Opsonization Encyclopedia Article

Opsonization

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Opsonization

Opsonization is a term that refers to an immune process where particles such as **bacteria** are targeted for destruction by an immune cell known as a **phagocyte**. The process of opsonization is a means of identifying the invading particle to the phagocyte. Without the opsonization process the recognition and destruction of invading agents such as bacteria would be inefficient.

The process of opsonization begins when the **immune system** recognizes a particle (e.g., a bacterium) as an invader. The recognition stimulates the production of antibodies that are specific for the antigenic target. Certain **antibody** molecules are stimulated to bind to the surface of the particle. Typically, the binding molecules are a type of antibody classified as IgG. As well, proteins involved in the complement-mediated clearance of foreign material, specifically a protein designated C3b, can bind to the surface of the foreign object. Proteins such as IgG and C3b, which can promote opsonization, are designated as opsonins.

When the IgG antibodies bind to the invading bacterium, the binding is in a specific orientation. An antibody is somewhat "Y" shaped. The binding of IgG to the bacterium is via the branching arms of the "Y." The stalk of the molecule, which is termed the Fc region, then protrudes from the surface. The Fc region is recognized by a receptor on the surface of an immune cell called a phagocyte. When the Fc region is bound to the phagocytic receptor the invading particle is taken into the phagocyte and enzymatically digested.

The Cb3 **complement** protein can bind in a nonspecific manner to an invading particle. Phagocytes also contain surface receptors that recognize and bind Cb3. As with IgG, the binding of Cb3 to the phagocytes triggers a process whereby the invading particle is engulfed, surrounded, and taken inside the phagocytic cell for destruction.

Examples of phagocytic cells that can participate in opsonization are neutrophils and monocytes.

Bacteria that are associated with the development of infections typically possess a capsule, which is a layer of carbohydrate material. The capsular material encases the bacterial cell. The carbohydrate is not recognized as readily by the immune machinery of the body as is protein. As well, the penetration of antibodies through the capsule network to the surface of the bacterium is impeded. Thus, possession of a capsule can dampen the opsonization response.