Performance of tPSA and f/tPSA for prostate cancer in Chinese: a systematic review and meta-analysis

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CRD summary
This review of prostate-specific antigen (PSA) tests for diagnosing prostate cancer in Chinese men appeared to conclude that the best performing test was a ratio of free to total PSA (f/tPSA) of <0.15. Although this conclusion reflects the evidence presented, there are unexplained differences between the results of the included studies which make the reliability of the conclusion uncertain.

Authors' objectives
To determine the diagnostic performance of prostate-specific antigen (PSA) tests for diagnosing prostate cancer in Chinese men.

Searching
MEDLINE, the Cochrane Library, Chinese Biomedical Literature Database, Chinese Medical Current Contents and CNKI were searched from January 1995 to December 2005 for studies published in English or Chinese; the search terms were reported. Further studies were sought through contact with experts and by checking the reference lists of relevant papers.

Study selection
Study designs of evaluations included in the review
No criteria were specified for the study design.

Specific interventions included in the review
Studies of prostate-specific antigen tests were eligible for inclusion. To be eligible, blood sampling had to occur prior to prostate manipulation or biopsy. The included studies all assessed total PSA (tPSA) with thresholds of >4.0 nanograms per millilitre (ng/mL) and >10.0 ng/mL, and the ratio of free to total PSA (f/tPSA) with a threshold of <0.15. The majority of studies used commercially available PSA kits.

Reference standard test against which the new test was compared
Studies were eligible if they used transrectal ultrasound-guided prostate needle-biopsy or post-operation pathology checking as the reference standard.

Participants included in the review
Studies of Chinese men with prostate cancer or benign prostatic hyperplasia (BPH) were eligible for inclusion. The participants in the included studies had a mean age of 65.1 years (range: 30 to 96). The overall percentage diagnosed with prostate cancer was 18.8%; the remaining 81.2% had BPH.

Outcomes assessed in the review
Studies reporting data enabling the calculation of both sensitivity and specificity were eligible for inclusion.

How were decisions on the relevance of primary studies made?
Two reviewers identified eligible studies independently, resolving any disagreements by consensus.

Assessment of study quality
The methodological quality of the studies was assessed using some criteria (study design, blinding and study size) from the QUADAS checklist for diagnostic accuracy studies. The authors did not state how many reviewers performed the quality assessment.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Sensitivity and specificity data were extracted from each study. Positive likelihood ratios, negative likelihood ratios and diagnostic odds ratios (DORs) were also calculated, along with 95% confidence intervals (CIs).

Methods of synthesis
How were the studies combined?
The results were summarised using summary receiver operating characteristic (SROC) curves, and the area under the curve (AUC) was calculated to give a measure of overall test performance. The overall pooled sensitivity and specificities with 95% CIs were calculated using a random-effects model.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the chi-squared test.

Results of the review
Ten studies, involving 2,256 participants in total, were included in the review. Four of the studies had a cross-sectional design and six were case-control studies.

All of the included studies used blinded assessment.

For tPSA >4.0 ng/mL, the pooled sensitivity was 0.90 (95% CI: 0.87, 0.93) and the pooled specificity 0.58 (95% CI: 0.55, 0.60). The AUC was 80% and the DOR was 8.44 (95% CI: 4.45, 16.00).

For tPSA >10.0 ng/mL, the sensitivity was 0.65 (95% CI: 0.61, 0.70) and the specificity 0.87 (95% CI: 0.85, 0.88). The AUC was 85% and the DOR was 9.94 (95% CI: 4.15, 23.77).

For f/tPSA <0.15, the sensitivity was 0.69 (95% CI: 0.64, 0.73) and the specificity 0.82 (95% CI: 0.80, 0.83). The AUC was 87% and the DOR 13.75 (95% CI: 6.35, 29.76).

There was significant heterogeneity (p<0.001) in all estimates of specificity and DOR; it was not clear what level of heterogeneity was detected in the sensitivity estimates.

Authors’ conclusions
The authors appear to conclude that tPSA and f/tPSA tests give good diagnostic performance for diagnosing prostate cancer in Chinese people, and that the best performing test is f/tPSA <0.15.

CRD commentary
This review addressed a clear question and inclusion criteria were specified for the intervention, participants and outcome. A range of relevant databases was searched and the use of language restrictions was appropriate for capturing studies of the population of interest. The methodological quality of the included studies was assessed using three criteria from a validated tool, although it is not clear why only these criteria were selected.

The study results were combined using appropriate methods for diagnostic studies. Statistical heterogeneity was assessed and found in many of the analyses. Although some individual study details were provided, there were no details of the population, tests and reference standards used, which may have helped to explain some of the observed heterogeneity between the studies. Overall, although the conclusions of the study reflect the evidence presented, there are unexplained differences between the results of the included studies and it is therefore difficult to say how reliable these conclusions are.

Implications of the review for practice and research
Practice: The authors stated that f/tPSA <0.15 is the best current PSA diagnostic test for prostate cancer in Chinese men.

Research: The authors did not state any implications for research.

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