Pharmacokinetics Laws

1- Fick's Law: $$f = c_1 - \frac{c_2^* A^* P_c}{Th}$$

c_1: The higher conc.

c_2: The lower conc.

A: Area

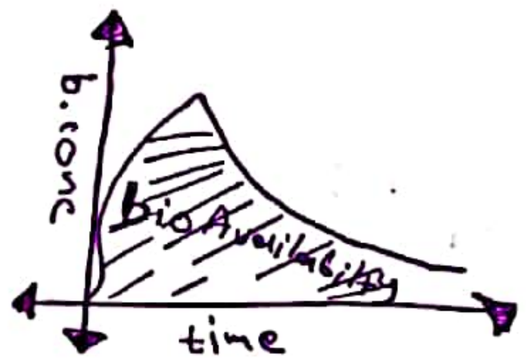
P_c: Permeability coefficient

Th: thickness

2- Henderson-H: $$Log\left[\frac{protonated}{unprotonated}\right] = pKa - ph$$

3- Bioavailability: * The area unde the curve of blood conc. & time *

1-



* $ER = \frac{Cl_{liver}}{Q_{liver}}$

Cl: clearance

Q: blood flow

2- $F = f^*(1 - ER)$

ER:

The fraction of the drug that we lose befor. reaching the circulation.

4- Volume of Distribution (V_d):

$$V_d = \frac{Ab}{C_p}$$

Ab: Amount of drug in the body.

C_p: plasma conc.

5- Clearance : 1. $Cl = \frac{\text{rate of elimination}}{C_p}$

④ Renal Cl: (Cl_R) $Cl_R = \frac{C_u * V}{C_p}$

C_p: conc. of plasma

C_u: conc. of blood in urine

⚠ V: Urine flow rate

*It's not volume

Ⓑ Hepatic clearance (Cl_H):

$Cl_H = \frac{(C_i - C_o) * \text{blood flow}}{C_i}$

$Cl_H = Q * ER$

C_i: blood conc. enter the liver.

C_o: blood conc. leave the liver.

Q: blood flow

6- Rate of elimination: (zero order) $R = \frac{V_{max} * C}{K_m + C}$

V_{max}: maximal elimination capcity

K_m: drug conc. at $\frac{1}{2} V_{max}$

C: drug conc.

7. $t_{\frac{1}{2}} = \frac{0.693 * Vd}{CL}$

$t_{\frac{1}{2}}$: Half-life

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8. $LD = VD * Css$

LD : Loading dose

Css : steady state conc.

Vd : volume of distrbution,

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9. $MD = CL * Css$

MD : Maintenance Dose.

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10. $K = \frac{0.693}{T_{\frac{1}{2}}}$

K : Rate of elimination (first-order)