OCULUS Optometry CUrriculum for Lifelong Learning through ErasmUS

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Evidence Based Practice in Optometry

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- No Conflict of Interest

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OCULUS

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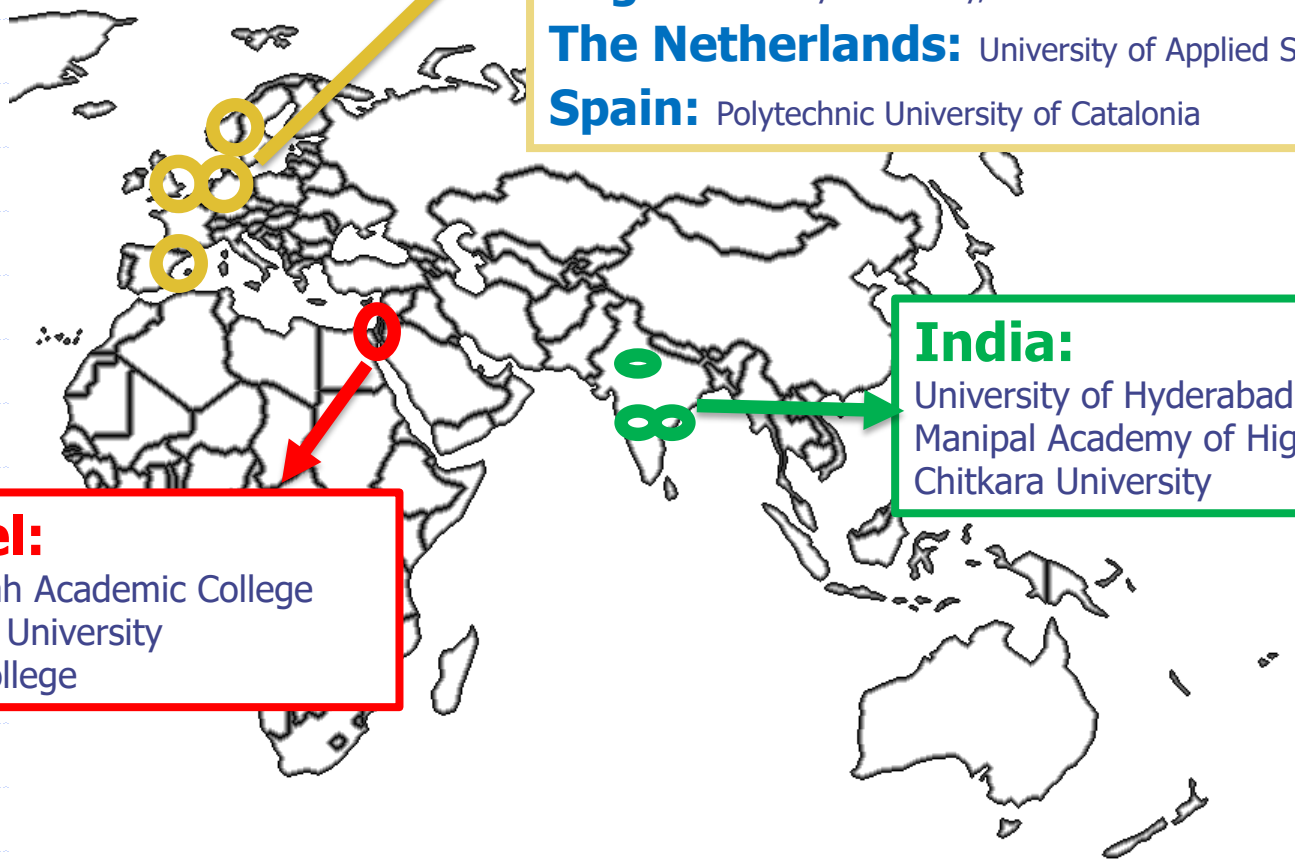
OCULUS: Consortium of Higher education institutions

Norway: University of South-Eastern Norway
England: City University, London
The Netherlands: University of Applied Sciences Utrecht
Spain: Polytechnic University of Catalonia



India:
University of Hyderabad
Manipal Academy of Higher Education
Chitkara University

Israel:
Hadassah Academic College
Bar Ilan University
Sapir College

To harmonize optometry education in Europe, Israel and India

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What is evidence-based practice?

"...the conscientious, explicit and judicious use of ***current best evidence*** *in making decisions about the care of the individual patient. It means* ***integrating individual clinical expertise with the best available external clinical evidence*** *from systematic research."*

Sackett et al, 1996

EBP Competency include

- Knowledge about EBP
- Knowledge of evidence sources
- Ability to search for research evidence
- Critical thinking – ability to appraise the evidence
- Confidence to question received wisdom
- Understanding of the importance of EBP for safe, best practice
- Willingness to 'do' EBP

Purpose of EBP

- Improved patient care
  - Use of Latest technology
  - Cost effective
  - Eliminates obsolete practices
  - Safe and ethical practice
  - Better patient outcomes

Importance of EBP

Who can do EBP ?

- Researcher
- Academician
- Students

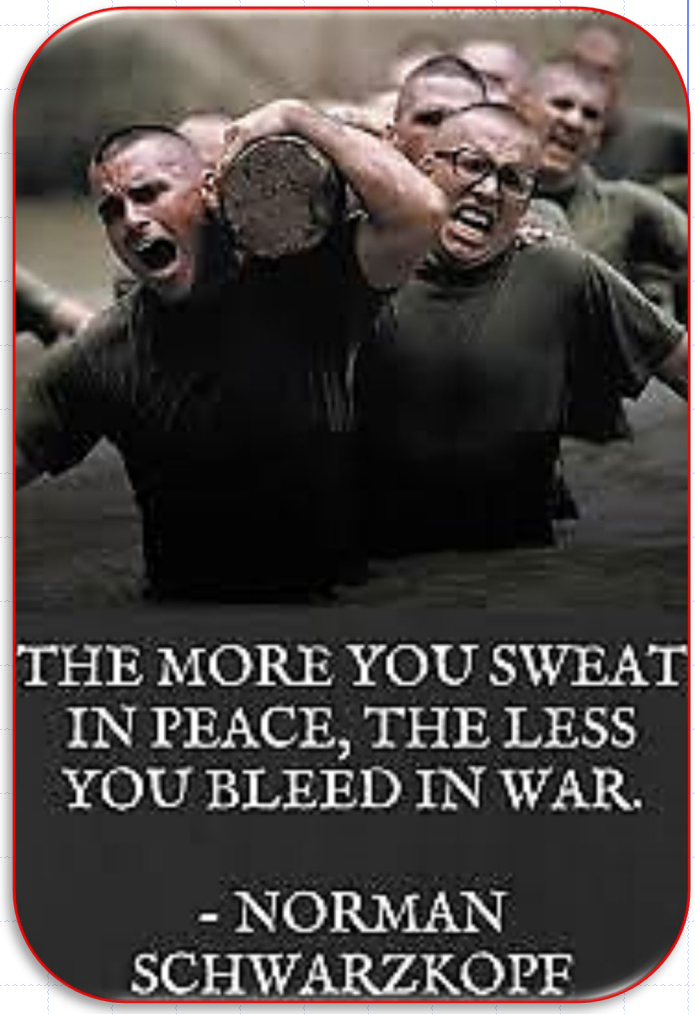
- Every optometry practitioner
  - Clinical practice
  - Optical / Dispensing practice

When can we do EBP ?

- Formal education
- Continued education

- In efforts to upgrade your professional practice

- Even in BUSY OPD...!



How can we do EBP ?

#Ask #Acquire #Appraise #Apply #Audit

ASK

- Phrase a question based on a clinical scenario

Boolean operators

AND, OR, NOT

"PICO"

- P=patient, problem, population (what type of person or problem are you asking about?)
- I=intervention (what treatment are you interested in?)
- C=comparison (is there another intervention you want to compare with?)
- O=outcome (what measure is used to assess outcome?)

Clinical scenario

- Mrs. A, a 71-year old woman with a
  - Family history of Glaucoma
  - Visual field (w/w) being normal
  - IOP OD: 19 mmHg & OS: 20 mmHg
  - CCT OD: 500 microns OS: 495 microns
  - Optic disc OU: 0.7 CDR, with Superior rim thinning
- She wants to confirm if she has to get treatment for Glaucoma

How do I confirm?

Which test do I ask for?

HRT

OCT

GDx

Form an answerable clinical question…

Hint: Use
P (Population/ problem)
I (Intervention/ method of choice)
C (Control)
O (Outcome/ parameter under consideration)

PICO keywords

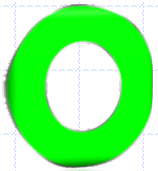
- P: Old age population, glaucoma suspects
- I: Imaging technique for optic nerve evaluation
- C: traditional method_ ophthalmoscopy
- O: Evidence for diagnosis of glaucoma

Which

Newer imaging technique

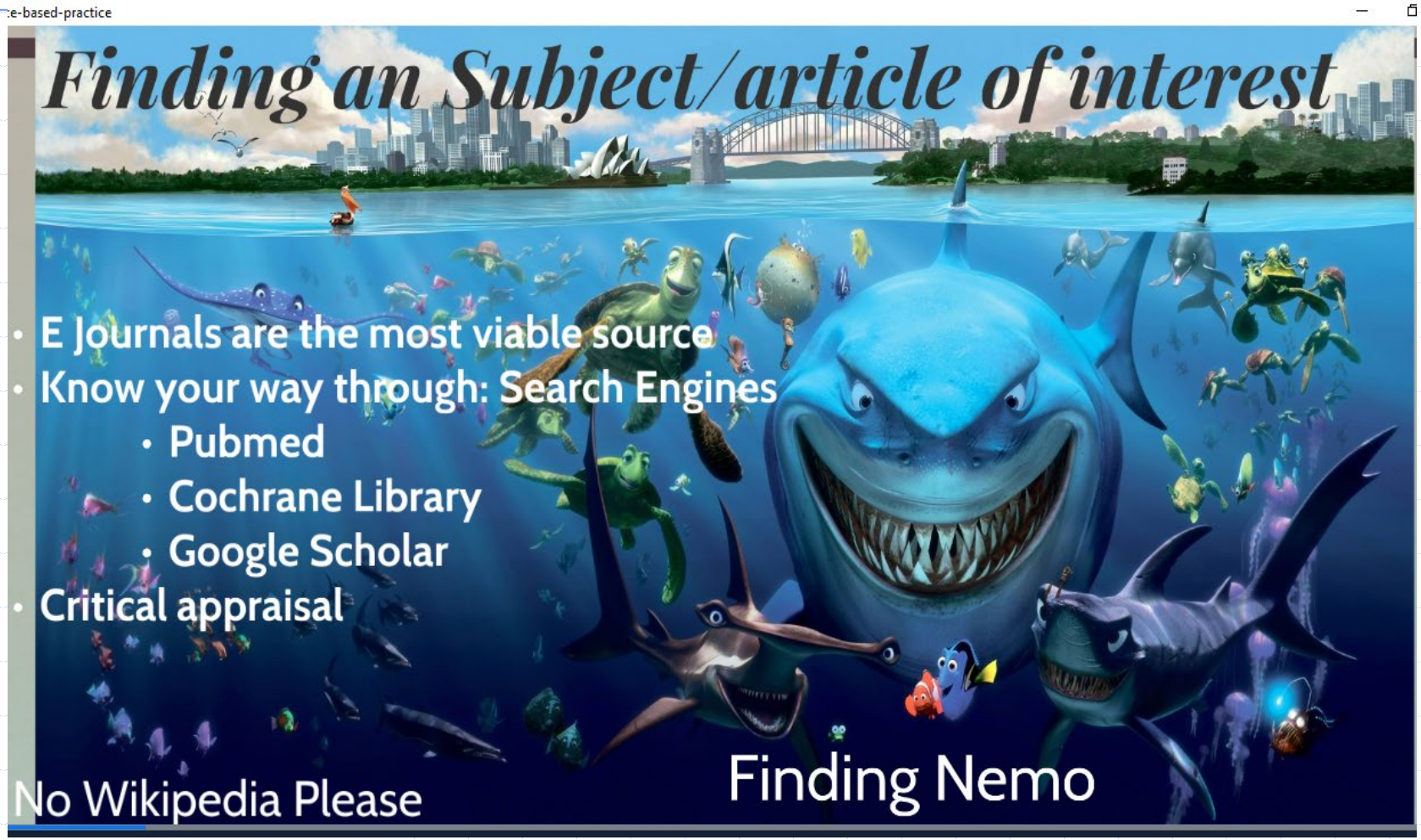
will help

accurately diagnose (confirm)



glaucoma in old age population

ACQUIRE


e-based-practice
Finding an Subject/article of interest
E Journals are the most viable source
Know your way through: Search Engines
Pubmed
Cochrane Library
Google Scholar
Critical appraisal
No Wikipedia Please
Finding Nemo

APPRAISE

Use of a *critical appraisal tool* to gauge the reliability of research evidence

Were patients allocated to groups randomly?

Is there a potential conflict of interest?

Critical Appraisal Tools

Are the results clinically significant?

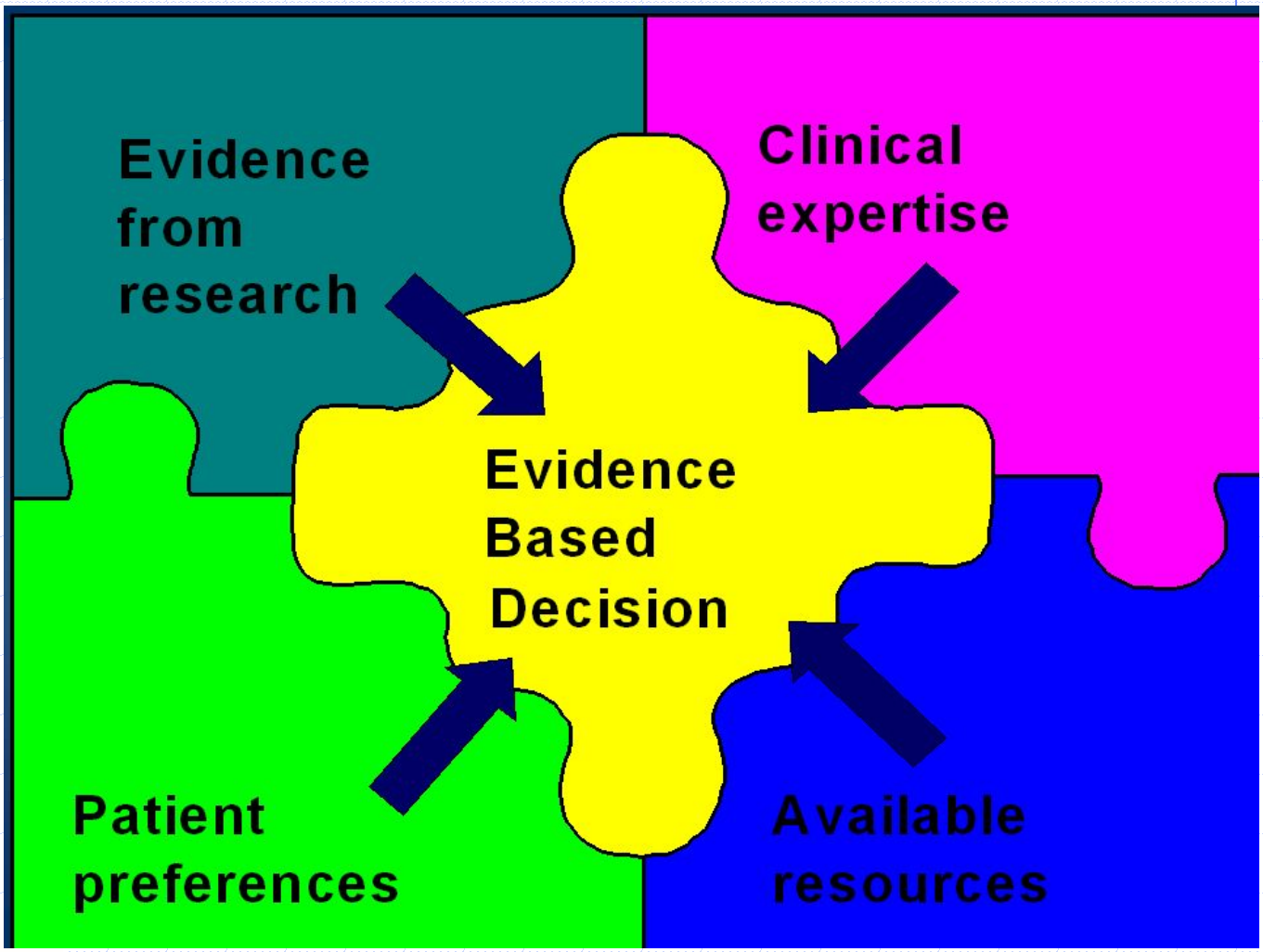
Are limitations recognised?

Are conclusions reasonable?

Could there be a placebo effect?

APPLY

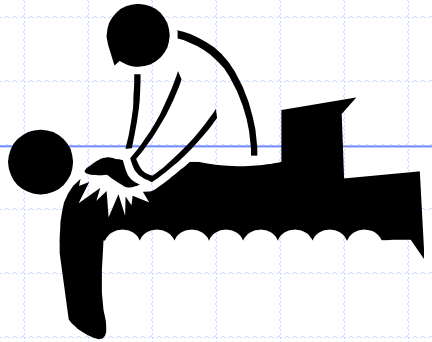
Clinical Decision Making

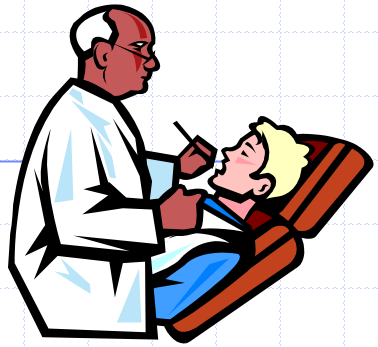


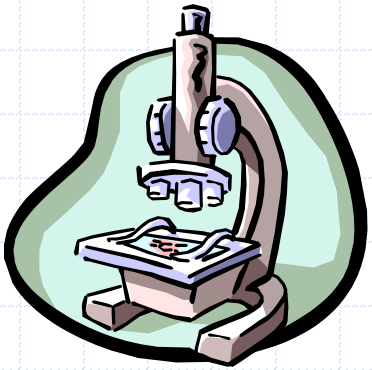
The art of Clinical Decision Making (CDM)

- Clinical Disease handling
  - How to go about
  - What is common eye disease
- Intituitive vs Evidence based
  - Clinical skill enhancement
- What is an Diagnostic test
- Case review

Using Diagnostic evidence in practice

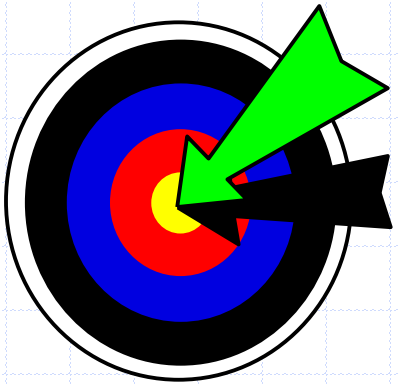




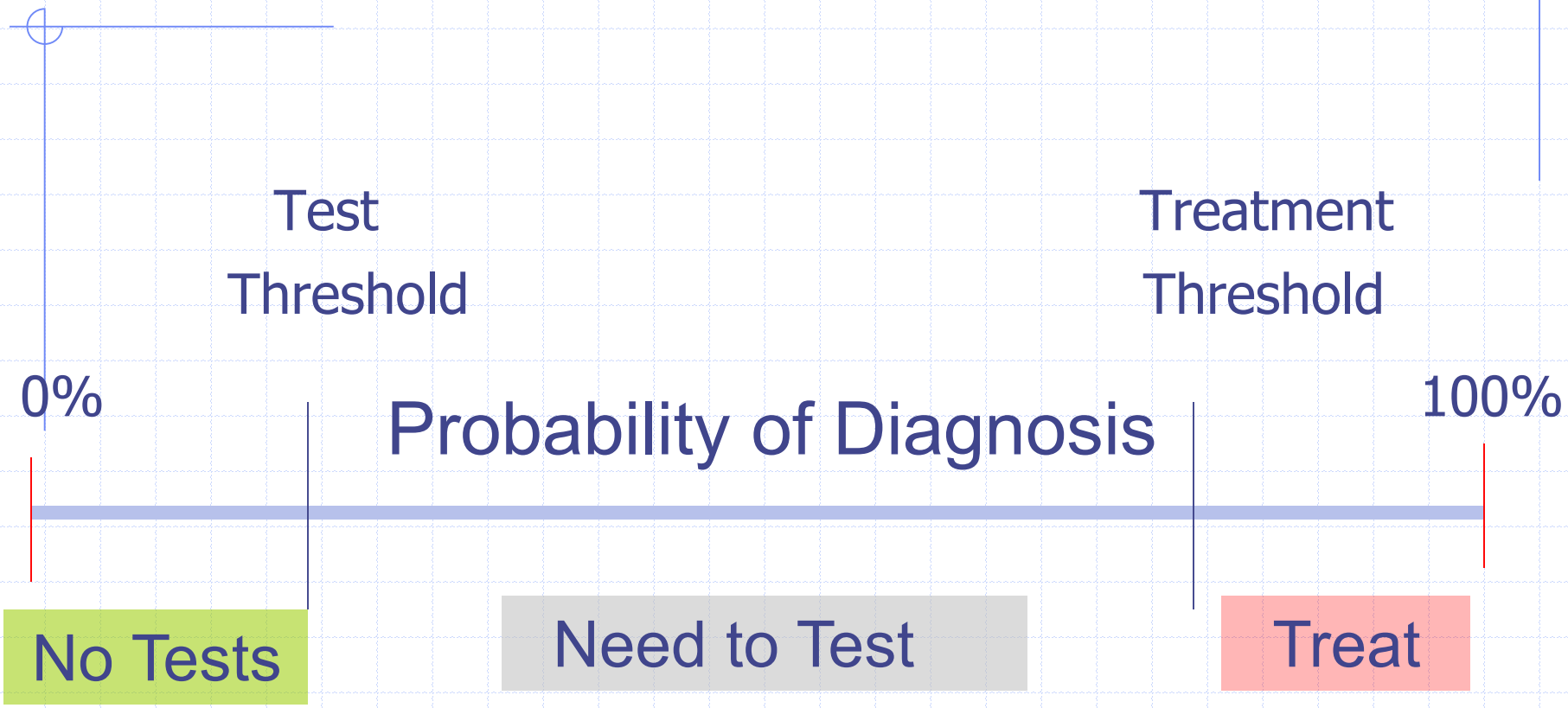


Terminology

- **Validity** [accuracy]: does it correspond to what is true?
  - sensitivity, specificity, likelihood ratios
- **Reliability** [precision]: does it give consistent results when repeated?
  - inter-observer, intra-observer variability

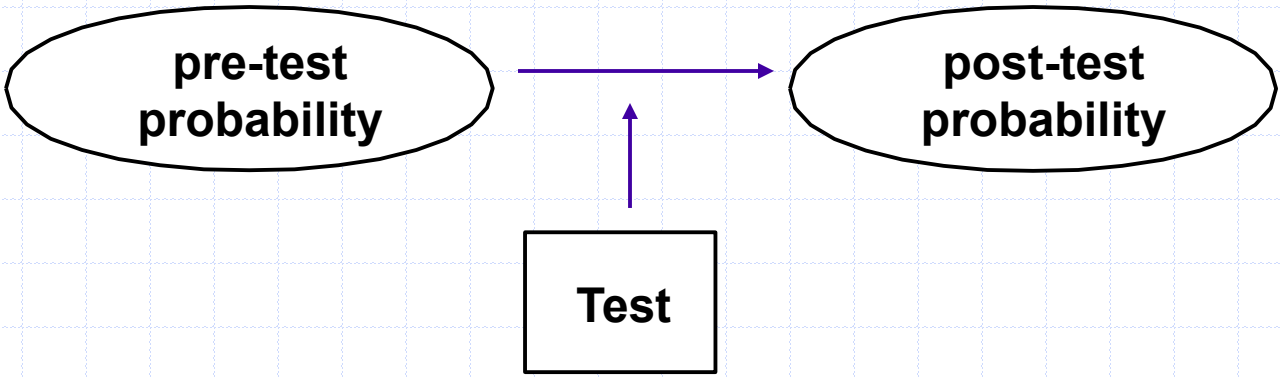


Process of diagnosis



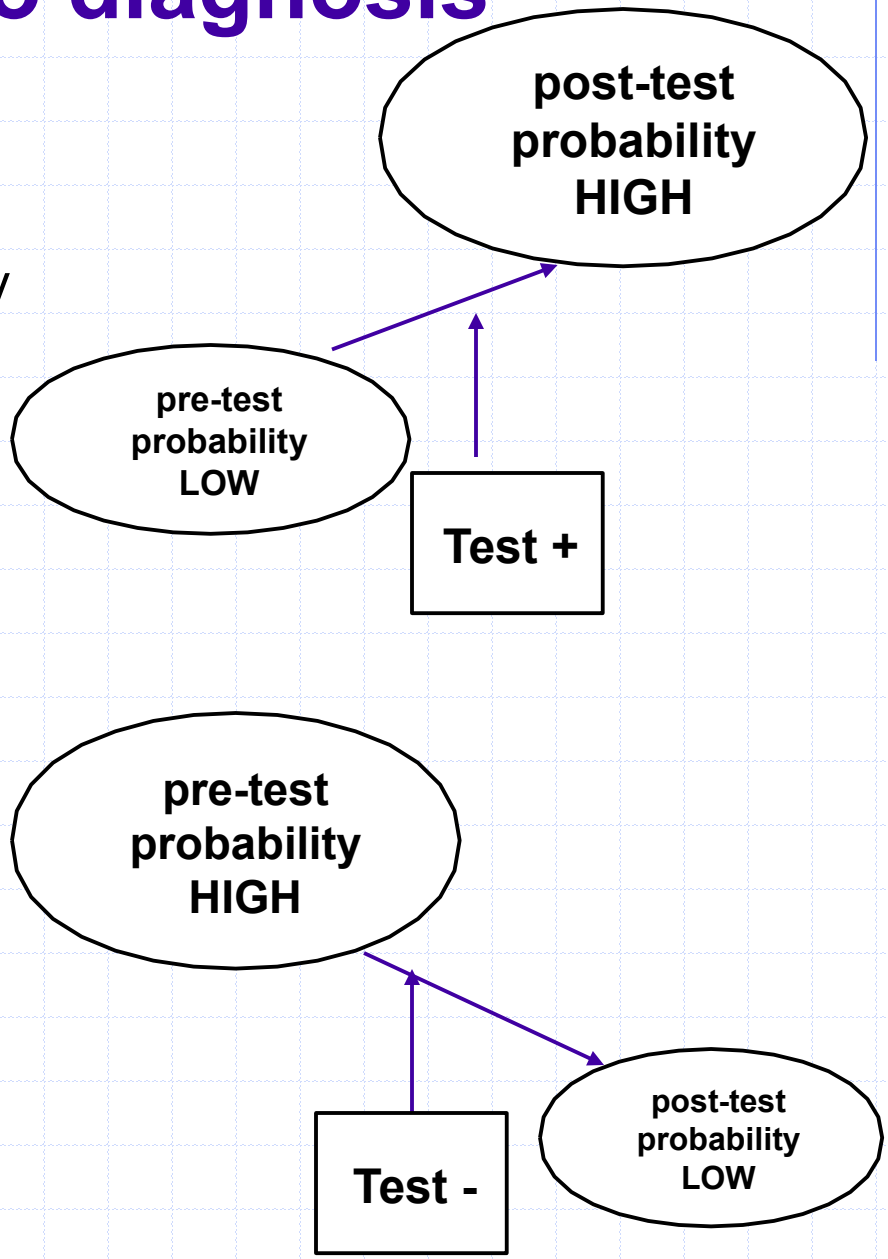
Bayesian approach to diagnosis

- every test is done with a certain probability of disease - degree of suspicion [pre-test probability]
- the probability of disease after the test is the post-test probability

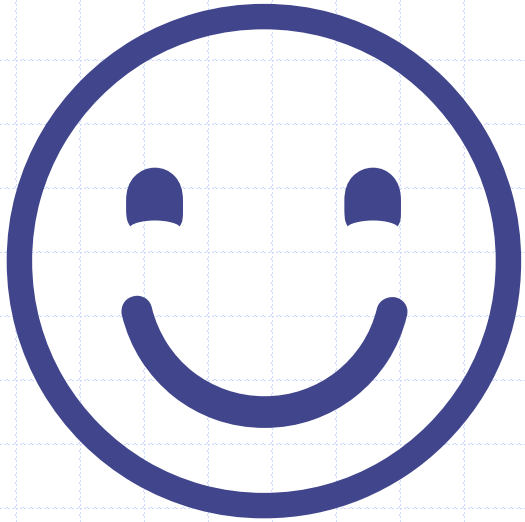


Bayesian approach to diagnosis

- A test result can not be meaningfully interpreted without pre-test probability
- The pre-test probability is revised using test result to get the post-test probability
- Tests that produce the biggest changes from pretest to post-test probabilities are most useful in clinical practice [very large or very small likelihood ratios]



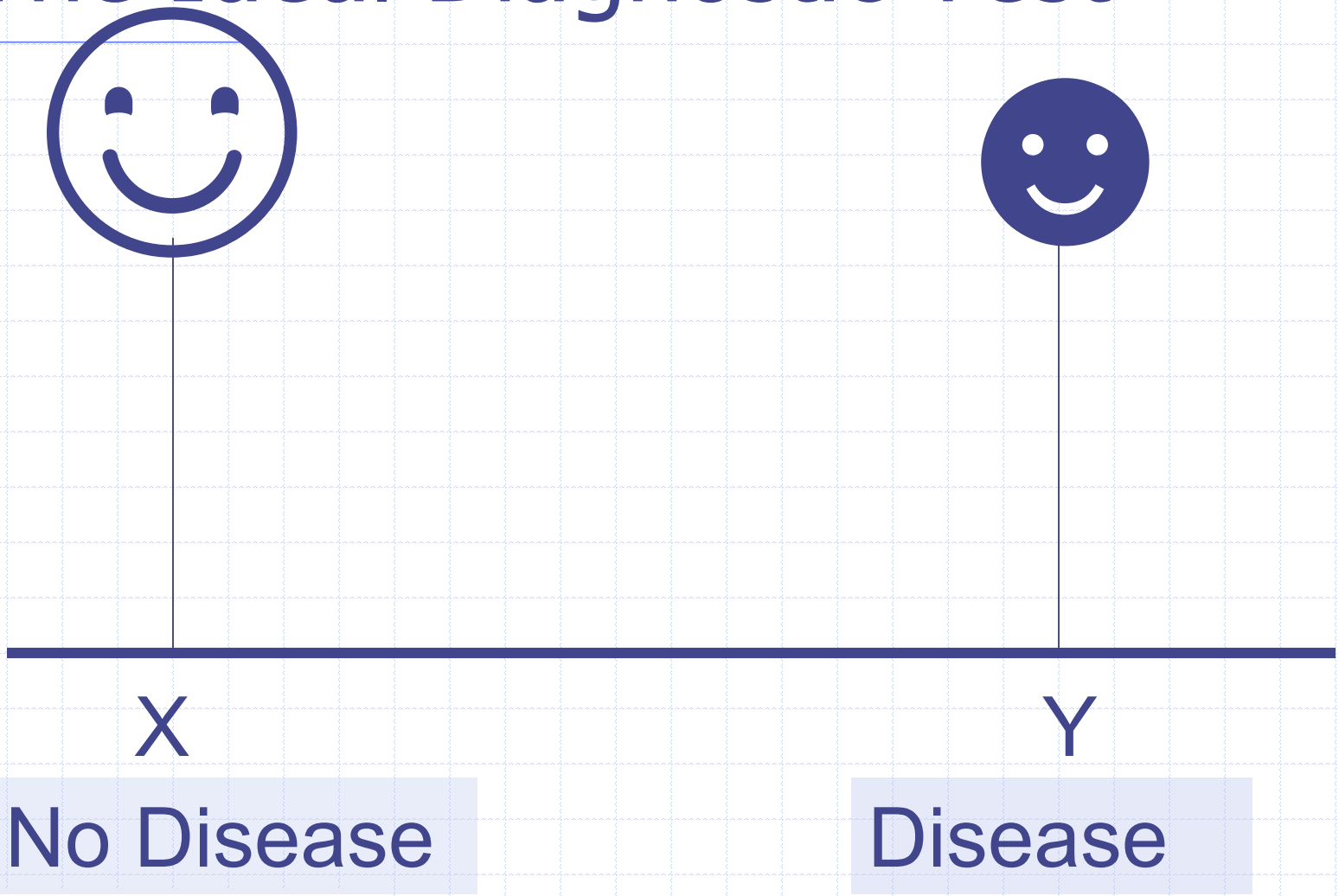
Diagnostic Test: Fundamental Principle



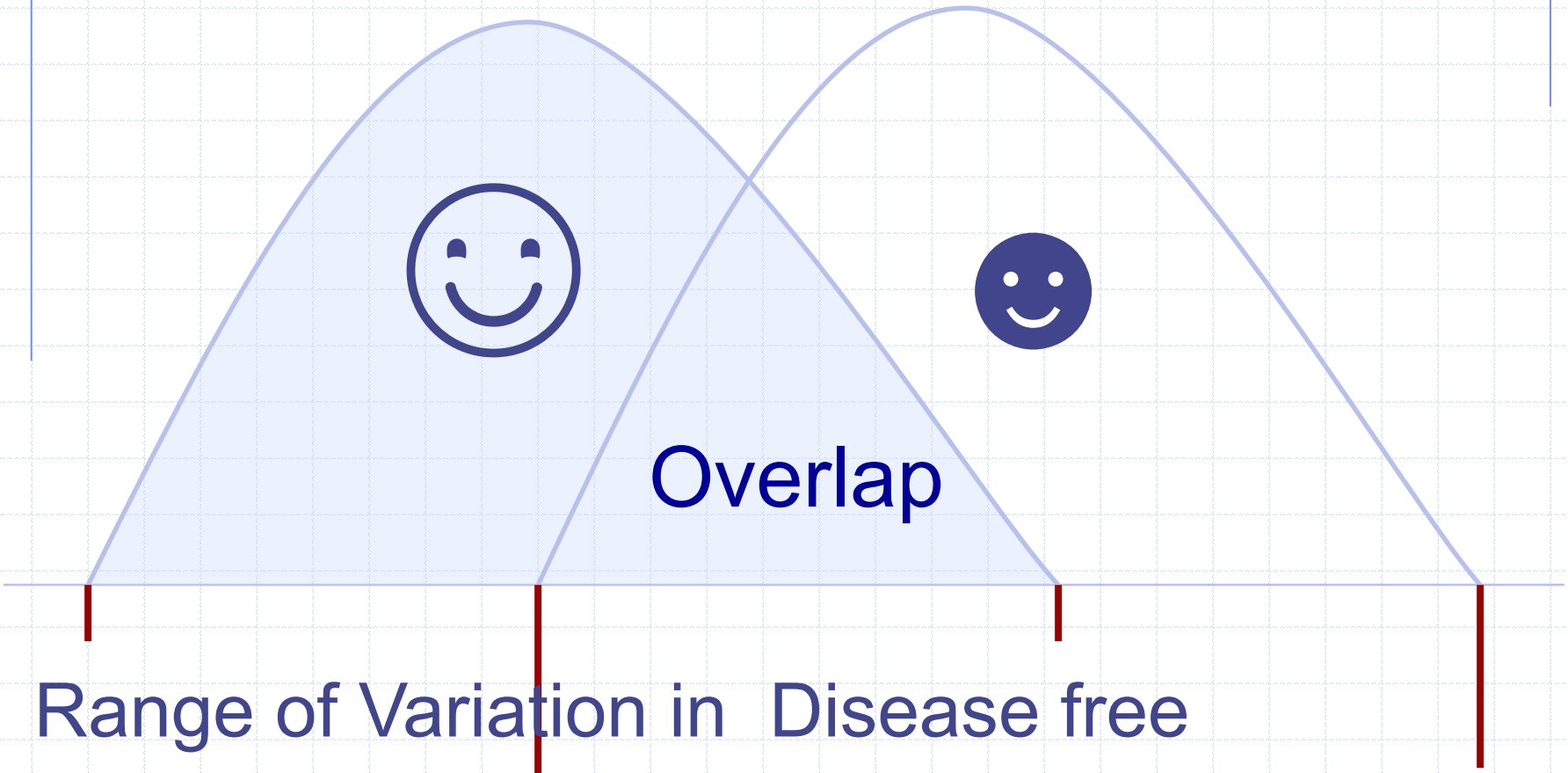
Disease +

Disease -

The Ideal Diagnostic Test

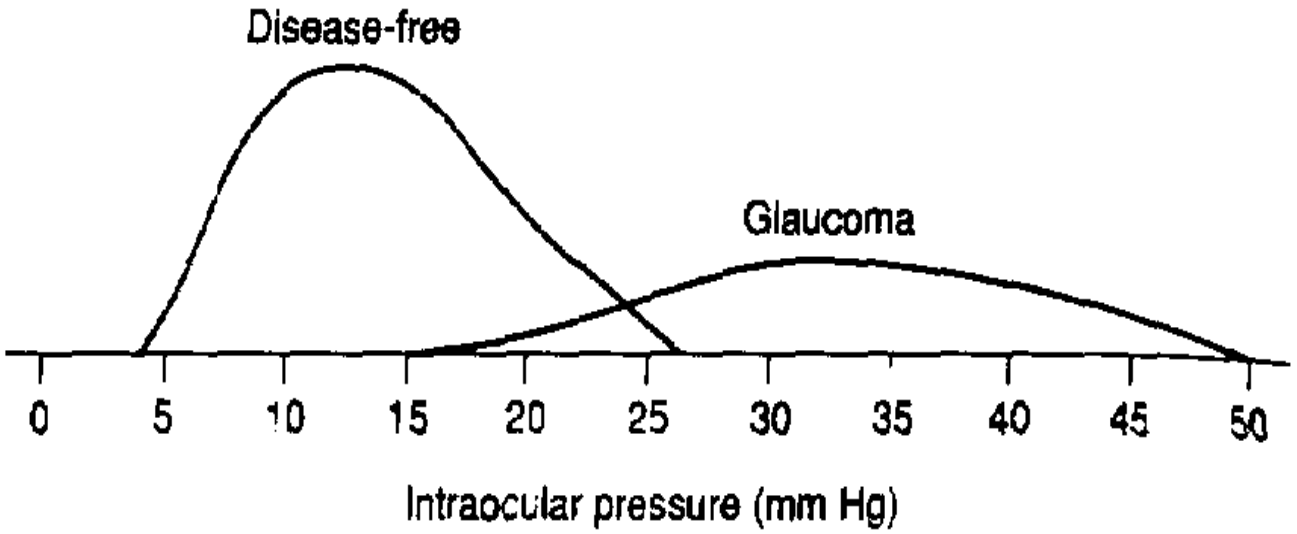


Variations In Diagnostic Tests



Variability among populations

Fig 2



Overlap of distributions of intraocular pressure among those with glaucoma and those without glaucoma

Riegelman & Hirsch 1996

Evaluating a diagnostic test

- Define gold standard
- Recruit consecutive patients in whom the test is indicated (in whom the disease is suspected)
- Perform gold standard and separate diseased and disease free groups
- Perform test on all and classify them as test positives or negatives
- Set up 2 x 2 table and compute:
  - Sensitivity
  - Specificity
  - Predictive values
  - Likelihood ratios

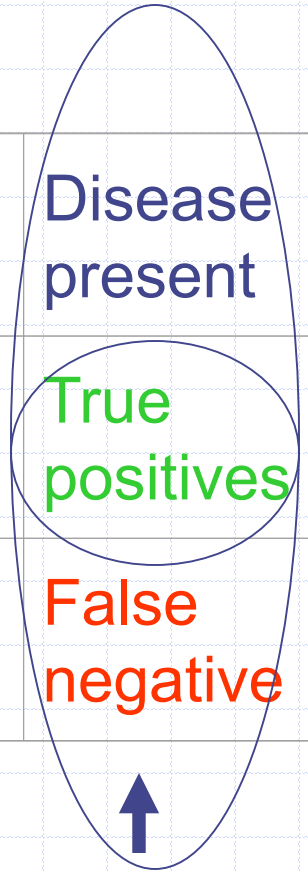
Evaluating a diagnostic test

- Diagnostic 2 X 2 table:

	Disease +	Disease -
Test +	True Positive	False Positive
Test -	False Negative	True Negative

SENSITIVITY
[true positive rate]

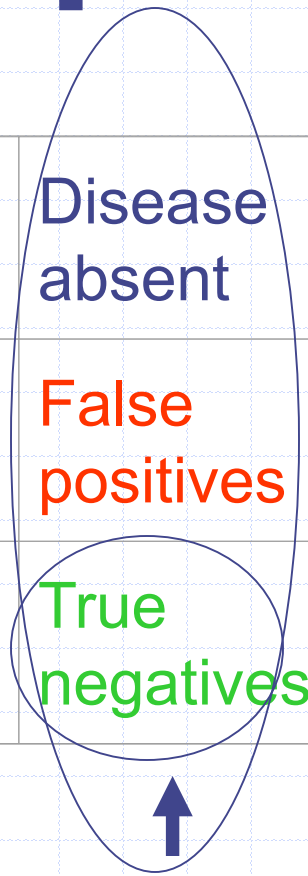
	Disease present	Disease absent
Test positive	True positives	False positives
Test negative	False negative	True negatives



The proportion of patients with disease who test positive = TP / (TP+FN)

SPECIFICITY
[true negative rate]

	Disease present	Disease absent
Test positive	True positives	False positives
Test negative	False negative	True negatives



The proportion of patients without disease who test negative: Specificity= TN / (TN + FP).

Predictive value of a positive test

	Disease present	Disease absent
Test positive	True positives	False positives
Test negative	False negative	True negatives

Proportion of patients with positive tests who have disease = TP / (TP+FP)

Predictive value of a negative test

	Disease present	Disease absent
Test positive	True positives	False positives
Test negative	False negative	True negatives

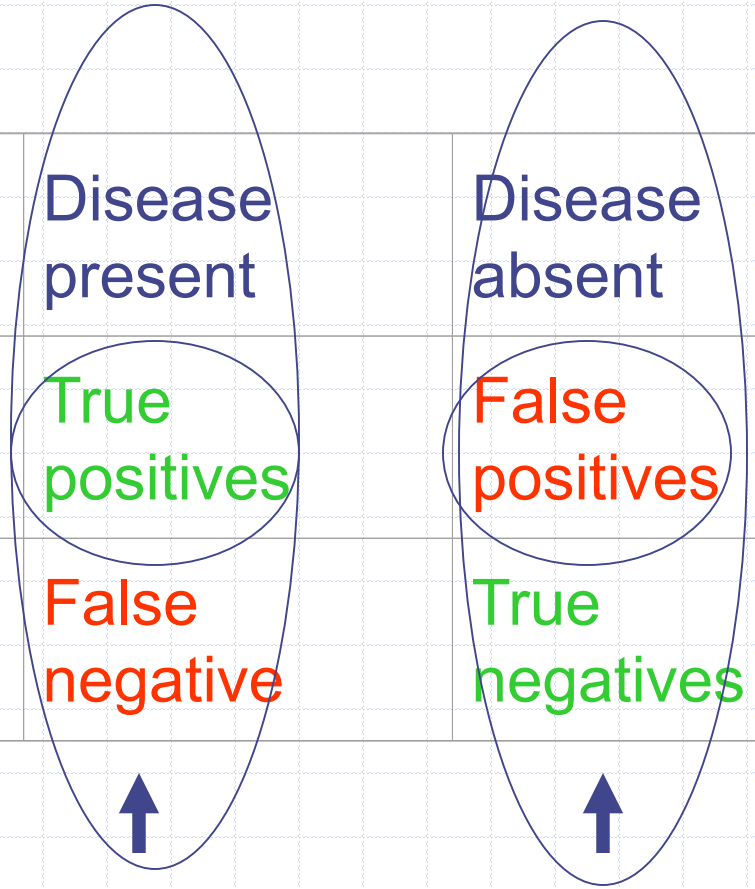
Proportion of patients with negative tests who do not have disease = TN / (TN+FN)

Likelihood Ratios

- Likelihood ratio of a positive test:
  - LR+ = TPR / FPR
    - High LR+ values help in RULING IN the disease
    - Values close to 1 indicate poor accuracy

Likelihood Ratio of a Positive Test

	Disease present	Disease absent
Test positive	True positives	False positives
Test negative	False negative	True negatives



$$LR+ = TPR / FPR$$

Compute Likelihood ratios

- Positive likelihood ratio= Sensitivity/

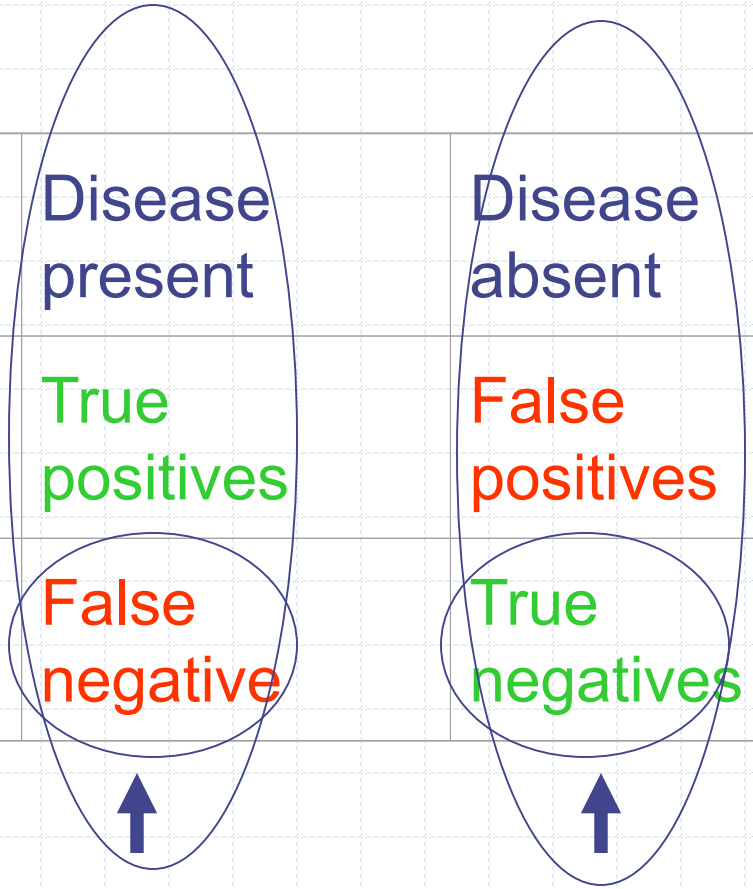
  (1-Specificity)

Likelihood Ratios

- Likelihood ratio of a negative test:
  - LR- = FNR / TNR
    - Low LR- values help in RULING OUT the disease
    - Values close to 1 indicate poor accuracy

Likelihood Ratio of a Negative Test

	Disease present	Disease absent
Test positive	True positives	False positives
Test negative	False negative	True negatives



LR- = FNR / TNR

Compute Likelihood ratios

- Negative likelihood ratio= (1- Sensitivity)/ Specificity

Read review article: use of newer Imaging test- detect early losses among Glaucoma suspects

	Sensitivity (%)	Specificity (%)	ROC
HRT (Scanning Laser Ophthalmoscope)	82	87	91
OCT (Optical Coherence Tomography)	79	79	85
GDx VCC (Scanning Laser Polarimetry)	79	69	78

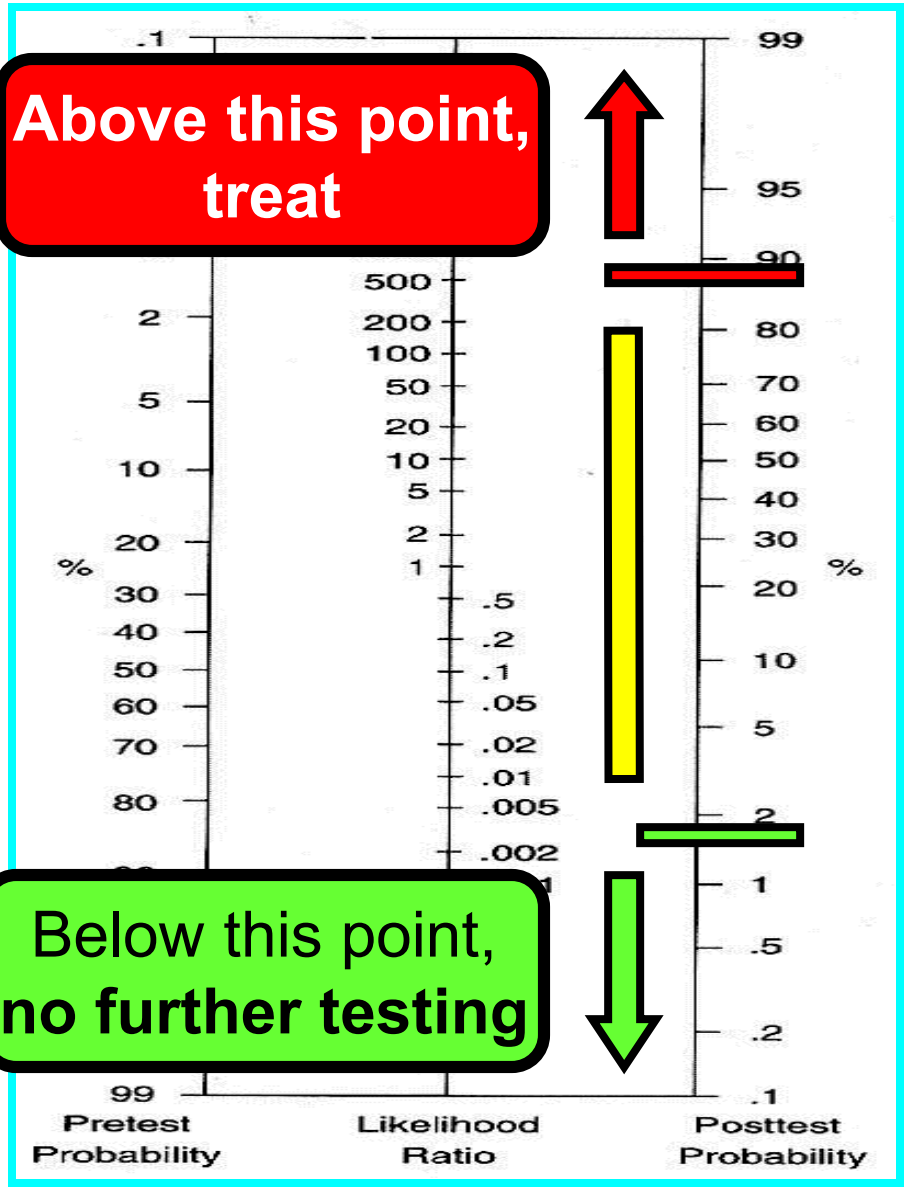
What Do we do with this data!!!!!!!!!!!!!!!!!!!!

Michelessi, M et al . (2015). Optic nerve head and fibre layer imaging for diagnosing glaucoma. *The Cochrane Database of Systematic Reviews*, *11*, CD008803.

Compute Likelihood ratios

- Positive likelihood ratio= Sensitivity/ (1-Specificity)
- Negative likelihood ratio= (1- Sensitivity)/ Specificity

Thresholds for decision-making: when will you stop investigating? when will you test further? when will you rule out disease?



Disease ruled IN

Disease not ruled in or out

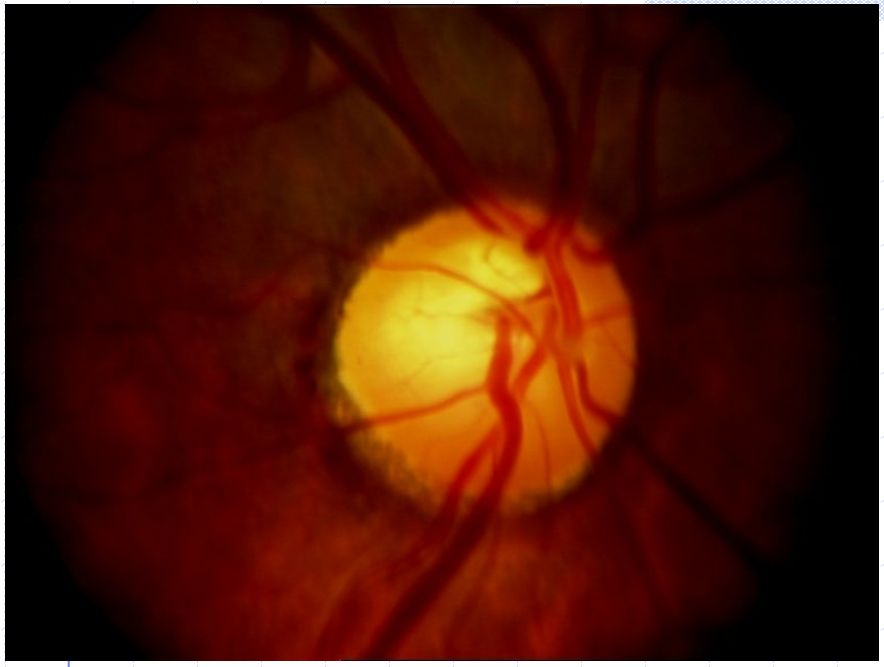
Disease ruled OUT

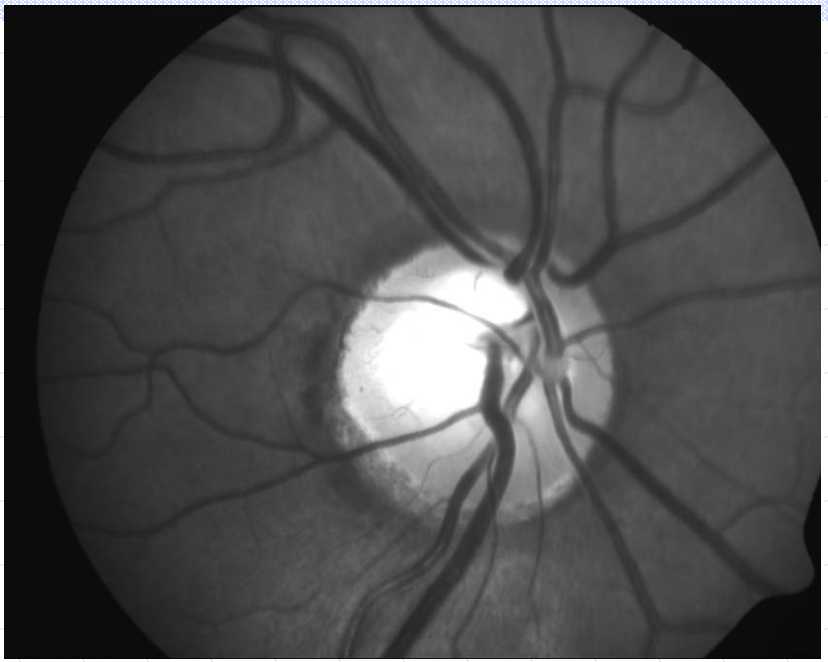
Compute Likelihood ratios

	Sensitivity (%)	Specificity (%)	ROC	Positive Likelihood ratio	Negative Likelihood ratio
HRT (Scanning Laser Ophthalmoscope)	**82**	**87**	**91**	**6.3**	**0.21**
OCT (Optical Coherence Tomography)	79	79	85	3.76	0.26
GDx VCC (Scanning Laser Polarimetry)	79	69	78	2.54	0.39

Using LRs in Clinical practice

- Scenario:
  - Mrs. A, a 71-year old woman with a
    - Family history of Glaucoma
    - Visual field (w/w) being normal
    - IOP OD: 19 mmHg & OS: 20 mmHG
    - CCT OD: 500 microns OS: 495 microns
    - Optic disc ou: 0.7 cdr, with Superior rim thinning





Single Field Analysis

Eye: Right

Name: ARUN KUMAR | ID: 267967 | DOB: 09-08-1956

Central 24-2 Threshold Test

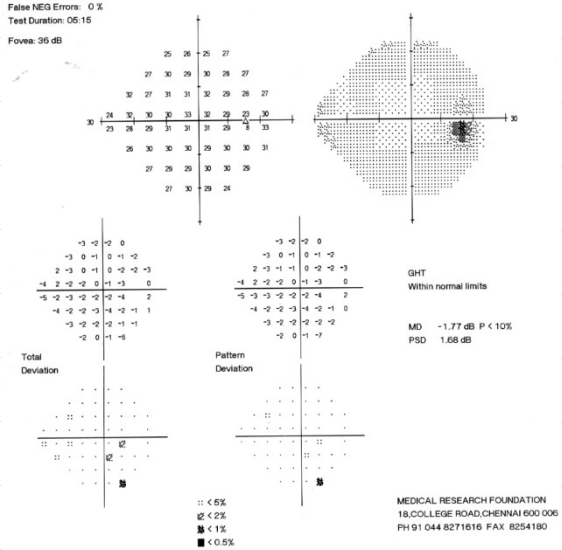
Fixation Monitor: Blindspot
Fixation Target: Central
Fixation Losses: 0/14
False POS Errors: 1 %
False NEG Errors: 0 %
Test Duration: 05:15

Fovea: 36 dB

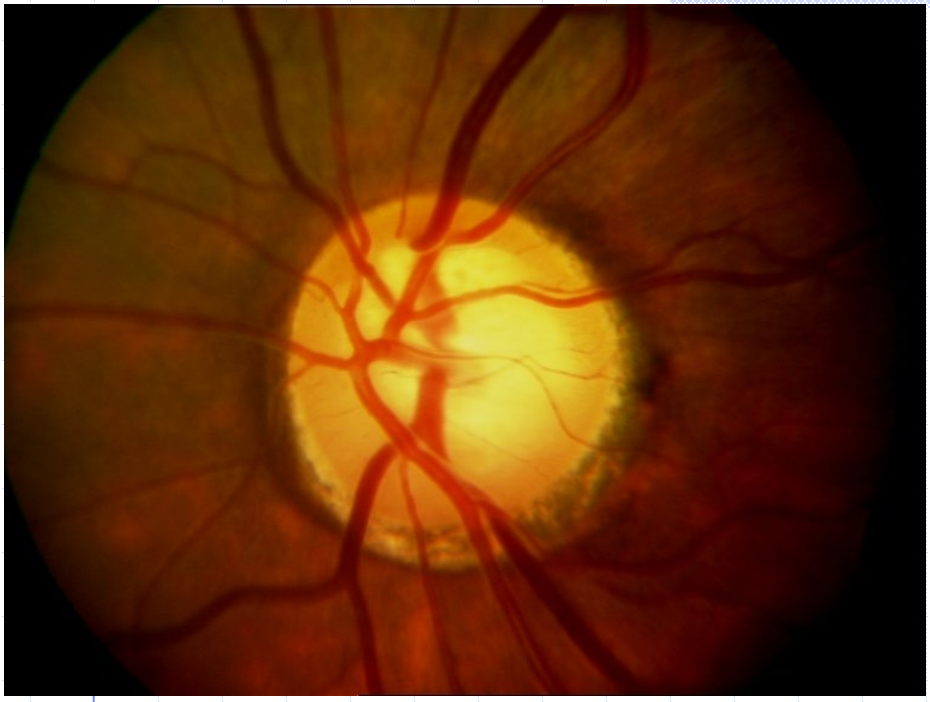
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard

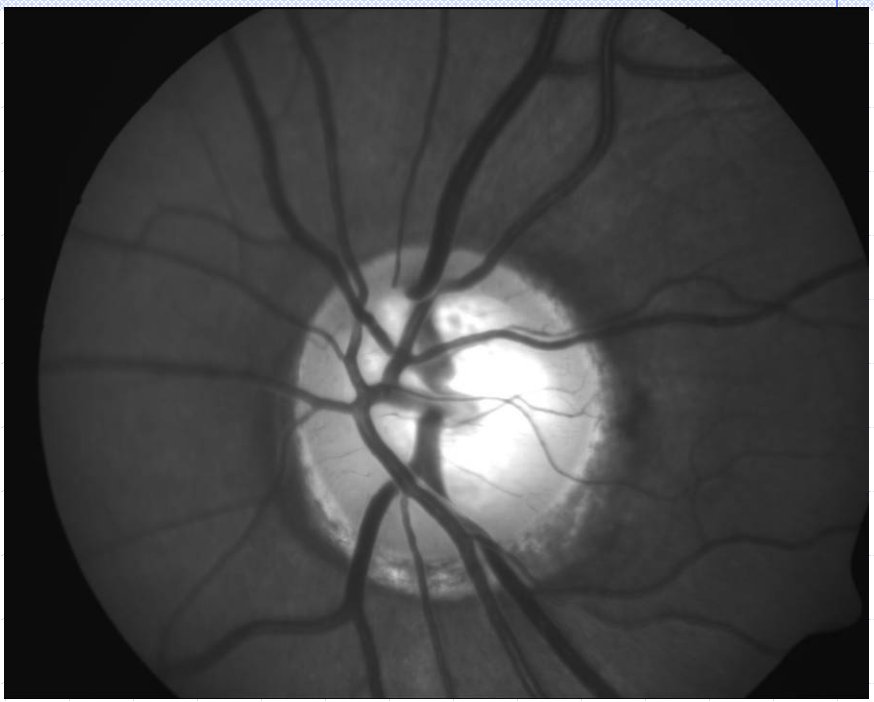
Pupil Diameter: 7.0 mm
Visual Acuity: 6/4.5
RX: +1.00 DS DC X

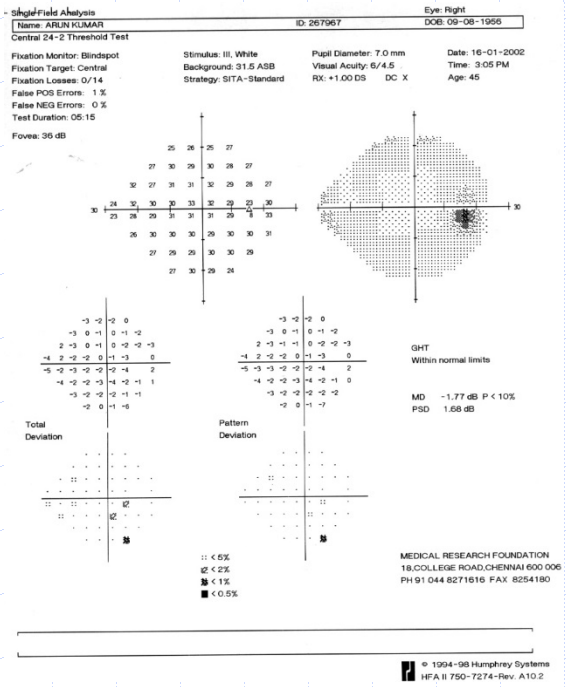
Date: 16-01-2002
Time: 3:05 PM
Age: 45



MEDICAL RESEARCH FOUNDATION
18,COLLEGE ROAD,CHENNAI 600 006
PH 91 044 8271616 FAX 8254180







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Assess your patient and estimate the baseline risk (pre-test probability)

Based on initial history, how likely is it that Mrs. A has a Glaucoma?

Pre-Test Probability

How might the result of a Diagnostic test Change the likelihood of Glaucoma in this patient?

Post-Test Probability

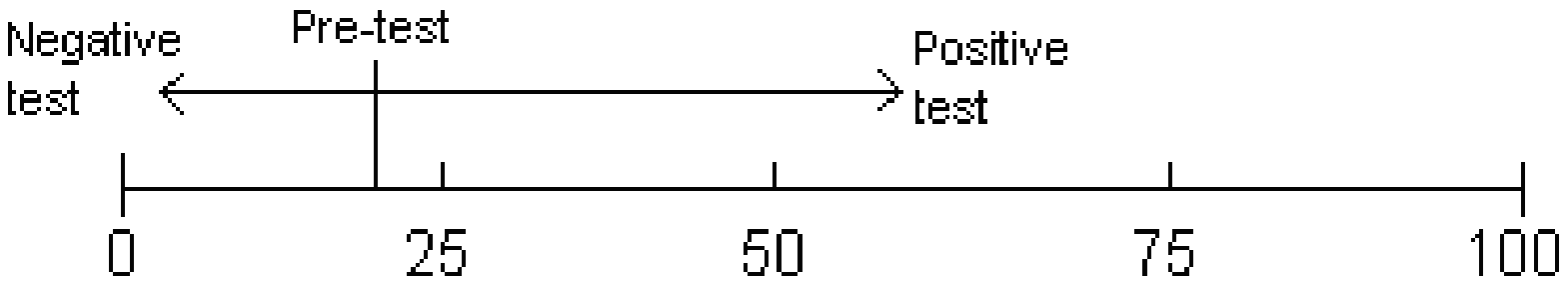
Pretest probability

- Approx. population based prevalence for 71 yrs is just 7-10.5%….
- Fairly high pre-test probability (37%) of Glaucoma: Family h/o, Borderline IOP But Fields Normal……
- To clear the dilemma what Diagnostic???????
  - HRT/OCT/!!!!!!!!!!!!!!

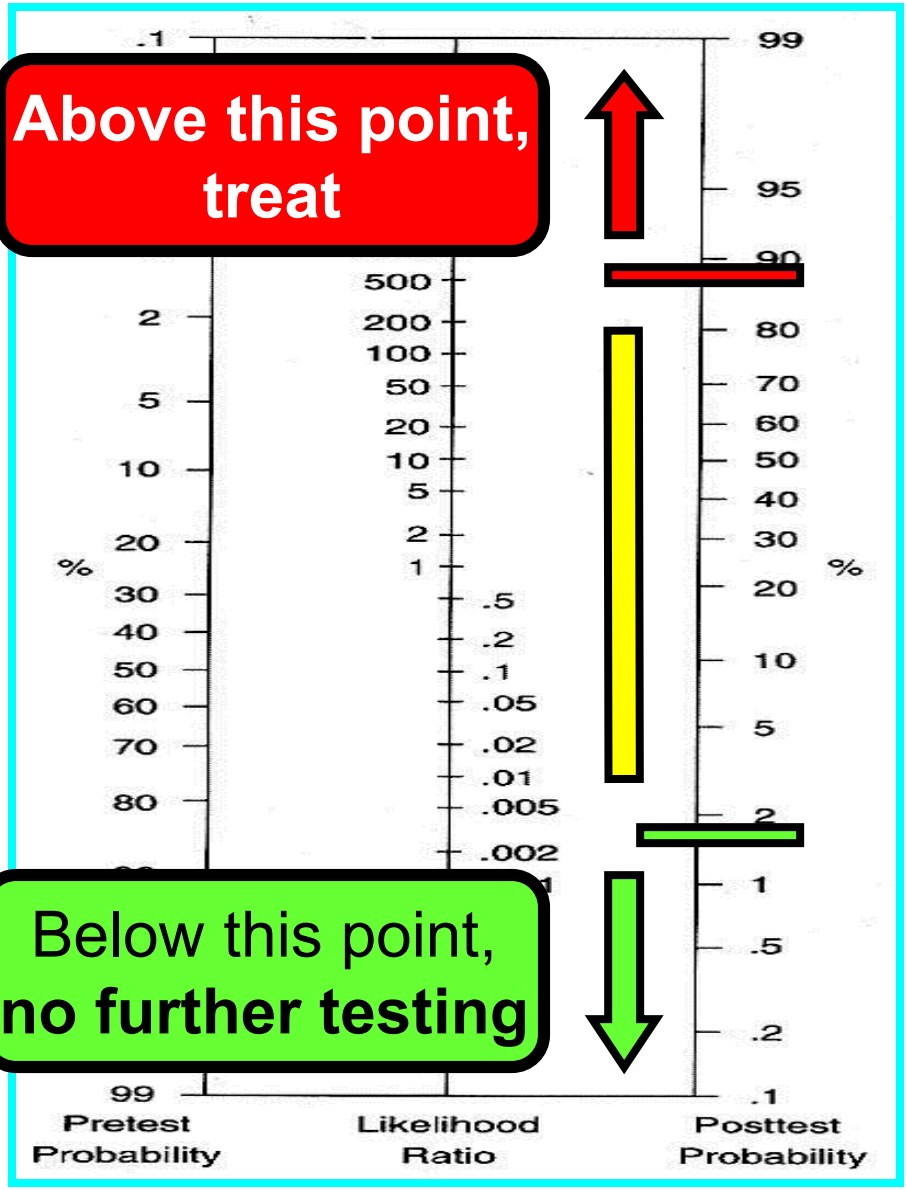
Which is better

	Sensitivity (%)	Specificity (%)	ROC	Positive Likelihood ratio	Negative Likelihood ratio
HRT (Scanning Laser Ophthalmoscope)	**82**	**87**	**91**	**6.3**	**0.21**
OCT (Optical Coherence Tomography)	79	79	85	3.76	0.26
GDx VCC (Scanning Laser Polarimetry)	79	69	78	2.54	0.39

Use the test to generate post-test probability



Thresholds for decision-making: when will you stop investigating? when will you test further? when will you rule out disease?



Disease ruled IN

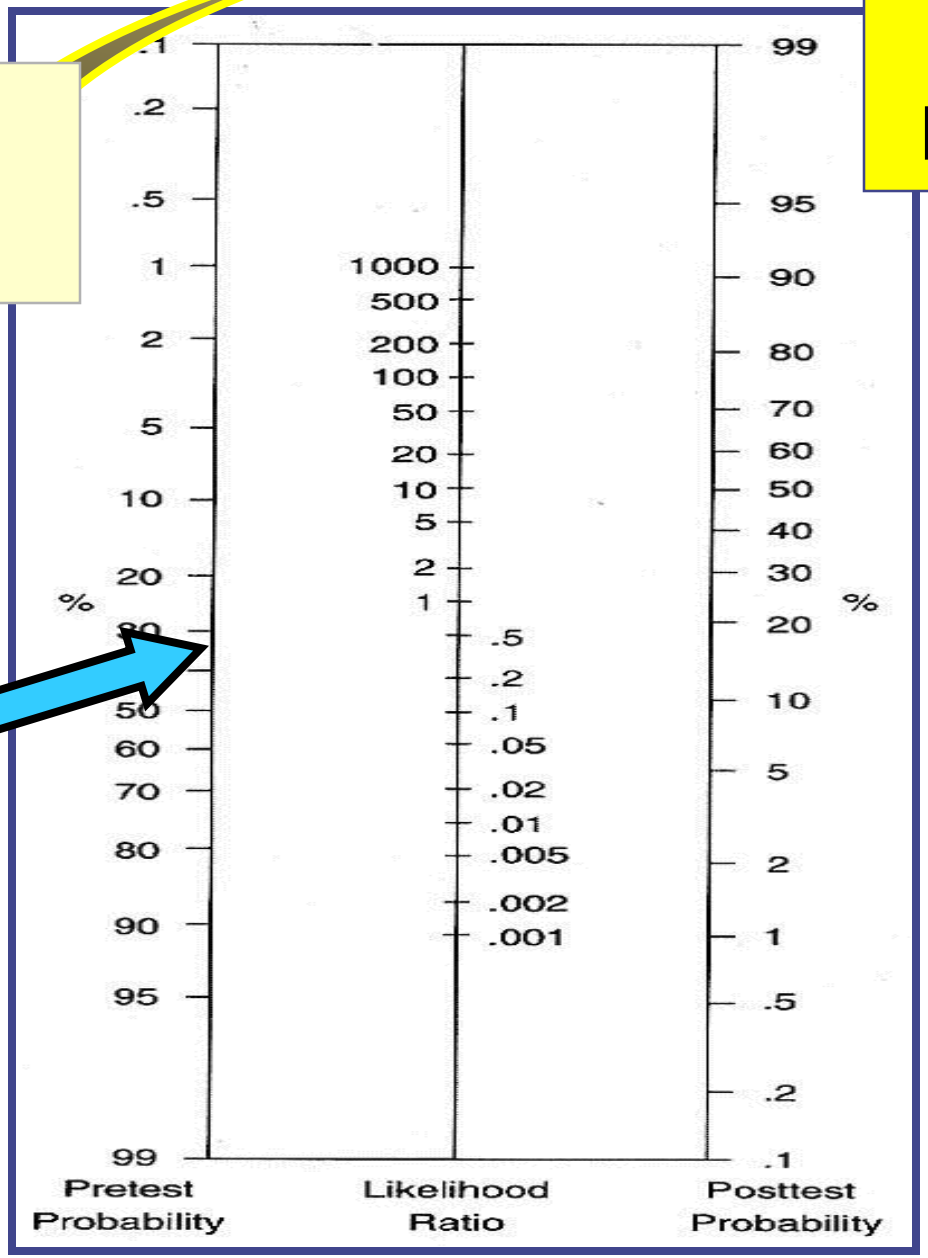
Disease not ruled in or out

Disease ruled OUT

Likelihood Ratios

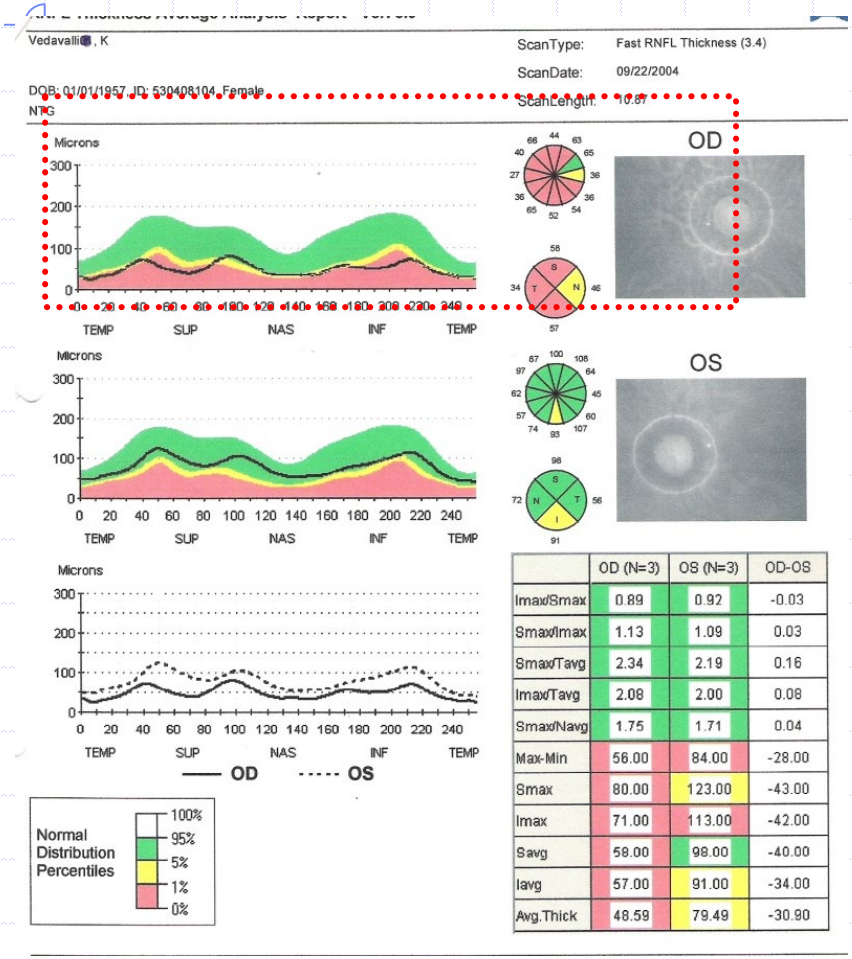
Pre-Test Probability

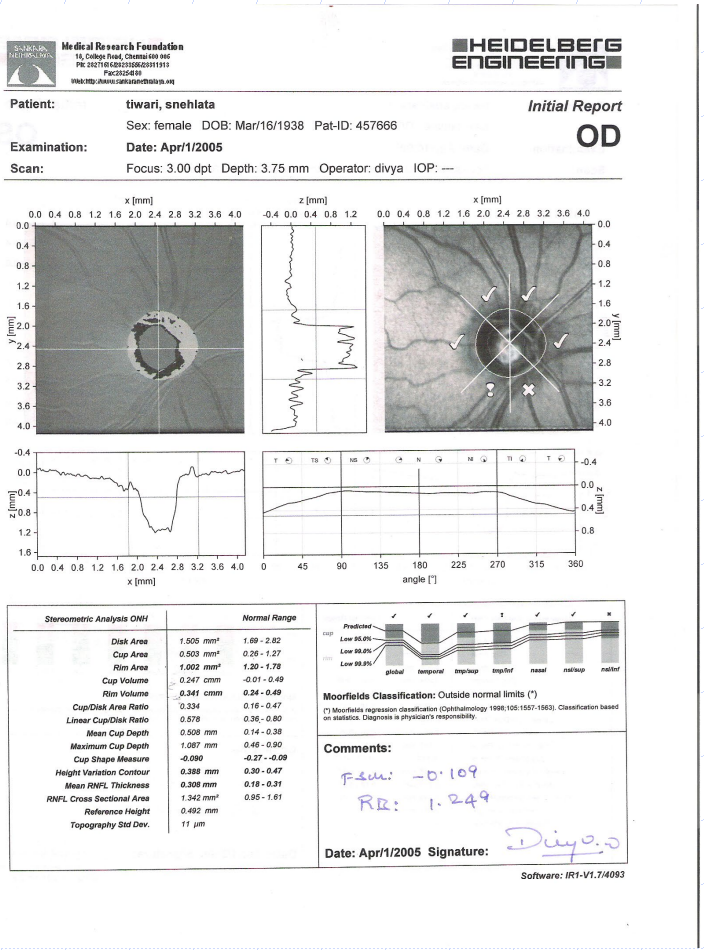
Post-Test Probability



Mrs. A Pre-Test Prob. 37%

Positive HRT& OCT report: OD





Which is Best diagnostic for this patient??

	Sensitivity (%)	Specificity (%)	ROC	Positive Likelihood ratio	Negative Likelihood ratio
HRT (Scanning Laser Ophthalmoscope)	**82**	**87**	**91**	**6.3**	**0.21**
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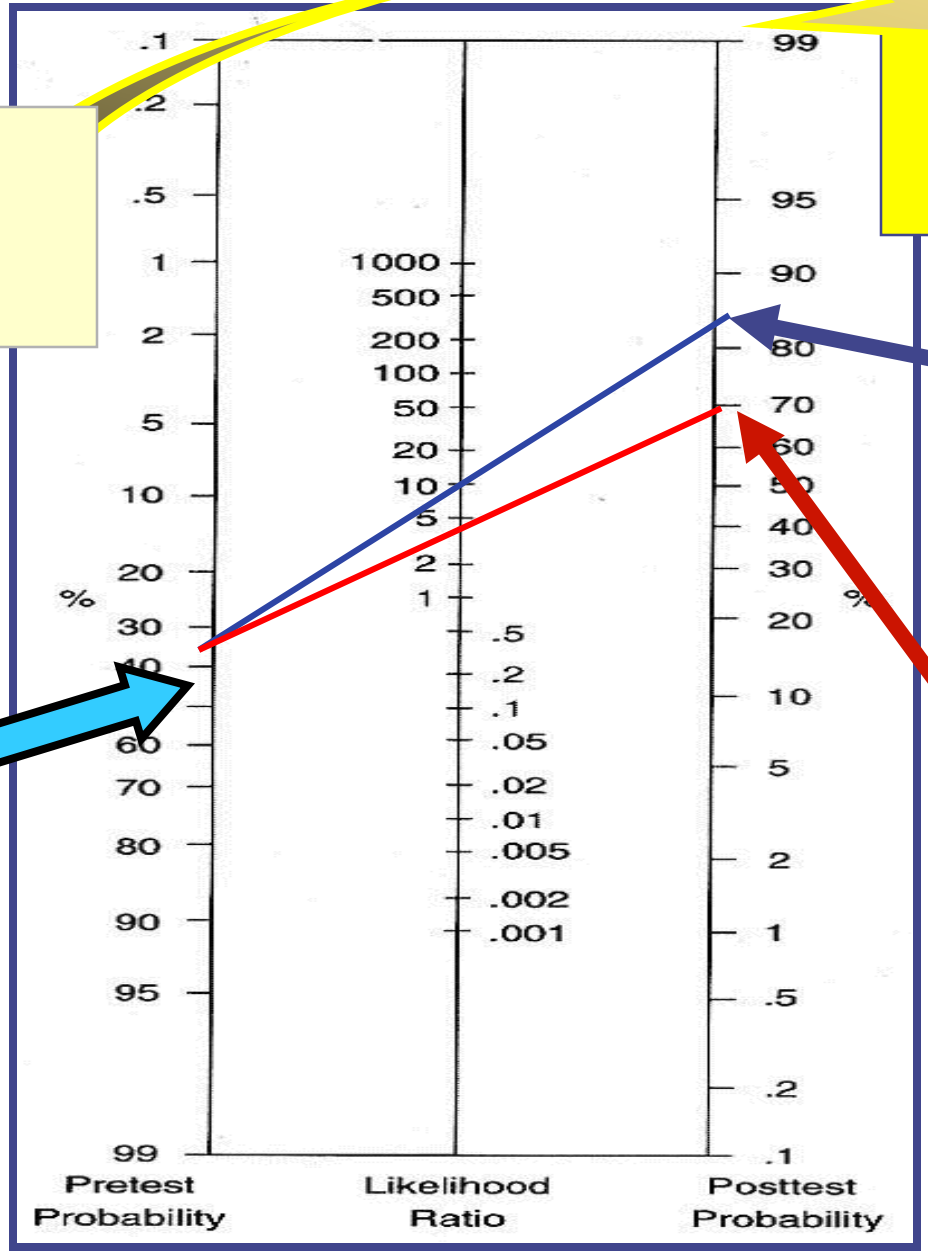
Likelihood Ratios

Pre-Test Probability

Post-Test Probability

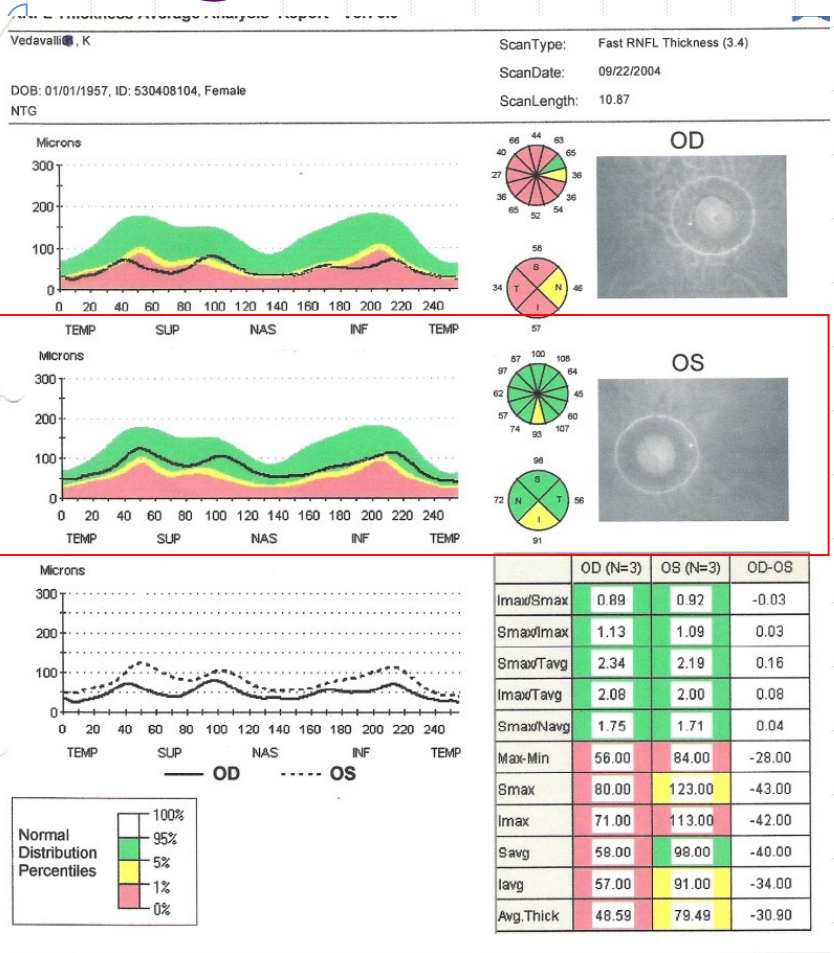


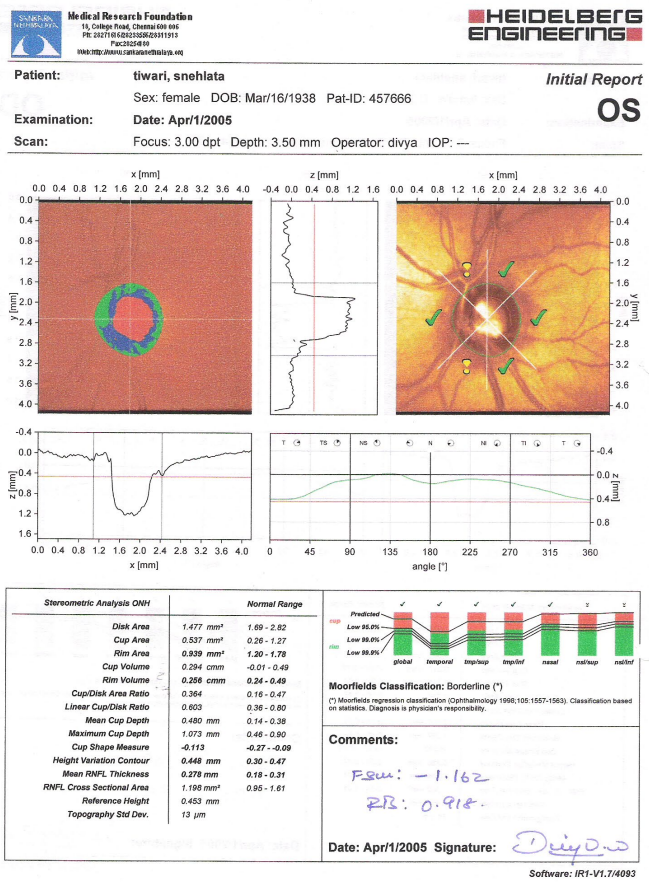
Mrs. A Pre-Test Prob. 37%

Post-Test HRT Prob. 85%

Post-Test OCT Prob. 70%

Negative HRT OCT : OS





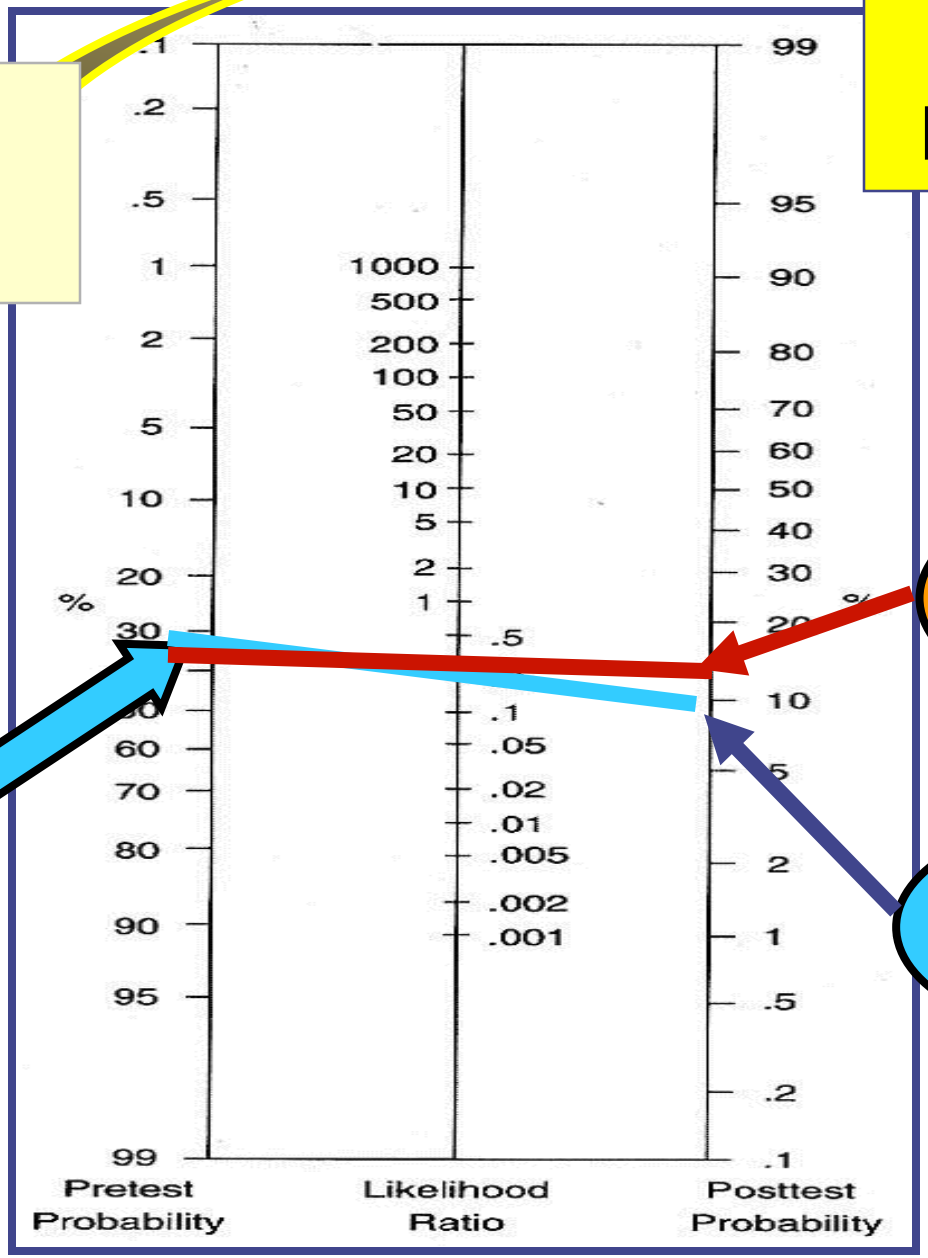
Which is Best diagnostic for this patient??

	Sensitivity (%)	Specificity (%)	ROC	Positive Likelihood ratio	Negative Likelihood ratio
HRT (Scanning Laser Ophthalmoscope)	**82**	**87**	**91**	**6.3**	**0.21**
OCT (Optical Coherence Tomography)	79	79	85	3.76	0.26
GDx VCC (Scanning Laser Polarimetry)	79	69	78	2.54	0.39

Likelihood Ratios

Pre-Test Probability

Post-Test Probability



Post-Test OCT Prob. 13%

Mrs. A Pre-Test Prob. 37 %

Post-Test HRT Prob. 9%

Clinical Management for Mrs A

Explore Best Evidence for Tx*

- Right eye- Disease positive
  - Needs antiglaucoma Mx
    - Refer to glaucoma specialist
  - Followup 6 monthly
    - Comprehensive eye examination
      - Target IOP maintained
    - Repeat Imaging (HRT) & Perimetry (HVF)
- Left eye- Disease Negative
  - No Need for any Tx
  - Needs Closure followup
    - 3 month
    - Repeat Imaging (HRT) & Perimetry (HVF)

* http://www.worldglaucoma.org/consensus-10/

Clinical Decision Making

- Assess Pretest Probability
  - Improvise your knowledge & clinical Skill
- Obtain or review diagnostic test
  - Search for valid literature
  - Estimate Likeli Hood ratios
- Determine the post test probability
  - Fagans Normagram
  - Cut off…….

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Thank You

- Q&A- Action begin

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- Request for Feedback

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