

PROSTATE SPECIFIC ANTIGEN (PSA) SCREENING - a patient's guide

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Physiology of PSA

PSA is produced in the ductal epithelium of the prostate. PSA is secreted into the lumen of the prostatic ducts and plays a very important role in the prostatic fluid. A small amount of PSA is reabsorbed through the ductal epithelial cells and circulated through the blood stream. The concentration of PSA is a million times higher in the prostatic fluid than in the blood.

Seventy percent of the seminal fluid is produced by the seminal vesicles and this contains gel forming proteins (for instance, fibronectin) which is responsible for coagulation of the seminal plasma and entrapment of the spermatozoa. Thirty percent of the seminal fluid is produced by the prostate and this contains PSA which is a proteolytic enzyme and is responsible for liquefaction of the coagulum and therefore release of the spermatozoa.

Factors affecting PSA levels:

Digital rectal examination (DRE), prostatic massage, cystoscopy, catheterisation and transrectal ultrasound have no effect on PSA levels.

Prostatitis

Clinical and subclinical prostatitis may elevate PSA levels up to 30 ng/ml. It takes 6-8 weeks for PSA concentrations to return to baseline levels after treatment of prostatitis.

Urinary retention

PSA levels may rise above 200 due to BPH as well as microinfarction of the prostate (85% of patients with urinary retention have got underlying prostatic infarction). PSA levels decrease by 50% within 24-48 hours after catheterisation.

Ejaculation

In men above 49 there is a definite rise in PSA with a peak increase within one hour following ejaculation. The mean rise of PSA is 0.8-2 ng/ml but increase in levels as much as 9.2 ng/ml has been recorded.

Therefore, men should abstain from ejaculation for at least 48 hours prior to PSA determination otherwise many prostate biopsies may be performed unnecessarily.

As it may be impractical to suggest this to all patients, it may at least be a good idea to repeat an elevated PSA under these circumstances before doing biopsies.

Prostate biopsies and TURP

There is a median increase of 7.9 ng/ml and it takes six weeks to return to baseline levels after these procedures.

Methods to improve PSA specificity and sensitivity:

Free PSA

In patients with prostate cancer, less than 20% of the total PSA is in the free form, while with BPH over 20% of the total PSA is free and not bound to alpha-1-antichymotripsin.

PSA velocity

An increase of > 0.75 ng/ml per year may be 90% specific for CA (cancer) detection.

PSA density

Serum PSA / TRUS prostate volume = PSA density

>0.28 in CA and < 0.18 in BPH

Age specific PSA

Age	PSA cut-off value (ng/ml)
40 - 49	2.5
50 - 59	3.5
60 - 69	4.5
70 - 79	6.5

New advances: (Complexed PSA)

They are now developing assays that will, in the future, measure the complexed form of PSA.

It is accepted that PSA complexed to the alpha-1-antichymotripsin, occurs to a greater proportion in those men with prostatic carcinoma.

This single assay (instead of free and total PSA) may well revolutionise all PSA testing as enhanced specificity can be achieved at a level where greater than 95% of all carcinomas are identified.

Results of PSA screening programmes

- The prostate cancer detection rate in screening programmes is 4%.
- Fifteen percent of men above 50 have elevated PSA levels (> 4).

- Twenty five percent of these had CA.
- Twenty five percent of men with early prostate cancer have normal PSA levels.
- Fifteen percent of men with PSA levels between 2.8 - 4 with normal DRE developed cancer within four years after screening. Therefore in men below 50 PSA levels of 2.5 should be the upper limit of normal.
- Sixty to seventy percent of PSA detected tumours are organ confined.
- Thirty percent of tumours with a palpable nodule are organ confined.

Conclusions of a paper written by Catalona et al:

- One hundred radical prostatectomy specimens were examined following the diagnosis by PSA screening.
- PSA is increased by 2.2 ng/ml for each gram of CA. Therefore PSA testing is not likely to detect indolent CA.
- Ninety one percent of tumours detected by PSA were clinically important.
- In 76% of patients with a low grade tumour at biopsy, the final histology showed a more aggressive tumour.
- Ninety one percent had a Gleason score of 5 - 8 (moderately to poorly differentiated).
- Sixty eight percent of tumours were > 0.5 cc which was the average size of indolent autopsy tumours.
- The mean amount of carcinoma in surgical specimens was 10.3%.

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Other Sources of Information

This editorial takes an honest look at the controversies surrounding the best treatments for cancer of the prostate; more high quality studies are needed to help men make the best possible choices.

<http://www.bmj.com/cgi/content/full/316/7149/1919>

The National Cancer Institutes has an excellent site for more indepth reading and information - there are doctor and patient sections as well.

<http://cancernet.nci.nih.gov/index.html>

This is an excellent site by the American Cancer Society, which provides good information on many of the common cancers.

<http://www2.cancer.org/crcGateway/index.cfm>

This U.K. based site has reliable information about a variety of common cancers.

<http://www.cancerbacup.org.uk/>

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