

Prostate specific antigen

Prostate-specific antigen (PSA) is a serine protease, which is produced by prostate ^[1]epithelial cells. It causes the semen to liquefy and thus allows sperm^[2] to move.

Physiologically, PSA is present in very small amounts in the blood. Most of it is bound to proteins (protease inhibitors – α_1 -antichymotrypsin and α_2 -macroglobulin), a small part is free.

For a prostate-specific antigen to enter the bloodstream, it must cross the basement membrane of the prostate, the prostate stroma, the basement membrane of the capillary, and the endothelium. PSA permeability increases if this barrier is disrupted by a pathological process – it can be a tumour, but also inflammation, benign prostatic hyperplasia or another factor. It is therefore a specific organ, not a tumour-specific marker^[1].

The prostate-specific antigen is synthesized as an enzymatically inactive precursor (proenzyme), pro-PSA. Activation occurs by glandular kallikrein 2 sequentially cleaving several peptide sequences. Gradually, several precursors are formed. One of them, **(-2)pro-PSA** or p2PSA, is also used in diagnostics, especially in determining the so-called *prostate health index*^[1].

Clinical significance

Elevated PSA levels are found in prostate cancer, higher PSA may also be found in patients with benign prostatic hyperplasia after palpation or per rectum examination, bladder catheterization, longer cycling, sex.

The specificity of increasing PSA to malignancy increases current:

- **setting age reference values** (cut-off increases with age);
- **PSA density** (relation of PSA quantity to **prostate volume** according to transracial USG);
- **determining the growth rate** of serum PSA (also higher in patients with prostate cancer);
- at the limit concentration of **4-10 ug/l** we determine **the ratio of free and total PSA** (free/total PSA ratio):
 - in patients with prostate cancer, the proportion of free fraction decreases,
 - at ratio of > 25 %, the probability of cancer is < 10 %,
 - at ratio of < 10 %, the probability of cancer is > 80 %.

Prostate cancer screening by PSA testing is sometimes recommended for all men over the age of 50.

More recently, a parameter that includes total PSA, free PSA, and precursor (-2)pro-PSA is used to stratify prostate cancer risk.

 For more information see *Prostate health index*.

Links

Related articles

- Prostate
- Prostate cancer

References

1. KOPECKÝ, Josef – POVOVÁ, Jana – JANOUT, Vladimír. Přínos (-2)proPSA a PHI pro diagnostiku karcinomu prostaty. *Urologie pro praxi* [online]. 2015, vol. 16, no. 3, p. 106-108, Available from <<https://www.urologiepropraxi.cz/pdfs/uro/2015/03/04.pdf>>. ISSN 1803-5299.
2. LÜLLMANN-RAUCH, Renate. *Histologie*. 1. edition. Praha. 2012. 576 pp. pp. 415. ISBN 978-80-247-3729-4.

Used literature

- RACEK, Jaroslav, et al. *Klinická biochemie*. 2. edition. Praha : Galén, 2006. 329 pp. pp. 252-253. ISBN 80-7262-324-9.