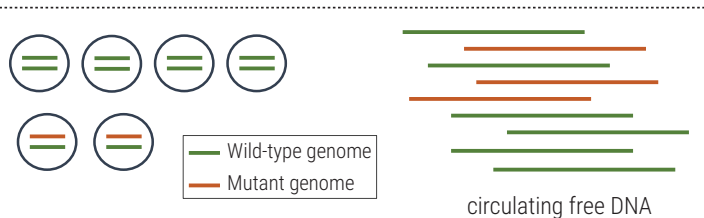


a**i. MCV calculation**

$$MSAF \approx \frac{ctDNA}{cfDNA} \quad MCV = \frac{VAF}{MSAF}$$

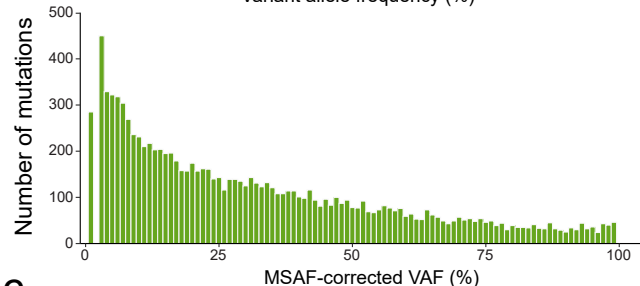
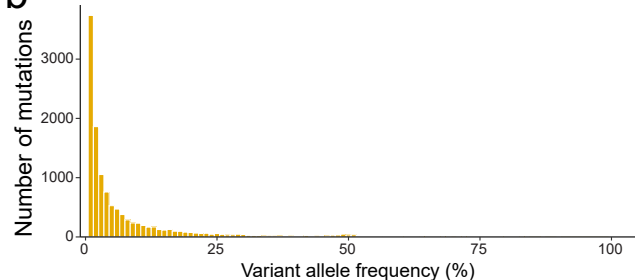
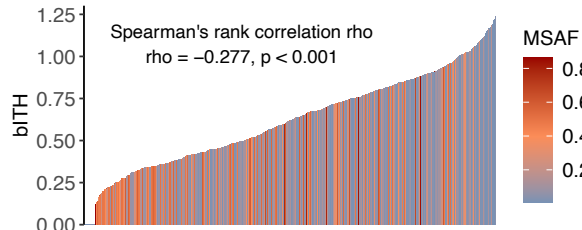
**ii. MCV binning & bin-specific frequency of mutations**

$$p_i = \frac{mc_i}{\sum_{i=1}^{10} mc_i}$$

iii. bITH calculation

$$\varphi_i = \text{median}((i-1) * 0.1, i * 0.1)$$

$$\mathbf{bITH} = - \sum_{i=1}^n \varphi_i * P_i \ln(P_i)$$

b**c****d**