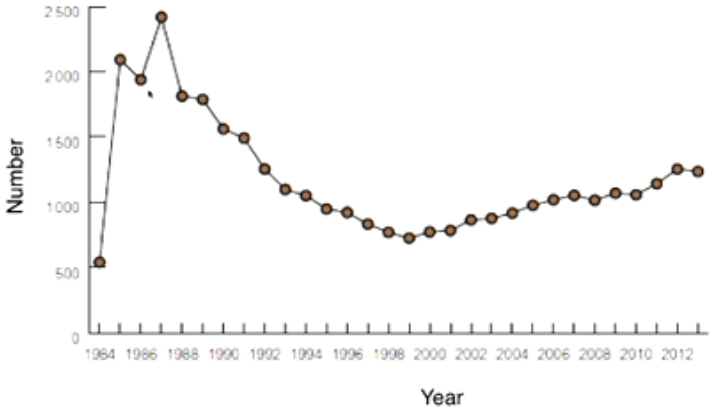
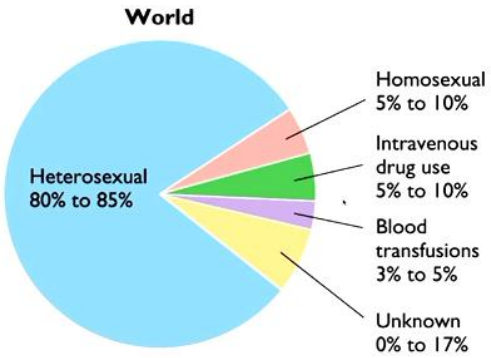
- Pandemics
  - Global outbreaks of infectious disease
  - Major historical pandemics include: typhoid, plague, smallpox, cholera, 1918 Spanish flu, tuberculosis, malaria
  - Major current pandemics: HIV/AIDS, tuberculosis, malaria
    - Mortality changes from area to area
- **Epidemiology of HIV**
  - Risk groups vary across the world
  - Strategies used to treat/prevent those affected differ in different countries
  - Availability of treatment has allowed for a dramatic decrease in new infections and mortality rates in countries across the world
  - Australia; rapid increase in new infections in the mid 90's (test for HIV became available around this time) and then a steady decline in new diagnoses until 2000, leading to a steady rate of transmission
    - This may be because most transmissions occur amongst people who haven't been tested/don't know that they are effected and because transmission occurs early in the course of HIV infection (high rates of transmission)
    - Note: about 20% of infections are newly acquired – within last 6 months



  - Newly diagnosed vs newly acquired – hard to tell
    - Are we catching up on old cases or are we having new cases?
    - **Newly acquired**: infection diagnosed in a patient who has had a negative HIV test in the past 6 months
    - **Newly diagnosed**: positive result in a patient whose time of acquiring the virus is not clear as there are no recent negative results
- **Diagnosis** by exposure category (**Australia**)
  - Homosexual (gay) sex is the major cause of HIV transmission
  - Injecting drug use
  - Heterosexual contact (least common cause of HIV transmission)
  - Note: Risk factors for HIV differ **globally** →→→



LECTURES 4-6: MALARIA **MODULE 1 - PANDEMICS**

- Pandemic:
  - Outbreak of infectious diseases
    - An epidemic occurring on a scale that crosses international boundaries
    - Usually effects a large number of people
  - Major historical pandemics: typhoid, plague, smallpox, cholera, 1918 Spanish flu, TB, malaria
  - Major current pandemics: HIV/AIDS, TB, malaria
    - Drug resistant malaria – spread all across the globe
  - Infectious diseases responsible for 19% of child mortality

- History of malaria:
  - Ancient problem
    - First described by Hippocrates
  - Most lethal infectious organism in history
  - Still a major problem
  - Discovery in the blood - 1880
  - Discovery of transmission by mosquitos – 1897

- *Plasmodium* species:
  - ***P. falciparum***
    - Causes majority of severe malaria disease and death
    - Population at risk: 2.2 billion
    - Largest burden in parts of Africa
  - ***P. vivax***
    - Increasingly recognised as a cause of severe illness
    - Population at risk: 2.6 billion
    - Dormant liver stage
    - Hardly any burden in Africa – widespread mutation present in Africa provides resistance – P. vivax unable to enter host cells
  - *P. ovale* and *P. malariae*
    - Limited distribution, mild disease
  - *P. knowlesi*
    - Zoonotic infection, can be severe
    - Present in macaques throughout SE Asia
    - Mosquitos pick up the infection from macaques, and then transfer it to humans
  - Note: two most important causes of human malaria – *P. falciparum, P. vivax*
    - Share a lot of similarities, share many common genes, but cause quite different diseases

Lectures 7-12 – MUSCULAR DYSTROPHY
MODULE 2

- **Muscle diseases**
  - Muscle tissues consist of highly specialised cells – fibres – which contract to actively generate force
  - Shortening of muscles moves joints, resulting in motion
  - Muscle tissue therefore enables both motion and maintenance of posture
  - Muscle tissue also engenders heat production
    - One of the major producers of heat in the body
  - Based on structural and functional characteristics, muscle tissue is classified into three types:
    - Cardiac
    - Smooth
    - Skeletal
  - Muscle disorders affect one or more of these tissue types
  - As a general term, ***myopathy*** refers to a disorder of muscle – can be genetic or acquired
  - **Congenital myopathies** are genetic disorders of the muscle contractile apparatus, with characteristic pathologic changes which do not generally change greatly over time, i.e. are usually **static**
  - Genetic disorders of muscle **supporting structures** – such as sarcolemmal proteins and proteins which anchor the contractile apparatus in place – **cause *muscular dystrophies***
  - Dystrophies are **usually** *progressive* disorders in which muscle pathology is characterised by degeneration and regeneration of muscle fibres

- **Skeletal muscle structure**
  - By definition: attached to bone
  - Can be made to contract or relax under conscious (**voluntary**) control
    - Extra-ocular (around eyes), limbs, truncal
  - It is **striated** – i.e. fibres (cells) contain alternating light and dark bands (striations) perpendicular to their long axes
  - Skeletal muscle fibres vary in structure and function
    - Variable colour depending on myoglobin content
      - **Myoglobin** – protein which stores oxygen for mitochondria
    - Fibres contract with **different velocities** depending on their ability to **split ATP**
    - Variable **metabolic processes** are used to generate energy
  - Each muscle belly is made up of muscle cells (**fibres**)
  - Each individual fibre consists of a membrane (**sarcolemma**) containing muscle tissue (**myofibrils**) and **sarcoplasm**
  - **Myofibrils** are surrounded by **sarcoplasm** and together make up the **contractile components** of muscle
  - Muscle fibres are **striated** and **multinuclear**, and grouped into bundles called ***fasciculi***
  - Fibres within each bundle are surrounded by connective tissue called **endomysium**
  - Each **fasciculus** (bundle) is surrounded by connect tissue called **perimysium**