

# LAB TESTS RELATED TO PROSTATE DISEASES

The prostate is a gland that is present in males at the base of the bladder where it surrounds the urethra. It is an important component of the male reproductive system. Normally the prostate is about the size of a walnut, but despite its size, it is a common site of disease. Some of the most common prostate diseases are benign prostatic enlargement, inflammation of the prostate (prostatitis), and cancer of the prostate (prostatic adenocarcinoma). Benign prostate enlargement and prostate cancer occur increasingly with patient age, whereas prostatitis tends to occur in younger men.

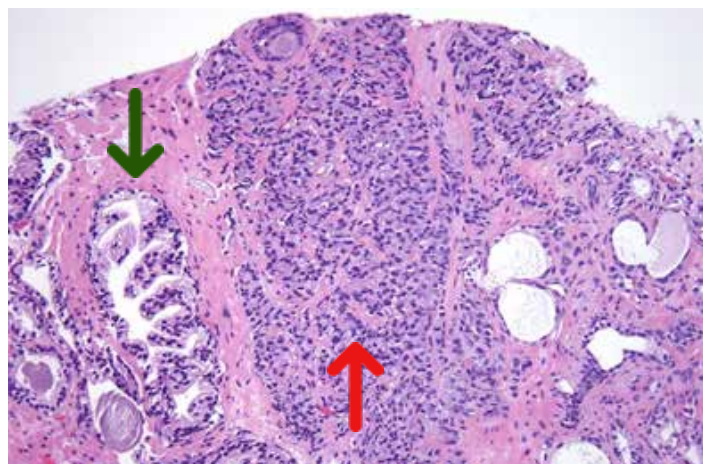
To learn more go to [www.ascp.org/patients](http://www.ascp.org/patients).

## ASK YOUR DOCTOR

- Should I have a screening for prostate cancer, and what issues should I consider to help me decide?
- My PSA levels continue to go up. What could be the causes?
- What is the course of action based on my lab results?
- What are all my treatment options?
- Why do you recommend this particular treatment option?
- How do we know the procedure was successful/what lab tests and which results indicate a successful procedure?
- What are the follow up tests and what are we looking for?

## UNDER THE MICROSCOPE

Picture legend. This is a pathology slide of a prostate biopsy, showing crowded small glands present centrally (red arrow), which represent prostate cancer. The larger glands seen at the periphery of the slide (green arrow) represent normal prostate glands.



## LABORATORY TESTS RELATED TO BENIGN PROSTATE DISEASES

**Benign prostatic Enlargement:** This is an increase in the size of the prostate due to an increase in benign prostate tissue (benign prostatic hyperplasia). It is a very common condition, being present in more than 50% of men over 70 years of age. This enlargement very commonly leads to obstruction of the flow of urine, and because of this, men can have lower urinary tract symptoms such as urinating with increased frequency (including at night), difficulty starting and stopping urination, slow stream and dribbling, and incontinence. In the assessment of these symptoms, the doctor will take a medical history and perform a physical examination, including a digital rectal examination of the prostate. Benign prostatic enlargement is not usually diagnosed on the basis of particular laboratory findings, however, some laboratory testing will usually be performed in order to exclude other causes of these lower urinary tract symptoms.

- **Urinalysis:** This test measures a number of substances in the urine, including bacteria, blood, glucose, and white cells. The presence of bacteria and white cells suggest a bacterial infection. The presence of blood may indicate cancer of the urinary tract (but there are other causes of blood in the urine also). The presence of glucose in the urine may indicate diabetes.
- **Urine Culture:** This test might be performed if a urinary infection is suspected clinically or if there are bacteria or white cells present in the urinalysis. Normally, no bacteria are present in the urine.
- **Serum Creatinine:** This test gives an assessment of kidney function, and might be performed if kidney damage is suspected. Kidney damage may occur due to obstruction to urine flow because of prostatic enlargement.
- **Serum Prostate Specific Antigen (PSA):** Although elevated PSA may be seen with benign prostatic enlargement, testing for PSA is not needed for the diagnosis. However, testing may be performed as the PSA levels give an idea of the volume of the prostate. Also, it may be important to get a baseline level for PSA, to compare with future PSA levels that may be measured as part of a future screening for prostate cancer (see below for further details about PSA and prostate cancer).

**Prostatitis:** This is the most frequent urologic diagnosis in men under the age of 50 years, and follows benign prostatic enlargement and prostate cancer in frequency in older men. Prostatitis may be caused by bacterial infection, and can be acute or chronic. Chronic prostatitis may also occur where there is inflammation in the absence of bacterial infection. In the assessment of prostatitis, the doctor will take a clinical history and perform a clinical examination, including a digital rectal examination of the prostate. Laboratory studies are an important component in the diagnosis and classification of prostatitis.

- **Urinalysis and Urine Culture:** The finding of white blood cells and bacteria in the urine is helpful for the diagnosis of prostatitis, and microbiologic culture of the urine can help identify the specific organism involved, as well as potentially determine its sensitivity to particular antibiotics. These tests can be performed on urine, and also on fluids obtained after massage of the prostate.
- **Blood Cultures:** Microbiologic culture of the blood is typically not needed for diagnosis but may be performed in certain circumstances. For example, if there is evidence that the infection has spread to the blood and the patient is becoming septic.

## LABORATORY TESTS RELATED TO PROSTATE CANCER

**Prostatic Adenocarcinoma:** Prostate cancer is a very common form of cancer in men. It is second only to skin cancer in terms of the number of patients that are affected per year. Prostate cancer arises in the glands of the prostate and is also known as prostatic adenocarcinoma. Prostate cancer is more common in older men, usually older than 50 years of age. It is more common in African-Americans than in other ethnic groups and is more common in men with a family history of prostate and other cancers. There are several possible approaches to management of early prostate cancer, including active surveillance, surgery, and radiation therapy. For more advanced tumors, treatment possibilities include radiation therapy, hormonal therapy, and chemotherapy.

**Serum Prostatic Specific Antigen (PSA):** Measurement of PSA in the blood may be used in screening for prostate cancer, and for monitoring for recurrence of cancer following treatment. PSA is a protein produced by prostatic tissue, and a value of 4 ng/mL or greater is often taken as representing an abnormally high level. Patients with prostate cancer tend to have higher levels of PSA in the blood than those without cancer. However, a difficulty is that benign prostatic tissue also produces PSA, and abnormal levels may be seen with benign prostatic hyperplasia (BPH), inflammation of the prostate (prostatitis), and even following activities such as bicycle riding or having sex. Thus, a high level of PSA in the blood does not necessarily mean that a man has prostate cancer. BPH incidence increases with age, which requires that the reference ranges for abnormal values vary by age as well. For example, for men aged 40-49 years, a level of 2.5 ng/mL or greater is abnormal, while for men aged 70-79 years, 6.5 ng/mL or greater is abnormal. PSA may be “free” in the blood, or “bound” to other molecules. Men with prostate cancer tend to have a lower percentage of free PSA, relative to the total PSA in the blood—this is another measurement that helps improve the use of PSA in the detection of cancer. It should be noted that there is ongoing debate about the use of PSA in screening for prostate cancer. One issue is the false positive results described above.

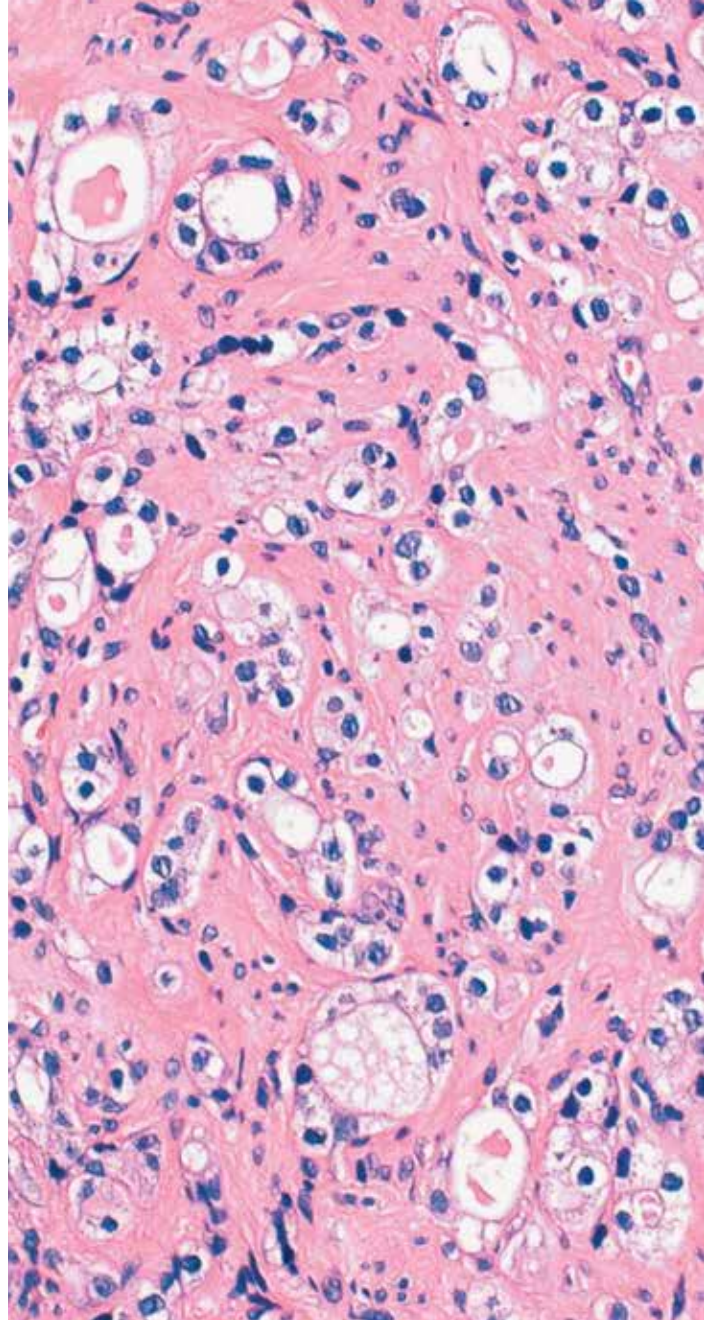
Another important issue is that PSA screening picks up many tumors that do not behave aggressively and will not lead to disability or death. This leads to what has been termed “overtreatment” of prostate cancer. It is important to remember that treatments such as surgery may have significant side effects. The decision whether to screen or not is a complex one and ideally should be a shared decision between the patient and his health care provider, taking all the risks and benefits into account.

**Prostate Biopsy:** The diagnosis of prostate cancer generally requires a biopsy of the prostate, with microscopic examination of slides of the biopsy tissue by the pathologist. The usual reason for a prostate biopsy is an abnormal PSA level or an abnormal digital rectal examination of the prostate. Prostate biopsy is a minimally invasive procedure and is usually performed by the urologist in an outpatient setting. Typically, multiple biopsies are taken through the rectum under ultrasound guidance. The biopsies may also be performed under magnetic resonance imaging (MRI) guidance. The following are some of the most important features reported by the pathologist on prostate cancer in the biopsy.

- **Tumor Grade:** The grade is an indication of how well or poorly differentiated the tumor appears. This helps predict how the tumor is likely to behave and what therapies might be considered. In prostate cancer, the grading is based on the architecture of the tumor glands, and is summarized as the “Grade Group”. The Grade Group is scored on a scale from 1 to 5, where Grade Group 1 has the most favorable and 5 has the least favorable prognosis.
- **Amount of Tumor:** The pathologist will usually report some measure of the amount of tumor present, such as the fraction of the total number of biopsy cores that are positive for tumor. This information helps predict how extensive the tumor is in the prostate and helps guide treatment.
- **Perineural Invasion:** If tumor invades nerves in the biopsy, this may be associated with the extent of tumor and may help guide treatment.
- **Extraprostatic Extension:** Occasionally, it is possible to determine from the prostate biopsy that the tumor has already spread outside the prostate. This indicates that the tumor is behaving aggressively, and has implications for possible treatment options.

#### Other Specialized Tests:

- **PCA3:** This molecule is associated with prostate cancer, and elevated levels in the urine may help decide if a patient with a negative prostate biopsy should have a repeat biopsy.
- **Commercial Genomic Tests:** In these tests, the analysis of tumor from the prostate biopsy provides prognostic information that may guide therapeutic decisions.
- **Mutational Testing:** It is recommended that patients with advanced metastatic prostate cancer be tested for mutations in DNA Damage Repair Genes (such as BRCA2), as tumors with these mutations may respond to particular class of drugs.



For more information and to get involved:  
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# MEET TRAVIS



Travis was diagnosed with prostate cancer after he received a second biopsy. Because of the unusual location of his cancer, the initial biopsy was negative. Thanks to laboratory tests, his team continued to follow up, and, after an MRI-guided biopsy, Travis received his diagnosis and was treated successfully.

To learn more and to watch a video about Travis, go to [www.ascp.org/patients](http://www.ascp.org/patients).

*“Don’t be afraid to ask questions. There are pathologists and laboratory professionals out there who are available to provide guidance and help you understand lab results. If you believe there may be a problem, make sure that you do everything you can to ensure that you get to a specific answer.”*

For more information and to get involved:  
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