TEST

Urine protein electrophoresis test

A urine protein electrophoresis test separates urine proteins to look for unusual patterns or abnormal antibody proteins.

WHAT IT MEASURES
Types and amounts of proteins passed into urine

SAMPLE
Urine, usually collected over 24 hours

FASTING NEEDED?
No

HOW LONG IT TAKES
A spot sample minutes; timed collection usually 24 hours

RESULTS IN
Several business days; timing differs by laboratory

USED FOR
Diagnosing and monitoring abnormal urine proteins

MAIN LIMITATION
Small monoclonal proteins can be missed

Overview

Urine protein electrophoresis, often shortened to UPEP, separates proteins in a urine sample according to their size and electrical charge. This produces a pattern showing which types of protein are present.

The test can help find an unusual amount or pattern of protein. In particular, it may detect a monoclonal protein , which is made by one group of antibody-producing cells. Small monoclonal antibody fragments found in urine are sometimes called Bence Jones proteins or free light chains .

Finding one of these proteins does not, by itself, establish a diagnosis. The result must be considered with blood tests, kidney function, symptoms, medical history and sometimes imaging or a biopsy.

UPEP may use a urine sample collected at one time, known as a spot sample. A 24-hour collection is often used when the amount of protein passed over a full day needs to be measured.

Why the test is ordered

UPEP is most often ordered to investigate an abnormal protein found in blood or urine. It may help assess conditions in which antibody-producing cells make one type of protein, including monoclonal gammopathy, multiple myeloma and related disorders.

It may also be used to monitor a previously identified monoclonal protein. Changes over time can be more useful than one result on its own.

Less commonly, electrophoresis helps show whether urine protein has a pattern suggesting damage to the kidney filters or kidney tubules. Other urine tests, such as an albumin-to-creatinine ratio or protein-to-creatinine ratio, are usually better for measuring common forms of protein loss.

UPEP is not generally used as a routine screening test for people without a clinical reason to have it.

Who should have the test

You may be offered UPEP if another test has found unexplained protein in your blood or urine. It may also be ordered after an abnormal serum protein electrophoresis, immunofixation test or serum free light-chain result.

Your healthcare team may consider it when investigating unexplained kidney problems, anaemia, high calcium, bone problems or other findings that could have several causes. These findings do not automatically mean that a plasma-cell disorder is present.

People with a known monoclonal protein disorder may have repeat testing to assess changes or response to treatment. The testing schedule is based on the specific condition and clinical context.

How to prepare

You can normally eat and drink as usual. Coffee does not directly interfere with the separation of urine proteins, although you should avoid drinking unusually large amounts of fluid solely to produce a sample.

Tell the laboratory about prescribed medicines, non-prescription medicines and supplements. Do not stop a medicine unless the clinician who prescribed it tells you to do so.

If you are collecting urine for 24 hours, ask how the container should be stored. Many

laboratories advise keeping it cool or refrigerated, but instructions differ.

A typical 24-hour collection involves:

Ask for another container if the supplied one is not large enough.

- Urinating into the toilet when you begin and recording that time
- Collecting every urine sample after that for the next 24 hours
- Including the final sample at the recorded time the following day
- Keeping the container closed and stored as instructed

What happens during the test

For a spot test, you urinate into a clean specimen container. The collection usually takes only a few minutes.

For a timed test, the laboratory gives you one or more containers and written instructions. You collect all urine produced during the stated period, usually 24 hours. The laboratory needs the complete collection to calculate how much protein was passed during that time.

Avoid touching the inside of the container or lid. Tell the laboratory if toilet paper, stool or another material enters the sample.

Once returned, the urine is concentrated if necessary and placed on a gel or analysed by an instrument. An electrical current separates the proteins into bands. A laboratory specialist reviews their pattern.

Understanding your results

The report may describe the total amount of urine protein, the proportions of different protein groups and whether a restricted band or monoclonal protein was seen.

Possible descriptions include:

If a monoclonal band is present, urine immunofixation may be used to identify its antibody type. Blood tests commonly include serum protein electrophoresis, serum immunofixation and serum free light chains.

There is no single universal reference range for every UPEP result. Methods, reporting units and collection types differ. Interpretation also varies with the laboratory, age, sex, pregnancy status, medicines, kidney function and wider clinical context.

- No monoclonal protein detected: no clear abnormal single-protein band was found
- Monoclonal band or spike: one protein appears unusually concentrated and needs further identification
- Glomerular pattern: proteins may be leaking through the kidney's filtering units
- Tubular pattern: the kidney tubules may not be reabsorbing smaller proteins normally
- Mixed or non-specific pattern: more than one process may be contributing

What affects the results

An incomplete 24-hour collection is one of the most important sources of a misleading result. Missing even one sample can make the calculated daily protein loss look lower than it is. Collecting for longer than instructed can make it look higher.

Drinking much more or less than usual changes how concentrated the urine is. A properly measured 24-hour result can account for some of this, but very dilute urine may make small protein bands harder to detect.

Strenuous exercise can temporarily increase urine protein. Fever, infection, dehydration and significant physical stress can also produce short-term changes without indicating a lasting kidney problem.

Blood in the urine, including menstrual blood, may add proteins and complicate the pattern. Urinary infections and contamination can have a similar effect.

Kidney function strongly affects how free light chains are filtered and removed. Kidney impairment can change both blood and urine light-chain results. Some treatments can reduce or remove a previously detected protein, so the laboratory should know about current therapy.

Storage also matters. A sample left warm for too long, collected in the wrong container or returned late may not be suitable for reliable testing.

Accuracy and limitations

UPEP can detect and measure many abnormal urine proteins, but it does not find every monoclonal protein. A small amount may be missed, particularly in a dilute or incomplete sample. Some monoclonal proteins remain mainly in the blood or are not passed into urine in a detectable amount.

Urine immunofixation can identify smaller or less obvious monoclonal bands more reliably than

electrophoresis alone. Serum immunofixation and serum free light-chain testing may also detect an abnormal protein that UPEP misses. These tests are often interpreted together rather than treated as substitutes for one another.

A narrow band does not always mean that a cancer is present. Infection, inflammation, kidney problems and other antibody-related conditions can produce unusual patterns. Further testing is needed to confirm whether a band is truly monoclonal and whether it has clinical importance.

UPEP can show that a protein pattern is abnormal, but it cannot by itself identify the underlying condition or show where abnormal cells are located. If the main question is how much albumin is leaking from the kidneys, an albumin-to-creatinine ratio is usually more direct.

Risks and complications

Providing a urine sample has no direct medical risk. The main difficulties are inconvenience, spills or needing to repeat an incomplete or contaminated collection.

If blood tests are performed at the same visit, the blood draw may cause brief discomfort, a small bruise or light-headedness.

What happens next

A normal or non-specific result may simply be reviewed with your other tests. If the clinical concern remains, your healthcare team may still order blood immunofixation or free light-chain testing because UPEP can miss small abnormalities.

If a monoclonal protein is found, follow-up commonly includes confirming its type and comparing it with blood results. Kidney tests, a blood count, calcium testing, imaging or a tissue or bone marrow sample may be considered according to the full clinical picture.

Monitoring results are usually compared with earlier tests collected in a similar way. A routine follow-up appointment is appropriate for discussing most results.

The UPEP result itself is rarely an emergency. Seek urgent medical help for symptoms such as producing almost no urine, severe shortness of breath, confusion, rapidly worsening swelling, or visible blood with clots that prevents urination.

Common questions

Can I drink coffee before the test?

Usually, yes. Fasting is not required. Drink your normal amount rather than using extra coffee or water to force urine production.

Does the time of day matter?

It matters for a timed collection. Start and finish at the instructed times. For a spot sample, follow any timing request from the laboratory.

Can I exercise beforehand?

Avoid unusually strenuous exercise before and during the collection if possible. Hard exercise can temporarily increase urine protein.

What if I miss one sample during a 24-hour collection?

Tell the laboratory. The collection may need to be restarted because missing urine can make the daily protein amount look falsely low.

Can I collect the sample during my period?

Menstrual blood can contaminate the sample and affect its protein pattern. Ask whether to delay the test; if it cannot wait, tell the laboratory that you are menstruating.

Do I need to keep the container refrigerated?

Often, but follow the instructions supplied with your container. Storage requirements differ between laboratories and collection preservatives.

Sources

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