Q16 List the constituents of plasma and the functions of plasma proteins (Sept 2012)

Plasma comprises about 18% of extracellular fluid, or 5% of bodyweight
It is the noncellular part of the blood, being about 60% of blood volume. It is 93% water, 6% proteins and 1% other solutes
The constituents of plasma include:

- Water
- Proteins
    - Albumin
    - Fibrinogen
    - Regulatory proteins
        - Coagulation factors
        - Complement proteins
    - Globulins
        - α1 (α1 anti trypsin, α1-fetoprotein, serum amyloid A)
        - α2 (haptoglobin, ceruloplasmin, Protein C, thyroxin-binding globulin)
        - β (transferrin, plasminogen, β2 microglobulin, C-reactive protein)
        - γ (immunoglobulins)
- Nutrients – vitamins, glucose
- Gases – oxygen, CO2, nitrogen
- Hormones
- Electrolytes – Na, K, Cl, Mg
- Products of metabolism – urea, creatinine, nitrogenous wastes,

FUNCTIONS OF PLASMA PROTEINS

- Maintenance of oncotic pressure → capillaries have semi permeable membranes impermeable to large proteins. Bulk direction of flow depends on the interaction of the 4 starling forces NFP = K[(Pc-Pi) – $\delta(\pi_c - \pi_i)$] where k is the diffusion coefficient (surface area x hydraulic permeability) and δ is the reflection coefficient
- Transport/carrier function → hormones, energy substrates, drugs
- Proteolytic → complement, kinins, fibrinolysis
- Coagulation → contains many circulating coagulation factors
- Buffering action → contains HCO3 and CO2 as well as plasma proteins and haemoglobin, all of which have buffering actions
- Enzymes (eg; plasma cholinesterase)
- Immune response → contains immunoglobulins
- Metabolism → albumin and other proteins provide a source of amino acids to tissues for fuel