

## Phagocytosis

- **chemoattractants** attract phagocyte to pathogen
- phagocyte **binds** to pathogen
- pathogen **engulfed** by phagocyte and isolated in a phagosome
- lysosomes within phagocyte **migrate** to phagosome
- lytic enzymes released into phagosome by lysosome, and **digest** pathogen
- break down products of pathogen released by **exocytosis** or displayed on surface of phagocyte
- attraction - bind - engulf - migrate - digest - exocytosis
- all - birds - enjoy - mashed - dolphin - ears
- innate and non-adaptive immune system

## Cell Mediated Response

- macrophage engulf pathogen and present antigen
- T helper cells recognise antigen and are activated
- many T cells divide by mitosis - army of undifferentiated clones
- 1. **cytotoxic T cells** - destroy pathogen and infect cells using perforin - only kill if infected
- 2. **T Helper Cells** - activate T and B cells (secretes chemicals)
- 3. **Memory T Cells**
- 4. **T suppressor Cells**

## Humoral Response

- B cell with complementary antibody attach to antigen - enters B cell by endocytosis and is presented on the surface
- T Helper cells bind to antigen and stimulate B cells to divide by mitosis
- 1. B cells become larger and produce **plasma B cells** - make antibodies
- 2. **memory B cells** remain in blood
- clone of B cells produced - all produce antibody specific to foreign antigen - clonal selection

## Antibodies

- glycoprotein, immunoglobulin
- **AGGLUTINATION** - antibodies cause microbes to stick together, easier for phagocytes to engulf them - stop reproducing/producing toxins and can be eaten all together
- **NEUTRALISATION** - antibodies neutralise toxins made by pathogens. Formation of antigen-antibody complexes stops reproduction and production of toxins
- **OPOSINISATION - COMPLEMENT CASCADE** - binding of antibody to surface of pathogen starts chain reaction with blood proteins, pathogen swell and burst. Holes poked in membrane which cause water potential to change so membrane falls apart

## Active Immunity

- antibodies made through immune response
- long term immunity
- **natural** - acquired infection
- **artificial** - vaccination i.e. influenza

## Passive Immunity

- antibodies passed onto individual
- short term immunity
- **natural** - mother to infant (placenta and breastmilk)
- **artificial** - vaccination containing antibodies once exposed (rabies / tetanus)

## Elisa Test

- antibodies detect presence and quantity of protein in sample - sensitive
- detect HIV, drug and allergen tests
- amount of antigen present relative to intensity of colour which develops



