

# Prostate Specific Antigen

Prostate cancer – a disease affecting old and young

CLIA



**Human**

Diagnostics Worldwide

# Prostate Specific Antigen (PSA)

## Prostate cancer – a disease affecting old and young

### What is PSA?

Prostate specific antigen (PSA) is an enzyme that is produced by epithelial cells in the prostate gland. This gland is located just beneath the bladder in men. It helps to regulate a man's bladder control and produces the seminal fluid that transports and nourishes sperm. The enzyme PSA itself is needed for the semen to become more liquid and thus PSA plays an important role in fertility.

### Why is PSA an important biomarker?

Prostate cancer is the growth of abnormal cells in the prostate. The prostate itself is both an accessory gland of the male reproductive system and a muscle-driven mechanical switch between urination and ejaculation. Anatomically, it sits below the urinary bladder. It is not clear what causes prostate cancer. But finding prostate cancer at an early stage may have a better prognosis. Prostate cancer can often be found early by testing for elevated prostate-specific antigen (PSA) levels in a man's blood. Therefore, PSA is known as an important tumor marker in men that have an elevated risk of developing prostate cancer.

### Epidemiology of prostate cancer

Prostate cancer affects mostly men in older age groups and is rare in men under 50 years of age. The chance of developing prostate cancer is significantly higher in men who have a close relative with prostate cancer and the risks are higher if the brother or father was diagnosed before the age of 60.<sup>1</sup> Worldwide, there are an estimated 1,400,000 new cases of prostate cancer annually (see figure 1), making it the second most commonly diagnosed cancer in men after skin cancer. It is also identified as the most frequent type of cancer-causing mortality among men in developing regions like in the sub-Saharan Africa and in many central and some Latin American countries.<sup>2</sup>

### New cases of prostate cancer and associated deaths per year

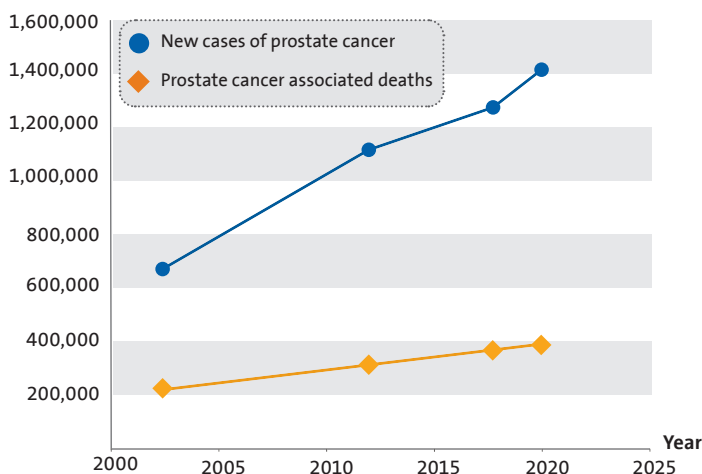


Fig. 1: The number of diagnosed new cases of prostate cancer per year increases continuously.<sup>2,3,4,5</sup>

Importantly, in contrast to some earlier publications that indicated black men might be intrinsically or biologically more susceptible to more aggressive forms of prostate cancer, new evidence suggests otherwise.<sup>6</sup> Progress in reducing cancer death rates might instead be accelerated by ensuring equitable access to preventive care, early detection and high-quality treatment of prostate cancer.<sup>7</sup> A recent publication indicates that prostate cancer is increasingly being encountered worldwide in men aged 15 to 39 years. The reasons for this observation are yet unknown. But factors under discussion are PSA testing, trends in obesity, and environmental carcinogens among others.<sup>8</sup>

### When is total PSA measured?

The quantitative determination of total prostate specific antigen (PSA), comprising both bound and free-floating antigens, is used as an aid in the diagnosis of prostate cancer, benign prostate hyperplasia and inflammatory processes such as prostatitis. Lately, however, PSA screening in healthy individuals without additional risk factors for prostate cancer, such as men under 50 years of age or without evidence of prostate enlargement, is under debate. The reason was that PSA screening has not been shown to reduce the number of men dying from prostate cancer when the test was used alone as a screening parameter.<sup>9</sup>

In addition, overdiagnosis of prostate cancer can lead to patients being subjected to confirmatory diagnostic testing and, potentially, treatments that can result in long-lasting adverse effects (e.g., impotence, urinary incontinence). Nevertheless, used in conjunction with other diagnostic tools, PSA screening is effective in diagnosing prostate cancer and enables doctors to provide life-saving therapy. Prostate cancer is very treatable and early detection of prostate cancer is key to treatment and recovery. Therefore, determination of total PSA is also used to monitor disease progression and response to therapy.

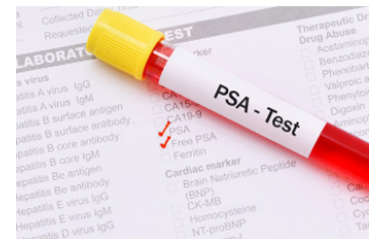
### Total PSA levels in the blood

Highest amounts of PSA are, of course, found in the seminal fluid. But PSA can also escape into the blood where it is usually bound to protease inhibitors (primarily alpha1-antichymotrypsin). A fraction, however, is cleaved by proteolysis and circulates as free PSA.<sup>10</sup> The total PSA assay detects inhibited and the free PSA forms in the blood. Concentrations of PSA below 4 ng/ml are often considered to be within the normal range.<sup>11</sup> However, PSA levels higher than 4 ng/mL can be correlated with both, benign and malign prostate enlargement.<sup>12</sup>

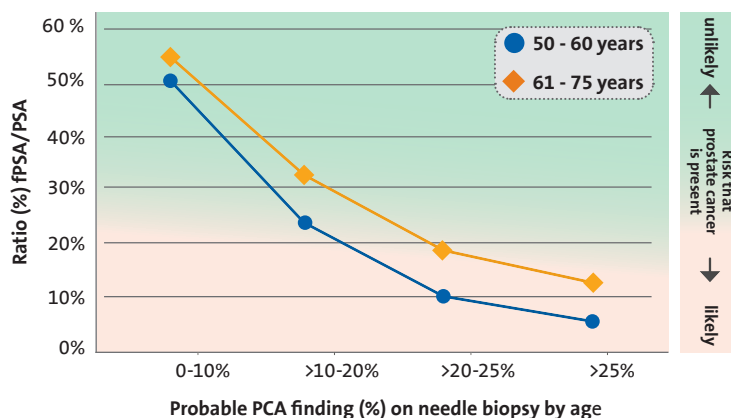
### When and how to test for free PSA?

A free PSA test only measures PSA that is floating freely in the bloodstream and not bound to a different protein. It is known that increased levels of total PSA in the gray zone of 4 – 10 ng/ml can also be observed in men having sexual intercourse, trauma to the rectum, prostatitis inflammation or with a benign enlarged prostate as is typical in men as they grow older.

In order to give doctors an idea of how likely it is that a person actually has prostate cancer, free PSA concentrations can be determined and compared to the results of total PSA tests, thereby reducing the number of unnecessary biopsies performed. The probability of finding prostate cancer in men with slightly elevated total PSA levels of 4 to 10 ng/ml increases with increasing age and with decreasing fPSA/PSA ratios (figure 2). The determination of the fPSA/PSA ratio helps doctors to distinguish between benign prostate hyperplasia and malign prostate cancer especially in the gray zone between 4 and 10 ng/ml total PSA. However, PSA tests alone will not confirm a diagnosis, as other factors can affect PSA levels. Therefore, PSA results should always be interpreted in combination with other medical findings. In addition, diagnostics, such as prostate biopsy, may also be necessary.



### Prostate cancer risk and fPSA/PSA ratio at PSA gray zone (4-10 ng/ml)\*



According to a large scale study\*, a cut-off at 25% or less free PSA, detected 95% of cancers while avoiding 20% of unnecessary biopsies, in patients with PSA values between 4.0 and 10.0 ng/ml and a palpably benign gland, regardless of patient age or prostate size.<sup>12</sup>

Fig. 2: Prostate cancer (PCA) risk in relation to fPSA/PSA-ratio and age with PSA levels in the gray zone (4-10 ng/ml).

\*Data from fPSA HumaCLIA SR (REF83125)

# Prostate Specific Antigen (PSA)

## Summary of indications

### PSA HumaCLIA SR

- > Aids in the diagnosis of prostate cancer, benign prostate hyperplasia and in inflammatory processes such as prostatitis.
- > Used in monitoring of disease progression and response to therapy.



### fPSA HumaCLIA SR

- > Aids in the differential diagnosis between prostate cancer and benign prostate disease.
- > Used together with the PSA HumaCLIA SR to determine the free/total ratio of PSA, to assess the risk of prostate cancer in patients with borderline or increased total PSA (4.0 – 10 ng/mL).

## Product and order information

<b>PSA HumaCLIA SR</b>	REF 83130
Contents	2 x 50 tests incl. calibrators
Traceability	WHO Int. Standard (NIBSC 17/102)
Time to result	17 min
Sample material	Serum, plasma
Sample volume	18 µL
Measurement range	0.0163 – 100 ng/ml
Reference interval	< 4 ng/ml

<b>fPSA HumaCLIA SR</b>	REF 83125
Contents	2 x 50 tests incl. calibrators
Traceability	WHO Int. Standard (NIBSC 17/102)
Time to result	17 min
Sample material	Serum, plasma
Sample volume	13 µL
Measurement range	0.03 – 20 ng/ml



### HumaCLIA 150 REF 15910

Random-access chemiluminescence immunoassay system

### Your local distribution partner

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