Global Disease Probability 0.1%

Population 1,000

$p(\mathbf{D}) = 0.1\%$ → 1 **D**iseased

$p(\mathbf{H}) = 99.9\%$ → 999 **H**ealthy

?

$p(\mathbf{S^1}|D) = 100\%$

$p(\mathbf{S^1}|H) = 0.1\%$

$p(-|H) = 99.9\%$
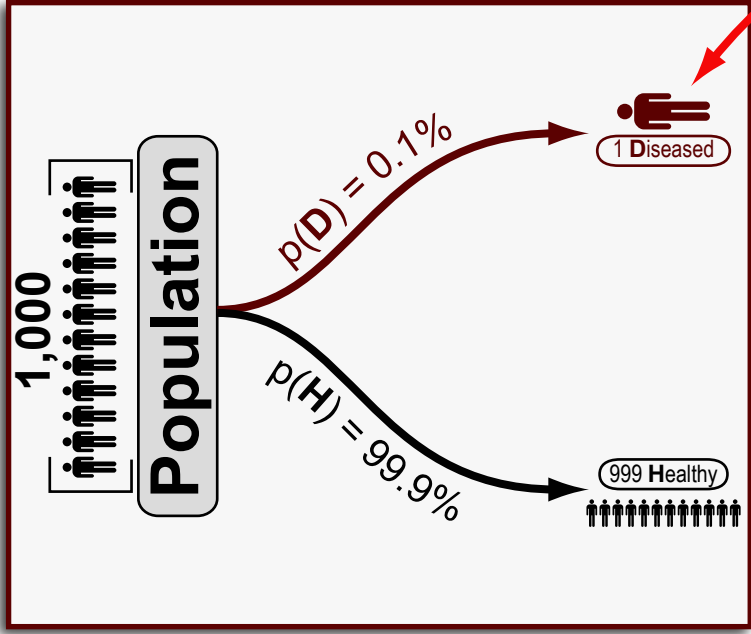
Global Symptom 1 Probability 0.2%

~1 **T**rue Positive

~1 **F**alse Positive

998 **T**rue Negatives

$p(\mathbf{S^1}) = 0.2\%$

$p(-) = 99.8\%$

Population 1,000
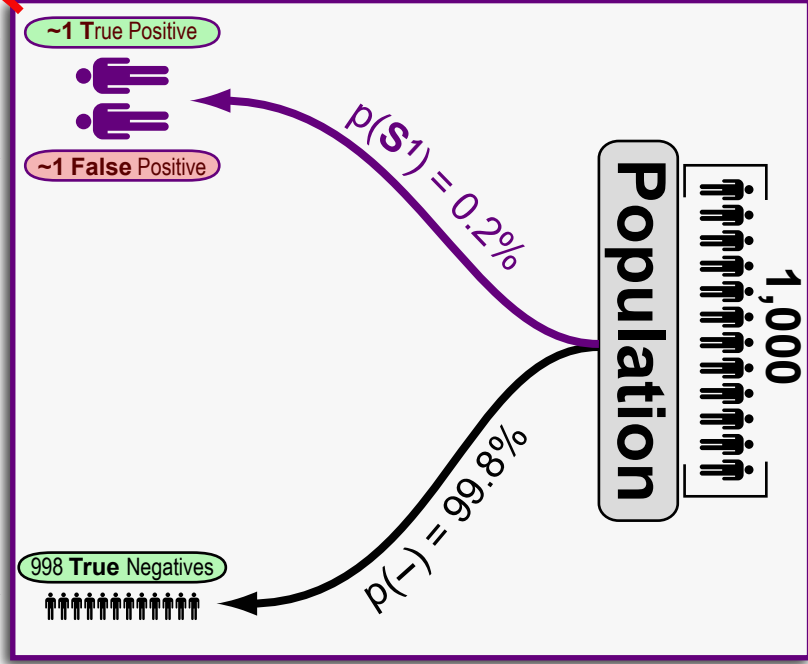
New Disease Probability

"Prior" Disease Probability

$$p(\mathbf{D}|S^1) = p(D) \frac{p(\mathbf{S^1}|D)}{p(\mathbf{S^1})} = p(D) \frac{p(\mathbf{S^1}|D)}{p(\mathbf{S^1}|H)p(\mathbf{H}) + p(\mathbf{S^1}|D)p(\mathbf{D})}$$

Symptom Probability Change

$$= 0.1\% \frac{100\%}{0.2\%} = 0.1\% \cdot 500 = \mathbf{50\%} =$$