

March 2011  
QUESTION 15

Define the concepts of: Sensitivity (20%) Specificity (20%) Positive predictive value (PPV) (20%) Negative predictive value (NPV) (20%) Explain how the prevalence of a disease influences the PPV and the NPV of a diagnostic test (20%).

Sensitivity and specificity are based on the outcomes (vertical comparison)  
PPV and NPV are based on the test aspects (horizontal comparison)

Sensitivity is the likelihood that those with the condition will test positive.  $TP / (FN + TP)$

Specificity is the likelihood that those without the disease will test negative.  $TN / (TN + FP)$

Positive predictive value indicates how likely if you have a positive result you have the disease.  $TP / (TP + FP)$

Negative predictive value indicates how likely if you have a -ve result you are disease free.  $TN / (TN + FN)$

	Outcome	
Test Result	Positive	Negative
Positive	TP	FP
Negative	FN	TN

Prevalence is the proportion of patients with disease at a specified time, and represents the prior probability before conducting a test. It will have a direct influence on the PPV and NPV.

If a disease is common then it will tend to have a high PPV. Likewise if the disease is rare, then it will have a low PPV but a high NPV.

All these concepts can be integrated together with Bayes theorem, which states that  
 $PPV = \text{sensitivity} \times \text{prevalence} / \text{all patients with a positive test.}$