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## PSA - what is it?

PSA or **Prostate Specific Antigen** is a protein which is secreted into ejaculate fluid by the healthy prostate. One of its functions is to aid sperm movement. Normally, only very low levels of the enzyme are able to enter the blood stream. However, because in cancer the normal structure of the tissue is disrupted, considerably more PSA is able to leak into the blood stream, and for this reason, a raised level of PSA in blood (or serum) can indicate the presence of prostate cancer.



## How good is the PSA test?

When we take any test, it is preferable to get a definite answer: "yes, you have the cancer" or "no, you don't". Unfortunately the PSA test is not that good. At best, it is an indicator of the probability or risk that you have prostate cancer. This can be very helpful, because it guides the decision about whether you should have further tests. However it does mean that the interpretation of PSA levels is not necessarily straight forward.



## What conditions other than cancer cause the PSA level to rise?

The prostate typically enlarges as men grow older, and because small amounts of PSA are produced by the healthy prostate, its blood level tends to rise. Benign prostate enlargement (a condition which causes urinary symptoms such as poor flow, getting up at night), is a common non-cancer condition causing PSA levels to rise. For this reason, age-based thresholds, shown in Table 1, can be used to decide if a test result is abnormal. The percentage Free to Total PSA (described below) also gives an indication whether raised PSA is due to benign enlargement.

A temporary rise in the PSA can be caused by a number of conditions<sup>1</sup>. Urinary infection, prostatitis (inflammation of the prostate), or a biopsy of the prostate can cause large rises while small rises can be caused by ejaculation and even bicycle riding. Because of these non-cancer causes of PSA rises, it is not surprising that if you have an abnormally high test result, it may not be due to prostate cancer. The chance that you have prostate cancer is only about one in three.

*Table 1 - Suggested upper limits of PSA for different age groups<sup>2</sup>*

Age (years)	Serum PSA (ng/ml)
40 - 49	2.0
50 - 59	3.0
60 - 69	4.0
70 - 79	5.5

*Note: These levels are used only as a guide. It is possible to have prostate cancer and have a PSA level in the normal range, although this is uncommon.*

If, in addition to the PSA test, you have a rectal examination, and it also is abnormal, your chances of having prostate cancer are higher, (one in two).

Other ways of measuring PSA have been developed in an effort to make the test more specific for prostate cancer. One of these is called the "Free to Total" PSA. This is a ratio, expressed as a percent. Much of the PSA in the blood is bound to protein, including that produced by cancer cells. But men with benign prostate enlargement have higher levels of free (unbound) PSA and so a higher Free to Total ratio. If the total PSA level is abnormal, the Free to Total PSA ratio will give an idea of whether the rise is due to benign disease or cancer. Cancer is more likely if the Free to Total percentage is below 10%<sup>2</sup>. This test is available and widely used throughout Australia.

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#### Footnotes

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## What is a normal PSA level?

Most authorities agree that if you have a PSA greater than 4 ng/ml, you should have further investigations. Some suggest that if your PSA is greater than the 'normal for age' range shown in Table 1, or if it is rising rapidly, it should be investigated.

Depending on your age and family history, your doctor may then refer you directly to a Urologist, or may repeat the test before referring you for further investigation.

If cancer is present, the level of PSA in the blood rises as the tumour grows. This means that small rises in PSA are found in association with small tumours which may be still confined to the prostate gland (localised). PSA levels of 10ng/ml or less have the best chance of being localised<sup>3</sup>. The PSA level and the cancerous characteristics of the tumour cells themselves (called "grade") can indicate the risk that a tumour has grown beyond the prostate.

If cancer is present, the rate at which the PSA level increases over a series of tests (called PSA velocity) also gives information about the risk that cancer will recur after treatment<sup>4</sup>.



## How fast do cancers grow?

Most (but not all) prostate cancers grow slowly. It can take 5 -10 years after the PSA rises above 2.5ng/ml, for it to "appear clinically", that is, cause symptoms. The median survival time (period for which 50% of men survive with treatment) after the PSA starts to rise, is reported to be 17 years<sup>5</sup>. For this reason, a PSA which starts to rise in an older man, say 75 - 80 years, is usually not considered to be a threat. In a man just over 50, however,

it is significant. These figures are presented as a guide only - the outlook for anyone diagnosed with prostate cancer depends on many clinical factors such as the nature of the tumour cells, or tumour grade, the stage of the disease, other illnesses and so on.



## Finally

It is clear then, that PSA levels can mean different things in different circumstances. Nevertheless, PSA levels are useful, because they indicate the risk of cancer in those who haven't been diagnosed with it, and may therefore indicate the need for further investigations. Typically the next step in the investigation at this stage is a biopsy (removal of prostate tissue with a needle guided by an ultrasound probe in the rectum). If you have had one or a series of PSA tests, it is important to discuss all of the factors which can influence the result with your medical adviser, to help determine your level of risk and the need for further investigation.



## For more information

**Mr PHIP Series** - available online at:  
[www.prostatehealth.org.au](http://www.prostatehealth.org.au)

1. Should I be tested?
2. Interpreting the PSA test
3. After the diagnosis
4. Monitoring after treatment
5. Hormonal treatment
6. Sexual function after treatment
7. Useful resources / Glossary

#### Internet:

[www.prostate.org.au](http://www.prostate.org.au)  
[www.prostatehealth.org.au](http://www.prostatehealth.org.au)  
[www.andrologyaustralia.org.au](http://www.andrologyaustralia.org.au)

#### Phone:

National Cancer Help-line: 13 11 20

This information sheet is not intended to take the place of medical advice. Information on prostate disease is constantly being updated. We have made every effort to ensure that information was current at the time of production, however your GP or specialist may provide you with new or different information which is more appropriate to your needs.