**Chapter 1**

**The History of Vaccines and How They Work**

# **The History of the Vaccine**

(Figure 1.1) A time line of the important vaccines that shaped the future of medicine starting from 1796 to 2010. [1]

The Beginning:

Vaccines are an important part of what makes life possible. When vaccines weren’t readily available as they are now life expectancy was very short. One important part of human history was when the small pox vaccination was invented by Edward Jenner in 1796. He inoculated a 13 year-old-boy with vaccinia virus (cowpox), and it demonstrated an immunity to smallpox. This was very important to the start of vaccination history. Though vaccines weren’t invented in 1776, Buddhist monks would drink snake venom to confer immunity to snake bites during 17th century China. They became more prominently known and practiced starting in 1776 with the smallpox vaccine.

The Polio Vaccine:

The polio vaccine was the turning point for life. Polio is a very deadly an infectious disease the can affect a person’s brain and spinal cord causing paralysis (which is the inability to move), in a person’s body. In 1954 the first inactivated polio vaccine was produced by Jonas Salk inactivated means that there are particles of the bacteria or virus that are dead, there have been 2 paths of vaccine development: attenuation, which is reducing the effect in something and inactivation. These particles are then placed into the vaccine for use. The OPV (oral polio vaccine) vaccine was produced which was used to decrease the severity of the disease, and with the discovery of IPV (inactivated polio vaccine) and OVP, they were then mixed together and used as a single vaccine instead of two separate ones. After the release of the polio vaccination the virus became mostly eradicated in first world countries, but it still prevalent in third world countries today. History has not always been very kind to the manufacturing of the vaccine the late 1970s and 1980s marked a period of increasing litigation and decreased profitability for vaccine manufacture, which led to a decline in the number of companies producing vaccines it was simple that vaccines were simply not getting made. This posed as a threat to everyone because of the young children who have not been vaccinated yet either because they were too young or there just simply weren’t enough vaccines.

What is a Vaccine:

A vaccine is a product that sends antibodies to provide an immunity to certain diseases. They can either be called a vaccination or an immunization. The latter is a more inclusive term because it implies that the administration of an immunologic agent actually results in the development of immunity. A person’s immune system is one of the most important parts of the body. It allows for a person to fight off disease or infections. Without the immune system people would be dying of influenza and every type of disease or infection that entered a person’s body. When a person gets vaccinated this allows the immune system to get introduced to the disease or sickness and learn how to repel the disease. A vaccine can only work, however, if it is used in what is called herd immunity, whereby even those offered less protection from a particular vaccine, or who may be allergic or otherwise unable to receive a vaccine, may still be protected because they are surrounded by a community far less capable of harboring an epidemic, in totality when people don’t get vaccinated this causes problems for people whom are maybe allergic to the vaccine and or babies who are not yet old enough to be vaccinated. They are more likely to contract diseases such as mumps or measles that would technically not be a serious virus. Some people don’t want their children to be vaccinated because of the myths that vaccines cause autism, pump chemicals into their bodies and they were only invented to make money, but these myths are simply myths. Vaccines do not cause autism. All the data shows that the original link between the measles, mumps, and rubella (MMR) vaccine and autism is simply not true. Usually autism starts to show in children around the time that they are first vaccinated with the MMR vaccine and that is one reason that people believe they are linked. Refusal of parents to vaccinate their children has been heavily implicated in the ongoing mortality associated with epidemics in the United States. These vaccines are not the actual disease itself, but in fact they are essentially a pathogen-imposter they are put into the immune system for the body to get used the disease and learn what it is, so when the disease shows itself again it can then be expelled and in some cases not cause symptoms at all.

T-cells and B-cells:

The immune system is like a memory card that backs up things on a computer. When a new file is added it then reads what is new and stores it inside its memory. Then if something were to happen, like a virus on the computer or a spill, that would ruin the hard drive in which the backup has the file stored. This is the same way the immune system is. All different parts of the immune system work to store data that the body intakes daily, either from the things people eat or a new area they’ve been exposed to. B-cells are the first to activate when a new vaccine is introduced to the body, if the vaccine contains weakened viruses, they enter the cells which are then killed by Killer T cells. B-cells are also a part of the adaptive immunity which is the immunity someone develops over time. These B-cells make the specific antibodies that target the antigen or the foreign substance in the body and then the T-cells help make this happen. B-cells are also found in the blood stream and they mature into plasma cells and memory cells for a faster response to the foreign body, what follows is the development of memory cells (B, T helper and killer T) that memorize the vaccine antigen and recognize the real pathogen for in the future. The T-cells are a part of the cell mediated immunity and the humoral immunity of the body, the cytotoxic T-cells or the killer T cells destroy the infected body, the virus. The B-cells help with the memory while the T-cells help get rid of the virus in the body.

Antibodies:

When a vaccine is introduced to the body it may take several days for the antibody to be seen in the blood stream. This is because this is the first encounter that the immune system has had with the vaccine. With a secondary encounter with the disease or a booster shot, the immune system already has memory of the disease so it would only take a couple hours for the antibodies to appear into the blood stream. People that are immunocompromised have an immune system that isn’t working how it should, with secondary immunocompromised people most immunodeficiencies affect the adaptive immune system. This makes it difficult for the body to make antibodies to attack the foreign body or virus. Antibodies are very important to the immune system. If there is no way to make antibodies for a certain type of disease or infection the chance that the sickness will go away quickly is very slim.

Why are Vaccines Important:

Vaccines are highly important. They allow people to freely live a life without the worries of contracting a disease that could leave them neurologically damaged or physically damaged. Vaccines are not the thing to be afraid of, but rather the disease a person could catch if they aren’t vaccinated should be the concern. Not only is it important for people who have a normal immune system to get vaccinated for their own benefit, but for the benefit of the other people who are immunocompromised due to such factors as cancer or HIV and babies who are not old enough to be vaccinated. Vaccines aren’t always about the individual, but rather about the entire community.

References:

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