

3.11 Things can go wrong with the immune system

* The immune system coordinates attacks on pathogens that are trying to disrupt the body. The immune system can be disrupted. Allergies result from an overactive immune system. Autoimmune diseases such as type 1 diabetes and rheumatoid arthritis are caused by the immune system attacking the rest of the body. HIV is a virus that specifically attacks the T cells, resulting in an acquired immunodeficiency syndrome (AIDS).

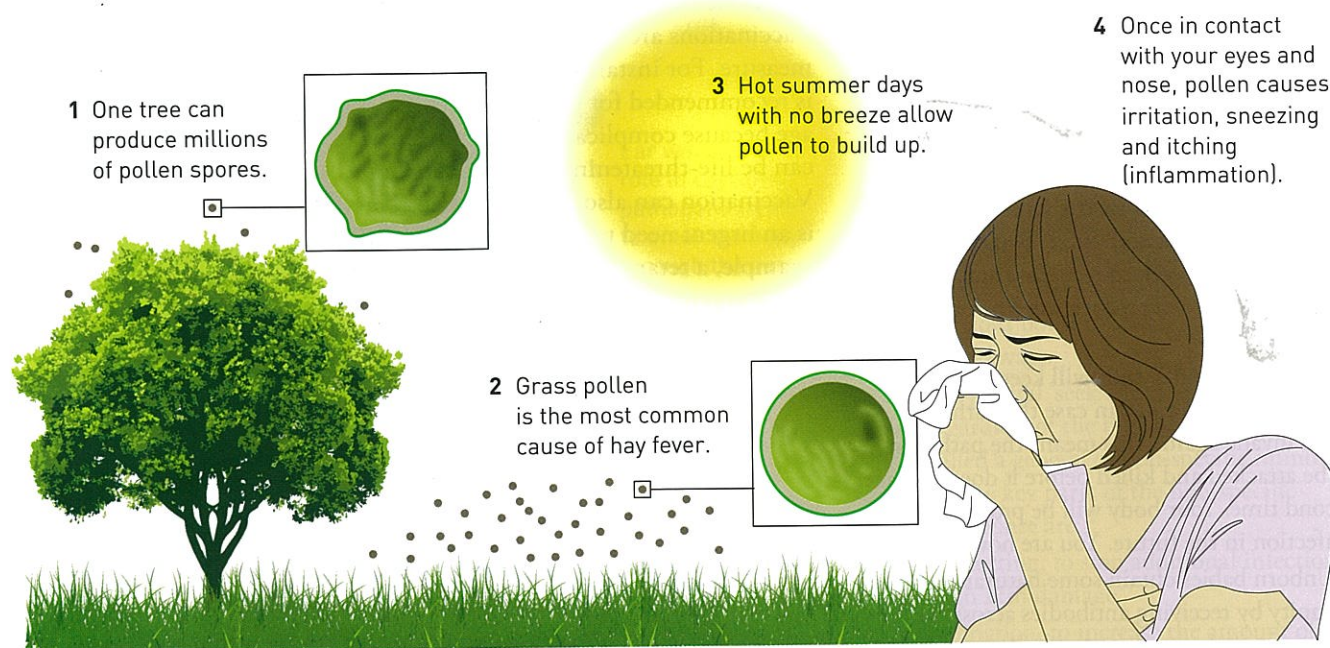


Figure 3.48 How a hay fever attack happens

Hay fever and other allergies

Allergies result when your immune system mistakes a harmless substance for a pathogen. The most common example is plant pollen, mainly from grass but also from trees. When the pollen gets in your eyes or nose, your second and third lines of defence start attacking it. Inflammation occurs, resulting in an increased amount of blood reaching the area. Fluid leaks out of the blood vessels and the area becomes red and swollen. This also contributes to a runny nose and watering eyes trying to flush out the pollen.

Phagocytes also invade the area in an attempt to destroy the pollen. If you have been exposed to the pollen before, then your body will already have antibodies that speed up this reaction. In extreme cases, the whole of your throat will swell shut, making it difficult to breathe. The large amount of fluid leaking from your blood vessels can also cause your blood vessels to collapse. This life-threatening response is called **anaphylaxis**.



Figure 3.49 EpiPens deliver adrenalin to people suffering anaphylactic shock.

Autoimmune diseases

Autoimmune diseases are a group of diseases that result from your body's immune system identifying healthy parts of your own body as a pathogen. **Rheumatoid arthritis** is an autoimmune disease in which the body produces B and T cells that attack the joints of the body. B cells produce antibodies, and T cells try and destroy the synovial membrane that lines the joint. This causes the joint to swell up with fluid. This causes heat and pain for the sufferer.



Figure 3.50 Inflammation causes the joints of rheumatoid arthritis sufferers to swell and become painful.

Type 1 diabetes is also caused by an autoimmune reaction against the cells in the pancreas that produce insulin. As a result of attack by B cell antibodies and T cells, these cells are destroyed. This means the person is unable to control their own blood glucose levels and instead must test their glucose levels regularly and inject artificial insulin when it is needed.

HIV causes AIDS

Human immunodeficiency virus (HIV) is a virus that infects a special type of T cells in the immune system. This affects the whole immune system and makes it ineffective. A person with HIV has a weakened immune system. This causes them to develop a range of infections that a normal immune system would be able to easily destroy. For example, simple fungal infections, viral eye infections and diarrhoea (loose bowel motions) can make a person with a HIV infection very sick. Collectively these symptoms are called acquired immunodeficiency syndrome (AIDS).

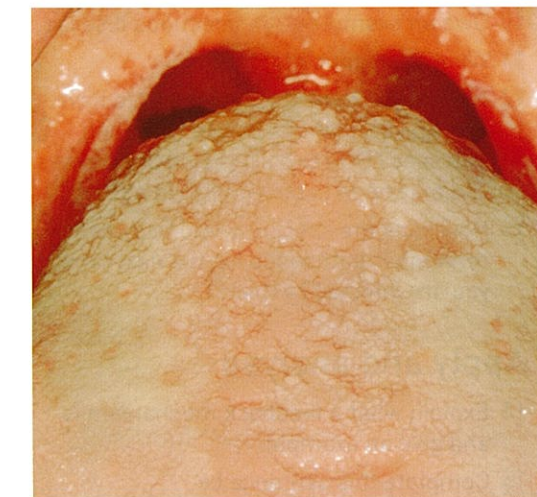


Figure 3.51 Opportunistic pathogens such as yeast will make the most of an ineffective immune system to grow out of control.

Extend your understanding 3.11

- 1 Why does hay fever cause a runny nose and watery eyes?
- 2 With hay fever, why is it always worse the second time you are exposed to pollen?
- 3 Why are the finger joints swollen in a person with rheumatoid arthritis?
- 4 Explain why people with type 1 diabetes are unable to produce their own insulin.
- 5 What is the difference between HIV and AIDS?
- 6 How can eating a small amount of peanuts cause death in some people?