

A grayscale micrograph of biological tissue, possibly a cross-section of a plant stem or a similar structure. The image shows various cellular and fibrous structures. Three large, bright, roughly circular or oval structures are prominent in the upper half of the image. The lower half shows more complex, fibrous, and layered structures. The text is centered in the middle of the image.

Lecture 2.
Learning Objectives and
Summary

2. Introduction to innate immunity and complement

Learning objectives:

1. Understand how leukocytes emigrate from the circulation to the tissue in response to chemotactic stimuli.
2. Appreciate the essential differences between the innate and acquired immune systems.
3. Understand basic mechanisms of phagocytosis and appreciate the role the phagocytosis plays in pathogen destruction and initiation of the immune response.
4. Distinguish between oxidative and non-oxidative killing mechanisms
5. Begin to understand the role that complement plays in the immune system.
6. Appreciate how phagocytosis of apoptotic corpses is essential in development and how this type of phagocytosis results in the suppression of inflammation and the maintenance of tolerance.

SUMMARY

1. Innate immunity represents the first-line of host defense. Its receptors are germline-encoded and recognize pathogen-associated “molecular patterns.”
2. Phagocytosis is a component of innate and acquired immunity. It is the principal means of destroying pathogenic bacteria and fungi. Phagocytosis initiates the process of antigen presentation.
3. Many phagocytic receptors recognize a diverse array of microbial pathogens. Some pathogens (e.g., *S. pneumoniae*) require opsonization by antibodies and complement for their clearance. However, bugs fight back.
4. Phagocytic leukocytes employ oxidative and non-oxidative means of killing. The NADPH oxidase generates reactive oxidants, such as superoxide anion and hypochlorous acid (bleach).
5. Innate immunity ushers in acquired immunity: innate immune activation of APCs results in up-regulation of co-stimulatory molecules, thereby enhancing the effectiveness of antigen presentation.
6. Phagocytosis is an essential component of development and tissue remodeling. Ingestion of apoptotic bodies is immunologically “silent” and is normally accompanied by a suppression of inflammation. Failure of this mechanism may result in autoimmunity.