

## ***Pathogens - viruses***

### ***Hepatitis B***

**Type of pathogen:** dsDNA enveloped virus

**Modes of transmission:** exchange of bodily fluids, blood transfusion, maternal transmission.

**Info:** Hepatitis B virus infects the liver and can cause a short term acute infection or a long term chronic infection. It is estimated that 2 billion people worldwide have evidence of current or past infection of hepatitis B, including more than 250 million chronic carriers and more than 600,000 deaths.

### ***Rotavirus***

**Type of pathogen:** dsRNA non-enveloped virus

**Modes of transmission:** Oral-Fecal transmission

**Info:** Rotavirus is a highly contagious and a very common cause of diarrhea in infants and children worldwide. It's estimated that before the introduction of the rotavirus vaccine, almost all children encountered the virus at least once before the age of five. While the death ratio of the virus is low, the severe diarrhea, vomiting and fever could cause serious complications and life-threatening dehydration.

### ***Measles***

**Type of pathogen:** (-) ssRNA enveloped virus

**Modes of transmission:** Airborne

**Info:** Measles is a highly contagious respiratory infection caused by the measles virus. Notorious for its red, full-body rash, infection with the virus actually starts with flu-like symptoms and fever that can last for several days. Two or three days after the infection, small white spots may appear inside the mouth with the infamous rash only appearing at day three to five. Complications with the disease are fairly common [30%] and to this day, measles remains the leading cause of vaccine-preventable deaths in the world [WHO].

### ***Mumps***

**Type of pathogen:** (-) ssRNA enveloped virus

**Modes of transmission:** Airborne

**Info:** The mumps virus is a highly infectious human pathogen that primarily infects the salivary glands and causes them to swell and ache. The incubation time for the virus (the time from infection until the first symptoms appear) is fairly long with symptoms appearing only 16 to 18 days post infection. That being said, infected individuals become contagious seven days before the onset of the symptoms, allowing them to spread the virus unknowingly.

## ***Rubella***

**Type of pathogen:** (+) ssRNA enveloped virus

**Modes of transmission:** Airborne

**Info:** Rubella, often referred to as German measles, is a contagious respiratory viral infection caused by the rubella virus. The disease is somewhat mild for most infected individuals with symptoms ranging from fever, sore throat, swollen lymph nodes to a mild rash. However, congenital rubella syndrome may occur in developing babies whose mothers are infected with the virus. These babies may suffer from birth defects such as deafness, cataracts, heart defects and brain damage.

## ***Varicella zoster***

**Type of pathogen:** dsDNA enveloped virus

**Modes of transmission:** Airborne

**Info:** The varicella zoster (VZV) virus is the causative agent of the chickenpox disease, a highly contagious illness manifesting as a skin rash that forms itchy blisters. Less characteristic symptoms may include fever and headaches with complications that can cause pneumonia, inflammation of the brain and bacterial skin infections.

VZV belongs to the herpesvirus family and as such, the virus will often remain dormant in the body even after the initial disease is resolved. Consequently, at an older age, when the immune system begins to deteriorate, the virus may reactivate causing a somewhat similar but more localized illness called shingles.

## ***Human papillomavirus***

**Type of pathogen:** dsDNA non-enveloped virus

**Modes of transmission:** Exchange of bodily fluids

**Info:** HPV is the most common sexually transmitted infection as most sexually active individuals get it at some point in their lives. For most people, the infection will go unnoticed, while some may suffer from genital warts. Nearly all [cervical cancers](#) are due to HPV (subtypes, HPV16 and HPV18 account for 70% of the cases). HPV is associated with a variety of other cancers as well.

## ***Pathogens - bacteria***

### ***Diphtheria***

**Type of pathogen:** a gram positive bacterium - *Corynebacterium diphtheriae*

**Modes of transmission:** Airborne

**Info:** Diphtheria is a serious bacterial infection of the mucosal membranes of the nose and throat. Infections manifest as a sore throat, fever, swollen glands and weakness and can cause a blockage of the airways. If left untreated, the infection can progress to the heart and kidneys and even cause nerve damage. The morbidity is caused by a toxin secreted by the bacterium.

### ***Tetanus***

**Type of pathogen:** a gram positive bacterium - *Clostridium tetani*

**Modes of transmission:** Direct contact - bacterial spores enter through cuts and abrasions of the skin

**Info:** A rod-shaped, anaerobic (does not require oxygen for growth) bacterium mostly found as spores in soil, the gastrointestinal tract of animals and dust. This pathogen can enter the body through breaks in the skin, often caused by a contaminated object. Once inside, the bacteria begins to produce the Tetanospasmin toxin that interferes with muscle contractions.

### ***Pertussis***

**Type of pathogen:** a gram negative bacterium - *Bordetella pertussis*

**Modes of transmission:** Airborne

**Info:** *B. pertussis* is a small immobile coccobacilli – a bacterium with an intermediate shape between a sphere (cocci) and a rod (bacilli). This pathogen can only infect and reproduce in humans and it's the causative agent of whooping cough – a severe and highly infectious respiratory infection. While antibiotics can be used to treat the disease, they are only effective if taken shortly after the infection, while the vaccine can provide a life-long protection if administered at a young age.

### ***Haemophilus influenza***

**Type of pathogen:** a gram negative bacterium - *Haemophilus influenza*

**Modes of transmission:** Airborne (direct contact with respiratory secretions)

**Info:** *Haemophilus influenza* is a coccobacillary, facultatively anaerobic (can grow with or without oxygen) bacterium that naturally live in our nose and throat and usually causes no harm. However, if it invades the blood, lungs or brain, it can cause a serious infection which can lead to brain damage, hearing loss and even death.

## ***Pneumococcal pneumonia***

**Type of pathogen:** a gram positive bacterium - *Streptococcus pneumoniae*

**Modes of transmission:** Airborne (direct contact with respiratory secretions)

**Info:** The bacterium *S. pneumoniae* naturally inhabit our respiratory tract, sinuses, and nasal cavity, often without causing any harm. Having said that, in individuals with weak or compromised immune system, the bacteria can become pathogenic and cause pneumonia, meningitis, septic arthritis, or osteomyelitis.

Historically, in 1928, *S. pneumoniae* was used by Frederick Griffith to demonstrate that DNA is the genetic material.