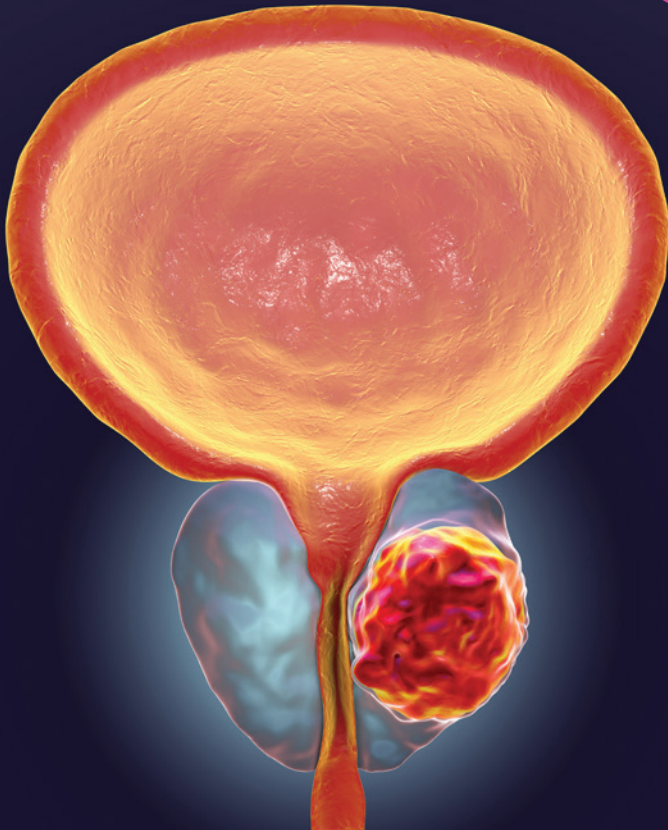


# A Comprehensive Prostate Cancer Diagnostic Guide Advanced Prostate Biopsy Options

UROLOGY CENTRE

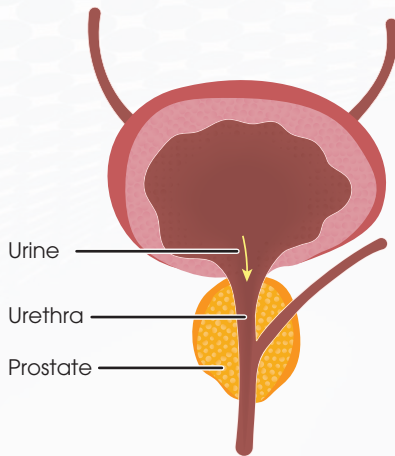


The standard tests for prostate cancer diagnosis have limitations in terms of accuracy and potential complications.

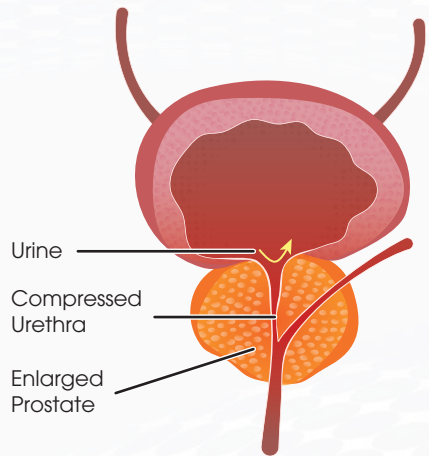
Advances in technology have allowed NUH to offer newer tests with improved diagnosis of prostate cancer.



## NORMAL PROSTATE



## BENIGN PROSTATE ENLARGEMENT



## A. Initial Investigation: Prostate Specific Antigen (PSA)

In order to make a diagnosis of prostate cancer, your doctor may offer a simple blood test by measuring the Prostate Specific Antigen (PSA) level. If the PSA level is high, a tissue biopsy of the prostate will be recommended.

A rise in PSA level does not necessarily mean you have prostate cancer. There are other benign causes for high PSA levels (e.g. urinary tract infection (UTI), inflammation of the prostate gland and prostate enlargement). However, a very high PSA range (e.g.  $> 100\text{ng/dL}$ ) is likely due to prostate cancer. Most commonly, an elevated PSA level in the grey zone of  $4 - 10\text{ng/dL}$  will be seen and this is where additional testing is available to better determine the likelihood of prostate cancer.

If your PSA level is elevated and is above  $4\text{ng/dL}$ , biopsy of the prostate or further evaluation for prostate cancer may be recommended.



## B. Additional Investigations:

### Prostate Health Index (PHI)

The Prostate Health Index (PHI) is a blood test that your doctor may use if your PSA level is between 4 - 10ng/dL. National University Hospital (NUH) has validated this test in Singaporean males and initiated its regional use. Your doctor will use the PHI level as a guide for further evaluation strategy (Table 1). A low PHI reading does not exclude prostate cancer.

Table 1: PHI Risk Stratification for Prostate Cancer

| PHI Level* | Risk of Cancer | Category          |
|------------|----------------|-------------------|
| 0 - 23     | 9%             | Low Risk          |
| 24 - 44    | 21%            | Intermediate Risk |
| > 45       | 44%            | High Risk         |

\*Beckman Coulter PHI Range (WHO Calibration)

Even though your PHI is low, there is still a small chance of a prostate biopsy revealing cancer. Your doctor will discuss with you whether you will need a biopsy or other investigational plans. This is a shared decision between you and your doctor.



### Multi-Parametric MRI (mpMRI) Prostate

Multi-Parametric MRI (mpMRI) prostate is now increasingly being performed before prostate biopsy and is used to detect any abnormal or suspicious areas within the prostate. Most prostate cancers (not all cancers) may be seen on the mpMRI scan. Findings on MRI scan cannot replace prostate biopsy, nor exclude prostate cancer. For a more optimal prostate biopsy, your doctor may recommend a MRI scan first, especially if you have the following:

1. A previous negative prostate biopsy but your doctor remains suspicious that you may have prostate cancer
2. A suspicion of prostate cancer based on a high PSA and/or PHI level

A dedicated team of radiologists will review your MRI images and any suspicious areas are graded using an International validated scoring system – the Prostate Imaging Reporting and Data System (PIRADS) Score (Table 2).

Table 2: PIRADS Score and the risk of clinically significant prostate cancer

| PIRADS Score<br>(version 2.1) | Risk of Cancer | Category                 |
|-------------------------------|----------------|--------------------------|
| 1 - 2                         | Minimal        | Low cancer risk          |
| 3                             | 12%            | Indeterminate Lesion     |
| 4                             | 60%            | Suspicion of cancer      |
| 5                             | 83%            | High suspicion of cancer |

Men with a PIRADS score of 3 to 5 have a significant risk of prostate cancer, and will be advised to undergo a prostate biopsy which could involve the usage of MRI-targeting platforms, to confirm the presence or absence of cancer.

Most men with a low PIRADS score of 1 to 2 may not need a MRI fusion targeted prostate biopsy. However, up to 28% of prostate cancers are invisible on the MRI scan. Based on other factors, if your doctor determines that the risk of prostate cancer is significant, your doctor may still recommend a biopsy. This is a shared decision between you and your doctor.

## C. Prostate Biopsies:

### Standard Prostate Biopsy

#### Transrectal Ultrasound Guided (TRUS) Biopsies of the Prostate

Transrectal Ultrasound Guided (TRUS) prostate biopsy is done by inserting an ultrasound probe into the rectum, and 12 or more cores of prostate tissues will be taken with a biopsy needle. This is done under local anaesthesia in the clinic.

Prostate tumours are not visible on ultrasound. TRUS images cannot differentiate between healthy prostate tissues from cancerous tissues. It will evaluate the shape and size of the prostate gland, and samples of the prostate are taken using the biopsy needle via TRUS images. Your doctor will take biopsies from both lobes of the prostate. This is not a targeted biopsy and there is some risk of missing clinically important prostate cancers.

In addition, some cancers lie at the front of the prostate, making this region difficult to reach from the rectum, therefore cancers in this area may be missed.

Possible side effects of a TRUS prostate biopsy may include blood in the urine and an approximate 3% risk of serious side effects such as severe infections, which may lead to hospitalisation.

## Newer alternatives to the standard TRUS prostate biopsy:

1. Transperineal Prostate Biopsy
2. MRI Fusion Targeted Prostate Biopsy

### Transperineal (TP) Biopsies of the Prostate

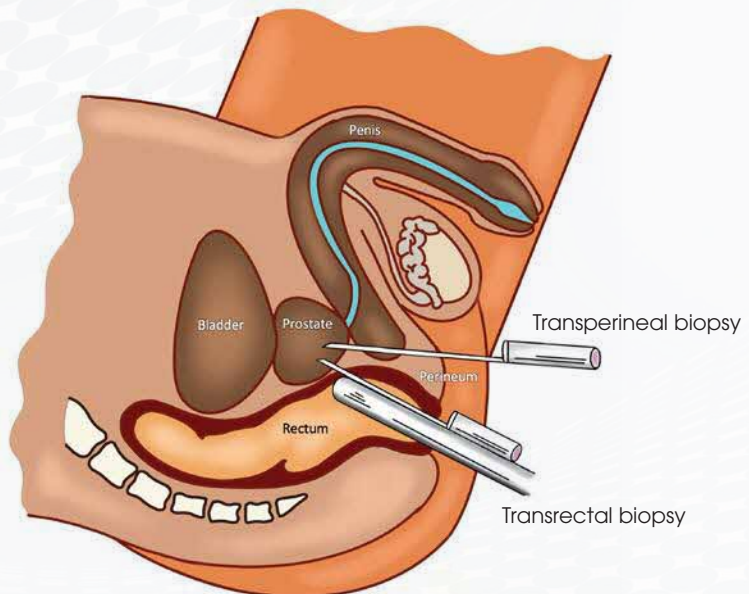
Transperineal biopsy of the prostate is an alternative route to biopsy the prostate. A transrectal ultrasound is inserted into the rectum to visualise the prostate and prostate tissues are sampled through two small needle punctures in the perineum (the area of skin between the scrotum and anus), instead of the rectum. Your doctor will inject local anaesthesia into the perineum and the prostate in order to minimise any discomfort.

The main advantages of this method over the TRUS prostate biopsy are:

1. By avoiding puncturing the rectum, the risk of severe infection and bleeding from the rectum is much lower compared to the transrectal route.
2. The front part of the prostate is easily reached, increasing the risk of detecting cancer in this area.

As the risk of infection is lesser in transperineal biopsies, more biopsy cores can be taken with better sampling of the prostate and a lower risk of severe infections.

NUH was the first hospital in the region to perform a transperineal prostate biopsy under local anaesthesia, using an external transperineal access system device and is now the training site for this procedure in Singapore.



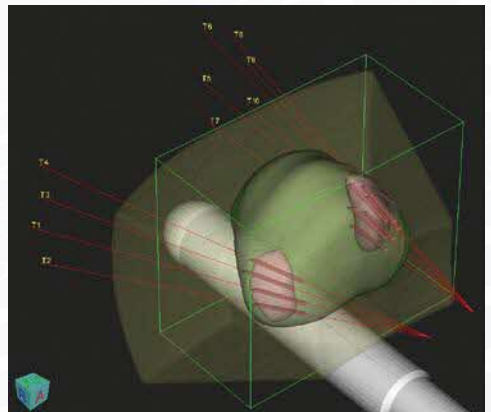
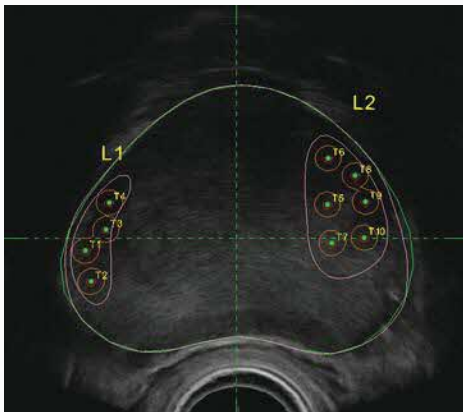
Transperineal vs Transrectal access for prostate biopsy

## Robotic-assisted MRI Targeted Prostate Biopsy

Targeted biopsy is often done using various platforms and this increases the diagnostic accuracy and reduces the detection of clinically insignificant cancer. If you have done a MRI scan of the prostate and areas suspected of cancer are seen, your doctor may recommend a MRI-Targeted fusion biopsy of the prostate.

An ultra-sound probe is inserted into the rectum and using digital fusion software in a computer, the MRI images are fused to the 'real-time' ultra-sound images of the prostate. This allows us to target suspicious lesions seen on the MRI scan for biopsy. The transperineal robotic-MRI targeting method allows for MRI-ultrasound digital fusion targeted biopsies, where the robotic arm guides the surgeon's placement of the needle to the desired target area in the prostate. Biopsies are taken via the transperineal route and the procedure is done under general or spinal anaesthesia. The risk of severe infection is usually negligible.

By doing both targeted biopsies of suspicious lesions in the prostate and systematic or saturation biopsies for the rest of the prostate gland, the risk of missing the cancer is potentially lower.



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