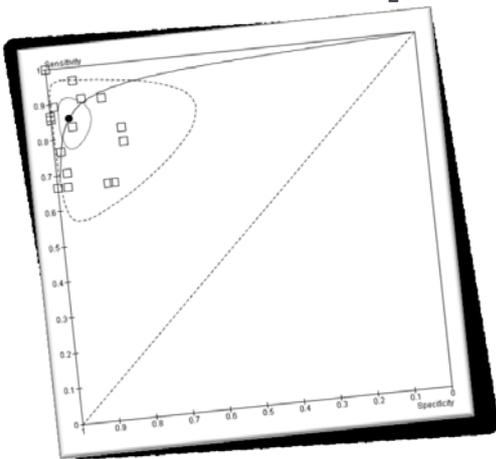


Introduction to Systematic Review of Diagnostic Test Accuracy

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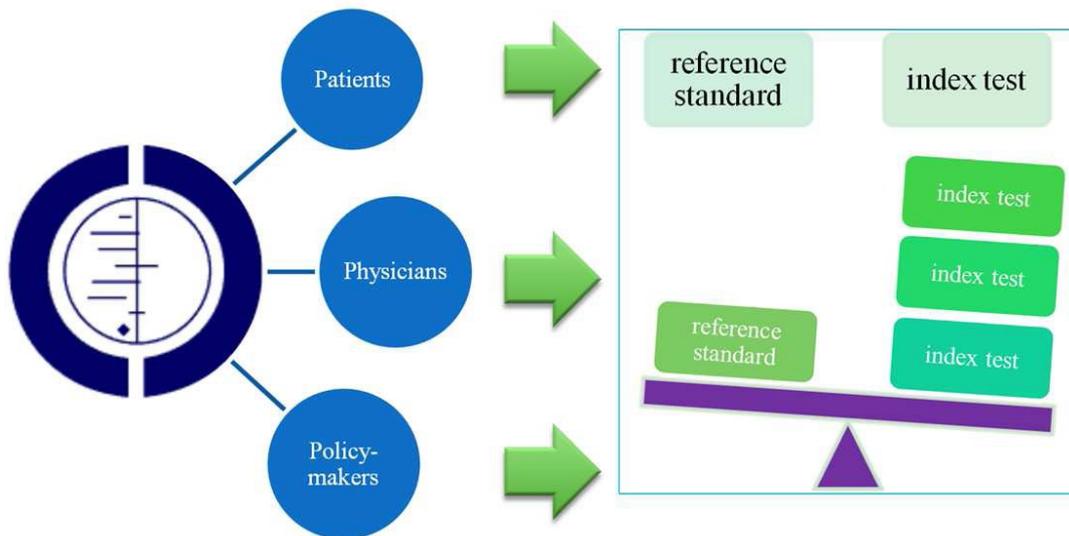
Outline

- ▶ Introduction
 - ▶ How to conduct the diagnostic review
 - ▶ How to define title and objective(s) of the review
 - ▶ How to search the diagnostic studies
 - ▶ How to select the included studies and extract data
 - ▶ How to assess the study quality
 - ▶ How to analyze data
 - ▶ How to do the diagnostic review in RevMan5
-



Introduction

- ▶ **What is a diagnostic systematic review ?**
- ▶ **Why is it important ?**



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How to conduct the diagnostic review

- ▶ **The major steps**
 - ▶ **Definition of title and objective(s) of the review**
 - ▶ **Searching the diagnostic studies**
 - ▶ **Selection the included studies and extraction of the data**
 - ▶ **Assessment of study quality**
 - ▶ **Statistical analysis**
 - ▶ **Interpretation of results and development of recommendations**

▶ Modified from [Gatsonis and Paliwal, 2006]

How to define title and objective(s) of the review

- ▶ **To define a title in a RevMan5 [CRDTA, 2005]**
 - ▶ *Index test(s)* versus *comparator(s)* for *target condition(s)* in *patient description*
 - ▶ *Index test(s)* versus *comparator(s)* for *target condition(s)*
 - ▶ *Index test(s)* for *target condition(s)* in *patient description*
 - ▶ *Index test(s)* for *patient description*
- ▶ **Example:**
 - ▶ **Positron emission tomographic versus computed tomographic imaging for detecting mediastinal lymph node metastases in nonsmall cell lung cancer [Birim et al., 2005].**

▶ 5

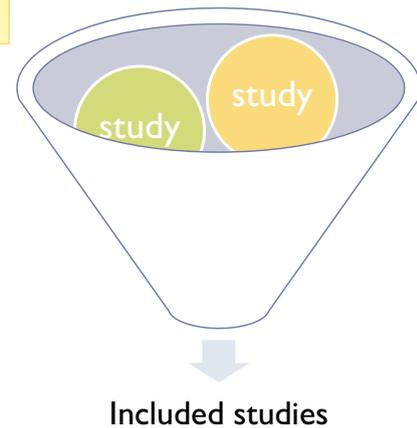
To define objective(s) of the review

- ▶ **The key components of objective(s) of the review**
 - ▶ The patients description, the presentation (a clinical problem)
 - ▶ Index test
 - ▶ Comparator test (other tests)
 - ▶ Outcome (the target condition or a disease)
- ▶ **Example:**
 - ▶ To determine the diagnostic accuracy of *Index test* for diagnosing *target disorder* in *patient description*.

▶ 6

How to search the diagnostic studies
How to select the studies

same as intervention review



How to extract data

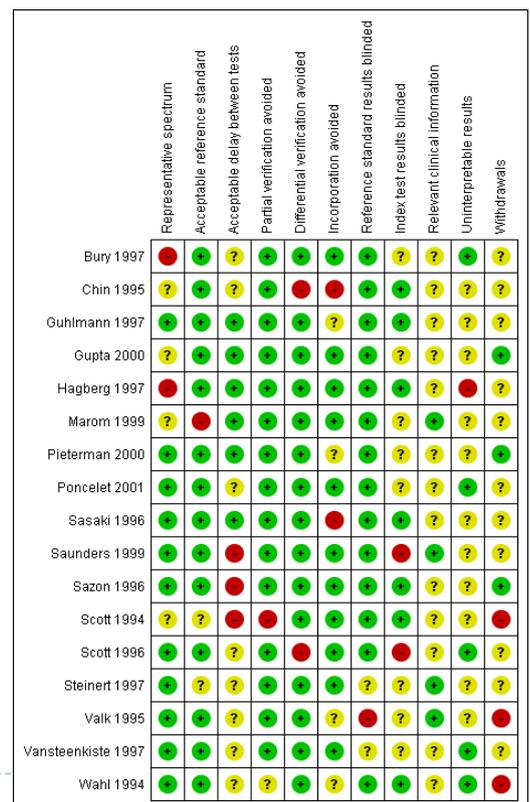
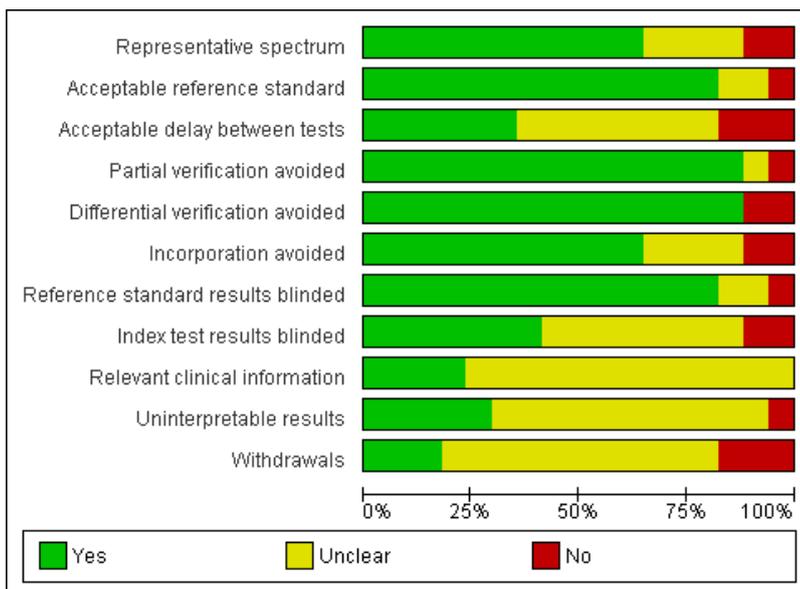
- ▶ **Important sections in the extraction data form**
 - ▶ **General Details**
 - ▶ **Participants**
 - ▶ **Target condition, reference standard, index test(s) and comparator test(s)**
 - ▶ **Results for diagnostic accuracy studies (2×2 table)**

How to assess the study quality

QUADAS Items		Answers		
		Yes	Unclear	No
1.	Was the spectrum of patients' representative of the patients who will receive the test in practice? (patients' spectrum)			
2.	Is the reference standard likely to correctly classify the target condition? (reference standard)			
3.	Is the time period between reference standard and index test short enough to be reasonably sure that the target condition did not change between the two tests? (disease progression)			
4.	Did the whole sample or a random selection of the sample, receive verification using a reference standard of diagnosis? (partial verification)			
5.	Did patients receive the same reference standard regardless of the index test result? (differential verification)			
6.	Was the reference standard independent of the index test (i.e. the index test did not form part of the reference standard)? (incorporation)			
7.	Were the index test results interpreted without knowledge of the results of the reference standard? (test review)			
8.	Were the reference standard results interpreted without knowledge of the results of the index test? (diagnostic review)			
9.	Were the same clinical data available when test results were interpreted as would be available when the test is used in practice? (clinical review)			
10.	Were uninterpretable/ intermediate test results reported? (uninterpretable results)			
11.	Were withdrawals from the study explained? (withdrawals)			

▶ 9

Methodological quality graph in RevMan5:



▶ 10

How to analyze data

- ▶ **Methods of meta-analysis of diagnostic test accuracy**
 - ▶ Forest plot
 - ▶ Summary receiver operating characteristic curves (SROC)
 - ▶ Bivariate regression model or HSROC model

How to do the diagnostic review in RevMan5

New Review Wizard

Which type of review do you want to create?

Type of Review:

- Intervention review
- Diagnostic test accuracy review
- Methodology review
- Overview of reviews

Cancel

New Review Wizard

What is the title of the review?

Title:

- [Index test(s)] versus [comparator(s)] for [target condition(s)] in [participant description]
- [Index test(s)] versus [comparator(s)] for [target condition(s)]
- [Index test(s)] for [target condition(s)] in [participant description]
- [Index test(s)] for [target condition(s)]

Cancel < Back Next > Finish

New Review Wizard

Which stage should the review start in?

Stage:

Title only

Protocol

Full review

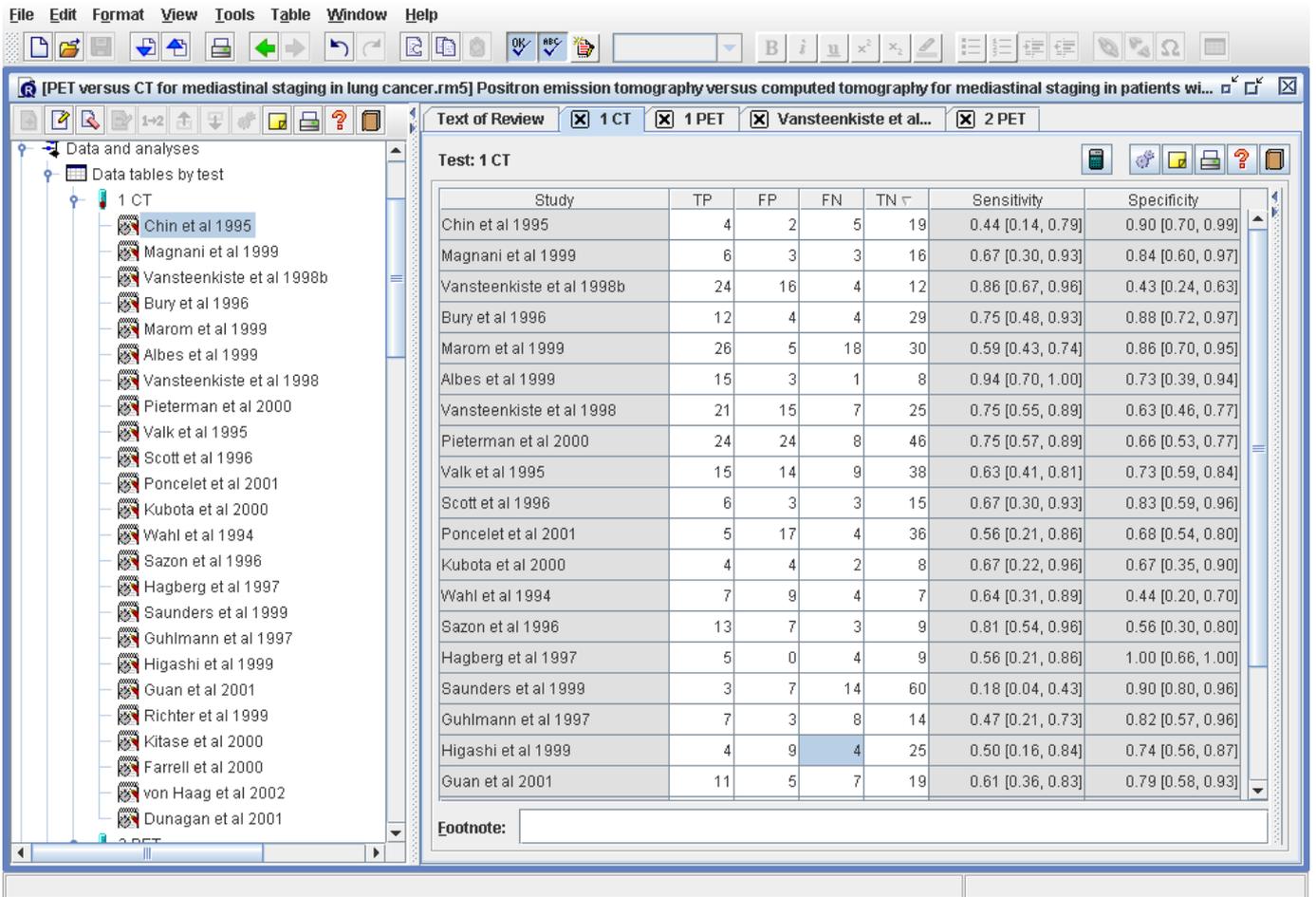
Cancel **< Back** **Next >**

Diagnostic test accuracy review

- Title
- Protocol information
- Main text
 - Abstract
 - Plain language summary
 - Background
 - Target condition being diagnosed
 - Index test(s)
 - Alternative test(s)
 - Rationale
 - Objectives
 - Secondary objectives
 - Investigation of sources of heterogeneity
 - Methods
 - Criteria for considering studies for this review
 - Types of studies
 - Participants
 - Index tests
 - Comparator tests
 - Target conditions
 - Reference standards
 - Search methods for identification of studies
 - Data collection and analysis

Diagnostic test accuracy review

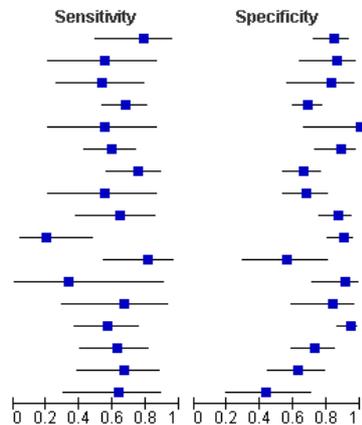
- Title
- Review information
- Main text
- Tables
- Studies and references
- Data and analyses**
 - Data tables by test
 - Data tables by study
 - Covariates
 - Analyses
- Figures
- Sources of support
- Feedback
- Appendices



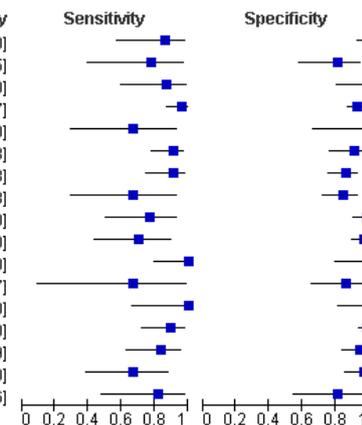
► Re-analysis of the data from Birim et al (2005).



Study	TP	FP	FN	TN	Sensitivity	Specificity
Bury 1997	11	8	3	44	0.79 [0.49, 0.95]	0.85 [0.72, 0.93]
Chin 1995	5	3	4	18	0.56 [0.21, 0.86]	0.86 [0.64, 0.97]
Guhlmann 1997	8	3	7	14	0.53 [0.27, 0.79]	0.82 [0.57, 0.96]
Gupta 2000	36	36	17	79	0.68 [0.54, 0.80]	0.69 [0.59, 0.77]
Hagberg 1997	5	0	4	9	0.56 [0.21, 0.86]	1.00 [0.66, 1.00]
Marom 1999	26	4	18	30	0.59 [0.43, 0.74]	0.88 [0.73, 0.97]
Pieterman 2000	24	24	8	46	0.75 [0.57, 0.89]	0.66 [0.53, 0.77]
Poncelet 2001	5	17	4	36	0.56 [0.21, 0.86]	0.68 [0.54, 0.80]
Sasaki 1996	11	7	6	47	0.65 [0.38, 0.86]	0.87 [0.75, 0.95]
Saunders 1999	3	7	12	62	0.20 [0.04, 0.48]	0.90 [0.80, 0.96]
Sazon 1996	13	7	3	9	0.81 [0.54, 0.96]	0.56 [0.30, 0.80]
Scott 1994	1	2	2	20	0.33 [0.01, 0.91]	0.91 [0.71, 0.99]
Scott 1996	6	3	3	15	0.67 [0.30, 0.93]	0.83 [0.59, 0.96]
Steinert 1997	16	5	12	79	0.57 [0.37, 0.76]	0.94 [0.87, 0.98]
Valk 1995	15	14	9	38	0.63 [0.41, 0.81]	0.73 [0.59, 0.84]
Vansteenkiste 1997	10	13	5	22	0.67 [0.38, 0.88]	0.63 [0.45, 0.79]
Wahl 1994	7	9	4	7	0.64 [0.31, 0.89]	0.44 [0.20, 0.70]

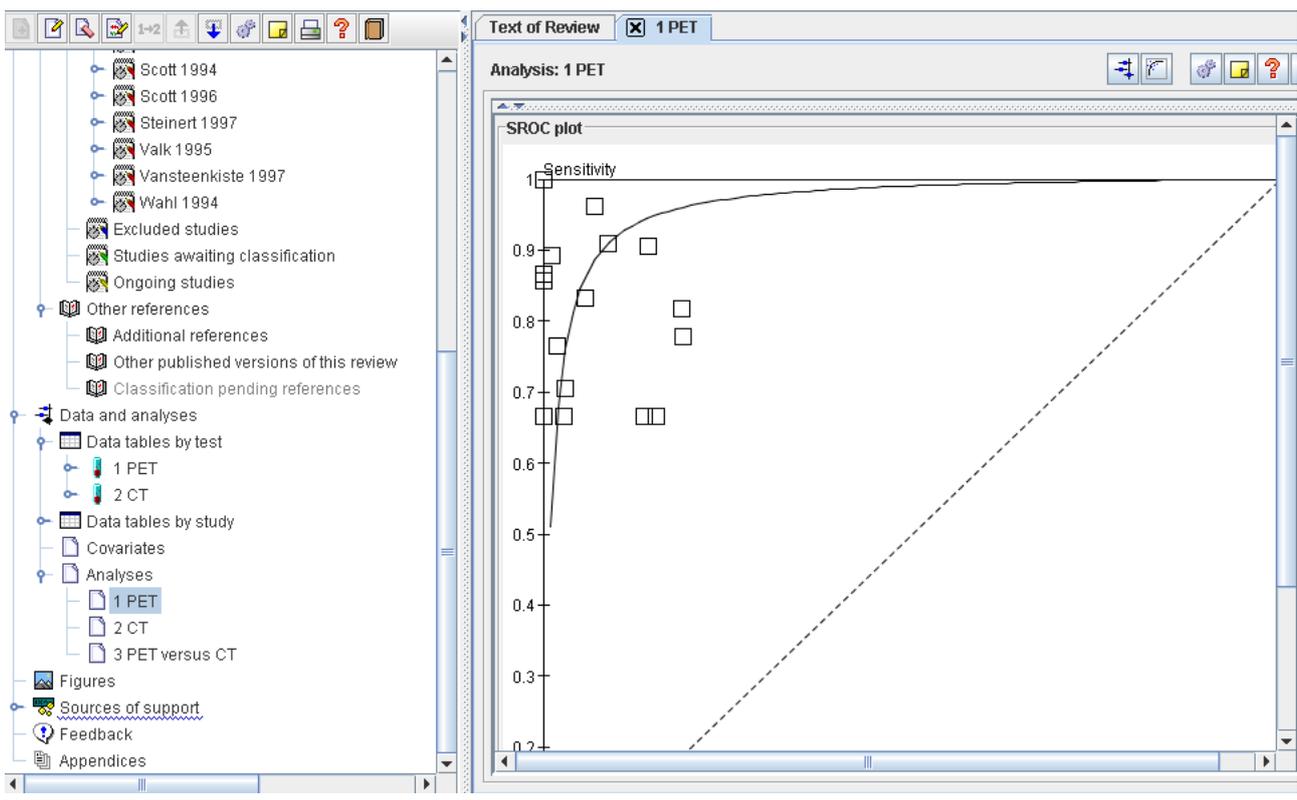


Study	TP	FP	FN	TN	Sensitivity	Specificity
Bury 1997	12	0	2	52	0.86 [0.57, 0.98]	1.00 [0.93, 1.00]
Chin 1995	7	4	2	17	0.78 [0.40, 0.97]	0.81 [0.58, 0.95]
Guhlmann 1997	13	0	2	17	0.87 [0.60, 0.98]	1.00 [0.80, 1.00]
Gupta 2000	51	8	2	107	0.96 [0.87, 1.00]	0.93 [0.87, 0.97]
Hagberg 1997	6	0	3	9	0.67 [0.30, 0.93]	1.00 [0.66, 1.00]
Marom 1999	40	3	4	31	0.91 [0.78, 0.97]	0.91 [0.76, 0.98]
Pieterman 2000	29	10	3	60	0.91 [0.75, 0.98]	0.86 [0.75, 0.93]
Poncelet 2001	6	8	3	44	0.67 [0.30, 0.93]	0.85 [0.72, 0.93]
Sasaki 1996	13	1	4	53	0.76 [0.50, 0.93]	0.98 [0.90, 1.00]
Saunders 1999	12	2	5	65	0.71 [0.44, 0.90]	0.97 [0.90, 1.00]
Sazon 1996	16	0	16	100	1.00 [0.79, 1.00]	1.00 [0.79, 1.00]
Scott 1994	2	3	1	19	0.67 [0.09, 0.99]	0.86 [0.65, 0.97]
Scott 1996	9	0	0	18	1.00 [0.66, 1.00]	1.00 [0.81, 1.00]
Steinert 1997	25	1	3	83	0.89 [0.72, 0.98]	0.99 [0.94, 1.00]
Valk 1995	20	3	4	49	0.83 [0.63, 0.95]	0.94 [0.84, 0.99]
Vansteenkiste 1997	10	1	5	34	0.67 [0.38, 0.88]	0.97 [0.85, 1.00]
Wahl 1994	9	3	2	13	0.82 [0.48, 0.98]	0.81 [0.54, 0.96]



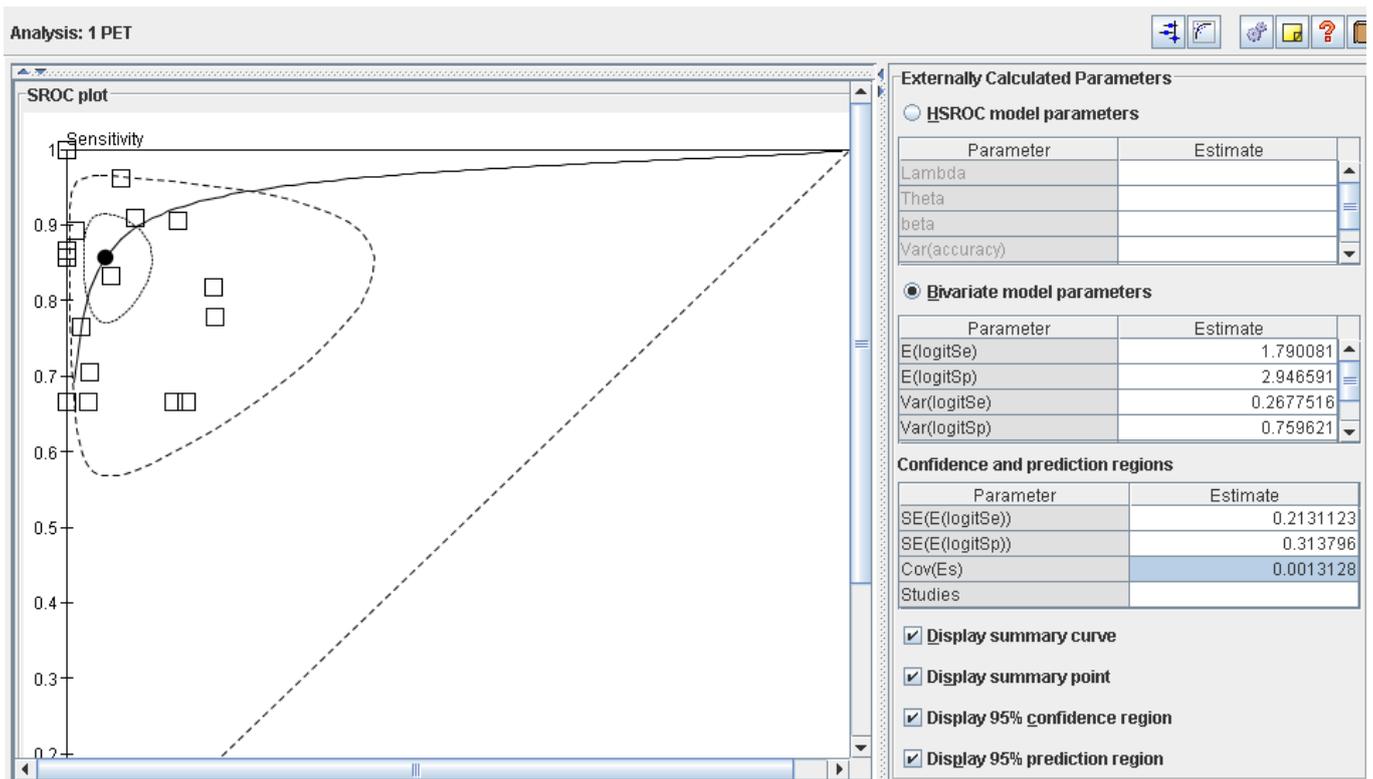
► Re-analysis of the data from Birim et al (2005).

SROC



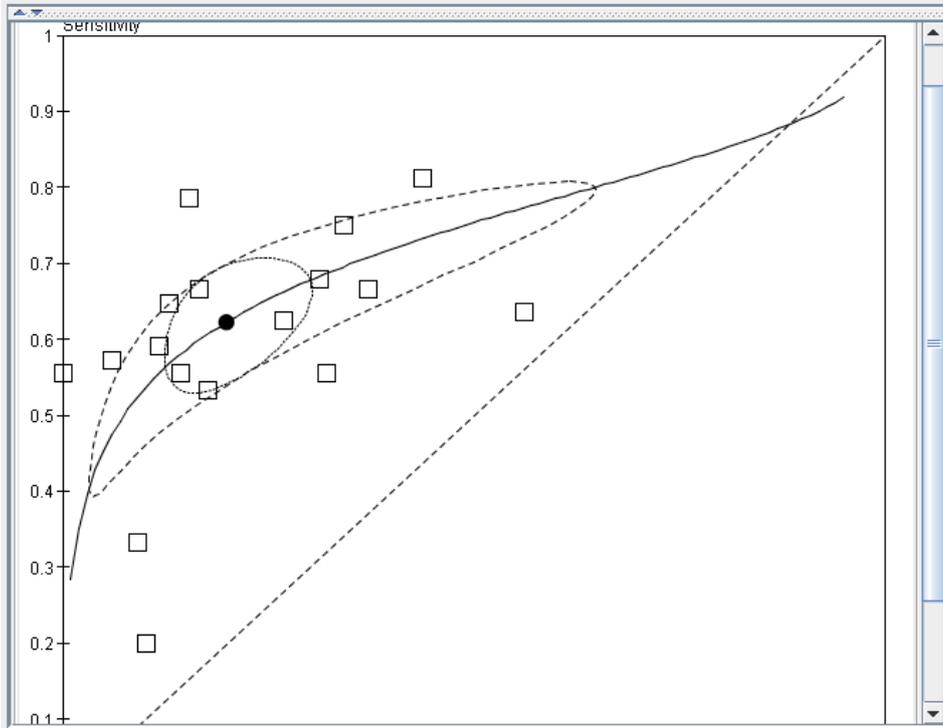
► Re-analysis of the data from Birim et al (2005).

SROC from bivariate model



► Re-analysis of the data from Birim et al (2005).

Analysis: 2 CT



Externally Calculated Parameters

HSROC model parameters

Parameter	Estimate
Lambda	
Theta	
beta	
Var(accuracy)	

Bivariate model parameters

Parameter	Estimate
E(logitSp)	1.390927
Var(logitSe)	0.099134
Var(logitSp)	0.5037137
Cov(logits)	

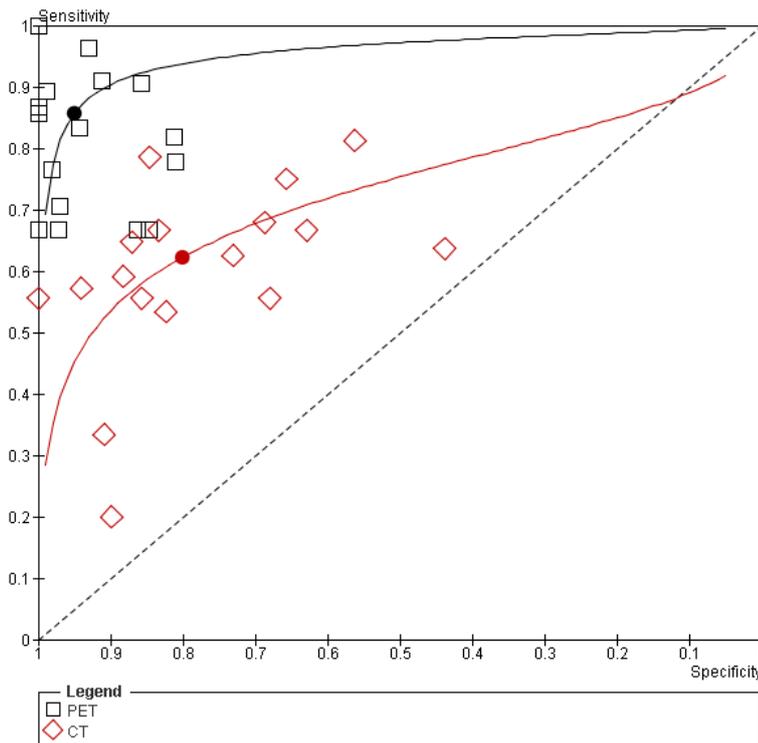
Confidence and prediction regions

Parameter	Estimate
SE(E(logitSe))	0.1412615
SE(E(logitSp))	0.2070113
Cov(Es)	-0.0140124
Studies	17

- Display summary curve
- Display summary point
- Display 95% confidence region
- Display 95% prediction region

► Re-analysis of the data from Birim et al (2005).

Comparison between the performance of tests



► Re-analysis of the data from Birim et al (2005).

Acknowledgments

- ▶ **Thailand Research Fund and Thai Cochrane Network for all support.**
- ▶ **Dutch Cochrane Centre and Diagnostic Test Accuracy Working Group for providing knowledge.**



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- ▶ **Review Manager (RevMan) [Computer program]. Version 5.0. Copenhagen, The Nordic Cochrane Centre: The Cochrane Collaboration, 2008.**

Thank you for your
attention

