

LIFE SCIENCES 11

VIRUSES & VACCINATIONS

History

- Variolation
 - first method used to immunize a person against smallpox (*Variola*)
 - oldest recorded use in China and India in 15th century
 - use of powdered dried scabs taken from a recently infected or variolated person blown into the nostrils of a healthy person
 - use of fluid from pustules of an infected person put into cuts or scratches on the arm recorded from the 17th century
 - introduced to England in 1721 by Lady Mary Montagu (had her son variolated in Constantinople in 1718, then her daughter in England)
 - usually resulted in a weakened infection (death rate dropped from 20-30% to 2-3%)
- Vaccination
 - first documented use by Edward Jenner
 - used cow pox to vaccinate against small pox
 - similar enough to small pox to activate the same immune response, but not deadly like small pox

How Traditional Vaccines Work

- vaccines are made by using a weakened or deactivated strain of a virus (or bacteria) and then injecting it into a person
- this can be done 4 ways
 1. change the genetic material so that it replicates poorly – called an attenuated virus
 2. destroy the genetic material so the virus can't replicate
 3. remove the genetic material so the virus can't replicate
 4. purify the toxin from a bacteria, and then deactivate the toxin, so that it can't harm the person
- the immune system identifies the foreign particle (called an antigen) and creates the antibodies required to fight off the infection
- immune system makes memory cells of how to fight off the virus so it responds faster in infected later on

mRNA Vaccines

- inserting genetic code so that some normal white blood cells produce the same identification markers as the virus has
- body produces antibodies to attack cells with the viral marker
- body makes memory cells of how to fight the virus

Community (Herd) Immunity

- if enough people are immunized against a pathogen, the chance of an outbreak is so low that even people who are not immunized become protected
- protects people who have allergies to vaccines
- without enough hosts to maintain a foothold, the virus or bacteria will eventually die out