**Vaccine and Immunity Extended Response**

**Definitions**

Antigen: any substance capable of causing a specific immune response. Proteins on surface of cell

Antibody: a substance produced in response to a specific antigen. Combines with the antigen to neutralise it or destroy it

Immunisation: programming the immune system so that the body can respond rapidly to infecting micro-organisms. Can occur naturally or artificially

Vaccination: the artificial introduction of antigens of pathogenic organisms so that the ability to produce the appropriate antibodies is acquired without the person having to suffer the disease

Antiserum: a blood serum containing antibodies against specific antigens, injected to treat or protect against a specific disease

Active immunity: A person produces antibodies after exposure to an antigen, immune response

Passive immunity: when the person is given antibodies produced by someone else

Natural immunity: Normal exposure to antibodies or antigen without human intervention

Artificial immunity: deliberately giving a person an antibody or antigen

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|  | **Natural** | **Artificial** |
| **Passive** | Antibodies enter the bloodstream across the placenta or in breast milk | Antibodies are injected into the bloodstream |
| **Active** | Ability to manufacture antibodies results from an attack of a disease | Ability to manufacture antibodies results from being given an antigen by vaccination |

**Types of vaccines**

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| **Type of vaccine** | **Description** | **Example** |
| Living attenuated micro-organism | A living micro-organism with less ability to produce disease symptoms. Can be produced using recombinant DNA technology. | Polio  Measles  Mumps  Yellow fever |
| Dead micro-organisms | Contains dead micro-organisms. Immunity produced this way is not usually as prolonged as when using living attenuated micro-organisms | Typhoid  Cholera  Whooping cough |
| Toxoids | A toxin from a pathogenic micro-organism which is no longer toxic but still has antigens on its surface for vaccine use | Diphtheria  Tetanus |
| Sub-unit | A fragment of the organism is used to provoke the immune response | HPV  Hepatitis B |

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| **Type of vaccine** | **Positive** | **Negative** |
| Dead micro-organisms | **Cholera** vaccine gives good protection against the disease | Every 1 in 1 million children vaccinated with dead **whooping cough** bacteria  dies from damage to the nervous system  **Cholera** is only effective for a short period of time |

\*note, there are only positives and negatives for dead micro-organism

**Recombinant DNA**

* DNA that has been formed artificially by inserting or changing the DNA in the micro-organism
* Used in 2 different ways

1. Slightly changing the DNA in the micro-organism’s cell so that the pathogen is less virulent
2. Insert DNA sequences from the pathogen into harmless bacterial cells. The chosen DNA sequences causes the production of antigens that are characterised with the pathogen

* Developers of modern vaccines will use this more because the vaccines created have no longer the potential to cause disease

**Herd Immunity**

* A type of ‘group immunity’ that occurs when such a high proportion of the people in a population are immunised so people who aren’t immunised are also protected.
* This is important for young infants because it greatly reduces illness in them and also prevent the spread of infectious diseases.
* Immunocompromised refers to in which the immune system's ability to fight infectious disease and cancer is compromised or entirely absent. (impaired immune system)
* If a child is immunocompromised and a high proportion of infants have received a vaccination for a specific pathogen then the immunocompromised will also be protected from it.

**Social/Economic/Cultural Influence Participation**

*Social*

* In developing countries, parental education is poor
* The level of education of women has a significant influence on vaccination rates of children
* Parents may be aware of the benefits of vaccinations, but the cost might be too much
* In Australia, the internet and media are sources of misinformation about the risks and benefits of immunisation

*Economic*

* In Australia most immunisations are free
* However, in other countries this may not be the case
* The economic circumstances of an individual may prevent participation
* In developing nations, average income level is low

*Religious*

* Religion is a reason why some Australian parents refuse to immunise their children
* None of the major religions in Australia oppose this however (Christianity, Muslim and Jewish)
* This is often not the case in other countries
* Christians in Nigeria have an immunisation rate of 66% whilst Muslims only have a 32% immunisation rate
* In many places traditional medicine is considered superior to evidence-based medicine