# luSummary of 4 Pathogens

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| Pathogen group | Diseases | Structural features | Reproduction & other unique features | Diagram |
| Virus | Influenza Ross River virus  Viral diseases of honeybees  Australian bat lyssavirus | Nucleic acid – DNA or RNA – enclosed in a protein coat (capsid) Contains proteins which can recognise and bind to receptors on a host cell  Very small – 30-300 nm in length  no cell organelles  can be enveloped – phospholipid bilayer surrounds virus 🡪 infects eukaryotes | Metabolically inert – no cellular machinery  * Requires taking control of a host cell to be able to replicate – obligate parasite | General structure of a virusEnveloped virus |
| Bacteria | Tuberculosis Tetanus  Crown gall of plants | Prokaryotic Unicellular  No membrane-bound organelles  Organelles present include ribosomes  No nucleus – singular circular chromosome found in nucleoid region, can have plasmids  Microscopic – 1 to 10 um long  Cell wall and plasma membrane is made of peptidoglycan (amino acids and sugars) | Reproduces asexually by binary fission |  |
| Fungi | Chytridiomycosis | Eukaryotic Membrane-bound organelles  DNA enclosed in nucleus  Cell wall is made of chitin  Can be unicellular or multicellular | Reproduction via spores |  |
| Protist | Malaria Phytophthora dieback | Eukaryotic Mostly unicellular  Membrane-bound organelles  DNA enclosed in nucleus  Some have cell walls – if they do they are made of cellulose | Can reproduce asexually or sexually, depending on the protist |  |

# Summary of 10 Diseases

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| Disease | Pathogen Type | Pathogen Name | Incubation period of Disease | Symptoms of Disease | Mode/s of Transmission | Life Cycle Specifications[portal of entry, site(s) of replication (sexual/asexual reproduction), reservoir(s), portal of exit] |
| Influenza | Enveloped RNA virus | Influenza A, B or C | 1-4 days | Symptoms last for up to 2 weeksHigh fever Coughing  Muscle aches and pains  Sore throat  Runny nose  Severe fatigue  Vomiting and diarrhoea (in children) | Direct via close contact to airborne droplets containing influenza virusdirect via direct contact of infected host’s bodily fluids Indirect via fomites, aerosols | Reservoir: Human hostEntry and exit via respiratory system – coughing, sneezing Replicates inside epithelial cells of the respiratory tract |
| Ross River virus | Enveloped RNA virus | Ross River virus Genus: alphavirus | 1-3 weeks | Most people recover completely within 3-6 months, but some people can have symptoms lasting for more than a year, or reoccurring symptomsRash on limbs for 5-10 days Painful and swollen joints lasting for months  Fever and headache  Fatigue | Indirect via vector – pregnant female mosquito containing the Alphavirus  * Aedes vigilax * Aedes Camptorhynchus * Culex annulirostris | Reservoir: marsupials eg. wallabies   * Preganant female mosquitoes feed on marsupial reservoir and take in Alphavirus   Replicates in the epithelial cells of the mosquito vector Entry to human via skin –virus migrates to mosquito salivary glands and is injected into human bloodstream when mosquito feeds Replication in muscle cells of human host  Symptoms occur when virus re-enters bloodstream  No exist from human host unless mosquito bites infected human |
| Honey bee viruses: deformed wing virus | Virus | Deformed wing virus |  | Deformed wings Early death of pupae  Infected bees can also be asymptomatic | Indirect via varroa mite vector Direct via vertical transmission from queen bee to offspring | Entry and exit via skin – blood feeds from varroa mite vectors Replicates in bee |
| Honey bee viruses:Sacbrood Disease | Enveloped RNA virus | Sacbrood virus Genus: Ifavirus |  | Adult bees stop eating pollen and become foragers, collecting nectar instead Larvae display unusual behaviour – turn onto backs and lie stretched out with their heads lifted  Skin hardens and fills with fluid | Indirect via foodborne  * If infect adult honeybees collect pollen, it is contaminated * Vector nurse bees bring contaminated food to larvae – hypopharyngeal glands (produces food) are infected   Direct via dead infected larvae and their bodily fluids – fluids in larvae skin, scales | Entry via ingestion of contaminated foodReplicates in larvae cells Exit via corpse |
| Australian Bat Lyssavirus | Enveloped RNA virus -cylindrical shape | Australian bat lyssavirus Family: Rhaboviridae | 27 days to 21 months | In humans:Flu-like headache Fever  Fatigue  Paralysis  Delirium  Convulsions  Encephalitis – inflammation of the brain  Death  In bats:  Paralysis  Weakness  Tremors  Seizures  Infected bats can be asymptomatic | Direct via direct contactwith bat reservoir/vector bodily fluids, through a bite or scratch | Reservoir: flying foxes( fruit bats) and some species of microbats  * Replication in bat reservoir (nervous system)  Entry via site of bite/other break in skin/mucous membranes – saliva of infected bat enters human body Replication in infected human host before travelling along nerves to the central nervous system  No exit from human host |
| Tuberculosis | Rod-shaped bacteria | Mycobacterium tuberculosis | 3-9 weeks TB can stay dormant in the body for months or years as latent TB | Usually impacts the lungs, though it can cause disease in any part of the body Cough persisting for over 3 weeks with no improvement  Blood-stained sputum  Fevers  Night sweats  Unexplained weight loss  Constant fatigue  Loss of appetite  Pain and/or swelling in the affected area | Direct via close contact to airborne droplets containing the bacterium Indirect via aerosols, fomites  Direct via direct contact with infected host’s bodily fluids eg. phlegm | Reservoir: infected human host – can be active or domant Entry and exit via respiratory system – coughing, sneezing  Replicates inside infected macrophages, lung tissue |
| Crown Gall Disease | Rod-shaped bacteria | Agrobacterium tumefaciens |  | Tumour-like growth at the crown area – around stem and roots Affects plant growth – plant wilts, experience stunted growth  death | Direct via direct contact with the roots of infected host Indirect via soil-borne – bacteria spores have flagella and can move through water in soil | Reservoir: infected plants - gall Entry via wound in plant (susceptible host)  Replicates in wounded plant cells whose genomes have been permanently transformed |
| Tetanus | Rod-shaped bacteria | Clostridium tetani |  | Symptoms begin 3-21 days after infectionRigidity Painful fits lasting for minutes  Muscle contractions and spasms particularly in the face and neck  ‘lockjaw’/trismus – muscles contract and can’t relax – can’t open mouth  Difficulty swallowing and breathing  Heat problems and fever  death | Direct via direct contact with soil reservoir | Reservoir: soil, rusty nails, dog’s teeth, animal intestines and faeces, house dust Entry via deep wound in skin – hypoxic conditions  Replication in deep hypoxic wound – produces toxins  No exit from human host |
| Chytridiomycosis/ amphibian chytrid fungus disease | Fungi | Bactrachochytrium dendrobatidis (BD) | 2-10 weeks | Lethargy Extension of hind legs from body  Abnormal behaviour eg. sitting in shade instead of sun  Loss of appetite  Skin thickens, hardens and sheds  Death 2-3 days after the onset of symptoms | Indirect via waterborne zoospores Direct via skin to skin contact with infected amphibian | Reservoir: skin of infected amphibians Entry via skin  Replicates in zoosporangia in amphibian skin  Exit via zoosporangia discharge tubes in amphibian skin |
| Malaria | Protist – animal-like – protozoa/ protozoan | Plasmodium falciparum Plasmodium vivax  Plasmodium ovale  Plasmodium malariae  Plasmodium Knowles | 7 – 18 days Plasmodium vivax and ovale can remain dormant for up to a year | Fever Headache  Chills, shaking, shivering  Sweating  Vomiting  Anaemia  Liver and kidneyfailure  Muscle aches  Nausea  Death  Jaundice  Cerebral malaria – swelling of the brain  Acidosis  Enlarged spleen  Pulmonary oedetra | Indirect via pregnant female mosquito of genius Anopheles Rare: direct via direct contact with bodily fluids of infected human host eg. blood transfusions, sharing of needles | Reservoir: mosquito Entry via vector biting human – protist in saliva in sporozoite form  Replicates in human liver cells – sporozoites develop into merozoites   * Merozoites invade red blood cells * Some merozoites can develop into gametocytes   Exit via vector biting human – mosquito takes in gametocytes  Replicates in the gut of mosquitoes |
| Phytophthora dieback | Protist – plant-like | Phytophthora cinnamomi |  | Root rot Death of plant from top down | Indirect via soil-borne – spores can remain dormant for a long time in soil Direct via root to root contact with infected plant | Reservoir: infected plants, soil Entry via roots  Replicates in mycelium in roots  Exit via spore sacs or chlamydospores, depending on suitability of conditions |