new therapies to treat inflammatory diseases and improve patient outcomes.

The book "Proteases and Their Receptors in Inflammation Progress in Inflammation Research" provides a comprehensive overview of this important topic. It covers the latest research on proteases and PARs, as well as their therapeutic potential. This book is a valuable resource for scientists, clinicians, and students who are interested in inflammation and its treatment.



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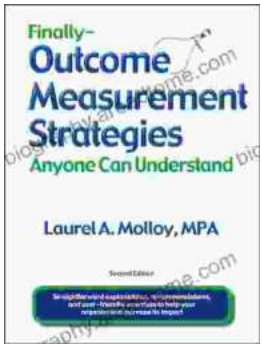

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