Mechanisms of solute transport: convection and sieving coefficient

**CONVECTION**

In contrast to diffusion, which relies on concentration gradients, convection relies on ULTRAFILTRATION, which in turn relies on PRESSURE.

As there is diffusive flux ($J_d$), so there is CONVECTIVE FLUX ($J_c$)

\[ J_c = Q_f \times C_b \times S \]

- **Sieving coefficient**
  - A sieving coefficient is the measure of how easily a substance passes from the blood compartment to the dialysate compartment in a hemofilter.
  - In physics, it is expressed as

\[ S = \frac{C_r}{C_d} \]

- Thus, a sieving coefficient of 1.0 means the solute is 100% filterable; i.e. in a hemofilter, the solute will equilibrate on both sides of the membrane.
- So... the returning blood and the effluent both have the same concentration (50:50).
  - An example is potassium (sieving coefficient is 1.0)
  - A sieving coefficient of 0 means the solute does not cross the membrane, eg. albumin.
  - Of course, this all depends on the membrane, and sieving coefficients will vary depending on the pore size.

A MIDDLE MOLECULE: anything heavier than 500 daltons, but lighter than albumin.

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