

Sinnvoller Einsatz von Untersuchungen im Notfall

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Untersuchungsmöglichkeiten

- Erster Eindruck
- Vitalparameter
- Physikalische Krankenuntersuchung
- Eil-Labor, TnT, D-Dimer, ..
- Basis Röntgen: C/P, Abdomen leer
- US, Echo
- CT: CCT, Abdomen, Thorax, PE, ...

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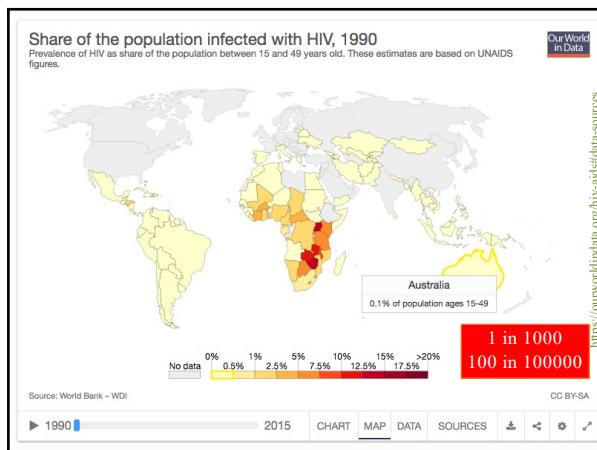


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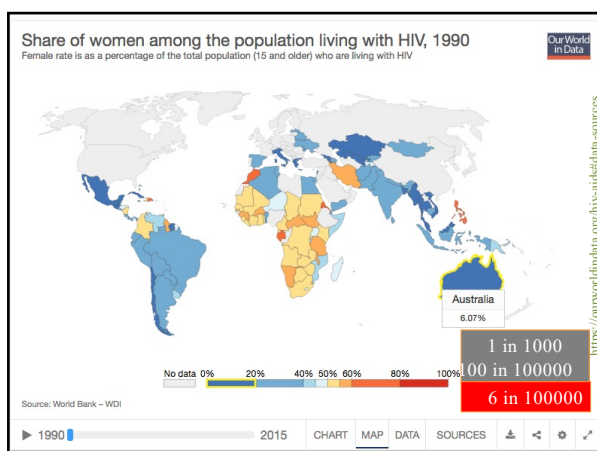
Wie hoch ist das Risiko der jungen Frau für eine HIV Infektion zum Zeitpunkt der Gesundenuntersuchung?

1. ca 10%
2. ca 1%
3. ca 0,1%
4. kleiner als 0,01%

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Diagnostische Tests

		Reference Standard	
		»Wahrheit«	
Index Test	Test-Ergebnis	D+	D-
	T+	TP	FP
	T-	FN	TN

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Wieviele der Kranken sind Test-Positiv?
Wieviele der Gesunden sind Test-Negativ?

$$\text{Sens} = \text{TP} / (\text{TP} + \text{FN})$$

$$\text{Spez} = \text{TN} / (\text{TN} + \text{FP})$$

		»Wahrheit«	
		D+	D-
Test-Ergebnis	T+	TP	FP
	T-	FN	TN

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Wieviele der Test-Positiven sind krank?
Wieviele der Test-Negativen sind gesund?

$$\text{PPV} = \text{TP} / (\text{TP} + \text{FP})$$

$$\text{NPV} = \text{TN} / (\text{TN} + \text{FN})$$

Prävalenz-
abhängig!!!

		D+	D-
Test-Ergebnis	T+	TP	FP
	T-	FN	TN

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Wieviele der Test-Positiven sind krank?
Wieviele der Test-Negativen sind gesund?

$$PPV = TP / (TP + FP)$$

$$NPV = TN / (TN + FN) \gg \text{Wahrheit} \ll$$

Prävalenz-
abhängig!!!

	D+	D-
T+	TP	FP
T-	FN	TN

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Bayes Theorem

$$P(A | B) = (P(B | A) / P(B)) \times P(A)$$

$$= (\text{Sens} \times \text{Prev}) / ((1 - \text{Spez}) \times (1 - \text{Prev}) + (\text{Sens} \times \text{Prev}))$$

$$\text{Posttest odds} = \text{LR} \times \text{pretest odds}$$

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vote

- Was benötigt man zur Berechnung der Nachtest-Wahrscheinlichkeit?

1. Testergebnis
2. Vortest-Wahrscheinlichkeit
3. Testcharakteristika (Sens/Spez)
4. 1 + 2 + 3

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Vortestwahrscheinlichkeit

» Wie wahrscheinlich
hat mein Patient
die vermutete Erkrankung? «

- Prävalenz
- Risiko-Scores

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Beispiel Pulmonalembolie

Clinical Evaluation	Points
DVT signs and Sx's	3.0
HR > 100	1.5
Immobilization/Surgery	1.5
Previous DVT or PE	1.5
Hemoptysis	1.0
Malignancy	1.0
PE > alternative Dx	3.0

Geneva Score. Arch Intern Med 2001

Point Total	Pre-Test Probability
Low < 2	1.3%
Moderate 2 to 6	16%
High > 6	41%

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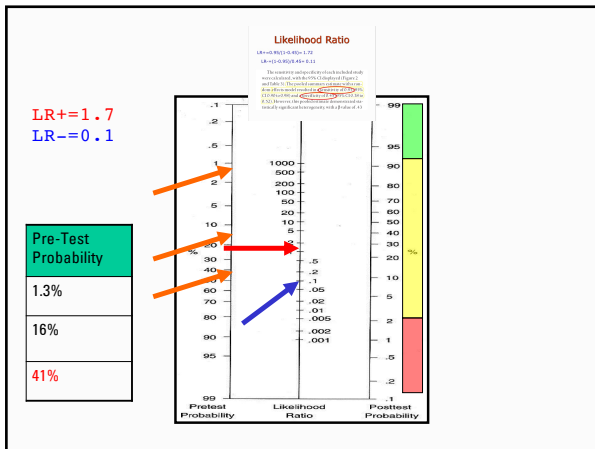
Likelihood Ratio

$$LR+ = 0.95 / (1 - 0.45) = 1.72$$

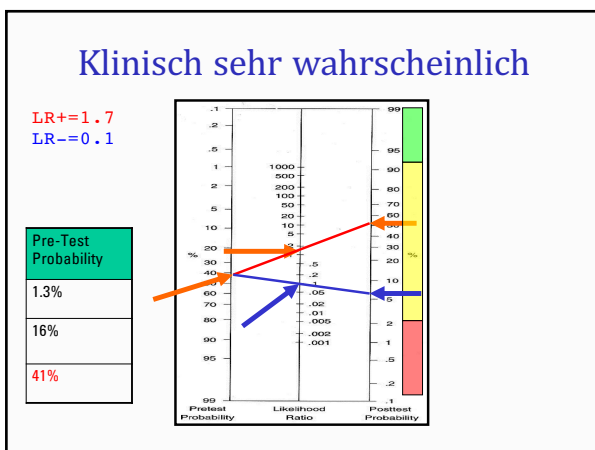
$$LR- = (1 - 0.95) / 0.45 = 0.11$$

The sensitivity and specificity of each included study were calculated, with the 95% CI displayed (Figure 2 and Table 3). The pooled summary estimate with a random-effects model resulted in a sensitivity of 0.95 (95% CI 0.90 to 0.98) and a specificity of 0.45 (95% CI 0.38 to 0.52). However, this pooled estimate demonstrated statistically significant heterogeneity, with a β value of .43

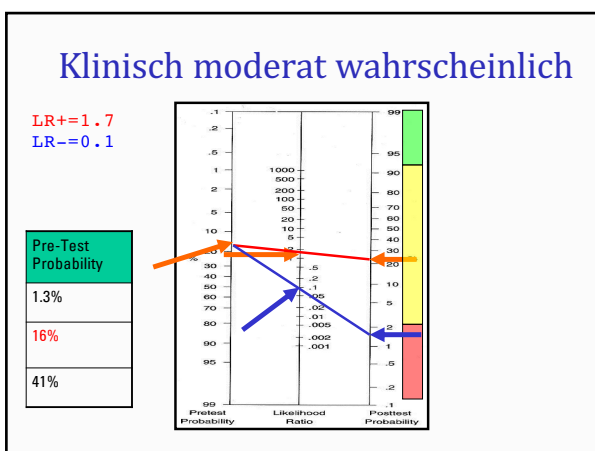
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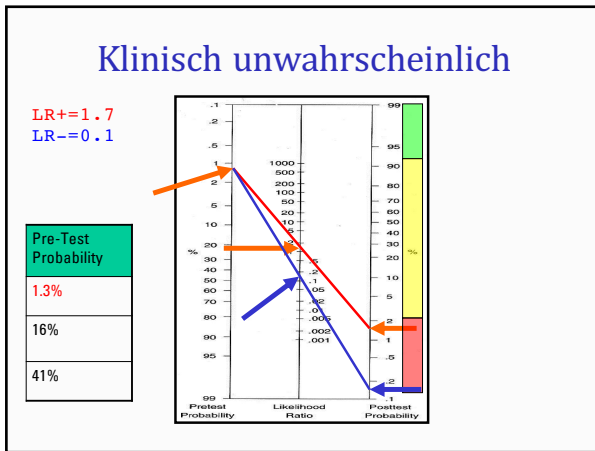
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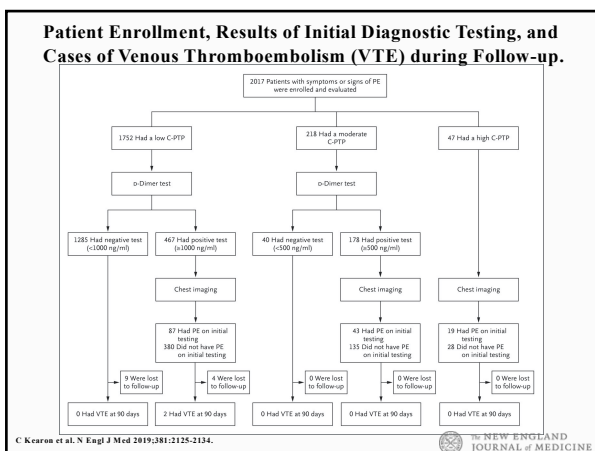
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vote

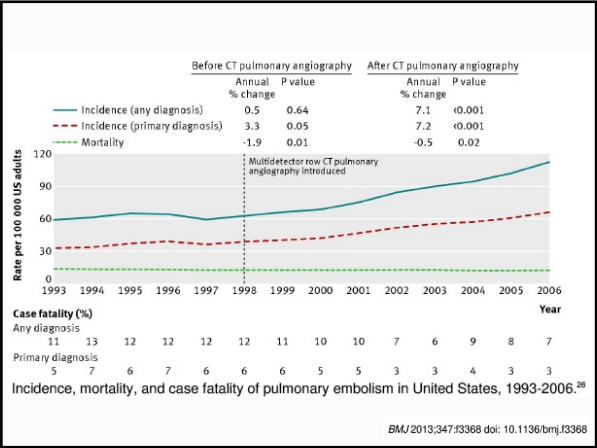
Wer hat die höhere Wahrscheinlichkeit für eine PE:

- 1.niedriges Risiko + DDpos
- 2.mittleres Risiko + DDneg

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The Rational Clinical Examination

Does This Patient With Chest Pain Have Acute Coronary Syndrome?

The Rational Clinical Examination Systematic Review

Alexander C. Farrow MD, Jennifer A. Ryan MD, Sarah A. Goldstein MD, David L. Sirel MD, MSc, L. Kristin Verhey MD, MSc

Table 2. Performance of Chest Pain Characteristics in Diagnosing Acute Coronary Syndrome^a

Test	No. Studies	Patients	Sensitivity % (95% CI)	Specificity % (95% CI)	LR+ (95% CI)	I ² , % ^b	LR- (95% CI)	I ² , % ^b	PPV %	NPV %
Radiation to both arms ⁴⁹	1	2718	11 (8.3-15)	96 (95-96)	2.6 (1.8-3.7)	0	0.93 (0.89-0.96)	0	28	12
Pain similar to prior ischemia ⁴⁹	1	2718	47 (42-53)	79 (77-80)	2.2 (2.0-2.6)	0	0.67 (0.60-0.74)	0	25	9
Change in pattern over prior 24 h ⁴⁹	1	2718	27 (23-32)	86 (85-88)	2.0 (1.6-2.5)	0	0.84 (0.79-0.90)	0	23	11
*Typical chest pain ^{47,48,54,60,62,71}	6	14 584	66 (58-74)	66 (49-83)	1.9 (0.94-2.9)	98	0.52 (0.35-0.69)	95	22	7
Worse with exertion ^{48,73}	2	5049	38-53	73-77	1.5-1.8	0	0.66-0.83	0	18-21	9-11
Radiation to neck or jaw ^{37,49,60}	3	4018	24 (15-36)	84 (76-90)	1.5 (1.3-1.8)	0	0.91 (0.87-0.95)	0	7.2	18 12
Recent episode of similar pain ⁷³	1	2331	55 (50-60)	56 (54-59)	1.3 (1.1-1.4)	0	0.80 (0.71-0.90)	0	16	11
Radiation to left arm ^{37,47,49}	3	13 613	40 (28-54)	69 (61-76)	1.3 (1.2-1.4)	0	0.88 (0.81-0.96)	0	69	16 12
Radiation to right arm ⁴⁹	1	2718	5.4 (3.4-8.3)	96 (95-97)	1.3 (0.78-2.1)	0	0.99 (0.96-1.0)	0	16	13
Associated diaphoresis ^{48,49,60}	2	3249	24-28	79-82	1.3-1.4	0	0.91-0.93	0	16-17	12-12
Associated dyspnea ^{48,60,62}	3	3648	45 (42-49)	61 (59-63)	1.2 (1.1-1.3)	0	0.89 (0.82-0.96)	0	15	12
Altered onset ⁴⁹	1	2718	76 (71-80)	32 (30-34)	1.1 (1.0-1.2)	0	0.75 (0.61-0.91)	0	14	10
Any improvement with nitroglycerin ^{48,66,73}	3	3218	71 (23-95)	35 (44-86)	1.1 (0.93-1.3)	86	0.90 (0.85-0.96)	0	14	12

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Clinical Decision Tools for ACS

Table 5. Performance of Clinical Decision Tools in Diagnosing Acute Coronary Syndrome^a

Risk Level	Threshold	LR (95% CI) ^b	I ²	Predictive Value ^c
High				
HEART score ^{18,20,21,23}	7-10	13 (7.0-24)	89	66
TIMI score ⁴	5-7	6.8 (5.2-8.9)	56	50
Intermediate				
HEART score ^{18,20,21,23}	5-6	2.4 (1.6-3.6)	96	26
TIMI score ⁴	3-4	2.4 (2.1-2.7)	77	26
HFA/CSANZ rule ^{18,58,63}	High risk	2.8 (2.6-3.0)	0	29
Indeterminate				
HEART score ^{18,20,21,23}	4	0.79 (0.53-1.2)	88	11
TIMI score ⁴	2	0.94 (0.85-1.0)	23	12
Low				
HEART score ^{18,20,21,23}	0-3	0.20 (0.13-0.30)	78	2.9
TIMI score ⁴	0-1	0.31 (0.23-0.43)	96	4.4
HFA/CSANZ rule ^{18,58,63}	Low to intermediate risk	0.24 (0.19-0.31)	10	3.5

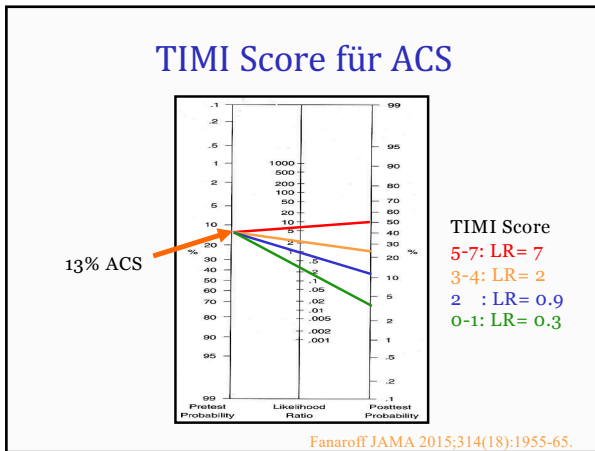
^aAbbreviations: HEART, History, Electrocardiogram, Age, Risk Factors, Troponin; HFA/CSANZ, The Heart Foundation of Australia and Cardiac Society of Australia and New Zealand; LR, likelihood ratio; TIMI, Thrombolysis in Myocardial Infarction.

^bSummary LR from studies that report original data at each threshold without combining across clinical decision rule thresholds.

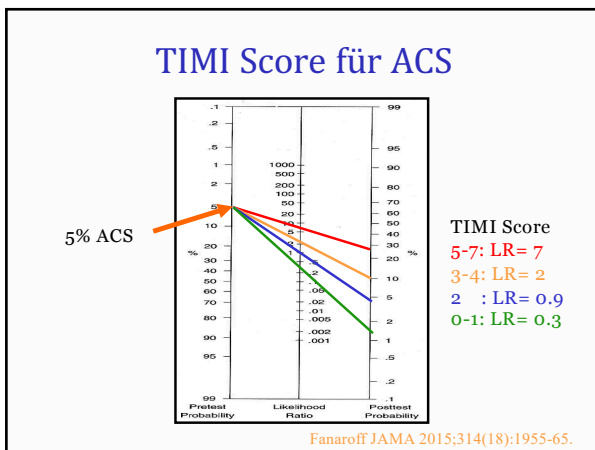
^cPredictive value calculated assuming an acute coronary syndrome rate of 13%. The included studies had an acute coronary syndrome rate of 13% (95% CI, 11%-16%).

^dReferences 20, 28, 29, 32-34, 36, 38, 39, 46, 49, 52, 55, 56, 58, 62, 65.

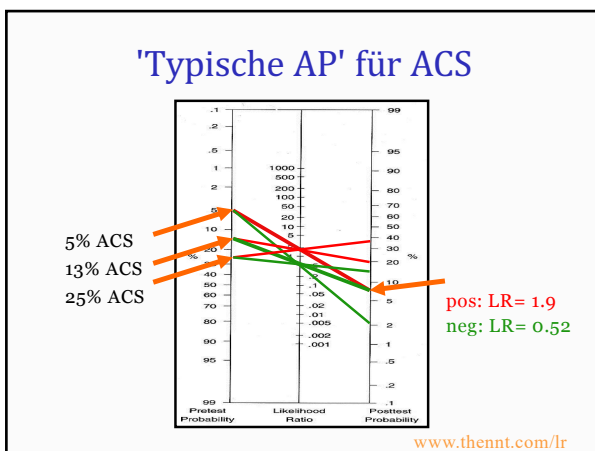
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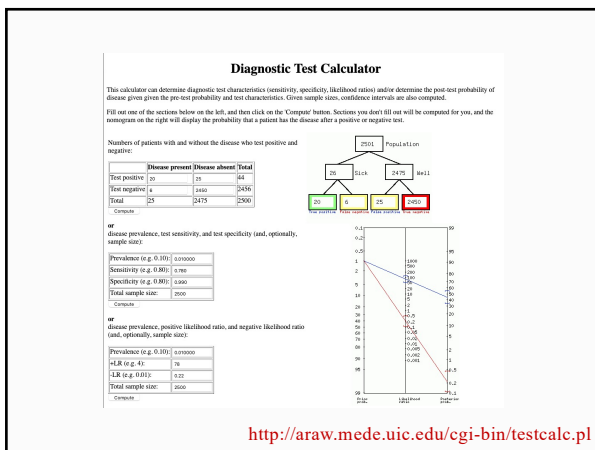
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DIAGNOSTICS GLOBAL HEALTH

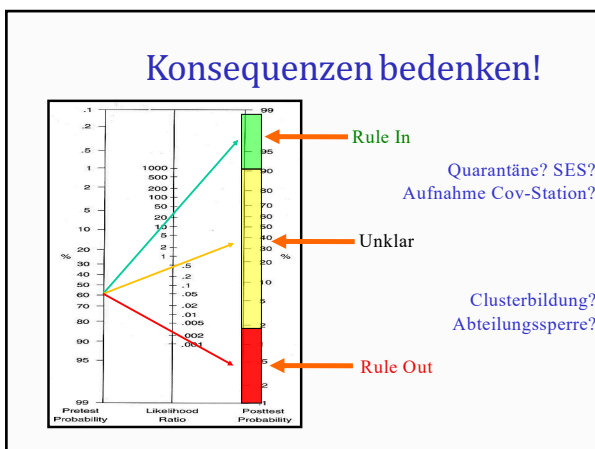
small amount of studies to judge their sensitivity not only based on clinical accuracy below, but also to take their limit of detection as found in analytical studies
[link to the analytical studies page] into consideration.

r	Study location	Time horizon	QUADAS	Independent	Sample condition	Sample type	Sample size	Sensitivity (95% CI)	Specificity (95% CI)
OVID-VIRO*									
Ab, J.M., et	Switzerland	prosp.	low concern	yes	unclear	NP	248	96.7% (95% CI 91.8*-99.1*)	100% (95% CI 97.1*-100*)
ilemont, L.	France	prosp.	intermediate concern	yes	fresh	NP	324	84.1% (95% CI 76.9-89.7)	100% (95% CI 98.0*-100*)
BinaxNOW™									
k, N.R., et	USA	prosp.	low concern	yes	fresh	AN	2308	78.1% (95% CI 77.4-72.2)	99.4% (95% CI 99.0-99.7)
aski, G., et	USA	prosp.	low concern	no	unclear	AN	878	57.7% (95% CI 36.5*-76.7*)	100%* (95% CI 99.6*-100*)
u, A. E., et	USA	prosp.	low concern	yes	fresh	AN	2339	56.5% (95% CI 48.7-64.5)	99.9% (95% CI 99.7-100)

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Take home ...

Die Kombination von

Vortestwahrscheinlichkeit +
Testgüte (Likelihood-Ratio)

bestimmt die

Sinnhaftigkeit und Aussagekraft
jedes Testergebnisses.

...und ist ein gutes Argument warum man
eine Untersuchung macht oder bleiben lässt

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Referenzen

<http://www.cebm.net>

<http://www.thennt.com/home-lr/>

SRDTA-Cochrane

QUADAS II

<https://www.klinikum.uni-heidelberg.de/diagnostics-global-health>

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