

Antigenic Mimicry Encyclopedia Article

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Antigenic Mimicry

Antigenic mimicry is the sharing of antigenic sites between **microorganisms** and mammalian tissue. An immune response can be directed both at the microorganism and at the host site that shares the antigenic determinant. This autoimmune response due to antigenic mimicry is known to be a crucial factor in the development of certain ailments in humans.

The **immune system** recognizes three-dimensional structure of protein. A protein, which is made up of a sequence of amino acids strung together, will fold up in various ways, depending on whether a section is more hydrophilic ("water loving") or **hydrophobic** ("water hating"), and depending on the function of various regions of the protein.

Proteins that adopt a similar three-dimensional configuration can stimulate a common response from the immune system. Typically, proteins that have a similar amino acid sequence will adopt the similar folded structures. For example, the **bacteria** *Chlamydia pneumoniae*, *Chlamydia psittaci*, and *Chlamydia trachomatis* possess a protein that is part of the bacterial outer membrane. This protein is similar in amino acid sequence to a portion of a protein, called alpha-myosin heavy chain, which is found specifically in the heart muscle of humans and animals such as mice. In mice, an immune reaction to *Chlamydia* triggers a condition known as inflammatory heart disease. A continued host autoimmune response damages the heart, leading to cardiac malfunction. Indeed, it has been shown that a significant number of patients with heart disease have antibodies to *Chlamydia* in their blood, indicative of a past infection with the bacteria.

Rheumatoid arthritis is another example of a malady that is the consequence of an autoimmune reaction.

The *Chlamydia* studies have pointed out the widespread nature of antigenic mimicry. Other bacteria, **viruses**, **fungi** and **protozoa** share the antigenic similarity with the mouse antigenic region. The bacteria include *Borrelia burgdorferi* (the agent of **Lyme disease**), *Treponema pallidum* (the causative agent of **syphilis**), and *Mycoplasma pneumoniae* (the cause of non-viral atypical **pneumonia**).

Antigenic mimicry may also be the basis of the ulcers formed upon infection of humans with *Helicobacter pylori*. The acidic environment of the stomach would exacerbate host tissue damage due to an autoimmune response.

Antigenic mimicry supports a hypothesis known as the "infection hypothesis," which proposes that common human diseases are caused by infections. If so, then treatment for heart disease and stomach ulcers would involve strategies to eliminate bacterial infections.