1 May, 2013

Allergies and the Modern World

Introduction:

Most of the time our immune system protects us from the outside world. Occasionally, it tries to protect us from things like pollen and peanuts instead, a process that we call allergy. The allergic response involves several specialized types of white blood cells acting together. For some this is a minor inconvenience, while for others it can lead to a life threatening condition termed “anaphylaxis.” The overall incidence rate of allergies is increasing in the developed world for reasons that are not yet fully understood, but recent research suggests that this has more to do with our modern lifestyle than with anything else.

Speaker:

Dan Dwyer is a fourth year immunology graduate student. In lab, he studies what makes an allergen different from things that do not provoke an allergic response and focuses on the Mast Cell, a white blood cell involved in asthma and allergy. In tonight’s lecture, Dan will be talking about how the immune system causes an allergic response and why we have an immune system that’s capable of doing this to us. He’ll then go into current theories behind the rise of allergies and how this can help us develop new treatments.

Glossary

**Cell:** The fundamental unit of life. Everything in our bodies is made up of cells. Cells are organized into tissue, an example of which would be skin, which is in turn organized into organs, such as the heart and lungs.

**Immune System:** A network of cells that protects us from infection by pathogens.

**Pathogen:** Something that tries to infect us and reproduce inside of us, such as viruses, bacteria, fungi, and multicellular parasites.

**Allergic Response:** The immune system improperly responding to a non-pathogenic foreign substance.

**Anaphylaxis:** An extreme, body-wide allergic response that can lead to dangerously low blood pressure and difficulty breathing, which can ultimately lead to death.
**Local Response:** An immune response that is restricted to the area of the body that encounters a foreign substance. An example of this is the redness and swelling surrounding an insect bite.

**Systemic Response:** A very strong immune response that happens throughout the body instead of just at the point of exposure. An example of this is anaphylaxis.

**Mast Cells and Basophils:** Immune cells that are responsible for much of what happens during an allergic response. The mast cell is a long-lived cell that resides in tissue, while the basophil is a shorter-lived cell that circulates throughout the body. Mast cells and basophils both contain granules which, when released, are responsible for much of their observed activity.

**Granule:** A structure found within many cells such as mast cells and basophils that is used to store things for future usage by the cell. Mast cell and basophil granules contain histamine as well as a host of other factors.

**Histamine:** A small molecule released by mast cells and basophils that directly causes many aspects of an allergic response. Histamine has a wide variety of effects on different cell types. It can lead to smooth muscle constriction, blood vessel leakage, and itchiness and hives on the skin.

**Degranulation:** The process by which a cell releases its granules into the extracellular environment.

**Antibody:** A specialized protein that recognizes foreign substances and has a variety of functions within the immune system. One specific type of antibody, termed “IgE,” interacts strongly with basophils and mast cells, activating them and leading to degranulation when they encounter allergens that the IgE recognizes.

**Receptor:** Specialized protein that allows cells to “see” the outside world.

**Helminth:** A parasitic worm.

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