

early on and to initiate necessary therapy. If there is already malfunctioning of the kidneys, regular testing of the level of potassium in the blood is required. Moreover, the measurement of creatinine clearance, a more precise indicator of kidney function, may be required. Creatinine clearance is a test for creatinine and urea based on a 24-hour collection of the urine.

Blood sugar / glucose

The level of glucose in the blood may change significantly after an LTx. In some cases medication with insulin may be required. This is a frequent side effect of drugs such as glucocorticoids (e.g., Urbason®). Moreover, a patient's metabolism may markedly change after LTx. Hence, regular glucose checks are necessary.

Blood count

The so-called blood count really tests for red blood cells (erythrocytes), white blood cells (leucocytes), and platelets (thrombocytes). While red blood cells and platelets are homogeneous, the white blood cells comprise different types and functions of cells: granulocytes, lymphocytes, and monocytes. They are analyzed in the differential blood count / hemogram. The hemoglobin value (Hb) is an indicator of the quantity of red blood pigment contained in the erythrocytes. The main function of this iron-containing pigment is to transport oxygen. In case of anemia the values are low. Infections

affect (raise or reduce) the number of leucocytes. Side effects of drugs can also significantly change the number of erythrocytes, leucocytes, and thrombocytes. A low Hb value resulting from shortage of iron or vitamins can easily be treated. Changes in the blood count after an LTx may also be an indicator of graft rejection. Thus, blood counts have to be taken seriously and discussed with the post-transplant care physician.

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**Further brochures are available, e.g., on
Liver Transplantation, Handicap Status and LTx,
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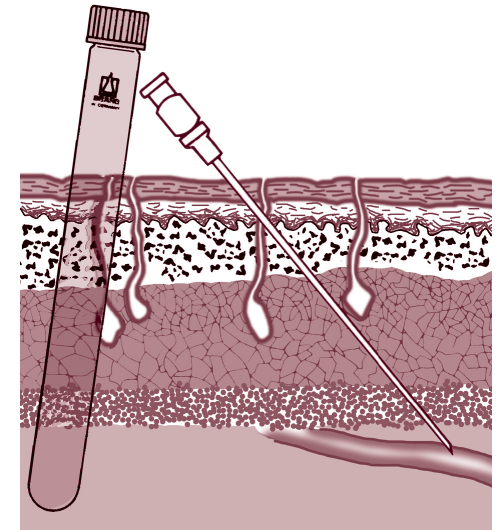
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Lab Test Results after LTx

Information for Patients Lab Test Results after Liver Transplantation



 **Lebertransplantierte
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Lab Test Results after Liver Transplantation: Which ones are important? What do they mean?

Blood Tests as part of Post-Transplant Care

To secure optimal organ function after the LTx, patients have to have medical care for the rest of their life. In addition to consulting with the physician and a general check-up as well as "machine-based" diagnostics (such as sonography, bone-density measurement, etc.), regular blood tests are indispensable. Blood tests will be performed several times a day immediately after surgery; after release from the hospital, their frequency will be reduced to about two per week. If the recovery progresses without problems, the intervals for blood tests may be stretched; a year after LTx, they could be performed only every 2 to 4 weeks. The adequate frequency should be determined by the physician in consultation with the patient.

Medication levels in the blood

The prescribed use of anti-rejection medicines (immunosuppressants) helps to prevent the rejection of the transplant. To secure adequate protection with the "classical" immunosuppressants, i.e. Cyclosporine (Sandimmun®) and Tacrolimus (Prograf/Advagraf®), there is a need for regular checks of their level in the blood. If the level is too low, the dose has to be increased to prevent the risk of graft rejection. Too high levels should be avoided by timely reduction of the dosage to keep side effects to a minimum (such as kidney/renal malfunction, hypertension, gum disease, susceptibility to infections, excessive growth of hair, neurological side effects such as headaches or trembling). Drugs from the family of the glucocorticoids (e.g. Urbason®) do not require checks of their level in the blood. However, they make it necessary to regularly measure the blood sugar level.

Measured liver values

The check of the liver function is measured via a series of parameters. Regular tests help to diagnose infections, graft rejections, and other complications (e.g., impediments to the blood flow in the liver) before they cause problems, and to come up with a therapy. While, for example, an increase of the "transaminases" in the blood (GOT, GPT) would point to liver damage, increased "cholestasis values" (Gamma-GT, AP, bilirubin) point to problems with the bile ducts. In addition, albumin and protein in the blood as well as the so-called "quick ratio" are indicators of the functioning of the graft. An isolated increase of the alkaline phosphatase

(AP) with otherwise normal liver values might suggest the incidence of bone disease (e.g., osteoporosis). The liver parameters in the blood (particularly the Gamma-GT) are also affected by side effects of medication.

Kidney function

Long-term medication with immunosuppressants (anti-rejection medicines) as well as accompanying diseases (such as diabetes, hypertension, infections) may harm the functioning of the kidneys. Hence, regular checks of the kidney parameters (creatinine, urea) are very important. In some cases the urine has to be tested for protein so as to detect any kidney damage

Parameters and their normal levels

Important: Keep in mind that "normal values" may differ from lab to lab as a result of different measurement methods.

Medication level

- Cyclosporin (Sandimmun Optoral®) 75–200 ng/ml
- Tacrolimus (Prograf/Advagraf®) 3–15 ng/ml

Important: The adequate level within the above ranges must be individually determined.

Kidney function

- Creatinine up to 1,3 mg/dl
- Urea up to 45 mg/dl
- Potassium 3,5–5,0 mmol/l

Other parameters

- Protein 60–80 g/l
- Albumin 30–50 g/l
- Quick (INR) Ration 70–125 %
g/l (= Gramm pro Liter)

Standard units: ng/ml = nanogram per milliliter
 • U/l = units per liter • mg/dl = milligram per deciliter
 • mmol/l = millimol per liter • pl = pico-liter,
 nl = nano-liter • g/dl = gram per deciliter

Blood count

- Erythrocytes = red blood cells 4,3–6,1/pl
- Leucocytes = white blood cells 4,0–10,0/nl
- Thrombocytes = platelets 150–440/nl
- Hemoglobin (Hb) 13,0–17,0 g/dl

Blood sugar

- Glucose (on an empty stomach) 65–110 mg/dl

Liver function (measurement at 37 degrees C)

- GPT (= ALT) and GOT (= AST) = transaminases
Women 10–35 U/l, Men 10–50 U/l
- Gamma-GT = transferases
Women up to 39 U/l, Men up to 66 U/l
- AP
Women 35–104 U/l, Men 40–129 U/l
- Bilirubin up to 1,0