

Testing

The transplant office has made arrangements for you to have your labs drawn at a hospital convenient for you. At the time those arrangements are made, we gave the lab permission to release those results to you should you ask. The lab values are also faxed to the transplant office to be reviewed by the transplant team. You may know the results of your lab tests before the transplant office receives them. If your lab is abnormal, call the transplant office immediately. Please have lab drawn before a clinic visit.

Below is a list of lab values that we will be tracking. Your lab results may fall outside of the “normal” range but be “normal” for you. It is important for you to know what your expected lab range/baseline is. However, it may be several weeks after transplant before we will be able to determine what your “normal” lab values are.

It is very important to have your labs done fasting – nothing to eat or drink after midnight with the exception of water. Fasting labs help

us monitor your blood sugar (glucose) levels. The blood sugar (glucose) levels can be elevated and/or more difficult to control after transplant. And if you have received a pancreas transplant, the blood sugar (glucose) results help us know that your transplanted pancreas is working.

If you live outside the local area, tubes and mailers will be supplied to you at the time of discharge. These are used by your lab to draw blood to be sent to the Transplant Center to measure your immunosuppression levels. The tubes and mailers are automatically replaced by our lab to yours as they are used; however, in the early weeks after transplant you may be having frequent labs drawn and your supply of tubes and mailers may get low. Please feel free to call the transplant office if you or your lab is running low. Also, if you have Home Health Care after transplant, you will need to take your tubes and mailers to your local lab the first time that you go (after discharge from Home Health Care). You may leave your supply there and we will then send the next supply to your local lab.

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Routine Labs

* Note that normal ranges for lab values will vary depending on where the test is performed. Also, your Blood Urea Nitrogen and Serum Creatinine may not be within the normal range, even if the kidney is stable and functioning well.

Test	Normal Range
Hemoglobin (Hgb)	10–16 gms/dl
Hematocrit (HCT)	30–46%
White Blood Count (WBC)	4,000–10,000/ul (Usually reported out as 4.0-10.0)
Platelet Count (Plat)	150,000–400,000/ul (Usually reported out as 150-400)
Blood Urea Nitrogen (BUN)	6–20 mg/dl
Serum Creatinine (Scr)	0.64–1.27 mg/dl – male 0.44–1.03 mg/dl – female
Sodium (NA)	135–145 mmol/L
Potassium (K)	3.6–5.0 mmol/L
Bicarbonate	20.0–31.0 mmol/L
Magnesium Level	1.8–2.5 mg/dl
Phosphorus Level	2.4–4.7 mg/dl
Glucose	65–110 mg/dl
Cyclosporine Level	Varies
Tacrdimus Level	Varies
Sirolimus Level	Varies
Everolimus Level	Varies
Serum Amylase	< 200U/L Can vary
Timed Urine for Amylase	(Units/Hour) < 1000 U/Hour
Spot Urine for Amylase	(Units/Liter) > 10,000 U/Liter

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Amylase

The pancreas is a gland that has two functions:

1. Endocrine function, which makes insulin and other hormones
2. Exocrine function, which makes digestive juices such as amylase, lipase and other

Bladder Drained Pancreas

The transplanted pancreas is attached to the bladder so the pancreatic duct drains the digestive juices into the bladder. A piece of small bowel is transplanted with the pancreas and attached between the bladder and the pancreas.

Monitoring the drainage of digestive juices is very helpful in watching for rejection. This is because in most cases the exocrine or digestive portion of the pancreas will reject before the endocrine or insulin portion of the pancreas. A decrease in the amount of the amylase in the urine can indicate rejection. If you have a bladder-drained pancreas, we will arrange for you to have random urine for amylase done with your routine lab work and/or timed urine for amylase (a urine collection that you start the night before your lab work and finish when you get up in the morning and take this collection to the lab). The amylase levels in your urine should be very high. A drop of urine amylase of more than 50 percent could indicate rejection.

Patients with a bladder-drained pancreas usually have more problems with dehydration in the early weeks after transplant and may require additional fluids either orally or intravenously (IV).

Procedure for collecting the overnight urine specimen for amylase:

- The night before you are scheduled to go in for lab work, you will collect your urine throughout the night.
- Start the urine collection by emptying your bladder and discarding the first specimen.
- Save all the other urine during the night in the collection container, including the first voiding in the morning.
- Keep the urine refrigerated.
- Be sure to write on the bottle the total number of hours the urine was collected so the lab can calculate the correct results.

Bowel (Enteric) Drained Pancreas

The transplanted pancreas is attached to the colon (bowel), so the pancreatic duct drains digestive juices into the colon. We have no way to measure the amount of digestive juices that drain into the colon, and it is not necessary to do urine amylase studies as the pancreas drains into the colon. Patients who have a bowel-drained pancreas generally have fewer problems with dehydration than a patient who has a bladder-drained pancreas. However,

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we do lose one mechanism of monitoring for rejection by not being able to measure the amount of amylase the pancreas is producing.

Hematuria

Hematuria is the presence of blood in the urine. The blood may or may not contain clots. Approximately 20 percent of patients who have a pancreas transplant that is bladder drained will develop hematuria. This can occur either early or late in the first year after transplant.

Possible causes include:

- Inflammation of the small bowel (duodenitis) - a portion of the donor bowel is attached to the pancreas at the time of transplant
- Ulcer formation at some point where the new pancreas is connected to the urinary bladder
- Rejection
- Inflammation of the new pancreas (pancreatitis)
- Irritation of trauma from having a urinary catheter (foley)
- Following a kidney or bladder-drained pancreas biopsy

Having blood in the urine can be very alarming, as it does not take much blood to change the color of the urine to red. Hematuria can be handled as an outpatient in some cases but may require an emergency room visit or

an admission. Hematuria may cause clots to form in the bladder and you may have trouble urinating or not be able to urinate at all. You need to go to the closest emergency room should you not be able to urinate.

Treatment of hematuria may include:

- Increasing hydration with oral or intravenous fluids to maintain good urine output and “flush out” any clots
- Inserting a foley catheter into your bladder and irrigating the bladder to remove the clots
- Starting a medication called Sandostatin to decrease inflammation of the new pancreas
- Admission to the hospital for close monitoring

It is important to notify the transplant team if you have blood in your urine to determine the best course of action based on your symptoms.

Hyperamylasemia (Elevated Serum Amylase)

Hyperamylasemia or elevated serum amylase is defined as a serum amylase level greater than 200 and means that the amylase level in your blood is too high. High serum amylase levels generally mean that the new pancreas is inflamed or swollen. This is called pancreatitis. About 35 percent of patients having a pancreas transplant develop hyperamylasemia or pancreatitis. The average duration of hyperamylasemia is about one to two weeks.

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Causes of hyperamylasemia include rejection, infection, constipation and urinary reflux or “backwashing” into the pancreas of urine due to inadequate bladder emptying (with bladder-drained pancreas transplant).

Some common symptoms of pancreatitis include:

- Fever
- Lower abdominal pain
- Swelling or tenderness over the new pancreas
- Constipation, bloating or “gas”

If hyperamylasemia does occur, the treatment consists of:

- Insertion of a foley catheter into your bladder to stop the “backwash” of urine into the pancreas
- Starting medication called Sandostatin to decrease inflammation of the new pancreas
- Relieving constipation
- Monitoring your lab work
- Other testing such as an ultrasound or CAT scan of the transplanted pancreas
- Possible biopsy of the transplanted pancreas and/or kidney if rejection is suspected

Specimen Labeling

After transplant, you will be asked to collect urine or stool specimens to take to the lab for various reasons. It is important for you to label the specimens with your name and date

of birth to prevent the lab from discarding the specimen because of missing patient identifiers. When collecting a timed urine collection, please include the date and start and stop time of the urine collection and add this information to the label.

Biopsy And Testing

The following scans, x-rays and lab tests may need to be done periodically after your transplant. Many of these tests should be familiar to you as they were part of your pre-transplant evaluation workup.

Chest X-Ray

A chest x-ray will be done in the event that you should develop respiratory symptoms such as: a persistent cough (productive or dry), chest pain, shortness of breath, a bad cold (sore throat or runny nose) or possible infection. It is also common to have a chest x-ray before having surgery.

Ultrasound

This test is done in x-ray (radiology) and utilizes sound waves to look for abnormalities of your transplanted kidney and/or pancreas. A gel is applied to the abdomen over the area of the kidney and/or pancreas and a probe (shaped like a microphone) is moved gently over the abdomen, allowing images to be displayed on a computer screen for the doctor to view.

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This test will be performed if there is any question of rejection. This test generally takes one hour to complete. This is NOT a painful test.

Kidney Biopsy

A biopsy is a procedure to obtain a small piece of tissue from the transplanted kidney for microscopic examination by a pathologist. A kidney biopsy will be performed when rejection is suspected. A rise in serum creatinine and BUN can mean rejection; however, there are many other causes for lab values to rise. For this reason, a biopsy of the transplanted kidney may be arranged to make sure of the cause of the abnormal labs and provide information to help us administer proper treatment. This test is usually performed in the ultrasound department in x-ray. A local anesthetic is first given, and then a needle is passed through the skin into the transplanted kidney. A small piece of kidney tissue is taken out and examined under a microscope for signs of rejection. You will remain on bed rest for two to six hours after this procedure. There may be blood in your urine for up to 24 hours after the biopsy. Increasing your fluid intake will help this clear.

When kidney transplantation first became possible, the biggest concern for long-term kidney function was the prevention and treatment of rejection. Over the years, anti-rejection medications have improved and rejection occurs in less than 10 to 20 percent of all kidney transplants. However, one of the side effects of the anti-rejection

medications is toxicity to the kidneys. Our team feels that it is important to know whether the newer medications are causing toxicity to the transplanted kidneys before the damage occurs. The biopsy also helps us determine if we need to change the doses of your anti-rejection medications to decrease damage to the transplanted kidney.

Pancreas Biopsy

A pancreas biopsy may be performed in the event of a rejection episode. The biopsy is a minor surgical procedure requiring anesthesia.

With bladder-drained pancreas transplants, a cystoscope (a lighted instrument) is passed through the urethra and bladder up to the transplanted pancreas. A small piece of tissue is obtained from the pancreas under ultrasound guidance and then examined under a microscope. A foley catheter is placed after the biopsy. Hematuria (blood in the urine) is common after this procedure for approximately 24 hours. Increasing your fluid intake will help this clear.

With a bowel-drained pancreas, the biopsy is performed in the radiology department under CAT scan guidance. A needle is placed through the skin into the pancreas to obtain a sample of the transplanted pancreas to examine under a microscope. Sedation and/or local anesthesia are used to decrease discomfort.

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Cytogram

Sometimes after a transplant, a test may be performed to visualize your bladder. This test is performed to look for any fluid leaks at the site where the new pancreas and kidney are attached to your bladder.

Stent Removal

At the time of the kidney transplant, a small tube (stent) is usually placed inside the ureter (the tube that connects your new kidney to your bladder). The tube is left in place for about four weeks. We will schedule you to have this tube removed by a urologist in his/her clinic. The tube is removed by inserting a lighted instrument into the urethra (tube from the bladder to the outside of your body) and removing the stent. A local anesthetic is used to reduce the discomfort. Though this procedure sounds uncomfortable, it can be safely and comfortably done in a urologist's office and takes just a few minutes. A general anesthetic to remove this tube is not needed (exception is made with pediatric patients).

Cancer Screening

As a transplant patient, you will need to take anti-rejection medication for the rest of your life, as long as you have a functioning transplant. These medications place transplant patients at a higher risk for developing cancer. Because of this, it will be necessary to do routine yearly screening tests such as: mammograms (for women), stool specimens for blood and a prostate cancer blood test (for men). Women will be encouraged to have a yearly Pap smear and pelvic exam.