

The Unified Theory

Derivation of Major Biochemical and Biophysical Equations from the Median-Effect Equation

[Chou T.C. *Pharmacol. Rev.* 58: 621-681, 2006

Henderson-Hasselbalch equation

$$\log [H^+] = \log K_a + \log \frac{[HA]}{[A^-]}$$

$$\text{pH} = \text{p}K_a + \log \frac{[A^-]}{[HA]}$$

Michaelis-Menten equation

$$v/V_{\max} = [1 + (K_m/S)]^{-1}$$

$$\frac{f_a}{f_u} = \left(\frac{D}{D_m} \right)^m$$

The Median-Effect Equation

Chou, J. Theor. Biol. 59: 253-276, 1976

$$f_a / (1 - f_a) = (D/D_m)^m$$

$$f_a = [1 + (D_m/D)^m]^{-1}$$

$$\log [(f_a / (1 - f_a))] = m [\log(D) - \log D_m]$$

$$\log [(f_a)^{-1} - 1]^{-1} = m \log(D) - m \log D_m$$

$$f_a / f_u = D / D_m$$

Hill equation

$$\log [v / (V_{\max} - v)] = n \log(S) - \log(K)$$

Scatchard equation

$$\frac{[L]_b}{[L]_f} = \frac{n[M]_t}{K_d} - \frac{[L]_b}{K_d}$$