

LD – linkage disequilibrium

$$D = \text{freq}(A1B1) * \text{freq}(A2B2) - \text{freq}(A1B2) * \text{freq}(A2B1)$$

$$D' = \frac{|D|}{D_{\max}}$$

$$D_{\max} = \begin{cases} \min[\text{freq}(A1) * \text{freq}(B2), (1 - \text{freq}(A2)) * (1 - \text{freq}(B1))] & \text{dla } D > 0 \\ \min[\text{freq}(A1) * (1 - \text{freq}(B1)), (1 - \text{freq}(A2)) * \text{freq}(B2)] & \text{dla } D < 0 \end{cases}$$

$$r^2 = \frac{D^2}{\text{freq}(A1) * \text{freq}(A2) * \text{freq}(B1) * \text{freq}(B2)}$$