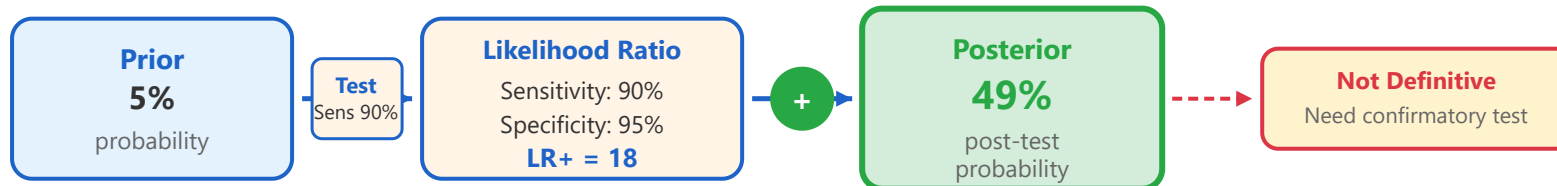# Bayesian Reasoning Integration

Bayesian Framework

- **Prior Probability:** Pre-test likelihood based on prevalence

- **Likelihood Ratio:** How much test changes probability

- **Posterior Probability:** Post-test diagnostic certainty

- **Sequential Testing:** Chain multiple tests together

Bayes' Theorem in Diagnosis

$$P(Disease|Test) = [P(Test|Disease) \times P(Disease)] / P(Test)$$

Prior
5%
probability

Test
Sens 90%

Likelihood Ratio
Sensitivity: 90%
Specificity: 95%
LR+ = 18

+

Posterior
49%
post-test
probability

Not Definitive
Need confirmatory test

Critical: Integrating prevalence and test characteristics improves diagnostic accuracy