

Deacon's Challenge

No 175 - Answer

A 60 mg dose of a drug is given to a male experimental subject who weighs 80 Kg. Assuming the drug is completely absorbed and distributed evenly throughout the total body water estimate the potential peak plasma level. If the drug were distributed only within the extracellular compartment what would the plasma level be?

FRCPath, Autumn 2003

$$\text{Plasma concentration (mg/L)} = \frac{\text{Amount of drug given (mg)}}{\text{Volume of body water in which it is distributed (L)}}$$

If the drug is distributed throughout the total body water (approx 60% of body weight):

$$\text{Total body water (L)} = \text{Body wt (Kg)} \times 60/100 = 80 \times 60/100 = 48 \text{ L}$$

$$\text{Plasma concentration} = \frac{60}{48} = 1.25 \text{ mg/L}$$

If the drug is only distributed throughout the extracellular fluid (approx a third of the total body water):

$$\text{Extracellular compartment water (L)} = \frac{\text{Total body water (L)}}{3} = \frac{48}{3} = 16 \text{ L}$$

$$\text{Plasma concentration} = \frac{60}{16} = 3.75 \text{ mg/L}$$

Or more simply as the ECF is a third of total body water the concentration will be three times higher ($3 \times 1.25 = 3.75 \text{ mg/L}$)

Question 176

Blood specimens from 100 healthy volunteers were analysed for a hormone and the data showed a good Gaussian distribution with 95% confidence limits of 35 to 65 pmol/L. The analytical imprecision (CV_a) of the assay is 10%. Calculate the expected 95% confidence limits if the assays had been performed in duplicate (on a single sample from each individual with results expressed as the mean of the duplicate determinations) instead of singlicate.