

# Volume OF Distribution

The volume of distribution (V) is defined as: How many liters of plasma are needed to contain the whole dose given of the drug at the current plasma concentration of the drug .

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- Example :

Suppose the drug dose we are giving contain 9 active units of that drug, if we have monitored the abundance of that drug in the plasma and found that the whole body plasma contain only 3 active units of the drug (meaning that the 6 other active units were distributed to the body different tissues) What would the volume of distribution be assuming that the whole plasma volume in the body is equal to 2 Liters?

• Ans:  $VD = 3 \times 2 = 6$  Liters

Clarification  $\rightarrow$  the whole body's plasma (2 Liters) contained  $\frac{1}{3}$  the amount, So how many liters of plasma will be required to contain the whole 9 active units at the same concentration?  $\rightarrow = \underset{\substack{\downarrow \\ 3}}{2} + \underset{\substack{\downarrow \\ 3}}{2} + \underset{\substack{\downarrow \\ 3}}{2} = 6$  Liters  
 $3 + 3 + 3 = 9$  active units  
(The whole dose)

- After that example we should conclude that the volume of distribution is an Apperant volume and not a real one. That's why a drug with a very high distribution to body tissues (Very low concentration of it left in the plasma) would have a volume of distribution that is larger than the whole body volume. (VD is a theoretical concept to measure drug distribution, don't relate or compare it to real body volumes)

High drug concentration in the plasma  $\rightarrow$  Low VD  
Low drug concentration in the plasma  $\rightarrow$  High VD