6.3: The Ability to Induce Autoimmune Responses

Skills to Develop

1. State what is meant by autoimmunity.
2. Name three bacterial diseases that may result from autoimmunity.

The Ability to Induce Autoimmune Responses

Autoimmunity (def) is when the body's immune defenses mistakenly attack the body. In certain cases, bacteria can serve as a trigger for this response.

One way bacteria can do this is by inducing the production of cross-reacting antibodies (def) and possibly auto-reactive cytotoxic T-lymphocytes or CTLs (def). These are antibodies and CTLs made in response to bacterial antigens (def) that accidentally cross react with epitopes (def) on host cells. As a result, the antibodies and CTLs wind up destroying the host cells to which they have bound. Furthermore, when the antibodies activate the classical complement pathway (def), this further stimulates the inflammatory response resulting in more tissue damage. Rheumatic fever triggered by rheumatogenic strains of Streptococcus pyogenes (inf) is an example. Antibodies and CTLs stimulated by antigens of S. pyogenes cross-react with heart and joint tissues damaging the heart and joints.

GIF animation showing opsonization of cells during Type-II hypersensitivity.

GIF animation showing MAC lysis of cells during Type-II hypersensitivity.
Another way autoimmunity can be triggered by certain bacteria is by **stimulating the production of soluble immune complexes**. When high levels of circulating antibodies react with certain bacterial antigens, they form large amounts of immune complexes (antibodies bound to antigens). These immune complexes can lodge in filtering units such as the kidneys where they **activate the complement pathway** (*def*). The resulting **inflammatory response** then destroys kidney tissues. An example of this is **acute glomerulonephritis** that sometimes following infection by *Streptococcus pyogenes* (*inf*).

Two other possible examples of bacterial induced autoimmunity are **chronic Lyme disease** (arthritis, neurological abnormalities, and heart damage) following infection by *Borrelia burgdorferi* (*inf*), and **tertiary syphilis** (heart damage, neurological abnormalities, and destructive skin lesion) following infection by *Treponema pallidum* (*inf*).

**Exercise**

1. Describe two mechanisms we have learned by which the antibody molecules we make as a result of adaptive immunity protect the body.

2. Describe one example of how the body’s antibodies can harm the body by causing an autoimmune response.
Autoimmunity will be discussed in greater detail under Hypersensitivities in Unit 6.

Summary

1. Autoimmunity is when the body's immune defenses mistakenly attack the body and sometimes certain bacteria can serve as a trigger for this response.

2. One way bacteria can trigger autoimmunity by stimulating the production of cross-reacting antibodies. These are antibodies made in response to bacterial antigens then accidently cross-react with and destroy host cells to which they have bound. An example is rheumatic fever following Streptococcus pyogenes infection.

3. Another way autoimmunity can be triggered by certain bacteria is by stimulating the production of soluble antigen-antibody (immune) complexes. These immune complexes can lodge in filtering units such as the kidneys where they activate the complement pathway and trigger an inflammatory response then destroys kidney tissues. An example of this is acute glomerulonephritis that sometimes following infection by Streptococcus pyogenes.

Questions

Study the material in this section and then write out the answers to these questions. Do not just click on the answers and write them out. This will not test your understanding of this tutorial.

1. State what is meant by autoimmunity. (ans)

2. Name 3 bacterial diseases that may result from autoimmunity.
   A. (ans)
   B. (ans)
   C. (ans)

Contributors

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