



Your Blood Work



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Why you need blood tests

Blood test results show us if you are on the right diet and medications. They also show if you are getting enough dialysis.

Every month you will need to collect a sample of your blood just before you start dialysis and at the end of your dialysis treatment. You will be taught how to spin your blood in a centrifuge and to store it in the fridge overnight until you can deliver it to your local laboratory.


What your blood tests measure and why

CBC (Complete blood count)

1. **Hgb (hemoglobin)** Your Hgb level tells us if you are anemic. A normal Hgb level for a patient with kidney disease is between 110 and 125g/L. Your Hgb level indicates how many red blood cells are in your system. Red blood cells carry oxygen throughout your body. If you don't have enough of these cells you will be anemic.

Symptoms of anemia can include:

- feeling cold
- looking pale
- tiredness
- shortness of breath
- chest pain



Note: Always let your nurse know if you accidentally lose blood during dialysis or if you bleed a lot from your needle sites after a dialysis treatment.



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Sometimes your Hgb level can become too high and your blood becomes thick. This can clog up your dialysis circuit and may increase the risk of clotting in your fistula or neckline catheter.

If your Hgb gets too high, your doctor may ask you to throw away a circuit of blood at the end of your treatment. Your doctor will also lower your dose of EPO [erythropoietin] or Aranesp.

2. **WBC (white blood cell) count** A high WBC count may mean you have an infection. A normal WBC count is between 4000 and 10,000/mm³.
3. **Platelet count** This tells us if your blood is clotting properly. A normal platelet count is between 150,000 and 400,000/L.

Iron Studies

Iron studies show us how much iron is readily available in your blood to build new red blood cells. Iron studies are done every three months and include:

1. **Ferritin** The normal range for dialysis patients is 100–800ug/L.
2. **Iron saturation percentage** The normal range is 20%–50%.

Your nurse or doctor will adjust your intravenous iron dose based on the results of your iron studies.

Note: Don't forget to hold your intravenous iron dose for at least one week prior to collecting your iron studies, otherwise you may get an artificially high iron reading.



Electrolytes

Electrolyte levels (e.g. sodium, potassium, bicarbonate and chloride) help to determine the correct dialysis prescription for you.

1. **Sodium (Na)** The normal range is 135–145mmol/L.
High sodium (salt) levels will make you thirsty and can cause high blood pressure.
Low sodium levels can cause your blood pressure to get too low while you are on dialysis and may cause leg cramps.
2. **Potassium (K)** The normal range is 3.5–5mmol/L.
High potassium levels will stop your muscles from working properly. The muscles in your arms and legs may feel heavy and you may get tingling in your fingers and toes.



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Note: A dangerously high potassium level will cause the heart to beat abnormally and in some cases, could cause the heart to stop beating altogether (cardiac arrest).

High potassium levels are caused by diet, inadequate dialysis (not enough) and sometimes by medications.

A low potassium level can also be harmful to your heart and may mean you need to eat more foods rich in potassium and run on a higher potassium bath.

Minerals

Calcium, phosphorus and parathyroid hormone levels need to be balanced to maintain strong bones and teeth and to help muscles work.

1. **Calcium (Ca⁺⁺)** The normal range is 2.10–2.7mmol/L when on dialysis. Dialysis patients often have low calcium levels due to poor absorption within the gut. This causes your body to “steal” the calcium it needs from your bones. Over time this results in weak and brittle bones.
2. **Phosphate (PO₄)** The normal range is 0.8–1.8mmol/L. Dialysis patients often have high phosphate levels since it is found in many foods. Phosphorus is a large, heavy molecule which is slow to move through your dialysis filter and so builds up in your body.

Phosphorus likes to bind with free calcium in your body and will steal the calcium it needs from your bones, as described above. Your renal diet, dialysis and phosphate binders will help to lower the phosphorus level in your body.

3. **Parathyroid Hormone (PTH)** The target level for PTH for dialysis patients is about 20–35mmol/L.

Parathyroid hormone is made by the parathyroid glands found in your neck. PTH is released into your bloodstream when the level of calcium in your blood is too low and/or the phosphorus level is too high. PTH tells your bones to give up their calcium, which leads to a weakening of the bones.



Note: Following your renal diet, taking your phosphate binders and Vitamin D supplements as prescribed (see the section of this workbook on Your Medications) and getting adequate dialysis will all help to keep your calcium, phosphorus and parathyroid hormone levels in balance.

4. **Magnesium Mg⁺⁺** The normal range is 0.70–1.00mmol/L. High magnesium levels can cause neurological problems and abnormal heart rhythms. Do not take magnesium-based antacids or laxatives such as Milk of Magnesia, Maalox, Mylanta or Gelusil.



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Low magnesium levels can occur if you are very malnourished or if you have severe diarrhea. Low Mg levels can cause abnormal heart rhythms and muscle weakness.

Other substances

1. **Creatinine** The normal range for dialysis patients is 300–1200.

Your creatinine level will depend on:

- Your size and muscle mass
- Your level of kidney function
- How much dialysis you get

Creatinine is the breakdown product of your working muscles.

Your creatinine levels show us how well your kidneys are functioning.

2. **Urea** The normal range is 3.2–7.1mmol/L. As your body breaks down protein in your food, urea is formed. When the kidneys do not work normally, this urea builds up in your blood. We measure the level of urea in your blood before and after dialysis to see if your dialysis treatment is cleaning your blood properly.

Better dialysis gives better outcomes, including a longer life, less hospital time, less anemia and better blood pressure control.

3. **Glucose or random blood sugar** The normal range is 3.8–7mmol/L. This is a measure of the sugar in your blood. Levels may vary for patients who have diabetes.
4. **HbA1C or glycosylated hemoglobin** The normal amount for a non-diabetic person on dialysis is less than 6%. The target for a person with diabetes on dialysis is less than 7%.

This shows us how well your blood sugar level is controlled over a three-month period. Fasting for this test is not necessary.

5. **Albumin** The normal level is 35–52g/L. Albumin is a protein and it shows us how well you are eating. Poor dietary intake of protein-rich foods will lower your albumin. Protein is important for growth and repair of your body tissue.



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Lipid (fat) screen

The target levels for patients on dialysis are as follows:

- Cholesterol 2.0–5.19mmol/L
- Triglycerides 0.45–2.29mmol/L
- Cholesterol: HDL Ratio less than 4.9
- LDL Cholesterol 1.5–3.39mmol/L

High levels of cholesterol and triglycerides can increase your risk of heart disease.

Liver function tests

- AST (aspartate transaminase) The normal level is less than 35u/L.

Your AST level tells us if you have a healthy liver.

- Alk Phos (alkaline phosphatase) The normal level is 48–138u/L.

This level may be high if you have bone disease (see calcium, phosphorus and parathyroid hormone levels discussed above)

Hepatitis Screen

Hepatitis BsAg, Hepatitis BsAb, Anti HBc and HCV

This screen is done once a year to test for Hepatitis B and C viruses. You can catch these viruses if you come into close contact with the blood or body fluids of an infected person.

Since blood spills can sometimes occur in hemodialysis units, we offer all non-infected dialysis patients the Hepatitis B vaccine to protect you from this virus. At this time there is no vaccine available for protection from hepatitis C.

Cytotoxic antibodies

Patients who are on the active kidney transplant waiting list must collect blood antibody levels at the beginning of every month.



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How to draw blood before starting dialysis (Fistula)

Required supplies

1. Vacutainer Sleeve/Adaptor — blue one (slip tip type)
2. Blood tubes (Ask your educator what tubes are required)
3. Labels, which include:
 - Your name
 - PHN (care card number)
 - Your date of birth
 - The date and time your blood was drawn
 - Pre-hemo blood sample

Steps for drawing blood

1. Insert fistula needles using the procedure you were taught. Do not heparinize needles until after blood is collected.
2. Connect the vacutainer adaptor to the vacutainer sleeve.
3. Attach the vacutainer adaptor and sleeve to the fistula needle you are collecting blood from.
4. Unclamp the fistula needle.
5. Attach blood tubes one at a time to vacutainer sleeve/adaptor. Collect blood until the blood tube stops filling. Clamp the fistula needle once you have finished filling all blood tubes.
6. Remove blood tubes and gently invert tubes back and forth, 2–3 times.
7. Let blood tubes stand upright for 30 minutes, until the blood is clotted in the tubes.
8. Spin the blood tubes in the centrifuge as instructed. If you are unsure which tubes should go in the centrifuge, ask your educator.
9. Store your blood tubes in a refrigerator until you can deliver the blood tubes to the lab. Ask your educator how much time you have before you must get your blood samples to the lab.



How to draw blood before starting dialysis (Catheter)

Required supplies

1. Vacutainer Sleeve/Adaptor-luer lock
2. Blood tubes (Ask your educator what tubes are required)
3. Labels, which include:
 - Your name
 - PHN (care card number)
 - Your date of birth
 - The date and time your blood was drawn
 - Pre-hemo blood sample

Steps for drawing blood



1. Follow the procedure for “Starting dialysis using a catheter” in *Section 6 (Your Hemodialysis Catheter)* of the *HHD Patient Workbook*, working through all steps until step 5 — removing old heparin or sodium citrate. Withdraw 4–5mLs of heparin or sodium citrate from one port and 10mLs of blood from the port you are collecting blood samples from and discard. Clamp both catheter ports and remove syringes.
2. Attach the vacutainer sleeve/adaptor-luer lock to the tego connector on the port you are collecting blood from.
3. Unclamp the catheter port.
4. Attach blood tubes one at a time to the vacutainer sleeve/adaptor. Collect blood until the blood tube stops filling. Clamp the catheter port when you have finished collecting all blood tubes. Remove the sleeve/adaptor.
5. Remove the blood tubes and gently invert the tubes back and forth, 2–3 times.
6. Let the blood tubes stand upright for 30 minutes, until the blood has clotted in the tubes.
7. Continue to step 6 of the procedure in the *HHD Patient Workbook* — the procedure for flushing lines with saline.
8. Spin the blood tubes in the centrifuge as instructed. Ask your educator which tubes need to go in the centrifuge.
9. Store your blood tubes in a refrigerator until you can deliver them to the lab. Ask your educator about how much time you have before you must get your blood samples to the lab.





Your Blood Work

How to draw blood after dialysis

Required supplies

1. Vacutainer Sleeve/Adaptor — green one (needle type)
2. Blood tubes (Ask your educator what tubes are required)
3. Alcohol swabs
4. Labels, which include:
 - Your name
 - PHN (care card number)
 - Your date of birth
 - The date and time your blood was drawn
 - Pre-hemo blood sample

Important Notes:

- For nocturnal home dialysis patients, especially those without a helper, make sure all supplies are ready, along with your take-off supplies.
- Have your centrifuge ready and within reach.
- Your date of birth
- Once dialysis treatment is complete and before you return your blood, slow your blood pump speed to 50–100mL/min. **DO NOT** turn off the blood pump.
- Wait 15 seconds, then obtain sample.



Steps for drawing blood

1. Connect the vacutainer adaptor to the vacutainer sleeve.
2. Swab the arterial port (red port) on the arterial bloodline with alcohol swab.
3. Poke the arterial port with the needle end of the vacutainer sleeve.
4. Attach blood tube to vacutainer adaptor inside vacutainer sleeve. Collect blood until the blood tube stops filling.
5. Remove blood tube and gently invert tube back and forth, 2–3 times.
6. Let the blood tube stand upright for 30 minutes, until the blood is clotted in the tube.
7. Spin the blood tube in the centrifuge as instructed.
8. Store the blood sample in a refrigerator until it can be delivered to the lab. Ask your educator about how much time you have before you must get your blood samples to the lab.



How to draw blood after dialysis (Single needle)

Required supplies

1. Vacutainer Sleeve/Adaptor — green one (needle type)
2. Blood tubes (Ask your educator what tubes are required)
3. 10mL pre-filled saline syringe
4. Labels, which include:
 - Your name
 - PHN (care card number)
 - Your date of birth
 - The date and time your blood was drawn
 - Pre-hemo blood sample



Important Notes:

- For nocturnal home dialysis patients, especially those without a helper, make sure all supplies are ready, along with your take-off supplies.
- Have your centrifuge ready and within reach.

Steps for drawing blood

1. At the end of dialysis, return your blood.
2. Ensure arterial leg of Y needle is clamped.
3. Attach empty 10ml syringe to venous leg of Y needle, open clamp and aspirate 10ml of blood into the syringe.
4. Clamp the line and remove the syringe.
5. Attach vacutainer to venous leg of Y needle.
6. Attach blood tube to vacutainer. Collect blood until the blood tube stops filling.
7. Remove blood tube and gently invert tube back and forth, 2–3 times.
8. Clamp line and remove vacutainer.
9. Attach pre-filled syringe, open clamp and flush needle, close clamp.
10. Let the blood tube stand upright for 30 minutes, until the blood is clotted in the tube.
11. Spin the blood tube in the centrifuge as instructed.
12. Store the blood sample in a refrigerator until it can be delivered to the lab. Ask your educator about how much time you have before you must get your blood samples to the lab.



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How to use the centrifuge

Take all blood samples to the lab as soon as possible after they have been collected.

Note: Blood tubes must be spun if not being taken to the lab within two hours.

Supplies Needed

- Centrifuge
- Blood collecting tubes
- Tubes with water for balancing the your sample blood tubes

Spinning your blood samples

1. Place centrifuge on a flat, level surface making sure the suction cups have good contact.
2. Press **Open** to allow opening of lid.
3. Ensure that tube holders are placed in the six holes in the rotor.
4. Plug the machine into a power outlet.
5. Each tube must be placed with a tube opposite so that they are balanced while spinning. If necessary, use a tube filled with water to achieve balance.
6. Close the latch on the lid.
7. Press **Start**.

Note: If excessive vibration or noise occurs, **stop the centrifuge by pressing Emergency Stop**. Then recheck the loading pattern to ensure it is balanced and restart.

8. Wait until rotor stops spinning.
9. Press **Open** and open the lid.
10. Store your blood sample tubes upright in the tube holder and keep in your refrigerator.

