Research Article

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Standardization of living donor liver transplantation in Turkiye

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Preliminary Report of the ministry of health working group on standardization of living donor liver transplantation in Turkiye

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Abstract

Liver transplantation is successfully achieved all over the world and in Turkiye. Similar to many middle and far east countries, donation from deceased donors has not reached the desired level in Turkiye. Therefore, in Turkiye, living donors have been frequently used for liver transplantation. Although Turkiye is the leading country in Europe and one of the top three countries in the world executing LDLT, nationwide standardization of LDLT protocols, including donor and recipient evaluation and acceptance criteria, donor and recipient follow-up and reporting rules, and routine periodic audits by the ministry of health authorities, has not been established. Therefore, we created a working group to study reviewing regulations of LDLT operation in Europe and the USA. The establishment and implementation of standardization of LDLT operation will serve to improve the donor and recipient outcomes while preventing incomplete or incorrect practices. The guide prepared on this subject is presented in the Appendix.

Keywords: Liver; living donor; transplantation.

Introduction

Liver transplantation is the standard treatment option for patients with end-stage liver disease, acute liver failure, and some genetic/metabolic liver diseases with excellent long-term patient and graft survival. Liver transplantation is successfully applied all over the world and in Turkiye. Similar to many middle and far east countries, donation from deceased donors has not reached the desired level in Turkiye. Therefore, in Turkiye, living donors have been frequently used for liver transplantation. It is the primary wish of the authors that all public and private health institutions and organizations, transplant centers, and nongovernmental organizations should make all efforts to increase the donation from deceased donors by establishing the necessary infrastructure and implementing public awareness activities. The aim of this study is to establish and implement nationwide standardization of living donor liver transplantation. This mandated approach by the Ministry of Health of Turkiye improves the donor and recipient outcomes by collecting and reporting accurate donor/recipient data in a timely manner. It also helps recognize low-performing centers. Such centers would be scrutinized more frequently to improve their outcomes.

Discussion

Transplants from a living donor have many advantages for the transplant candidates, including shorter waiting time on the transplant list, short ischemia time, and better organ quality. Furthermore, compared with the deceased donors, the transmission of donor-derived infections to the recipient is reduced to the lowest level of risk or eliminated completely. From the point of view of surgical teams and transplant centers, LDLT is an elective operation and puts less pressure on the team in terms of workforce and resource utilization.

On the other hand, donor hepatectomy is major surgery and carries potentially serious risks for living liver donors. Donors are healthy individuals without any disease and exhibit self-sacrificing and admirable behaviors, gifting life to the patients waiting for liver transplantation by risking their lives. Thus, protecting donor rights, standardizing medical and psychological examinations of donor candidates, and preventing or minimizing complications and possible mortality in donors have been the main focus of LDLT in Europe and the USA.

Although Turkiye is the leading country in Europe and one of the top three countries in the world performing LDLT, nationwide standardization of LDLT protocols, including donor and recipient evaluation and acceptance criteria, donor and recipient follow-up and reporting rules, and routine periodic audits by the ministry of health authorities, have not been established. Therefore, we created a working group to study reviewing regulations of LDLT operation in Europe and the USA. We found both UNOS and British Transplant LDLT operational rules adaptable to establish LDLT standards in Turkiye.[1,2]

Our working group consisted of surgeons, hepatologists, high-level administrators, and lawyers from the Transplant Department of the Ministry of Health working to adapt these rules to Turkish law, culture, and health system realities. While we do that, we also paid attention to not being a major economic and workforce burden on centers performing LDLT in Turkiye.

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The establishment and implementation of standardization of LDLT operation will serve to improve the donor and recipient outcomes while preventing incomplete or incorrect practices. Moreover, it will facilitate better and complete near real-time data collection, which is important for identifying centers with undesirable outcomes and initiating corrective action plans, as well as improving national collaboration of clinical research projects on LDLT. The guide prepared on this subject is presented in the Appendix.

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APPENDIX

Evaluation Guide for Living Donor Liver Transplantation

The minimum requirements to be followed by centers performing liver transplantation from living donors are explained in detail in these ten articles:

1. Psychosocial assessment for living donors
2. Independent advocate for the well-being of living donor (IAWLD)
3. Informed consent
4. Medical evaluation for living donors
5. Evaluation and reporting of living donor blood group
6. Verification of living donor before procurement
7. Packaging, labeling, and transporting of living donor organs, extra vessels, and tissue typing materials
8. Domino and Non-Domino Therapeutic Donors
9. verification of living donor organ before transplanting into a recipient
10. Reporting

Article 1. Psychosocial Assessment for Living Donors

Living donor psychosocial assessment requirements are applicable to kidney, and liver, donors.

A living donor's psychosocial assessment should be performed by a psychiatrist, psychologist, social worker with a master's degree, or licensed clinical social worker prior to organ procurement.

A copy of the documentation for psychosocial evaluation should be kept among the living donor health assessment files and all the following components should be involved:

1. An assessment for psychosocial problems, including mental health problems that may complicate the living donor's recovery and may be identified as a risk for a poor psychosocial outcome
2. Evaluating the risk criteria for HIV, HBV, and HCV infections and retesting 2 weeks before surgery.
3. Re-evaluation of previous or current use or addiction of tobacco, alcohol, or drug of the living donor.
    a. Due to the increased risk of intravascular coagulation with the use of tobacco and the possibility of serious complications resulting in death in the donors during the early postoperative period, quitting of smoking is highly recommended.
    b. Those with active use of drugs are ineligible for donation.
    c. Donor candidates who are determined/considered for possible alcoholism during the donor evaluation process should be kept out of evaluation. Those who are determined/considered at risk for alcoholism should be reevaluated with a report from AMATEM (Research and Treatment Center for Alcoholics and Patients with Other Substance Abuse – Alkol ve Uyuşturucu Madde Bağımlıları Tedavi ve Araştırma Merkezi) after 3 months of quitting. If they are considered suitable for donation, a liver biopsy should be taken during the medical evaluation.
4. Female donor candidates using birth control pills must stop these drugs at least 3 months before donation.
5. Before the final decision of donation, identification of factors requiring education or therapeutic intervention should be identified.
6. Determining that the a living donor understands the short, and long-term medical and psychosocial risks associated with living donation for both living donor and recipient.
7. An evaluation of whether the decision to donate is free from incentives, pressure, and other coercive factors, exploring the reasons for donating and, if any, the nature of the relationship with the transplant candidate.
8. Evaluation of the living donor's ability to make an informed decision, to cope with major surgery and the stress associated with it. This includes assessing whether the donor has a realistic donation and recovery plan with appropriate social, emotional, and financial support as recommended.
9. Review of the living donor's occupation, employment status, health insurance status, lifestyle, and social support.
10. Determining that the living donor understands the potential financial impact of the donation.
11. Detailed psychological evaluation and examination of prisoners should be carried out in the presence of an expert.

Article 2. Independent Advocate for the Well-being of Living Donor (IAWLD)

2. a. IAWLD Requirements for Living Donor Surgery Centers

Living donor IAWLD requirements are applicable to kidney and liver donors. To any living donors who are evaluated for donation, the health center where the operation is performed is responsible for providing and assigning an independent IAWLD who is not included in any part of the potential recipient evaluation process. IAWLD can be a single person or can be a team with multiple members. An IAWLD team should assign one member as the key contact person for each living donor. All IAWLD requirements should be completed before the final decision is made for donation.

The duties of IAWLD are listed below:

1. Must work independently of the recipient candidate's team.
2. Should defend the rights of the living donor.
3. In accordance with the qualification and training requirements specified in the center's protocols, must fulfill the following for the living donor:
    a. Should give details about organ donation, the details of donor surgery, and its possible complications.
    b. Should receive an informed consent.
    c. The presence and role of any familial or external pressure on the donation decision should be investigated.
4. Should revise and document whether the living donor has received information on each of the topics below and should assist in receiving additional information from other professionals on these topics:
    a. Informed consent process as described in "Article 3: Informed consent."
    b. Evaluation process according to "Article 1: Psychosocial assessment for living donors" and "Article 4A: Living donor medical evaluation requirements."
    c. Surgical procedure and possible complications.

d. Requirements of follow-up and the necessity to be included in the operating center's requirements: living donor data submission requirements and living donor reporting, unexpected/adverse problems.

2. b. IAWLD Protocols for Living Donor Surgery Centers

Centers, where living donor operations will be performed, should develop protocols on the following subjects and should comply with these written protocols.

1. If the transplant center employs a team for IAWLD (social worker, psychologist, or psychiatrist), the center should reveal the composition of the team and the distribution of tasks within the team.
2. Establishing necessary qualifications and training curriculum for IAWLD (for both the beginning and for continuing recertification courses). The content of these trainings should include the minimum requirements, living organ donation, transplantation, medical ethics, informed consent, and the potential impact of family or other external pressures on the potential living donor's donation decision. IAWLD, who have completed 3 years from the date of obtaining the certificate, are obliged to participate in the first recertification program to be organized by the Ministry of Health. Their certificates will remain valid until this date, but if the recertification process is not successful or if there is no participation, the certification will be suspended. These trainings should be documented.
3. The detailed tasks and responsibilities of IAWLD should be taken under a protocol by the center. (Article 2A: 'IAWLD Requirements for Living Donor Surgery Centers').
4. The center where living donor operation will be performed should provide a protocol for IAWLD that allows and ensures the filing of a complaint to the Ministry of Health, Department of Organ Transplantation to protect the rights of the living donor.
5. There should be a protocol stating that any complaints filed to the Ministry of Health, Department of Organ Transplantation regarding the interest and rights of the living donor will be answered by the hospital within 2 business days.
6. IAWLD responsibilities toward the Ministry of Health: Reporting any violation of living donor rights to the Department of Organ Transplantation. For those who fail to report, action will be taken within the scope of the relevant legislation of the Ministry of Health.
7. A center's decision to terminate IAWLD's work during the living donor process requires approval from the Ministry of Health. Centers have the right to terminate IAWLD's employment due to disgraceful crimes and crimes against the law.
8. Centers performing the living donor operation are responsible for the follow-up of donors within periodic time intervals (3rd month, 6th month, 1st year, and 2nd year) and should be responsible for resolving issues that may arise related to the donor surgery. No additional fee can be charged to patients who are Turkish citizens due to complications related to the direct surgery that may occur after donor and recipient surgeries.

Article 3. Informed Consent

Centers performing living donor operations are responsible for obtaining and documenting informed consent before retrieval of organs. Informed consent requirements apply to living kidney, liver, pancreas, intestinal, and lung donors and should include all components in Tables 1–3. Documentation of informed consent should be retained in the living donor's medical record.

Also, as part of the informed consent process, the transplant centers should provide living donors with the recipient outcomes and graft survival data as stated in Table 3, which are determined according to Karnofsky Risk scores.

After the rules are notified to the centers, a total of 1-year transition period, 6 months will be for the preparation of their protocols and notification to the Ministry of Health and 6 months for the training of IAWLD, will be given to the centers for adaptation, and then the rules will be implemented.

Article 4. Medical Evaluation for Living Donors

4. a. Living Donor Medical Evaluation Requirements

Living donor medical evaluation requirements apply only to living kidney and liver donors. Medical evaluation of living donors should be performed in the center, where donor operation will be performed, and should be undertaken by an experienced doctor or surgeon. Documentation of the medical evaluation should be kept in the donor's medical record. Medical evaluation should contain all components in Tables 4 and 6.

4. b. Additional Requirements for Medical Evaluation of Living Liver Donors (Table 5)

4. c. Conditions That Prevent Being a Live Donor (Table 6)

Article 5. Evaluation and Reporting of Living Donor Blood Group

Living donor surgery centers must develop and adhere to a written blood type determination and reporting protocol that includes all the following requirements.

5. a. Living Donor Blood Type Determination

The living donor surgery center must ensure that each living donor's blood type is determined by testing at least two donor blood samples before establishing the living donor identity. Living donor blood samples should have the following characteristics.

1. Samples should be drawn at two separate times
2. They must be sent as separate samples

Living donor liver center should outline the process to be followed for evaluation of contradictory or unclear results of the primary blood type in their written protocols. Living donor liver center should document that blood type determination is performed according to the hospital's protocol and the above requirements.

5. b. Living Donor Blood Subtype Determination

Subtyping for living donors should be evaluated by taking the opinion of a hematology specialist as needed. If living donor surgery centers choose to do subtyping and samples before red blood cell transfusion are available, subtyping should be completed as in Table 7.

Appendix 1. Requirements for living donor informed consent

The operating center should:	Elements of informed consent:
Obtain from the living donors	A document signed by the living donor indicating that the living donor approves the following: 1. Willing to donate 2. Free from manipulation and external pressure 3. Informed that he/she can refuse to donate at any time
Provide to the living donors	1. The living donors should know that they can waive the consent and evaluation process at any moment, and they have the opportunity to stop this process in a confidential and protected way. 2. IAWLD must introduce themselves and explain their duties according to "Article 2: Independent advocate for the well-being of living donor (IAWLD)." In this context, IAWLD are obliged to notify that they will be with the donors and assist them in all processes (including the consent process). 3. The center performing the donor surgery is responsible for solving the problems that may be encountered after the donor surgery for 2 years, according to point 8 in "Article 2B: IAWLD protocols for living donor surgery centers." 4. All the items listed below are required: • Consent • Medical and psychosocial assessments • Pre- and postoperative care • Postoperative follow-up in line with "living donor data submission requirements." Teaching (teaching materials may comprise any media) is performed through one-to-one or small groups. Instructions or the informative education provided by the hospital personnel should be given using a language and expression that is meaningful, descriptive, and understandable to the donors and their families.
Explain to the living donors	1. It is a legal offense for any person to knowingly acquire, obtain or otherwise transfer any human organs for anything of value, including but not limited to cash, property, and vacations. (Organ and Tissue Transplantation Law 2238, Article 15) 2. The center performing the donor surgery should provide the living donor with IAWLD. 3. The living donor should be provided with detailed information about alternative procedures or treatment options, including cadaveric transplantation. 4. The center performing the donor surgery should inform the donor about the possibility of finding a suitable cadaveric organ prior to the living donation. 5. Transplant centers may set up their own specific recipient and donor criteria, being within the general criteria set by the Ministry of Health. These criteria should be declared to the ministry, and the centers are obliged to comply them. 6. Transplant centers are obliged by the law to protect the personal data of the living donors and recipients. 7. Transplant centers should clearly inform the donor about the recipient's medical, surgical, psychological, and social problems that can occur in the preoperative or postoperative periods. These problems are summarized below; however, other unexpected problems may also arise. a. Early period problems: HAT, PVT, PNF, bile duct problems, graft rejection, intra-abdominal bleeding, wound infections, and sepsis, anesthesia related complications, and mortality. b. Medium- and long-term problems: primary disease recurrence (autoimmune hepatitis, cancer, alcoholism, etc.) and mortality. 8. Transplant centers can disclose some information regarding the recipient candidate to the living donor only with permission from the recipient candidate: a. The underlying reasons why a transplant candidate may experience adverse outcomes at higher risk. b. All information and personal data obtained during the evaluation of transplant candidates are under protection in compliance with the personal data c. If the recipient does not consent to share his/her information with the donor, the center may refuse the transplant surgery under these circumstances. 9. The information obtained during the evaluation of the living donor, regarding the diseases that are obligatory to be reported, must be shared with the relevant units of the Ministry of Health within the framework of current legislation in effect. 10. The transplant center performing the living donor surgery, a. Is obliged to report the donor information (Living Donor Data Submission Form) to the Ministry of Health, in defined intervals, as stated in the ''Living donor guide''. b. Is responsible that the donor adheres to the post-donation follow-up tests specified in the protocols prepared by the center.

Appendix 1. Cont.

The operating center should:	Elements of informed consent:
	11. If an infectious disease or malignancy is detected during the first 2-year follow-up of the donor (in compliance with the law on the protection of personal data): a. It should be reported to the Department of Organ Transplantation of the Ministry of Health. b. It should be reported to the transplant center of the recipient. 12. A living donor should undergo the medical and psychosocial evaluation outlined in "Living Donor Guide." ("Article 4: Medical evaluation for living donors" and "Article 1: Psychosocial assessment for living donors"). 13. The transplant center may consider the living donor unsuitable for surgery due to medical or psychosocial reasons. In this case, the center is obliged to notify the living donor of this decision. The transplant center can refer the patient to a different center working with different criteria and is responsible for sending the donor-related tests/examinations to the other center. 14. Certain situations may arise where living donor candidates may be exposed to certain risks during medical examinations. These are: a. Contrast-induced allergic reactions b. Discovery of reportable infections 15. Unknown and previously unexpected medical problems may arise during the medical evaluation of the living donor: a. Detection of cancer, unknown viral infections, or previously undiagnosed medical conditions that may preclude being a donor. b. Discovery of adverse genetic findings unknown by the living donor. 16. There are surgical, medical, psychosocial, and financial risks associated with living donation. These risks may be temporary or permanent, and although they are not limited to the following, all of the following are possible: a. Possible medical or surgical risks: i. Death. ii. Pain, fatigue, wound infection, blood clots, pneumonia, nerve injury, and other consequences specific to any surgical procedure. iii. Abdominal symptoms such as bloating, nausea, and the development of intestinal obstruction. iv. Morbidity and mortality may be affected by the age of the living donor, obesity, hypertension, or other donor-specific pre-existing conditions. b. Potential psychosocial risks: i. Issues with body image. ii. Post-operative depression or anxiety. iii. Emotional distress or feelings of grief if the transplant recipient suffers from any recurrent disease or dies. iv. Changes in the lifestyle of the living donor due to donation. c. Possible financial effects: i. Loss of employment or income. ii. Negative impact on the ability to find a job in the future. iii. Adverse impact on the ability to acquire, maintain, or afford health insurance, disability insurance, and life insurance. iv. The future health problems of the living donor following the donation may not be covered by the recipient's insurance.

Living donor blood samples for subtyping must comply with:

1. Before transfusion of red blood cell, testing should be done using the samples
2. Must be drawn in two separate times
3. Must be sent as separate samples

All subtype results reported to the organ and tissue transplantation unit in the Ministry of Health, must be from two separate tests showing the same result. If there are conflicting or ambiguous subtype results, subtype results should not be reported to this unit and living donor transplant compatibility or determination should be based on primary blood type. If a subtype is identified and reported, the living donor surgery center should document that subtyping was performed according to the above requirements.

5.c. Living Donor Blood Type and Sub-type Reporting

Before registering the donor to the organ and tissue transplant system in the ministry of health, the living donor surgery center must report and verify the living donor's blood type as stated below, using the "Living Donor Blood Type Reporting Form":

1. As defined in the protocol of the living donor surgery center, the organ transplant coordinator should report about the blood type to the organ and tissue transplantation unit in the Ministry of Health.

Appendix 2. Additional requirements for informed consent of living liver donors

Transplant center should	Additional elements to the components of informed consent for living liver donors
Explain to all living liver donors	Surgical risks can be temporary or permanent. Although they are not limited to, these risks include the following: • Pain at the incision site in the early postoperative period. • Intra-abdominal bleeding requiring transfusion or reoperation. • Risk of red blood cell transfusion or transfusion of other blood products. • Acute liver failure requiring liver of transplantation. • Transient liver dysfunction with improvement (the probability of temporary liver dysfunction depends on the total amount of liver removed for donation). • Biliary complications, including biliary leakage and biliary stricture (may require additional intervention with interventional radiology or re-operation). • Post-donation laboratory tests may produce abnormal or false-positive results, and this may require additional testing, which involves some risk.

Appendix 3. Recipient outcome and graft survival required data

Transplant center should provide the living donor with	All of the following information should be available
Both the latest national survival results from the Ministry of Health and the center results for transplant recipients and donors specific to the program	• National 1-year patient and transplant survival. • 1-year patient and transplant survival of the center.

2. IAWLD checks the blood type that the organ transplant coordinator in the living donor surgery center has notified to the Ministry of Health.
3. If the blood subtype is used to ensure transplant compatibility or allocation, the organ transplant coordinator (in accordance with the hematology consultation) should notify the blood subtype to the organ and tissue transplant department in the ministry. This report should be verified by IAWLD according to the protocol of the living donor surgery center.
4. Both the organ coordinator and IAWLD, should use all available blood type and subtype source documents to verify the information below:
   a. It includes the blood type and subtype for the donor (if used to ensure transplant compatibility)
   b. Test results of the same blood type and subtype (transplant compatibility) are specified. If results are inconsistent or uncertain, the living donor surgery center should refer to the written protocol as outlined in "Article 5A: Living donor blood type determination."

At the end of the organ transplantation council meeting, the standard council book, developed by the ministry of health and approved by the chief physician of the hospital, involving notes regarding all living donors and recipients, should be signed by the responsible surgeon, anesthesiologist, gastroenterologist, and all of the remaining council members. It should be documented that all required laboratory tests and blood type reports have been reviewed and checked by the council, and it should be recorded that the hospital protocols and above requirements were followed.

Article 6. Verification of Living Donor before Procurement

Living donor surgery centers should develop a written protocol to verify the patients and their data and must comply with them. Living donor surgery centers are obliged to fulfill the standard surgery procedures and verify recipient and donor blood types in line with "Health quality standards."*

*SKS – SON10.01, SAH01, and SAH11. Article Link: https://shgmkalitedb.saglik.gov.tr/Eklenti/38654/0/skshastanesetiv62020revize29082020pdflinkpdf.pdf

Article 7. Packaging, Labeling, and Transporting of Living Donor Organs, Extra Vessels, and Tissue Typing Materials

In instances where any living organ or samples required for tissue typing are required to be sent outside of the operating area, living donor surgery centers should comply with the following rules:

- The packaging material must be inert, impermeable, heat-insulated and resistant to possible situations, in accordance with national and international regulations.
- Organs should be stored in the preservation solution used for final perfusion.
- The innermost container should be sterile and contain sufficient preservation solution to prevent direct contact of the organ with crushed ice.
- Cold stored organs for transplantation should be kept in the temperature range of 0–6°C depending on the characteristics of the organ.

Collection and Storage of Living Donor Extra Vessels

During the living donor hepatectomy, if necessary, extra vessels can be obtained if the donor has signed consent for the removal of extra vessels to be used for the intended recipient. If the vein taken from the living donor does not need to be used (or the unused part), it can be kept in accordance with the written vein and tissue storage protocol of the center, provided that it is used in another recipient if needed, taking into account the matching blood type and serology.

Article 8. Domino and Non-Domino Therapeutic Donors

Although domino and non-domino therapeutic donors are considered living donors, according to the "Living Donor Guide," domino and non-domino therapeutic donors are obliged only with 8A to 8C requirements.

Appendix 4. Requirements for living donor medical evaluations

Assessment must be completed:	Includes determination and evaluation of this information:
General medical history of donor	1. Personal history of major medical conditions including, but not limited to: a. Hypertension b. Diabetes c. Lung disease d. Heart disease e. Gastrointestinal disease f. Autoimmune disease g. Neurological disease h. Genitourinary disease i. Hematological disorders j. Bleeding or clotting disorders k. History of cancer, including melanoma 2. History of infection 3. Use of nephrotoxic and hepatotoxic medication currently or in the past, that is attributed to special attention or use of chronic pain relievers 4. Allergies 5. An assessment for coronary artery disease T
General family history	• Coronary artery disease • Cancer
Social background	• Job • Employment status • Health insurance status • Living arrangements • Social support • Smoking and alcohol and drug use and abuse • Psychiatric illness, depression, and suicide attempts • Risk assessment should be done for acute HIV, HBV and HCV infections
Physical examination	• Size • Weight • BMI • Vital signs (fever, pulse, blood pressure, respiration rate) • Examination of all major organ systems
Assessment must be completed:	**Includes identifying and evaluating information:**
General laboratory and imaging tests	• Complete blood count (CBC) with platelet count • Blood type and subtypes as stated in “Article 5: Evaluation and reporting of living donor blood group” • Prothrombin time or international normalized ratio • Partial thromboplastin time • Metabolic test (including electrolytes, BUN, creatinine, transaminase levels, albumin, calcium, phosphorus, alkaline phosphatase, and bilirubin) • Beta HCG quantitative pregnancy testing for premenopausal woman • Chest X-ray • Electrocardiogram
Infectious disease screening	Infectious disease tests should be done. Tests should include all of the following: 1. Cytomegalovirus antibody 2. Epstein–Barr virus antibody 3. HIV antibody (anti-HIV) test or HIV antigen/antibody (Ag/Ab) combination test as close as possible, but within 28 days prior to organ procurement

Appendix 4. Cont.

Assessment must be completed:	Includes identifying and evaluating information:
	4. HIV ribonucleic acid (RNA) by nucleic acid test (NAT) as close as possible, but within 28 days of organ procurement 5. Hepatitis B surface antigen (HBsAg) test as close as possible, but within 28 days prior to organ procurement 6. Hepatitis B core antibody (total anti-HBc) test as close as possible, but within 28 days prior to organ procurement 7. NAT with HBV deoxyribonucleic acid as close as possible, but within 28 days prior to organ procurement 8. Hepatitis C antibody (anti-HCV) test as close as possible, but within 28 days prior organ procurement 9. NAT with HCV RNA as close as possible, but 28 days prior organ procurement 10. Syphilis test (Detailed history is essential; preferred first laboratory test is ELISA IgG/IgM or the TPHA hemagglutination test can be used. VDRL testing may be used in very urgent situations where these tests are not available.) For tuberculosis (TB), living donor surgery centers must determine if the donor is "suspected" and at "high risk" for this infection. If TB risk is suspected, testing should include screening for covert infections using: • Intradermal PPD • Interferon Gamma Release Test (IGRA)
Cancer screening	Centers performing donor surgery should develop protocols and comply with the cancer screening protocols of the Ministry of Health for the following cancer types: • Cervical cancer • Breast cancer • Prostate cancer • Colon cancer • Lung cancer

Appendix 5. Additional requirements for medical evaluation of living liver donors

Assessment should be completed:	Includes identifying and evaluating information:
Liver-specific family history	• Liver diseases • Bleeding or clotting disorders
General laboratory and imaging tests	• Hospitals must develop and follow a written protocol in which a tendency for thrombosis should be examined and evaluated by a hematologist
Liver specific tests	• Liver function panel • Ceruloplasmin • Iron, iron-binding capacity, ferritin • Alpha-1-antitrypsin level: those with low alpha-1-antitrypsin levels should have the phenotype • If close relatives of transplant recipients for genetic diseases are donors, they should develop and follow a written protocol for testing these patients. • Hospitals should develop and follow a written protocol for autoimmune disease screening. • Hospitals should develop and follow a written protocol for pre-donation liver biopsy.
Anatomical evaluation	A radiological evaluation should be performed to determine whether the liver is anatomically suitable for transplantation and to assess resection safety for the donor. The assessment should include at least all of the following: • Evaluation of predicted graft volume • The remaining volume of the donor • Vascular anatomy • Presence of steatosis

Appendix 6. Conditions that prevent being a live donor

Exclusion criteria for all living donors	Living donor surgery centers may find the donor inappropriate for transplantation according to the medical decision of the hospital, which includes any situation where the donor candidate is not suitable for donation. Living donor surgery centers may find any donors with the below criteria unsuitable for transplant: • If they are not over 18 years of age or not competent • Active malignancy or incompletely treated malignancy • Candidates who have had any cancer treatment before and who have recovered must obtain a medical oncology opinion to become a donor. • High suspicion for any signs of enforcement of the donor for donation • High suspicion of illegal financial exchange between donor and recipient • Evidence of acute symptomatic infection (following the recovery of the acute infection, the donor candidate can be reevaluated with the approval of the infectious disease specialist) • Uncontrolled, diagnosable psychiatric conditions requiring treatment prior to donation (including any evidence of suicide) • Diabetes
Exclusion criteria for living liver donors	Liver living donor surgery centers can find all donors with any of the below additional criteria unsuitable for transplant: • HCV RNA positive • HBsAg positive • ZZ, Z-null, null–null, and S-null alpha-1-antityripsin phenotypes and donors with nontypeable phenotypes • Conditions where it is expected to remain less than 30% of the total liver volume • Previous donation of liver

8. a. Informed Consent Requirements for Domino and Non-Domino Therapeutic Donors

Live donor surgery centers must confirm the following on a certificate, and the donor's signature should be taken on the document:

1. Ready for donation.
2. There are no incentives or pressure.
3. Donor has been informed that the donor can refuse to donate at any point and in time.
4. Received information about treatment options that do not contain organ donation.

Living donor surgery centers should also provide domino donors and non-domino therapeutic donors with all of the following:

1. Statement that the living donor surgery center will take all reasonable precautions to ensure confidentiality of donor and recipient.
2. It was explained that any person acquiring or transferring a human organ, in exchange for cash, property and holidays included, or for anything of value, is committing a crime in accordance with Turkish law.
3. All health information obtained during evaluation for donation is subject to the same regulations and conditions that must be reported to the Ministry of Health authorities might be revealed.
4. When discovering of any infectious disease or any information indicating transmission risk of a potential malignancy to domino or non-domino therapeutic recipient, found within the two years of post-donation care of a domino or non-domino therapeutic donor, the following are explained:
   a. May need to be reported to health ministry officials.
   b. To be disclosed to the recipient's transplant hospital.
   c. It will be reported through the online data system on the organ and tissue transplantation unit in the Ministry of Health.
5. Giving information about treatment options that do not include organ donation.
6. Opportunity to suspend the donor's approval or evaluation process in a protected and confidential manner.

Documentation of informed consent should be kept in the donor's medical record.

Appendix 7. Subtype requirements by first subtype result

If the donor's primary blood type is:	A second subtype must be completed if the first subtype result is
A	Blood type A, non- A_1
AB	Blood type AB, non -A_1B

8. b. Psychosocial and Medical Evaluation Requirements for Domino and Non-Domino Therapeutic Donors

Living donor surgery centers, should evaluate domino and non-domino therapeutic donors with all of the following requirements:

1. An assessment should be done for acute HIV, HBV, and HCV infection risk criteria.
2. A whole domino donor or non-domino therapeutic donor is screened according to "Article 4: Medical evaluation for living donors" and Table 4:
   a. Infectious disease screening
   b. Endemic infectious diseases
   c. Cancer screening
3. Written protocol should be developed and accepted according to Table 6 for domino and non-domino therapeutic donors.
4. Registration and verification of blood group of domino donor or non-domino therapeutic donor in accordance with "Article 5: Evaluation and reporting of living donor blood group."

Documentation of the psychosocial and medical evaluation should be maintained in the donor medical record.

8. c. Reporting and Data Submission Requirements for Domino and Non-Domino Therapeutic Donors

Living donor surgery centers should offer domino and non-domino therapeutic donors a feedback form and "living donor registration forms," in line with data submission requirements. If possible, patients with the same blood type should be transplanted; however, if there is no recipient in the same blood type, transplantation can be made to a compatible donor according to the rules of transfusion.

Article 9. Verification of Living Donor Organ before Transplanting into a Recipient

When the donor's organ enters the recipient's operating room, the identity information and blood types of the donor and recipient should be reconfirmed, signed, and documented. Verification must be performed before transplantation in line with "Article 6, Verification of living donor before procurement."

Article 10. Reporting

Transplant centers are responsible for providing living donor data submission requirements.