



Healthcare
Improvement
Scotland

SHTG
Advice on health
technologies

Plain Language Summary

Stability of prostate specific antigen (PSA) in blood samples
| February 2025

Key messages

1. In NHSScotland, total PSA levels are measured when testing for prostate cancer.
2. Total PSA levels are more stable than free PSA levels.
3. A 5% change in PSA levels from when blood is first taken to final testing can affect the accuracy of the test result.
4. Variation in total PSA levels remained below 5% for approximately 3 days at room temperature. Changes in free PSA levels exceeded 5% within about 24 hours, even at refrigerated temperatures.
5. Refrigerating blood samples for PSA testing slows down changes in PSA levels.
6. Needing to test PSA levels within 24 hours could be problematic for people living in remote, rural or island communities in Scotland.

What is PSA?

PSA is a protein produced by both normal and cancerous cells in the prostate. The prostate is a small gland located in the pelvic, between the penis and the bladder.

People who have a prostate have PSA in their bloodstream. PSA is present in the blood as free PSA and as PSA bound to proteins. Raised PSA levels can indicate prostate cancer, but they can also be caused by less serious conditions, such as infections.

What is PSA testing?

A blood test is available that can measure PSA levels (the PSA test). Blood samples from a patient are sent to a hospital laboratory for PSA testing.

Why is this important?

It can be several hours before blood samples arrive at a hospital laboratory for testing. During this time PSA levels in the samples could have changed. These changes can alter the test result.

What we did

We looked at the evidence on how long PSA remains stable in blood samples.

What we found

The quality of the evidence on PSA stability is not very good. The experiments described in the evidence all have flaws in how they were conducted.

In two studies blood samples were stored at room temperature. Total PSA levels varied by less than 2% over the first 24 hours. Changes in total PSA levels changed by less than 5% for up to 3 days after blood was drawn. Free PSA levels dropped by more than 5% within 24 hours at room temperature. This change in free PSA is enough to affect the PSA test result.

In one study, blood samples were stored in a refrigerator (4°C). Total PSA levels in these samples varied by less than 1.5% over 7 days. Free PSA levels in these samples dropped by 4.8% within 24 hours and by 5.4% within 72 hours.

One study looked at what happens if you do not remove blood cells from samples before PSA testing. In this study, total PSA levels decreased by 18.8% within 72 hours. This suggests that blood cells should be removed from samples before PSA testing.

One study looked at what happens if blood is allowed to clot before it is tested. Total and free PSA levels in these samples increased by more than 5% within a few hours, even when refrigerated.

Free PSA levels changed more rapidly in blood samples stored at room temperature than in samples stored in a refrigerator.

What is our conclusion?

Most studies concluded that PSA levels should be tested within 24 hours of a blood sample being taken. This could be a problem for people living on the most remote islands or in the most rural areas of Scotland.

Total PSA appears to be more stable than free PSA. Changes in PSA levels that could affect the results of a PSA test (5% change) occurred after about 3 days for total PSA and within 24 hours for free PSA. Storing blood samples in a refrigerator may slow down changes in PSA levels.

What next?

Evidence on the stability of PSA levels in blood samples will be considered as part of an update of the Scottish suspected prostate cancer referral guideline.

This plain language summary has been produced based on an SHTG Assessment