Complement Regulation by Factor H

One component of the complement system is a protein called factor H, which has a regulatory function. Essentially all cells of the body bind factor H, preventing the assembly of complement proteins on the cell surface. Complement components assemble only on antigen-antibody complexes. Since the body does not normally generate antibodies against itself unless cells have been modified or altered in some fashion (chemical, bacterial, or viral infection, injury, etc.), complement components will not aggregate at cell surface sites protected by factor H.

In contrast, foreign cells, bacteria, mycoplasma, and viruses do not typically have on their surfaces a binding site for factor H. The surfaces of foreign organisms are antigenic and will elicit a response from the immune system, because they are recognized as non-self. Antibodies will be developed and bound to the antigens present on their surfaces. The complement components will assemble on the antigen-antibody complexes thereby generated and will destroy the invaders through the action of the MAC (see Chart 1).

Protection of Normal Cells from Immune System Attack by Complement Regulatory Factor H

Factor H consists of a single strand of protein that, because of the nature of the amino acids along its length, is capable of folding back upon itself, thereby forming bunches, similar to beads on a string. The total number of beads on the string of a single molecule of factor H is 20. Complement itself, when assembled, consists of an aggregate of separate long chains, all bound to a single point of attachment. Apparently, factor H interferes with normal assembly by mimicking one of the long chains, thus preventing proper complement assembly.

Microorganism Protection from Immune Surveillance

Certain bacteria and viruses, including the Lyme disease causative agent, have exploited the protection afforded from the deleterious effects of the complement system by carrying a binding site on their surfaces for factor H. This site is typically antigenic and recognized by the immune system as non-self. Normally, without bound factor H,