Diagnosis

Chapter 4

Diagnosis

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Diagnostic test

Diagnostic test – a test performed in a laborotary (or clinical history, examination). A reduction of multiple levels of data; ordinal scales (or dichotomous) simplified from continuous. A diagnostic test changes the probability of a diagnosis.

True positive – test positive (abnormal), disease present
True negative – test negative (normal), disease present
False positive – test positive, disease absent
False negative - test negative (normal), disease absent

		Disease	
		Present	Absent
Test	Positive	True positive	False positive
	Negative	False negative	True negative

Gold standard

Gold standard – Reference standard - Criterion standard: some way of knowing whether the disease is truly present/absent (expensive eg MRi vs ECG for MI, EGD vs TTG for CD).

Strategies of use when lack of gold standard:
follow-up to detect disease occurrence, combine multiple tests (=composite reference standard/expert determination/differential verification)
S*cales and indexes with no objective standard measurments* (=***criterion, content, construct validity***).

Sensitivity vs specificity

Sensitivity – the proportion of pepole *with* the disease with a *positive tes*t (ddimer – high sens, low spec).

Of use when there is an important penalty for missing a condition; to rule out (eg child high fever, catharral symptoms, rule out pneumonia take crp), early stages of diagnostic workup.

A highly sensitive test is most useful for clinician when negative.

Specificity – the proportion *without* the disease with a *negative test.*

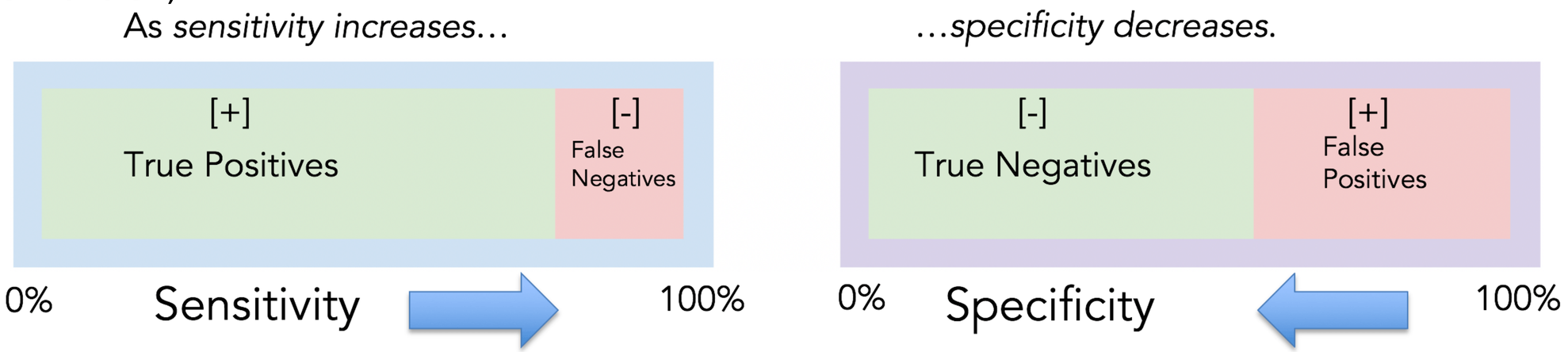
A highly specific test will rarely misclassify patients as having a disease that they do not.

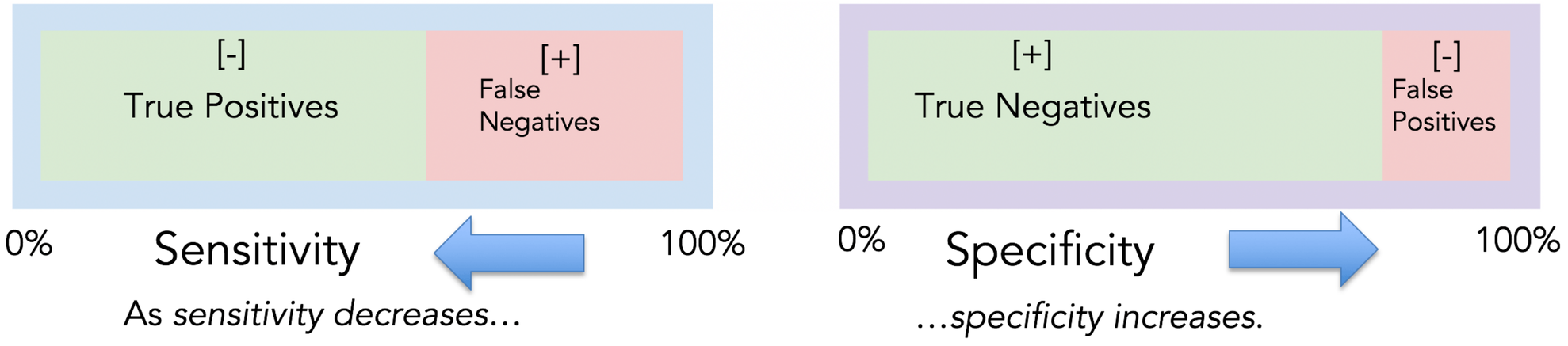
Of use in clinc: to “rule in”, confirm certain diagnosis. Eg TTG >10*ULN.

A highly specific test is most helpful when result is positive.

Cutoff point

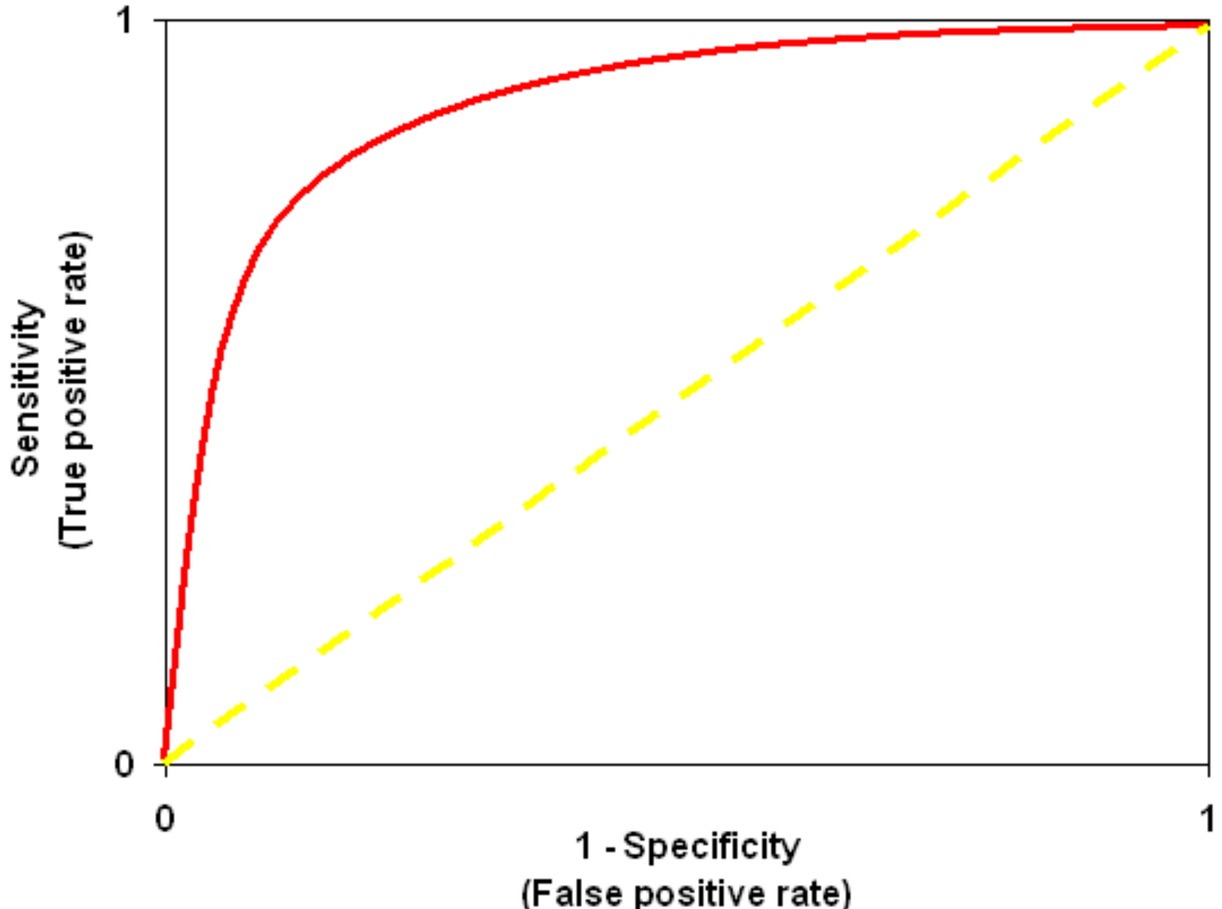
Cutoff point the point on the continuum between normal and abnormal, an arbitrary decision. Sensitivity and specificity depend on eachother. (e.g in clinic ANA-antibodies in children – different cutoff levels?)





ROC

Reciever operator curve roc: true positive rate (=sensitivity) against false positive (1-specificity) over a range of cutoff values. More sensitivity+specificity=larger AUC.



Pitfalls in designing diagnostic tests

Spectrum of representative patients with a disease (/without); spectrum of negative+negative/positive+negative, positive+positive, negative+positive.

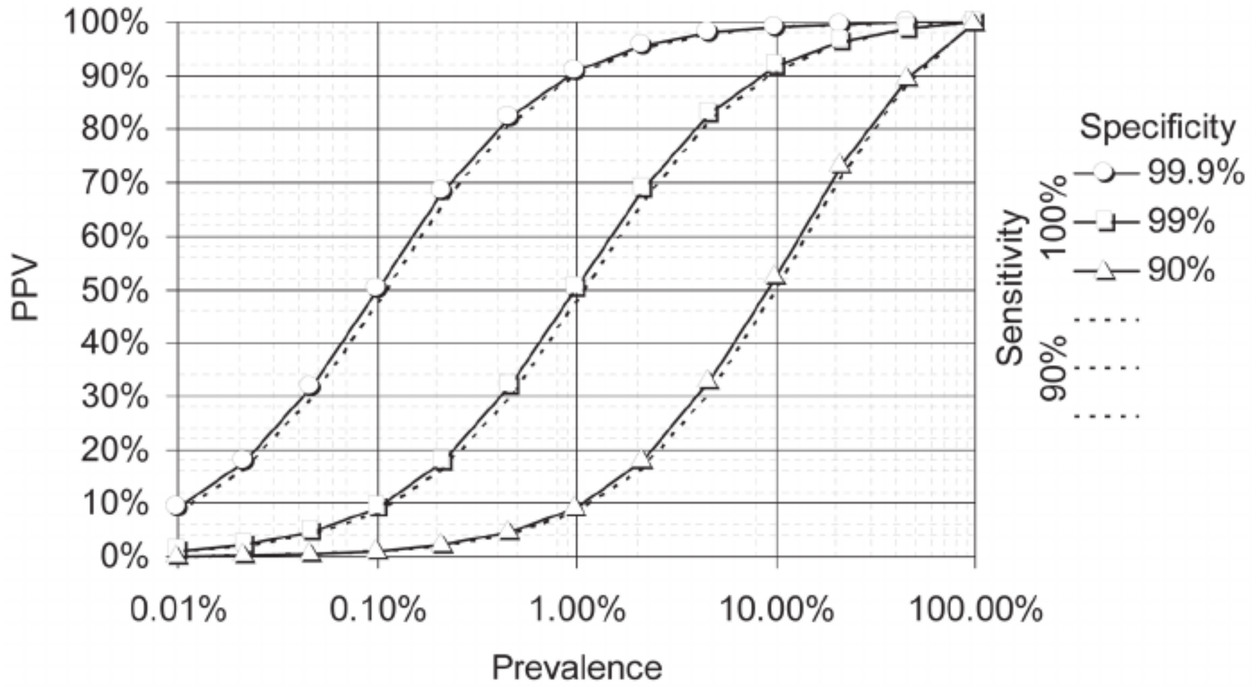
Often **study patients differ from general population** (e.g test designed based on patients that were already found to have a certain disease but aiming to find patients *before* or in earlier stage of diasease)

Bias:

- M*issing test results* – index test performed but gold standard lacking. Index test not performed in the same order.
- *Lack of blinding* – potential bias in interpretation but especially problematic with gold standard (eg ultrasound gold, ddimer index).
- *Imperfect gold standard.*
- *Chance:* 95% CI decreases with no. of observations

$$\hat{p} \pm 1.96 * \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Predictive value



Predictive value depends on sensitivity, specificity, prevalence of disease (=pretest probability)

Positive predictive value = high specificity, high positive predictive value. Low prevalence->low ppv
Negative predictive value = more sensitivity->higher negative predictive value. High prevalence->lower npv
Prevalence most important

Probability

Probability (rule out diagnosis vs possible diagnosis): proportion of people in whom e.g a positive test is present.

Prior (pretest) probability;
p*opulation-based estimate, specifics in the clinical situation, selected demographic groups, referral process…* (STRAMA strep a på >3), barn har inte AKS, referral process (jmf min studie hur mkt tester tar en subspecialist/generalist)

Likelihood ratios

Likelihood ratio – way of describing performance of a diagnostic test

Odds - ratio between two probabilities,
the probability of an event to **1-probability of the event**.

Odds = probability of event/(1-probability of event)

Probability = Odds/(1+Odds)

More fine tuned than -/+ sens/spec at one cutoff.

LR further away from 1,0 are associated with few false positive, false negative
(=less accurate results when LR>10 for LR+, LR 0,5-0,2 fpr LR-.)

Pretest odds, posttest odds

Parallell testing - all tests at the same time – higher sens, less spec = kan inte få högre specificity än den högsta specificiteten

Serial testing - tests performed after eachother, om ett är positivt, går vidare med nästa. Higher spec less sens (jmf glut 1 ta först lp därefter sclt2-gen) maximizes specificity e.g kub-test->nipd. Beräkna pretest probability för första testet och för varje test blir posttest odds nästa tests pretest odds=>posttest probability (e g två test med sens 80+60% används I serie=sens går upp till 92% (tryckfel I boken s.75?)

Clinical prediction rules - combining testing, history, physical examimnation, laboratory adds up to predictive power = Diagnostic decision making ~~rules~~ **tools**

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