Pharmacokinetics: Volume of distribution

Distribution in the body fluid compartments:

Volume of distribution: $\frac{\text{[amount of drug in the body]}}{\text{[serum concentration]}}$

Volume of distribution is the APPARENT VOLUME in which the drug appears to be distributed, from looking at its concentration. Say, having given 1 gram of something, one is presented with a sample of blood in which there is only 1mg per litre of this drug. If the drug were dispersed in the blood alone, one would be forced to conclude that it has been dispersed in a truly ridiculous 1000 litre bloodstream, in some sort of enormous fluid-filled patient.

So... if the drug is EXCLUSIVELY intravascular, it has a very low volume of distribution

... If the drug is widely distributed and is mainly in the extravascular tissues, the concentration in the serum is very low and the drug has a HUGE volume of distribution.

Generally speaking, drugs with a very high volume of distribution cannot be removed by dialysis very easily.

Volume of distribution depends on
- pKa
- degree of protein binding in the plasma and the tissues
- fatty tissue partition coefficient
  ("lipophilicity" – the degree to which the drug is prone to lodging in fatty tissues)

Volume of distribution changes in
- gender (increases in women - they have more fluid to distribute into)
- pregnancy (increases - pregnant women have even more fluid to distribute in, AS WELL AS more fat)
- disease (anything that messes significantly with the body fluid distribution, eg. ascites)
- age (old people are more "dry" – volume of distribution decreases)