

All Wales Clinical Biochemistry Audit Group

Standards for PSA (Prostate Specific Antigen) Measurement

INTRODUCTION

In recent years, PSA measurement has become an important tool in the investigation and management of carcinoma of the prostate. However, there are major differences between the assays used, partly due to differing proportions of free and bound PSA in different clinical situations: in carcinoma the proportion bound to α_1 -antichymotrypsin increases considerably.

A survey of PSA measurements in use in Wales, presented at an audit meeting in October 1999, showed significant variations in practice. The following standards are recommended, in the light of the presentations and discussion at this meeting, to aid the provision of a clinical laboratory service for PSA measurements.

STANDARDS

1. PSA Assay Service

- a) Each laboratory providing diagnostic support to a urology department should provide total PSA assays as a tumour marker service. Recommendations for measuring PSA should be based on a protocol agreed with local urologists and appropriate to the clinical situation.
- b) Population screening of healthy men is not recommended at present.
- c) Free PSA measurement is currently only at the evaluation stage, but may be considered for patients with total PSA levels above the upper limit of the reference range but below 10 $\mu\text{g/l}$, where determination of the free/total PSA ratio (normal >0.22) may help to distinguish benign and malignant disease and aid the decision as to whether to perform a prostatic biopsy.
- d) In order to minimise the likelihood of false positive results, it is recommended that blood for PSA assay is collected before physical examination of the prostate and that sample collection is deferred for 2 weeks in patients presenting with urinary obstruction and an enlarged bladder.

2. Total PSA Assay Requirements

Each laboratory providing PSA assays should ensure that appropriate internal quality control and external quality assessment procedures are in place. Any laboratory consistently unable to meet the following analytical criteria and which cannot change to a superior assay should consider referring samples elsewhere:

- a) The precision (expressed as between-batch coefficient of variation) should be less than 8% at a PSA level of 4 to 5 $\mu\text{g/l}$.
- b) It is recommended that the working range should be at least 0.5-100 $\mu\text{g/l}$.
- c) It is recommended that the assay should have the ability to detect antigen excess.
- d) The maximum turn round time should not exceed 3 working days.

3. Reporting of Results

- a) It is recommended that the units for reporting results should be µg/l.
- b) It is recommended that cumulative reports should be provided.
- c) It is recommended that age-related reference ranges are supplied for total PSA on reports.

Use of the following total PSA reference ranges should be considered:

age < 50 years < 2.5 µg/l

age 50-59 years < 3.5 µg/l

age 60-69 years < 4.5 µg/l

age ≥ 70 years < 6.5 µg/l

- d) Laboratories should provide interpretative advice where appropriate. Total PSA levels above 10 µg/l should be regarded as significantly raised and if a new finding, drawn to the attention of non-expert clinicians by telephone or addition of a comment to the report. In new patients, calculation of the probability of malignancy (as a %) based on age and PSA level may be helpful for non-expert clinicians, provided this has been agreed with the local urologists.

ACKNOWLEDGEMENTS: Mr.H.R.Hughes and Dr.D.Oleesky.

REFERENCES

1. Catalona WJ, Partin AW, Slawin KM, *et al.* Use of the percentage of free prostate-specific antigen to enhance differentiation of prostate cancer from benign prostatic disease. *JAMA* 1998; **279**: 1542-1547.
2. Nam RK, Klotz LH, Jewett MAS, Danjoux C, Trachtenberg J. Prostate-specific antigen velocity as a measure of the natural history of prostate cancer: defining a 'rapid riser' subset. *Br J Urol* 1998; **81**: 100-104.
3. Catalona WJ, Richie JP, Ahmann FR, *et al.* Comparison of digital rectal examination and serum prostate specific antigen in the early detection of prostate cancer: results of a multicenter clinical trial of 6,630 men. *J Urol* 1994; **151**: 1283-1290.
4. Catalona WJ, Hudson MA, Scardino PT, *et al.* Selection of optimal prostate specific antigen cutoffs for early detection of prostate cancer: receiver operating characteristic curves. *J Urol* 1994; **152**: 2037-2042.
5. France MW, Seneviratne CJ. Screening for prostatic carcinoma: case finding is not the problem. *Ann Clin Biochem* 1997; **34**: 333-338.
6. Dew T, Coker C, Saadeh F, Mulvin D, Coptcoat MJ, Sherwood RA. Influence of investigative and operative procedures on serum prostate-specific antigen concentration. *Ann Clin Biochem* 1999; **36**: 340-346.
7. Selley S, Donovan J, Faulkner A, Coast J, Gillatt D. Diagnosis, management and screening of early localised prostate cancer: a systematic review. *Health Technol Assess* 1997; **1**(2).

VERSION: 1

DATE: 28th December 2000.

Appendix

CALENDAR of Audit Process for Standards for PSA (Prostate Specific Antigen) Measurement

October 1995	Preliminary survey of 8 Welsh laboratories by Dr.D.Cassidy (Consultant Chemical Pathologist, Prince Charles Hospital, Merthyr Tydfil) presented at a Welsh Chemical Pathologists' Audit Group meeting held at Prince Charles Hospital, Merthyr Tydfil.
Sept. 1998	Further survey of all 13 Welsh clinical biochemistry laboratories which measure PSA undertaken by Mr.H.Hughes (Principal Biochemist, Royal Gwent Hospital, Newport) and presented at a joint meeting of the North-West England and All Wales Clinical Biochemistry Audit Groups in Chester.
March 1999	Initial draft standards prepared by Mr.H.Hughes, considered at an All Wales Clinical Biochemistry Audit Group committee meeting and presented at an All Wales Clinical Biochemistry Audit Group meeting at Maelor Hospital, Wrexham.
July 1999	Second draft of standards prepared and sent for consultation to consultant biochemists in Wales and also to Mr.K.Vaughton (chairman, Welsh Urological Society, Morriston Hospital, Swansea) to seek the views of urologists in Wales.
Nov. 2000	Standards finalised and ratified at an All Wales Clinical Biochemistry Audit Group committee meeting (on 22 nd November 2000) by Dr.K.Griffiths (chairman).
2005	Proposed review/re-audit date.