# Evaluation of the Living Kidney Donor – a Consensus Document from the AST/ASTS/NATCO/UNOS Joint Societies Work Group

On June 16, 2006, the Health Resources and Services Administration (HRSA) published a notice in the Federal Register in which the Secretary of Health and Human Services directed the Organ Procurement and Transplant Network (OPTN) to develop policies regarding living organ donors and organ donor recipients. The notice stipulated that noncompliance with such policies will subject OPTN members to the same consequences as noncompliance with OPTN policies regarding deceased donor transplantation. In response, the Board of Directors of the OPTN adopted changes to the Bylaws requiring transplant programs that perform living donor transplants to develop and follow written protocols that address all phases of the living donation process, including the evaluation, pre-operative, operative, and post-operative care, as well as the submission of data (Federal Register volume 71).

To assist the Living Donor Committee of the United Network for Organ Sharing (UNOS) in developing policy and bylaws that govern Living Donor Kidney Transplant Programs, a Joint Societies Steering Committee composed of representatives of the American Society of Transplantation (AST); the American Society of Transplant Surgeons (ASTS); the Organization for Transplant Professionals (NATCO); and UNOS was established by HRSA and the OPTN contractor on April 9, 2010 in Rockville, MD (attachment). This Steering Committee met to discuss and develop a new process for incorporating clinical input into developing OPTN/UNOS policies with the potential to direct or prescribe

medical care. The need for such a process had been identified during the course of OPTN/UNOS attempts to develop policies that are more specific and detailed regarding OPTN/UNOS member requirements in the area of living donor protections. During the discussion, it was noted that early involvement of the societies in the OPTN/UNOS policy development process, for the purpose of identifying the appropriate medical requirements and the appropriate level of specificity of such requirements, would be an important advance.

Therefore, the Steering Committee formed a Joint Societies Work Group (JSWG) consisting of appointed members of the represented Societies on June 30, 2010. These individuals were:

1. AST: Robert S. Gaston, MD; Didier A. Mandelbrot, MD; Robert W. Steiner, MD
2. ASTS: Stuart M. Flechner, MD; Joe Leventhal, MD; Lloyd Ratner, MD
3. NATCO: Catherine Garvey RN CCTC; Patricia McDonough RN CCTC
4. OPTN/UNOS: Matthew Cooper, MD; Christie Thomas, MD; Cynthia Forland, PhD

The charge to the JSWG was to *"…provide recommendations to OPTN/UNOS regarding appropriate requirements for the medical evaluation (including psycho-social evaluation) and informed consent of potential living kidney donors as well as post-donation follow-up and data submission."*

In order to accomplish the charge of the JWSG three documents were created, which represent the consensus reached by all members of the JSWG. These include (1) a

Guidance document for Informed Consent of Living Kidney Donors; (2) a position paper on the Medical and Psychosocial Evaluation of the Living Kidney Donor; and (3) recommendations for Donor Follow-up and Data Submission.

The JSWG believes that living kidney donor transplantation is an essential part of kidney transplant practice, and that this activity can only go forward if potential donors have full faith and confidence that their transplant professionals and transplant centers are looking out for their best interests and well being. To provide this degree of confidence the JSWG believes these guidelines represent the best available information for transplant centers to help potential donors make the decision to donate in an informed fashion, and to maximize donor safety. Although live donor transplantation in the United States commenced in the 1960's, it is understood that precise accurate information on long-term donor follow-up beyond 30-40 years is not known. The formal acquisition of detailed long-term follow-up information on donor outcomes may require extramural organization and financial support, and should not be considered an essential component of transplant center compliance.

Live donor kidney transplantation will always be a balance between utility for the recipient and safety for the donor. Therefore, the JSWG consensus has recommended that transplant centers use caution when considering borderline characteristics for young donors. In addition, The JSWG appreciates that there may be alternative choices to reach similar conclusions, and has attempted to point out these alternatives when appropriate. Lastly, the JSWG believes these Guidelines represent a living document for

which changes may be necessary over time as new information on living kidney donation becomes available.

## II. MEDICAL AND PSYCHOSOCIAL EVALUATION OF THE LIVING KIDNEY DONOR

### Pre-evaluation Guidance

While it must be recognized that each potential donor is unique, and no single evaluation protocol is applicable to all living donors, the potential living donor should be informed about all phases of the transplant center's evaluation protocol. The donor evaluation includes psychosocial and medical components. These evaluations should help determine if an individual is a suitable donor. The psychosocial evaluation should determine the presence of psychosocial risks and/or contraindications to donation. The medical evaluation may uncover conditions that could significantly increase the risk of donation to the potential donor. However a normal medical evaluation cannot accurately predict future risk of ESRD, especially in a very young donor. The evaluation should also screen for diseases that the donor could transmit to the potential recipient, particularly in the presence of immunosuppression. Lastly, this evaluation should define the anatomy of the potential organ so the surgical team can assess the anatomical suitability of the organ and properly plan the surgery.

To the extent possible, the potential donor and the intended recipient should be made aware of the alternatives to living donor transplantation prior to beginning the donor evaluation. Both the potential donor and intended recipient should be informed of the donor and recipient outcomes of living donor transplantation nationally and at the OPTN member institution where donor nephrectomy and living donor transplants will be performed.

It is important to receive informed consent from the potential donor, for evaluation, and to inform the potential donor that he/she can stop the evaluation or donation process at any time. If a potential donor chooses to not proceed with the evaluation or donation process, the center may state that the donor did not meet the program's criteria for donation to help avoid difficult social situations.

### Evaluation of the Living Donor

This document presents a list of tests and procedures that should be considered to assess the medical and psychosocial suitability of the donor. To date, there have been no randomized controlled trials to determine the testing required for the evaluation of living kidney donors. The process described here represents the consensus of representatives from the AST, ASTS, NATCO and UNOS and sets minimum standards for the assessment of living donors at U.S. transplant programs.

The tests and procedures will require periodic review as improved screening tests and more information about the results of donor testing and follow-up become available.

**A. Psychosocial Evaluation of the Living Donor**

This evaluation must be performed by a psychiatrist, psychologist or social worker with experience in transplantation. The psychosocial evaluation should, at a minimum:

- Review psychosocial (including mental health) issues that might complicate the living donor's recovery and identify potential risks for poor psychosocial outcome;

- Assess for the presence of high-risk behaviors, as defined by the Center for Disease Control (CDC), in the donor that have the potential to increase the risk of viral transmission to the recipient. These behaviors include but are not limited to: male-to-male sex within the last 5 years; nonmedical intravenous, intramuscular, or subcutaneous injection of drugs in the last 5 years; sex in exchange for money or drugs in the last 5 years; unprotected sex with multiple partners in the last 12 months; sex with a person known or suspected to have HIV infection; exposure in the last 12 months to known or suspected HIV-infected blood through percutaneous inoculation or through contact with an open wound, non-intact skin, or mucous membrane; and current or past incarceration in a correctional facility.

- Assess history of substance use, abuse, and dependency and provide intervention (i.e., referral, treatment) as appropriate;

- Attempt to identify factors that warrant educational or therapeutic intervention prior to final donation decision and provide the necessary referrals for further psychological or psychiatric evaluation and treatment if current or prior psychiatric disorders are suspected;

- Determine if the potential donor understands the short and long-term medical and psychosocial risks associated with living donation, for both donor and recipient, as currently understood with the information available;

- Allow the transplant program to explore the reason(s) for volunteering to donate, to determine that the decision is free of inducement or coercion and other undue pressure;

- Assess the potential donor's ability to make an informed decision and the ability to cope with the major surgery and related stress. This includes a

realistic plan for donation and recovery, with social, emotional and financial support available as recommended;

- Review the financial circumstances of the potential donor (employment, insurance coverage, etc) and determine if the potential donor understands the possible financial implications of living donation and the availability of financial resources where applicable;

- Inform the donor that he/she may experience problems in obtaining future or maintaining current disability, health, and life insurance following donation; and

- Inform the donor that health information obtained during their evaluation will be subject to the same regulations as regular medical records and may not be additionally protected.

## B. Medical Evaluation of the Living Donor

The medical evaluation must be performed by a physician or surgeon experienced in living donation. The goal of the medical evaluation is to:

- Assess the immunologic compatibility of the donor to the recipient;
- Assess the general health and surgical risk of the donor including screening for conditions that may predict complications from having one kidney in the future;
- Determine if there are diseases present that may be transmitted from donor to recipient; and
- Assess the anatomy and function of the kidneys.

**The Medical Evaluation should include the following components**

### 1. General History:

- Evaluate for significant medical conditions such as hypertension, diabetes, genetic renal diseases, lung disease, heart disease, gastrointestinal disease, autoimmune disease, neurologic disease, genitourinary disease, hematologic disorders, bleeding or clotting disorders, history of cancer and history of infections.

    - Kidney Specific Personal History:
      Kidney disease, proteinuria, hematuria
      Kidney injury
      Diabetes including gestational diabetes

Nephrolithiasis
Recurrent urinary tract infections

- Active and past medications (nephrotoxic, chronic use of pain medications and NSAIDS, other)
- Allergies

2. **Family history of coronary artery disease and cancer**

   - Kidney Specific Family History:
     Kidney disease
     Diabetes
     Hypertension
     Kidney Cancer

3. **Social History:**

The medical evaluation should place special emphasis on:

- Employment, health insurance status, living arrangements, social stability
- Smoking, alcohol and drug use/abuse and other high risk behavior
- Psychiatric illness, depression, suicide attempts

4. **Physical Exam:**

- Height, weight, BMI
- Examination of all major organ systems
- Blood pressure must be taken on at least two different occasions. It may however be preferable to perform a 24-hour blood pressure monitor as cohort studies show improved accuracy for determining the correct blood pressure category with 24-hour monitoring (**see appendix I).**

5. **General Laboratory Tests**:

- CBC with platelet count
- Prothrombin Time/Partial Thromboplastin Time
- Metabolic panel (electrolytes, BUN, creatinine, transaminase levels, albumin, calcium, phosphorus, alkaline phosphatase, bilirubin)
- HCG quantitative pregnancy test for women < 55 years old
- Chest X-Ray
- Electrocardiogram (ECG)
- Evaluation for coronary artery disease, as suggested by the American College of Physicians

- Pulmonary function tests for selected smokers, as suggested by the American College of Anesthesiology and American Lung Association

6. **Kidney-Specific Tests:**

- Urinalysis; Urine microscopy
- Urine culture if clinically indicated
- Measurement of urinary protein and albumin excretion. A random protein creatinine ratio and/or an albumin creatinine ratio is sufficient as a screening test for proteinuria and albuminuria. Urine albumin excretion as reported over time or per gram creatinine is the most reliable measurement for future kidney and cardiovascular disease risk. If values are borderline then a repeat screen or a 24-hour urine should be performed **(see appendix II)**
- Measurement of creatinine clearance or glomerular filtration rate by 24-hour urine collection or isotopic methods. Estimation equations to assess GFR is inadequate in candidates with normal or near normal renal function. If measured creatinine clearance close to the minimum acceptable age and gender specific value, a repeat measurement should be considered **(see appendix III)**
- Screening for Polycystic Kidney Disease or other inherited renal disease as guided by family history
- Patients with a history of nephrolithiasis or renal stones identified on radiographic imaging should have a 24 hr urine stone panel including calcium, oxalate, uric acid, citric acid, creatinine and sodium **(see appendix IV)**
- GTT and/or HgA1C in first degree relatives of diabetics and in at risk groups as defined by the ADA **(see appendix V)**

7. **Immunological testing:**

- ABO blood group typing
- Human Leukocyte Antigen (HLA) typing
- Donor Recipient Cross Match

8. **Metabolic Focused Testing:**

- Fasting blood glucose **(see appendix V)**
- Fasting cholesterol levels (Cholesterol, Triglycerides, HDL Cholesterol, and LDL Cholesterol) with Fasting Lipid Profile if cholesterol/triglycerides are elevated.

If the risk of diabetes is higher than the general population by virtue of family history, or the presence of some elements of the metabolic syndrome* the

prospective donor should be counseled that he or she is at an increased risk to develop diabetes and perhaps kidney disease and that this is a modifiable risk factor.

*Elements of the metabolic syndrome

Central obesity (BMI or abdominal circumference criteria),
BP >130/85
Fasting blood glucose ≥ 100mg/dl,
Fasting triglyceride levels > 150mg/dl,
HDL < 40 for a man and <50mg/dl for a woman.

**9. <u>Anatomic Assessment:</u>**

This assessment is used to determine whether the kidneys are of equal size or have masses, cysts, or stones or other anatomical defects and to determine which kidney is more anatomically suitable for transplantation. The radiologic imaging may reveal serendipitous findings that may need to be investigated. These findings may be related, or unrelated to the organ of interest.

- The test of choice will depend upon the local radiological expertise and surgical preference, but may include CT angiogram or MR angiogram.

**10. <u>Screening for transmissible diseases:</u>**

This screening is used to identify the risk of passing an infection or disease to a recipient. This screening may also identify a condition that may require donor treatment or may increase the risk of donation. Infectious disease testing typically should include the following:

- CMV (Cytomegalovirus) Antibody
- EBV (Epstein Barr Virus) Antibody
- HIV 1,2 (Human Immunodeficiency Virus)
- HepBsAg (Hepatitis B surface antigen)
- HepBcAB (Hepatitis B core antibody)
- HepBsAB (Hepatitis B surface antibody)
- HCV (Hepatitis C Virus)
- RPR (Rapid Plasma Reagin Test for Syphilis)
- Screening for Tuberculosis

Screening for transmissible diseases may need to be repeated if there is significant delay between evaluation and the eventual donor nephrectomy, especially in donors who meet CDC high-risk criteria. Transplant centers should consider additional testing based on donor risk profile such as:

- Strongyloides for donors from endemic areas
- Trypanosoma cruzi for donors from endemic areas
- West Nile for endemic areas
- Toxoplasmosis: Transmission is low if recipients are treated with trimethoprim-sulfamethoxazole

**11. <u>Cancer screening</u>:**

Age and gender appropriate cancer screening tests.
The screening tests follow the practices advised by the American Cancer Society. Screenings to be performed depending upon gender, age, or family history include:

- Cervical Cancer
- Breast Cancer
- Prostate Cancer
- Colon Cancer
- Skin Cancer

Lung cancer screening is not currently recommended by the American Cancer Society, but could be considered in the older patient with a strong smoking history.

The transplant program should verify that the donor has completed the screening recommendations from the American Cancer Society or from a relevant specialty society.

**EXCLUSION CRITERIA**

**Donor candidates with a history of certain conditions, or a donor candidate whose donor evaluation tests identify a condition or issues that may be unsuitable as a donor. Some of these conditions include:**

**Absolute**

- Age < 18 years (except in special circumstances as outlined by the American Academy of Pediatrics)
- Mentally incapable of making an informed decision
- Hypertension
  - Uncontrollable hypertension,
  - History of hypertension with evidence of end organ damage
- Diabetes **(see appendix V)**
- Active malignancy, or incompletely treated malignancy
- Evidence of donor coercion

- Evidence of NOTA violation (illegal financial exchange between donor and recipient)
- Persistent infections or infections with drug resistant organisms
- Untreated psychiatric conditions, including suicide risk

**Relative**

- Hypertension in a Caucasian younger than age 50 **(see appendix I)**
- Hypertension in a Caucasian greater than age 50 on more than one anti-hypertensive medication **(see appendix I)**
- Hypertension in a non-Caucasian at any age **(see appendix I)**
- Impaired fasting glucose with other features of the metabolic syndrome (low HDL and high triglycerides) in a < 50 year old **(see appendix V)**
- Significant history of thrombosis or embolism
- Bleeding disorders
- BMI > 35
- Clinically significant cardiovascular disease
- Clinically significant pulmonary disease
- Microalbuminuria > 30 mg per day **(see appendix II)**
- Proteinuria (protein in the urine) > 300 mg/24 hours, excluding postural proteinuria **(see appendix II)**
- Creatinine clearance or isotopic GFR within 1 standard deviations for age and gender **(see appendix III)**
- History of cancer, including metastatic.
- History of nephrolithiasis **(see appendix IV)**
- Untreated or active substance abuse
- Lack of or insufficient family, caregiver, social, and/or economic support
- Strained donor/recipient relationship

The impact of the above co-morbidities on the donor's future health is dependent upon age of onset, gender, access to healthcare, ethnicity, and family history as well as other criteria. An aggregate of relative contraindications in a given individual may also preclude donation.

## Appendices to the Medical Evaluation

## Considerations for Relative Contraindications to Living Donation:

### Appendix I: Hypertension

Hypertension is a risk factor for chronic kidney disease (CKD) and cardiovascular disease (CVD) with the risk of CVD in an adult beginning at 115/75 mm Hg. The risk of CKD and CVD is increased in individuals from certain racial backgrounds or ethnic groups and in those with elements of the metabolic syndrome. The risk of developing hypertension in a normotensive kidney donor is greater with black and Hispanic donors compared to Caucasians.

The definitions of hypertension are dynamic; donors should be normotensive at donation. Blood pressure can be measured either in the office setting after a period of rest with an appropriate sized cuff on at least 2 occasions, or by ambulatory blood pressure monitoring (ABPM). JNC7 defines hypertension as Systolic BP > 140 mm and/or Diastolic BP > 90 mm Hg or an average daytime blood pressure > 135/85 on ABPM. ABPM should be considered in donor candidates who appear to have white coat hypertension.

Candidates with uncontrollable hypertension or evidence of end organ damage (proteinuria, left ventricular hypertrophy or retinopathy) should not proceed to living kidney donation. Caucasian hypertensive donor candidates younger than age 50 and non-Caucasian donors at any age with hypertension have a greater lifetime risk of ESRD and may not be suitable candidates for unilateral nephrectomy. The risk of ESRD in Caucasians greater than age 50 whose hypertension is easily controlled on a single medication is less certain and with careful evaluation for other risk factors such as the metabolic syndrome and with adequate counseling of the risks, may be permitted to proceed to living donation.

**Appendix II: Proteinuria**

Proteinuria and specifically albuminuria are sensitive indicators of early kidney damage. Non-postural albuminuria and non-postural proteinuria are known predictive risk factors for the development of chronic kidney disease (CKD) and future cardiovascular disease. The risk of CKD is greater as the degree of proteinuria increases. The most reliable way to measure urinary protein or albumin is by a timed urine collection with the albumin excretion rate reported per unit time or per gram of creatinine. Microalbuminuria is defined as urine albumin excretion > 30 mg < 300 mg/day in both men and women or > 17 < 250 mg/gm creatinine in men and > 25 < 355 mg /gm creatinine in women. Clinical proteinuria is defined as protein excretion > 300 mg/day in both men and women or > 250 mg/gm creatinine in men and > 355 mg /gm creatinine in women. Living kidney donor candidates with microalbuminuria or clinical proteinuria should be considered to be at increased risk of future kidney disease and may not be suitable candidates for unilateral nephrectomy.

**Appendix III: Glomerular Filtration Rate (GFR)**

The evaluation of kidney function in potential donors is important for the safety of both the donor and the recipient. Ideally, kidney function should be assessed with a technique, which directly measures GFR using inulin, an iodinated tracer or a radioactive tracer. However, these techniques are not widely available, and a 24-hour urine collection to calculate creatinine clearance is an acceptable alternative. The adequacy of the 24-hour collection should be confirmed by assessing whether it contains 20-25 mg creatinine/kg body weight for men and 15-20mg/kg for women. The use of a serum creatinine alone, even if converted to an estimated GFR using one of the currently available formulas, is not sufficient.

Kidney function is evaluated in potential donors to identify those with established kidney disease and/or an increased risk of developing ESRD. Kidney function usually declines with aging, so cut-offs to accept a donor should vary based on age. An example of mean normalized GFR by age is shown in Table 1. Note that creatinine clearance overestimates GFR, so the mean values of creatinine clearance by age would typically be 10-20% higher than in Table 1. Different studies have also reported somewhat different mean values by age because they included fewer or more subjects with medical problems. Table 2 shows the range of mean GFR by age found in two large, recent studies of kidney donors. The age dependence of kidney function is important because normal losses with ageing may produce unacceptably low kidney function in later life at a much higher predonation GFR in a young donor than in an old donor. For example, a GFR of 85 ml/min/1.73m$^2$ would be of less concern for a 60 year old man, since that value is above average for that age and there is less remaining lifetime for GFR to decline. In contrast, the same GFR of 85 approaches two standard deviations below the mean in a 25-year-old donor. Such low GFRs also decrease renal reserve if new onset CKD develops during the next 50 years. Therefore, it is recommended that potential donors have measured GFR (ml/min/1.73m2) $\geq$ the value that is one standard deviation below the mean for the donor's age. If measuring creatinine clearance, the acceptable values will be somewhat higher.

Older potential donors with a GFR one standard deviation below the mean have relatively low absolute GFR, so consideration of whether the recipient would receive sufficient kidney mass becomes increasingly important with older donors. For example, a 60 year old donor with GFR of 65 has a low risk of developing kidney disease, but may not have sufficient kidney function to donate to a 30 year old recipient.

While the donor evaluation focuses on identifying those with kidney function that is too low to donate, excessively high kidney function (for example a value higher than the mean for age/gender plus one SD) make reflect early diabetic nephropathy, so urine albumin and serum glucose should be completely normal in these candidates.

**Table 1. Measured GFR in Healthy Adult Males According to Age**

| Age of Men | Mean GFR (mL/min/1.73m2) | SD | Mean minus SD |
|---|---|---|---|
| 20-29 | 128 | 26 | 102 |
| 30-39 | 116 | 23 | 93 |
| 40-49 | 105 | 21 | 84 |
| 50-59 | 93 | 19 | 74 |
| 60-69 | 81 | 16 | 65 |
| 70-79 | 70 | 14 | 56 |

Modified from Davies DF and Shock NW, 1950.

**Table 2. Measured GFR Ranges in Over 1300 Actual Donors (both men and women) According to Age Reported in 2004 and 2009**

| Age (years) | Mean measured GFR ranges expressed as cc/minute/1.73m2 | |
|---|---|---|
| 20 | 111 | 116 |
| 25 | 109 | 114 |
| 30 | 107 | 113 |
| 35 | 104 | 111 |
| 40 | 102 | 109 |
| 45 | 99 | 107 |
| 50 | 97 | 101 |
| 55 | 93 | 96 |
| 60 | 88 | 92 |
| 65 | - | 89 |
| 70 | - | 87 |

Modified from Rule et al 2004 and Poggio et al 2009.

**Appendix IV: Stone Disease**

Urinary tract stones (nephrolithiases) may complicate the decision to accept a candidate who may otherwise be a suitable renal donor. Currently, the widespread use of CT scans for donor evaluation may detect very small calcifications in the kidneys of patients that are asymptomatic and have never passed a kidney stone. Very small 1-2mm calcifications in the renal papillae found on CT scans, referred to as Randall's plaques, can be of no consequence, or may be the nidus of future stones. The most common type of kidney stone is calcium oxalate. A patient that develops a symptomatic calcium oxalate stone has a 50% chance of developing a recurrent stone.

The following should be considered exclusion criteria for potential donors with nephrolithiases:

- Patients that develop frequent calcium oxalate stones
- Patients that have metabolic stone disease such as cystinuria, oxaluria, uricosuria, renal tubular acidosis, metabolic acidosis, sarcoid, etc.
- Patients with an anatomic defect that leads to infection (struvite) stones
- Asymptomatic patients with multiple stones in one kidney or bilateral kidney stones detected on radiographic imaging
- Patients with enteric hyperoxaluria and recurrent stones after intestinal bypass procedures or inflammatory bowel disease

An asymptomatic potential donor with history of a single stone may be suitable for kidney donation in the absence of any exclusion criteria.

An asymptomatic potential donor may be suitable for kidney donation if a solitary stone is present:

- The kidney with the stone should be removed, leaving the donor stone free
- The current stone is <1.5 cm in size, and/or potentially removable during the transplant procedure

**Appendix V: Diabetes and Prediabetes**

Type 2 diabetes mellitus is becoming increasingly prevalent in the United States and one of its' important complications is the development of chronic progressive kidney disease. Prediabetes represents an intermediate category of hyperglycemia, which poses a significant risk of future type 2 diabetes mellitus, and cardiovascular disease. Important risk factors for prediabetes and diabetes include increasing age, high risk ethnicity or race, obesity, and history of diabetes in a 1st degree relative. Without active intervention, 6 to 23% of pre-diabetics progress to diabetes within 1 year. The younger the individual with risk factors for prediabetes, the higher the likelihood that diabetes and subsequent kidney disease will occur in that person's remaining lifetime.

The criteria for the diagnosis of prediabetes and diabetes are given in table 1. Prediabetes includes individuals with impaired fasting glucose (IFG), impaired glucose tolerance (IGT) or those with HgA1C between 5.7 and 6.4%. All potential donor candidates should be screened at a minimum with a fasting plasma glucose. Since no single test will identify all individuals who have prediabetes, consideration should be given to screening the highest risk groups with an oral glucose tolerance test (OGTT) and a HgA1C.

While prediabetes can be diagnosed with well-defined criteria and once established, the progression to diabetes can be substantially reduced with lifestyle changes and medications, it is not clearly known whether lifestyle modifications can prevent the onset of prediabetes. Candidates with prediabetes should be considered to be at increased risk of future kidney disease and may not be suitable candidates for kidney donation. Younger living kidney donor candidates who have normal measures of glycemia (blood glucose, HgA1C) but have multiple risk factors for future diabetes should be counseled about the possible future risk of diabetes before proceeding to living donation.

Table 1—Criteria for diagnosis of prediabetes and diabetes

| | Prediabetes* | Diabetes |
|---|---|---|
| Fasting plasma glucose (mg/dl) | 100 to 125 (IFG) | ≥126 |
| 2 hr plasma glucose (75 g ) load (mg/dl) | 140 to 199 (IGT) | ≥ 200 |
| Glycohemoglobin HgA1C | 5.7–6.4% | ≥ 6.5% |
| *For all three tests, risk of future diabetes is continuous, beginning below the lower limit of the range and becoming disproportionately greater at the higher end of the range. | | |

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