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# Statistics of Diagnostic Tests

## Continuous Test Results and the ROC Curve

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# ROC Curve

Diagnostic test (often) gives continuous result

Need to choose cut-off for T+ and T-

For each possible cut-off calculate sensitivity & specificity

Plot  sensitivity (y-axis) *vs* (1-specificity) (x-axis)

= Receiver Operating Characteristics Curve

Want ROC curve in top LH corner – choose cut-off to achieve this (max sens/ spec)

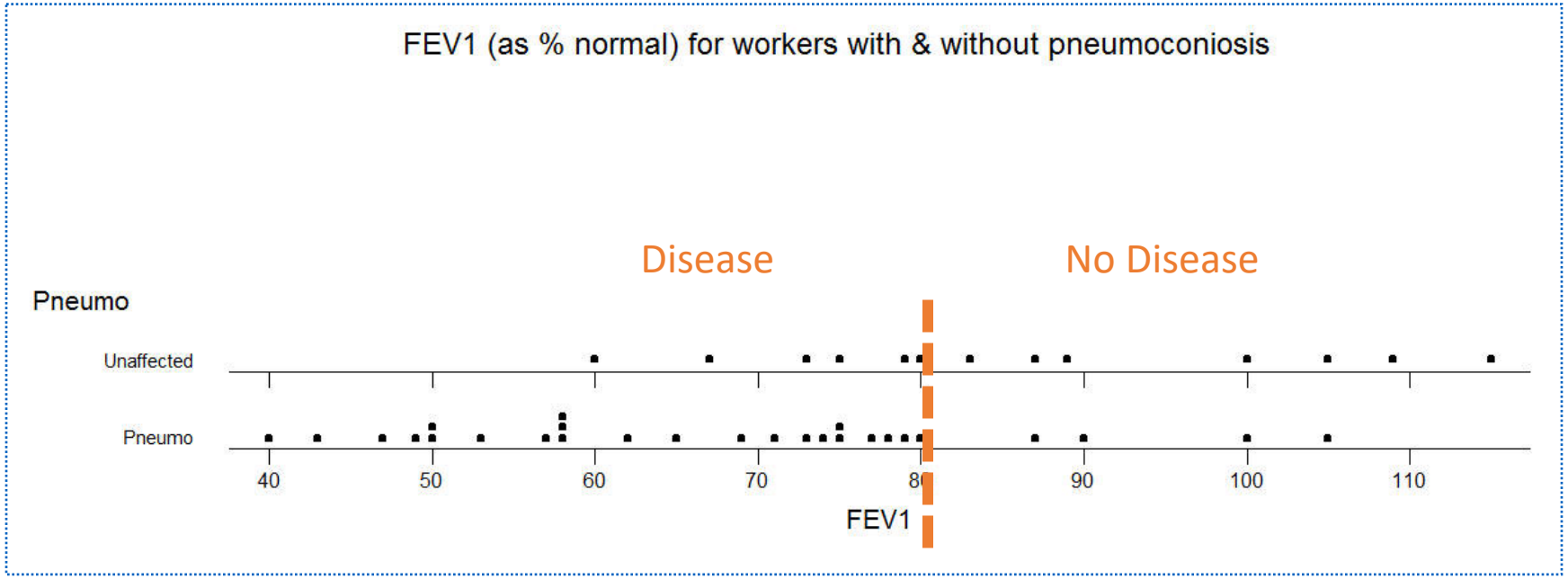
# Example

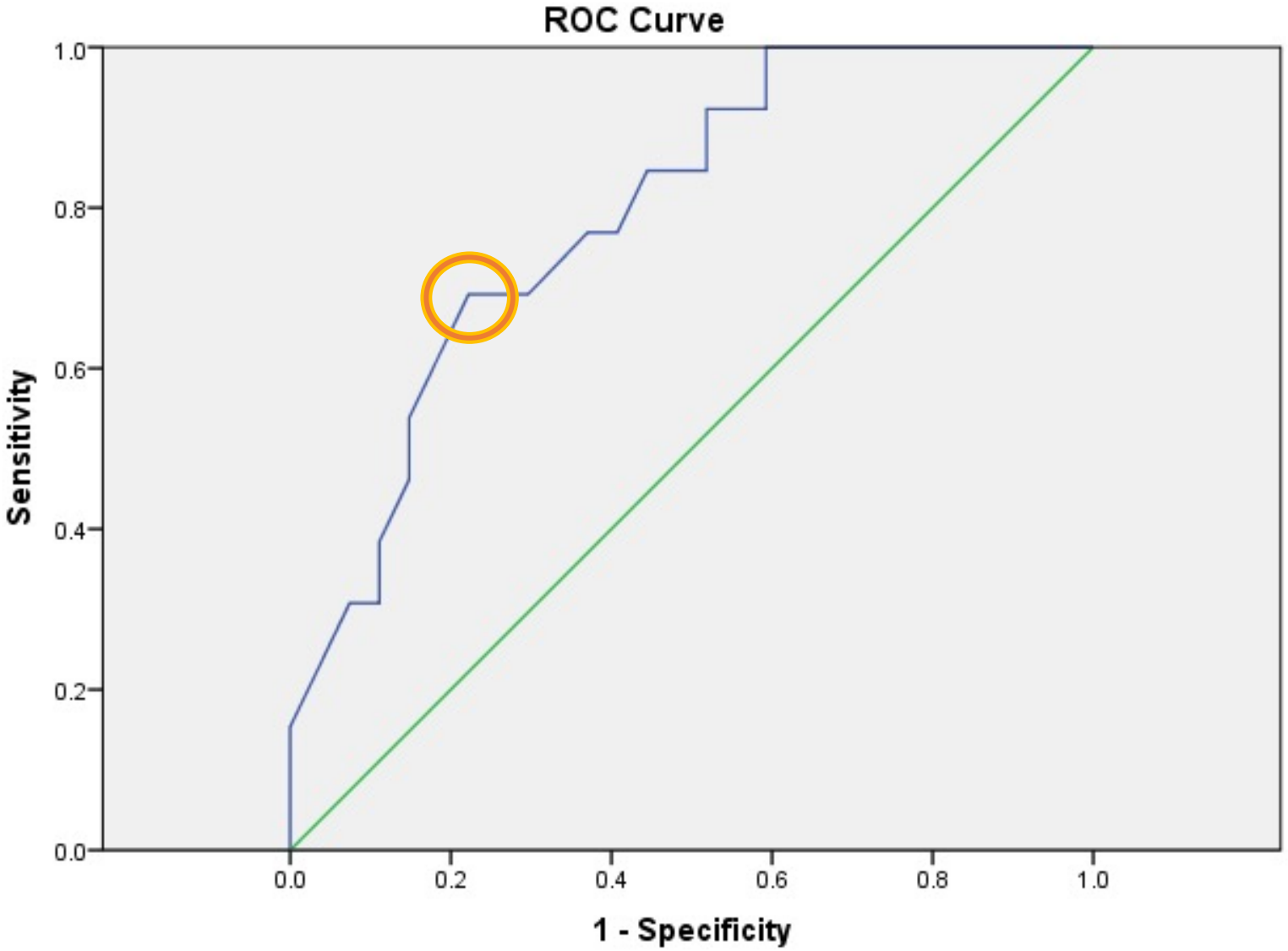
40 workers from coal industry.

27 have pneumoconiosis, 13 do not.

All have FEV1 measured (expressed as % normal).

What cutpoint should be used to distinguish between disease/ not?






Diagonal segments are produced by ties.

# Interpretation…

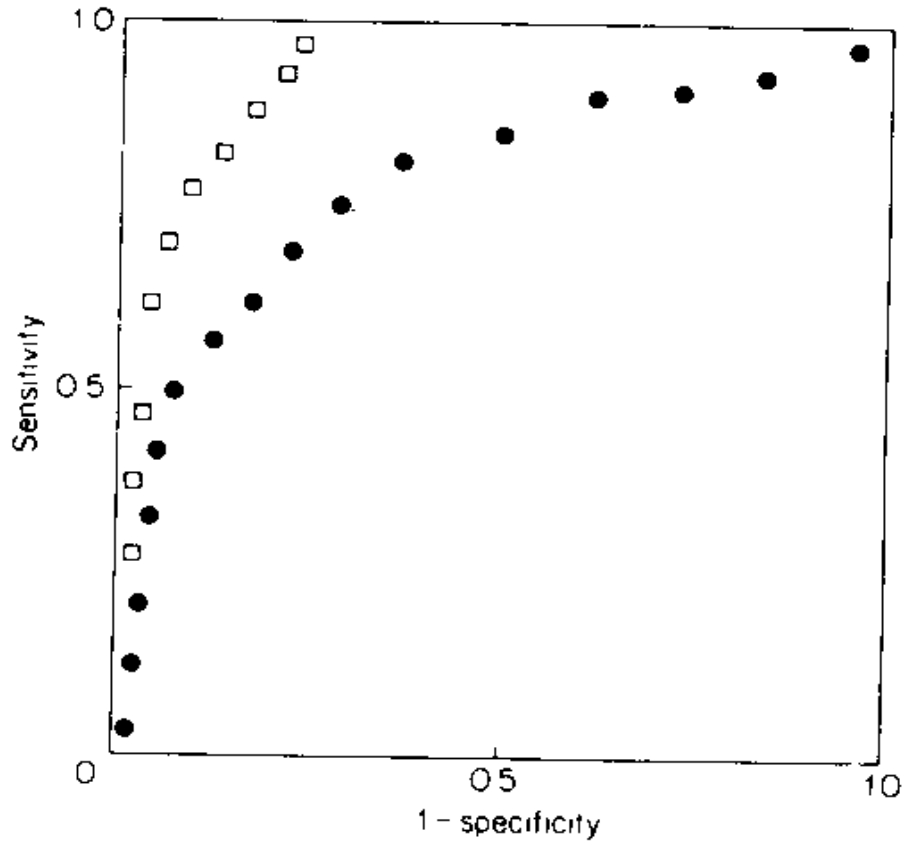
Point on ROC curve closest to top-left corner identifies a particular cutpoint

Often no clear-cut winner – judgement must be made regarding relative importance of sensitivity & specificity (e.g. costs of wrong decisions in each direction)

Can summarise shape of ROC curve using AUC = area under curve

Can also compare 2 or more ROC curves on same graph…

# ROC Curve for 2 Tests for Thyroid Tumours




AUC (area under curve) of hollow squares test larger than filled circles – clear advantage for one test.

Can test this formally.