Infection diseases and immunisation

Introduction

Despite modern medicine, infectious diseases such as influenza, tuberculosis, measles and HIV are still capable of causing epidemics, particularly in the developing world. According to the World Health Organisation, infectious diseases are responsible for nearly two-thirds of all childhood deaths and nearly half of premature deaths# worldwide. Immunisation holds the key to controlling infectious diseases, for which there is often no cure.

The germ (or micro-organism) responsible for an infectious disease is often a virus or bacterium that spreads from an infected to an uninfected person. This is why they are called infectious or communicable diseases. Bacteria are tiny organisms which tend to create colonies of many millions of germs.

Each type of micro-organism responsible for a disease tends to have a different identity. When the body comes into contact with one of these invaders, it mounts a variety of defences, including the production of special cells, known as antibodies, that attack the organism. Vaccination causes the body to produce antibodies which recognise and destroy the cells of the organism in the vaccine, preventing an infection taking hold, should the disease itself be encountered in the future.

How infection spreads

Infectious diseases are often very easily transmitted. The method of transfer varies, depending on the germ. Common routes include physical contact (skin to skin, or by touching an object recently handled by an infected person) or through the air (by droplets produced in sneezing or coughing). Infections can also enter the body through cuts in the skin or through contaminated food.

When immunisation isn't used

Some illnesses are caused by many different forms of similar infections. The common cold, for example, is caused by one of many thousands of different viral infections and it's not possible to have a vaccine to protect against them all. There are some major infectious diseases for which vaccinations have not been developed. The most significant example of this is HIV, the cause of AIDS.

"Herd" immunity

If most children in a community are immunised against an infection, the spread of that infection is significantly reduced and even unvaccinated people are at much less risk of catching the illness. This is called "herd "immunity. However, about 95% of children must be vaccinated to achieve this level of protection.

The decision to vaccinate

The vast majority of doctors, public health experts and governments around the world support vaccination as a crucial weapon in the battle against infectious diseases. However, some people believe that vaccinating their children is unnecessary or harmful. This view is often based on the idea that diseases like measles or diphtheria are relatively minor illnesses, or that they are easily treated with modern medicine. Parents sometimes believe that if everyone else's children are vaccinated, there is no chance of their child becoming infected.

The truth is that all of these infections can be serious and can have long-lasting consequences.

Diseases in detail

Diphtheria

This bacterial infection can cause a membrane to form at the back of the throat, or lower down in the airways in the lungs, and prevents an infected person from breathing properly. The toxin produced by the diphtheria bacteria may damage the heart and the nervous system. Once the infection has taken hold, there is no cure: the illness has to run its course.

Immunisation was introduced nationally in the UK in 1940 when there were over 46,000 cases of diphtheria and over 2,000 deaths. By 1957 there were only 37 cases and 6 deaths. But diphtheria is still a threat, and recent outbreaks have occurred in Eastern Europe.

Tetanus

The bacterium responsible for tetanus lives in the gut of humans and animals, where it does not cause disease. However, the spores of the bacteria are contained in faeces, such as manure, which contaminate the environment (including soil and plants). These spores can cause infection even through a minor injury, for example a scratch or a cut.

Symptoms of tetanus include very painful muscle spasms (severe enough to break bones), spasm of the jaw (hence the alternative name for tetanus: lockjaw), difficulty swallowing, paralysis of the muscles that move the eyes, kidney failure, loss of temperature control and blood pressure problems. Like diphtheria, doctors can only treatment the symptoms, but not cure the disease.

Whooping cough

This is also known as pertussis, after the bacterium responsible for it, and typically causes distressing bouts of coughing. It can last for two to three months. In young children, and especially in babies, the coughing can be followed by a prolonged period

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without breathing, which can be fatal.

Antibiotics will only work if they are given very early on in the infection but whooping cough is not always easy to diagnose, since it often starts like a normal cold.

Meningitis

This is an inflammation of the membranes of the brain and can result in serious brain damage. Even people who survive meningitis, apparently without any complications, may develop learning difficulties. There are a number of causes of meningitis, including viral and bacterial infections. There is a vaccination for the Type C form of the meningococcal bacteria, which is often responsible.

Measles

This is a viral infection that typically causes conjunctivitis, bronchitis, rash and fever. Complications include pneumonia, ear infection, inflammation of the brain, and bad diarrhoea. The virus can also remain in the nervous system, and several years later reactivate to destroy nervous tissue.

Mumps

This is usually a childhood viral infection that causes a mild fever and swelling in the glands in the neck. The infection can also cause meningitis and permanent deafness. If the infection is caught after puberty, mumps may produce inflammation in the ovaries or testicles, which sometimes causes in sterility.

Rubella

This virus is also known as German measles, and is considered a mild virus. However, if it is contracted in the first eight to ten weeks of pregnancy, it can severely damage the unborn child. All women of childbearing age should be vaccinated against this infection. Boys are immunised, too, so that they won't be a source of infection to non-immune pregnant women.

For more information about measles, mumps and rubella, see factsheet "MMR Vaccine".

Tuberculosis

This is one of the most significant infectious diseases worldwide. Most cases are in the developing world, though numbers in the USA and Western Europe are rising, probably due to poor living standards in inner cities, the spread of HIV and drug abuse. Tuberculosis is caused by one of three bacteria, and most commonly affects the lungs and the lymph glands. It can also occur in the bowels, kidney, bones and joints and can cause meningitis. Symptoms vary according to the main site of infection, but they almost always include weight loss, fever and night sweats. Antibiotics usually treat it effectively, but it takes six to nine months of continuous treatment. However, meningitis caused by tuberculosis is often fatal.

Further Information

Department of Health - Central Health Education Unit
http://www.cheu.gov.hk/eng/info/family_05.htm

World Health Organization
http://www.who.int/health_topics/infectious_diseases/en/

National Center for Infectious Diseases
http://www.cdc.gov/ncidod/index.htm

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