Immunology – Antibody Isotypes

- Light chains (only one kind on a single molecule) — amino acid variation
  - kappa (κ) (60%)
  - lambda (λ) (40%)
- Different light chains → different antigenic specificities
- Variable C-regions (heavy chains) → Isotypes
  - α (IgA)
  - γ (IgG)
  - ε (IgE)
  - δ (IgD)
  - μ (IgM)

Further variability → leads to subclasses

Important points

1. Antibodies belonging to same isotype can have different specificities
2. Isotype switch – antibody with same specificity can maintain or change isotypes

IgG (Immunoglobulin G)

- most abundant in serum (80%)
- 2 γ heavy chains + 2 κ or λ light chains
- 4 sub-isotypes - IgG1, IgG2, IgG3, IgG4 → based on serum conc.
  - → encoded by 4 different C_H genes, (90-95% homology)
  - → differentiated by size of hinge region & no. of & position of S-S disulphide bonds between heavy chains

Activity :

1. IgG1, IgG3, IgG4 - protect developing foetus
2. IgG3 > IgG1 > IgG2 >> IgG4 → complement activation
3. IgG1 & IgG3 > IgG4 > IgG2 → affinity for F_C receptors and mediating opsonisation

IgM (Immunoglobulin M)

- 5-10 % of total serum antibody
- pentamer-forming - held by disulfide bonds
- expressed as membrane-bound antibody on B cells
- first to be produced in primary response to antigen
  - ↳ higher valency due to 10 antigen binding sites
  - ↓
  - more efficient in binding antigens with many repeating epitopes (viral particles & RBCs) (agglutination)
- more efficient at activating complement than IgG; because F_c regions are in closer proximity due to complement activation
- does not diffuse well because of ↑ size => very ↓ conc. in ICF
- Additional joining chain (J-chain) bound to 2 F_c regions → allows IgM to bind to receptors on secretory cells
  - ↓
  - carried across epithelial barriers to external secretions that bathe mucosal surfaces

- Secretory immunoglobulin
- first to be secreted by the neonate.