| | | Disease | No Disease | |
|---|---|---|---|---|
| **Test** | **positive** | Right positive<br>**a = 72** | False positive<br>**b = 9** | **81** |
| | **negative** | False negative<br>**c = 48** | Right negative<br>**d = 171** | **219** |
| | Total | **120** | **180** | **300** |

Pretest probability of having the disease (p): is the prevalence of disease in the investigated population
Pretest probability of not having the disease (1-p): is the prevalence of healthy subjects in the investigated population
Sensitivity (sens): is the proportion of people with disease who have a positive test
Specificity (spec): is the proportion of people free of a disease who have a negative test
Positive predictive value (PPV): probability that a patient with a positive test has got really the disease
Negative predictive value (NPV): probability that a patient with a negative test is really healthy

p = a+c/a+b+c+d = 40%

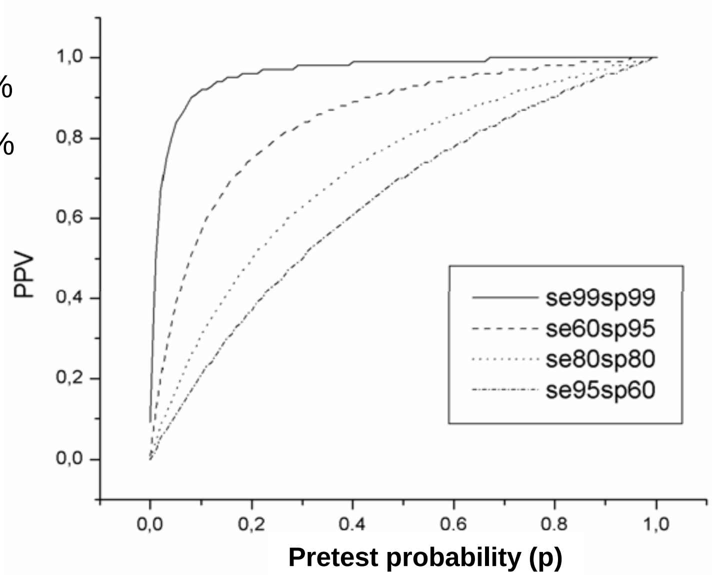
1-p = b+d/a+b+c+d = 60%

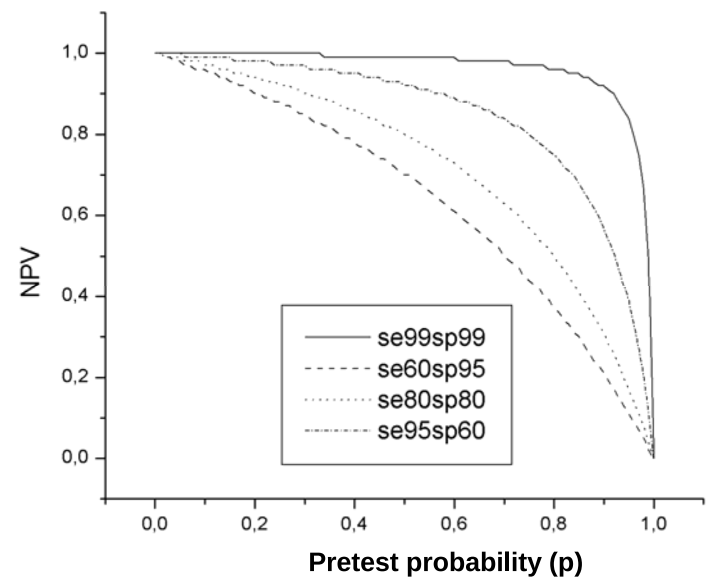
sens = a/a+c = 60%

spec = d/b+d = 95%

PPV = a/a+b = 89%

NPV = d/c+d = 78%




This example illustrates, that a test is useful when the pretest probability is increased up to a reasonable PPV (rule in the disease) or when NPV is increased reasonably (rule out). The figures illustrate that specificity is more important to rule in (spin = specificity rule in); and that sensitivity is more important to rule out (snout = sensitivity rule out). The relation between p, sens, spez, PPV and NPV is described by the Bayes´ Theorem. Indeed a test is only useful, if the pretest probability (p) is out of the range of 95%CI of PPV (in this example 95%CI = 80%-94%); and/or if the pretest probability of not having the disease (1-p) is out of the range of the 95%CI of NPV (in this example 95% CI = 72%-83%). The 95%CI is calculated using Wilson´s method.[28]
In this example p is increased up to a meaningful PPV. NPV seems not to be increased reasonably if compared with 1-p.