**Medical Diagnosis – Bayesian Conditional Risk Calculation**

### Given data

* Posterior probabilities after observing test result **x**
  + (patient actually has the disease)
  + (patient does **not** have the disease)
* Loss (cost) values
  + **Action α₁ – Treat**
    - Loss if true class is Disease:
    - Loss if true class is No Disease:
  + **Action α₂ – No Treat**
    - Loss if true class is Disease:
    - Loss if true class is No Disease:

### Conditional risk formula

### 1. Risk for **Treat** (α₁)

### 2. Risk for **No Treat** (α₂)

### 3. Optimal decision

The Bayes decision rule selects the action with the **minimum conditional risk**:



Since , the optimal action for this patient is:

This choice minimizes the expected loss given the observed test result.