<table>
<thead>
<tr>
<th>E</th>
<th>Nuts (e.g. peanuts, hazelnuts) Wheat germ oil Sunflower seeds</th>
<th>Antioxidant - prevents damage of tissues by radicals</th>
<th>Peripheral neuropathy Ataxia, skeletal myopathy Disease of the retina immune response ↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Vegetables (e.g. spinach, asparagus, and broccoli) Beans and soybeans Eggs Meat</td>
<td>Blood clotting Increase prothrombin time and slow down the process of blood clotting</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Fish, poultry, meat, eggs, or dairy, fortified cereals, soy and rice milk</td>
<td>Cell metabolism &amp; energy production Limited body storage Low stability – often labile to heat and light Lower risk of toxicity than fat sol. vitamins (For the skin, hair, eyes, immune system)</td>
<td>B12 - anaemia Psychological effects - depression, irritability, and psychosis, memory problems Muscle weakness Sore mouth</td>
</tr>
<tr>
<td>C</td>
<td>Citrus fruits Potatoes Kidney (easily lost when boiled)</td>
<td>Synthesis of collagen, neurotransmitters, and immune Absorption of non-haem iron Prevents the formation of insoluble ferric hydroxide</td>
<td>Bleeding gums. Hyperkeratosis. Petechial haemorrhages. ↓ skeletal strength. Incredibly painful. ≈ 50 – 100 days - scurvy</td>
</tr>
</tbody>
</table>

**Refeeding syndrome**

A metabolic complication that occurs when nutritional support is given to severely malnourished patients, metabolism shifts from a catabolic to an anabolic state.

As insulin is released on carbohydrate intake, triggering cellular uptake of potassium, phosphate, and magnesium, which lead to hypokalaemia, hypophosphataemia, hypomagnesaemia and their symptoms.

To prevent refeeding syndrome, nutrition can only be given at a low rate (including energy, vitamins and minerals), and the state of health has to be carefully monitored (e.g. cardiac rhythm).
| What causes hypoalbuminemia?       | 1. Decrease synthesis - normally due to decrease in liver mass (in diseased livers)  
                                           2. Increased catabolism - Increased breakdown, but at a low rate as synthesis rate > catabolic rate  
                                           3. Increased loss - diseases that causes the GFR to increase, increasing albumin loss; burns - damage to capillary wall + lose proteins  
                                           4. Haemorrhage (bleeding)  
                                           5. Losses through the guts due to enteropathy - unusually permeable to large molecules |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effects of hypoalbuminemia        | 1. Oedema - decreased oncotic pressure, lower pressure pulling water into plasma - more water in interstitial space. The lymphatic system's rate of clearance < fluid flux into interstitial space  
                                           2. Decreased ligand binding - drug kinetics + hormone transport affected |
| Diseases that can lead to hypoalbuminemia | 1. Malnutrition where low grade proteins are consumed - cannot make essential amino acid eg lysine  
                                           2. Liver diseases - loss of hepatocytes/diseased - cannot produce alb.  
                                           3. Renal diseases - through glomerulus and dialysis  
                                           4. Sepsis - increased capillary permeability – possibly due to bacterial endotoxins and cytotoxic T cells |

**Clotting factor**
- With the exception of von Willebrand Factor (VIII), the liver is responsible for the production of all of the coagulation proteins. Many require Vit K for conversion.

**Complement factors**
- The complement system is a part of the immune system that enhances the ability of antibodies and phagocytic cells to clear microbes and damaged cells from an organism.

- It is part of the innate immune system.

- Most of the proteins involved are made in the liver.
Impressions on the liver

Triangle of Calot

Boundaries: Common hepatic duct, cystic duct and liver

Content: Cystic artery