



**YNHTC**

Yale New Haven Transplantation Center

**YALE-NEW HAVEN  
HOSPITAL**

# Pre-Liver Transplant Evaluation

**Michael L. Schilsky, MD, FAASLD**

Medical Director, Adult Liver Transplant

Yale New Haven Transplantation Center

Division of Digestive Diseases

Section of Transplantation and Immunology

Departments of Medicine and Surgery

Yale University School of Medicine

# Disclosures

- Grant support: Alexion, GMPO (Orphalan), Vivet Therapeutics, Wilson Disease Association
- Chair, Medical Advisory Committee Wilson Disease Association
- No conflicts with any of the material presented today

# Learning Objectives

- Understand when to refer for a liver transplant evaluation
- Indications and contraindications to liver transplantation
- Learn about some center specific policies for evaluation of patients with alcoholic hepatitis
- Understand rules for simultaneous liver kidney evaluation

# General Criteria for Liver Transplant

- **Diminished life expectancy due end stage liver disease or acute liver failure**
- The ability to function normally and productively has been severely impaired by their liver disease.
- No medical contraindication that would preclude a satisfactory outcome or present an impediment to rehabilitation
- Psychological assessment, social arrangement, and family support suggest patient will participate in their recovery and adhere to the post-transplant medical regimen.
- The patient has no **active** alcohol or substance abuse history.
- The patient has a diagnosis meeting criteria for liver transplantation, severity of illness meeting minimum listing criteria and does not have any absolute contraindications to transplant – “suitability”.

# Indications for Liver Transplantation

- End stage liver disease
- Acute liver failure
- Metabolic disorders
- Hepatocellular carcinoma
- Other tumors – carcinoid, hemangioendothelioma
- Hepatopulmonary syndrome
- Portopulmonary syndrome

# Contraindications to Transplantation

- Active infections
- Cancer
- Active substance abuse
- Inability to cooperate with health care team
- Cardiopulmonary disease contraindicating surgery
- AIDS but not HIV
- What about BMI? Age?

# Etiologies – End Stage Liver Disease

- Viral hepatitis – B, C, D
- Autoimmune – AIH, PSC, PBC
- Metabolic – NASH, Alpha one antitrypsin, Wilson disease, Hemochromatosis, Amyloidosis, Glycogen storage disease, Tyrosinemia, familial hypercholesterolemia
- Drug or toxin induced liver injury
- Biliary cirrhosis – secondary
- Vascular – Budd Chiari

# Etiologies – Acute Liver Failure

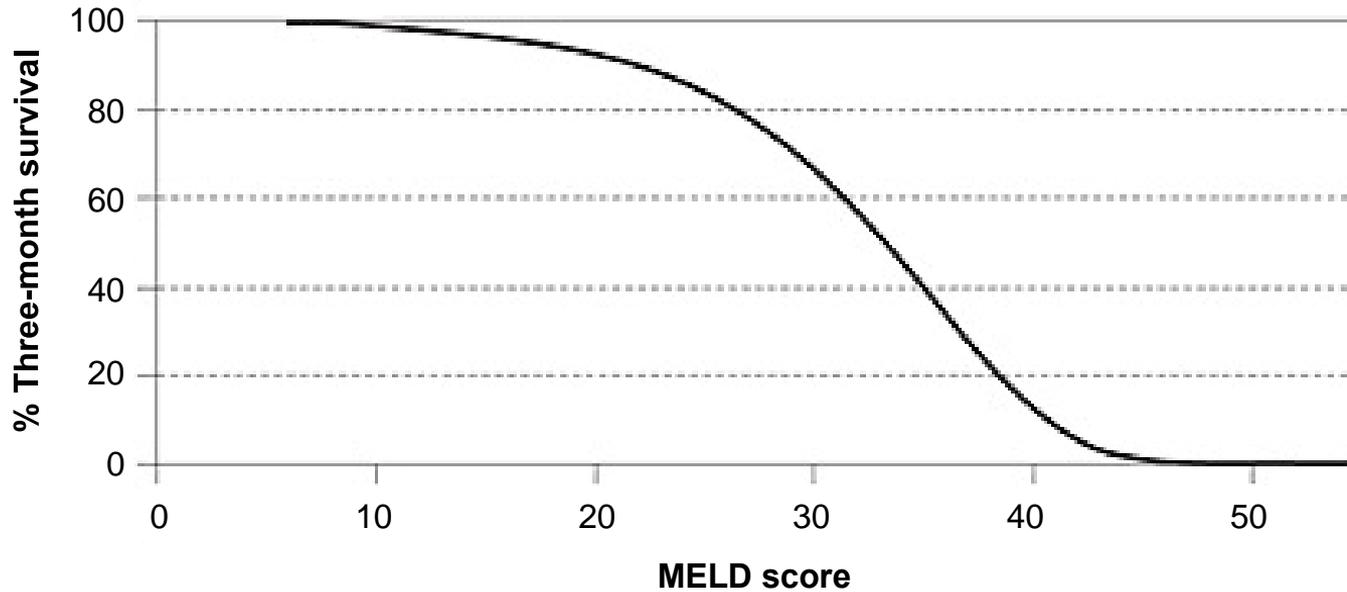
- Drug induced liver injury
- Viral hepatitis – A, B, E
- Metabolic disease – Wilson disease
- Autoimmune
- Vascular – shock, Budd Chiari
- Idiopathic

# Criteria for Patients With HIV

- Inclusion
- CD4 cell count > 200 cells/ml (kidney)
- CD4 cell count > 100 cells/ml (liver)
- HIV viral load < 48 copies/ml
- History of medical compliance
- Exclusion
- Active opportunistic infection
- History of PML
- History of any neoplasm except hepatocellular carcinoma

# How Do We Predict Diminished Life Expectancy? Triggers for Evaluation for Liver Transplant

- New onset ascites
- SBP
- Hepatorenal
- Child-Turcotte Pugh score
- MELD



Note:  $MELD\ score = 9.57 \times \log_e \text{ creatinine } mg\ per\ dL + 3.78 \times \log_e \text{ bilirubin } mg\ per\ dL + 11.20 \times \log_e \text{ INR} + 6.43$  (constant for liver disease etiology: 0 = cholestatic or alcoholic; 1 = all other).

# MELD Calculator

[Home](#) » [Resources](#) » [Allocation Calculators](#) » MELD Calculator

## Patient Safety

### Allocation Calculators

[CPRA Calculator](#)

[EPTS Calculator](#)

[KDPI Calculator](#)

[LAS Calculator](#)

**[MELD Calculator](#)**

[PELD Calculator](#)

## By Organ

[Kidney & Pancreas](#)

[Liver & Intestine](#)

[Heart & Lung](#)

[Vascular Composite Allograft](#)

## Organ Transport

## Living Donation

To determine your MELD score, please complete the form below.

- i** This calculator is recommended for ages 12 and older.
- i** All fields are required.

Date of Birth(mmm/dd/yyyy)



Bilirubin(mg/dl)

Serum Sodium(mEq/L)

INR

Serum Creatinine(mg/dl)

Had dialysis twice, or 24 hours of CWHD, within a week prior to the serum creatinine test?

Yes  No

Note: Creatinine will default to 4 mg/dl with a positive response.

[Reset](#)

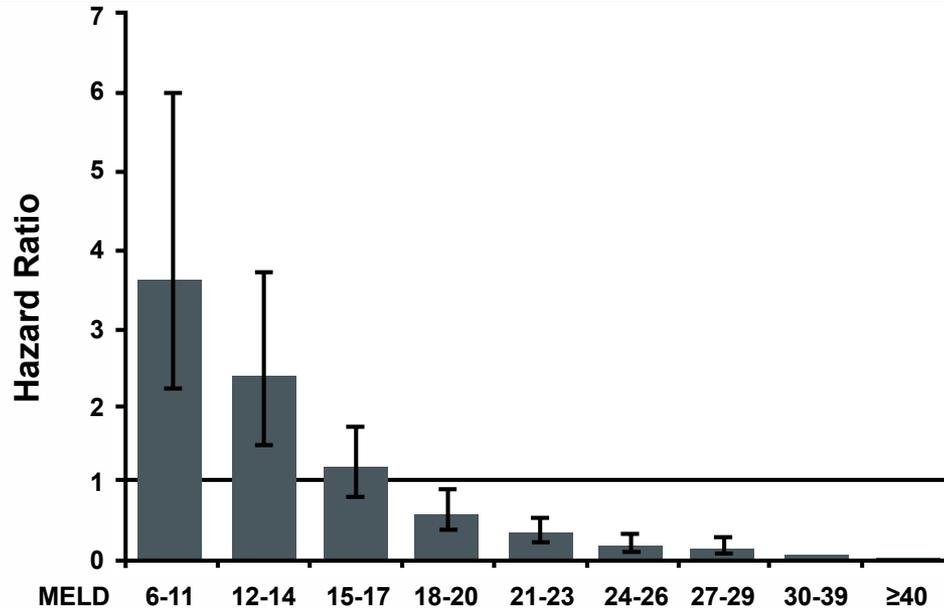
Calculate

## About MELD And PELD

The MELD and PELD calculators are used for liver allocation in the OPTN match system.

[Learn more](#)

# Concept of “Transplant Benefit”



|              |         |         |      |        |         |         |         |         |         |
|--------------|---------|---------|------|--------|---------|---------|---------|---------|---------|
| Hazard Ratio | 3.64    | 2.35    | 1.21 | 0.62   | 0.38    | 0.22    | 0.18    | 0.07    | 0.04    |
| p values     | < 0.001 | < 0.001 | 0.41 | < 0.01 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |

# What Constitutes an Evaluation?

## Initial Evaluation

- Transplant Hepatology/Coordinator
- Social Work/Transplant psychiatry
- Dietician
- Pharmacist
- Obtain labs for MELD, liver disease diagnostics and infectious exposures

# What Constitutes an Evaluation?

## Initial Evaluation – Next Phase

- Consultations: Cardiology, Infectious disease, Transplant Surgery, Anesthesia
- Echocardiography (with contrast study)
- Stress test/CTA/Cath – LH, possible RH
- PFT's
- Dynamic imaging liver

## In Evaluation, We Must Consider Pathways to Obtain Donor Organs for Each Potential Recipient

- Cadaveric – Brain death, Cardiac death
- Cadaveric – Split liver graft
- Marginal or Extended Criteria Donor
- Expedited placement of a donor organ
- Living donor

# Patient Care Map for Liver Transplant

## Pre-Transplant

## Transplant

## Post-Transplant



- Evaluations
- Wait list management

- Surgery
- Post-Op Care

- Life-long follow up
- Complication management

Outpatient

Outpatient/Inpatient

Inpatient

Inpatient/Outpatient

Outpatient

Pre liver transplant clinics  
Liver inpatient Service  
MICU

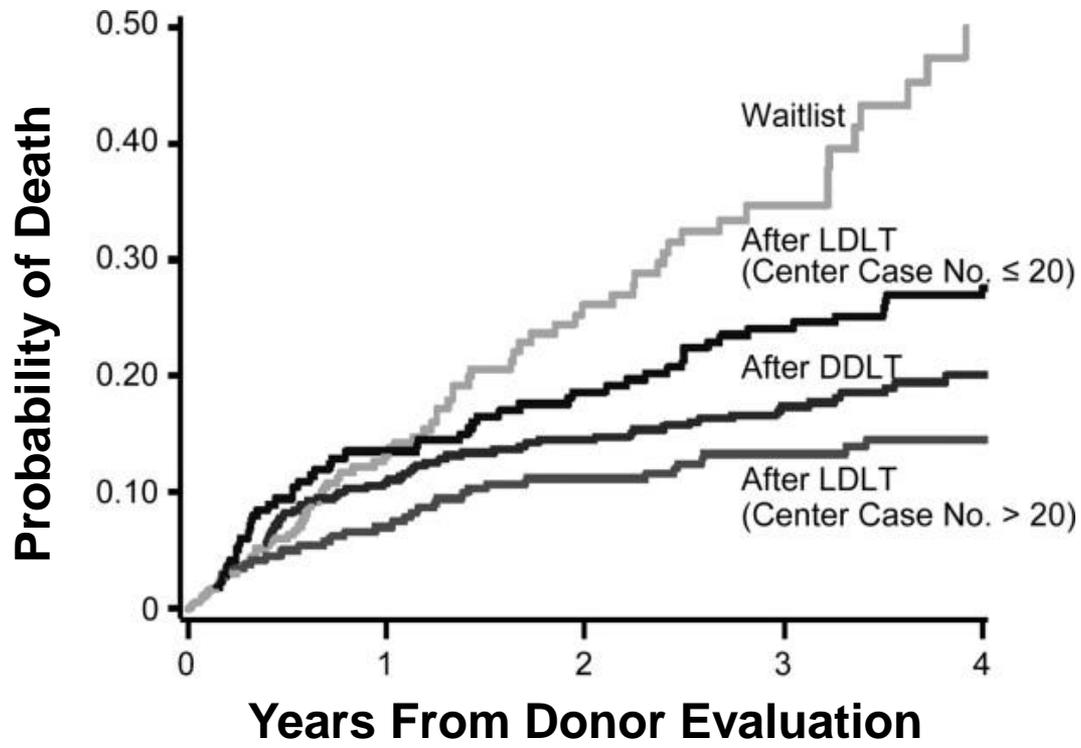
SICU  
Post liver transplant service  
Post liver transplant clinics

# Living Donor Liver Transplantation

- Patient must meet listing criteria and be listed for transplant and give their permission for donors to be evaluated
- Donor confidentiality maintained throughout the process

# Living Donor Liver Transplant – Principles

- Need donor size that yields adequate donor graft to recipient body weight ratio – safety zone ~ 0.8% for recipient (favors right lobe)
- Need to leave adequate liver volume for donor – safety zone > 30-40%
- Anatomically favorable vascular and biliary anatomy
- No liver disease



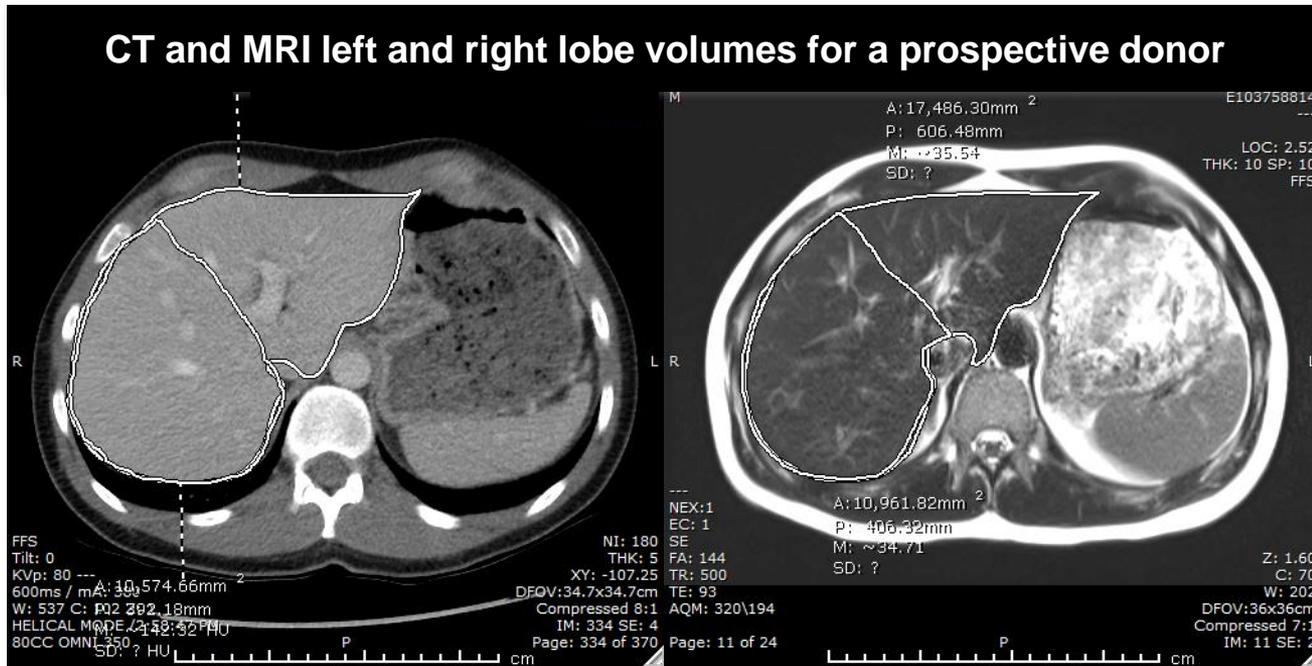
# Statistics on LDLT From A2ALL

- Only 45% of potential donors end up donating
- Almost all donors have genetic or emotional relationship to the recipient
- Biliary complications 22%, vascular complications 9.8%

# Limitations of Living Donor Transplantation

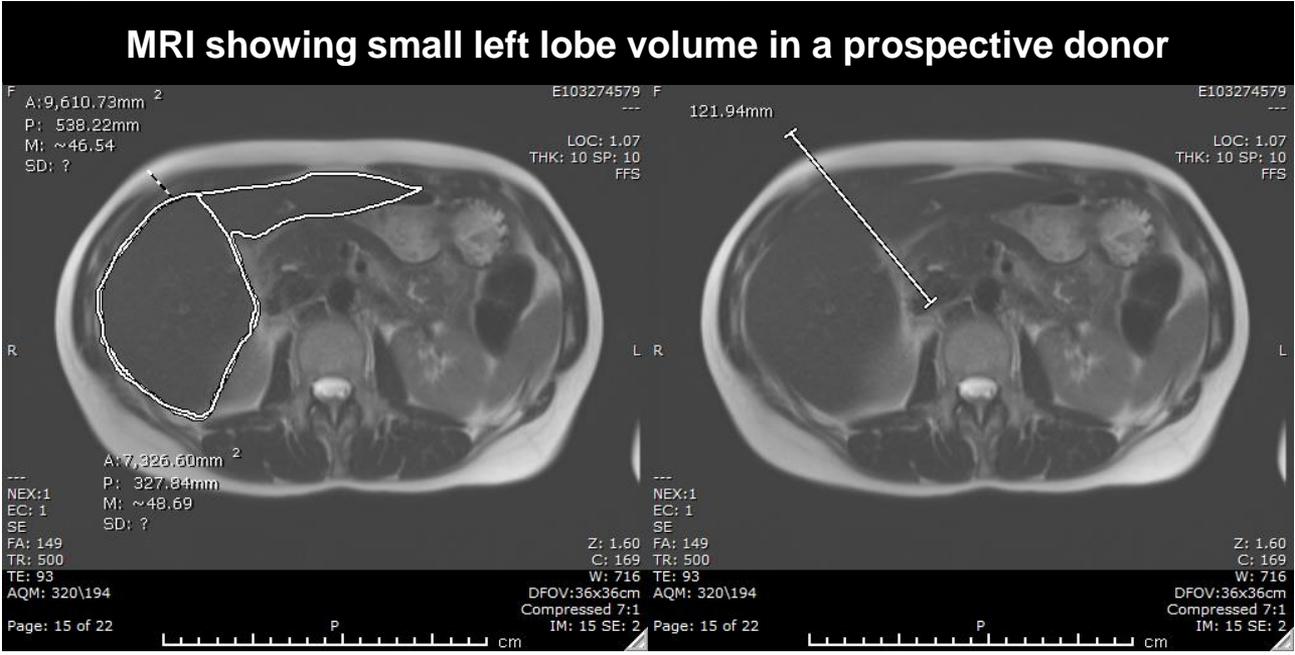
- Not all recipients have eligible donors
- Most potential donors that enter the process do not proceed to donation – medical, psychological, opt out
- Not for the most ill patients, for MELD < 30

# Results





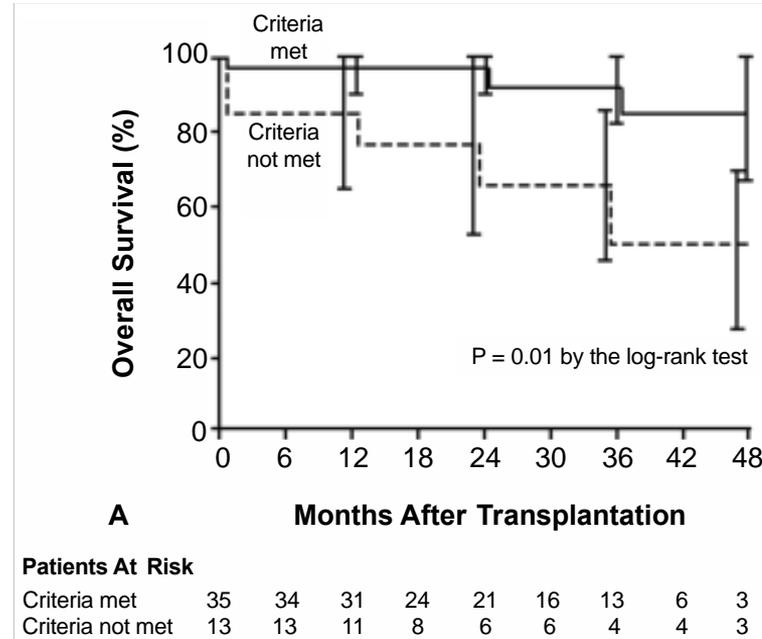
# MRI showing small left lobe volume in a prospective donor

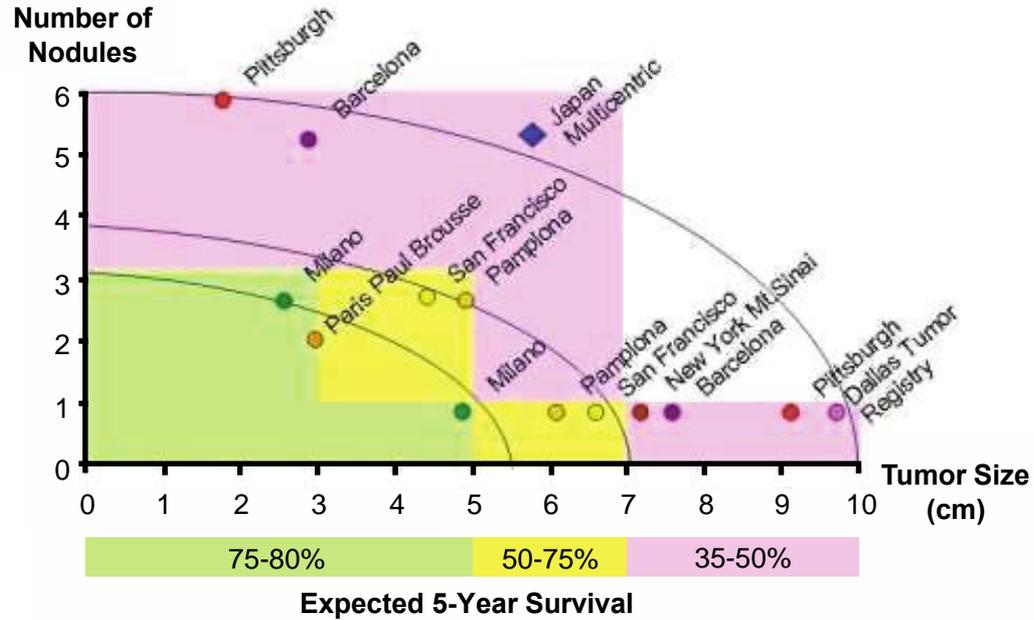


# Transplant for Hepatocellular Carcinoma

- When resection not possible
- When local treatment is not curative
- Within Milan criteria (AFP < 1000)
- If beyond Milan criteria – downstage to receive MELD exception

## Correlation of Post-Transplantation Pathological Confirmation of Early-Stage Hepatocellular Carcinoma with Overall Survival (Panel A) and Recurrence-free Survival (Panel B) among 48 Patients with Cirrhosis





Llovet JM, Schwartz M, Mazzaferro V. *Semin Liver Dis.* 2005; 25(2): 181-200;  
Majno P, Mazzaferro V. *Liver Transpl.* 2006; 12(6): 896-8; [www.hcc-metroticket.org](http://www.hcc-metroticket.org).

# If Beyond Milan – Eligible for Downstaging and MELD Exception

- One lesion greater than 5 cm and less than or equal to **8 cm**
- Two or three lesions that meet all of the following:
  - At least one lesion greater than 3 cm
  - Each lesion less than or equal to 5 cm, and
  - A total diameter of all lesions less than or equal to **8 cm**
- Four or five lesions each less than 3 cm, and a total diameter of all lesions less than or equal to 8 cm
- If **AFP > 1000**: If the candidate's AFP level falls below 500 ng/mL after treatment, the candidate is eligible for a standardized MELD or PELD exception as long as the candidate's AFP level greater than or equal to 500 ng/mL following local-regional therapy at any time must be referred to the NLRB for consideration of a MELD or PELD exception.

# Acute Alcoholic Hepatitis

## Criteria for an Expedited Evaluation

- First-time event with insight that alcohol caused their predicament
- No other substance abuse
- Stable mental health
- Good social supports
- Willing to sign a treatment contract and commit to post transplant rehab

# Alcoholic Hepatitis – Not Initial Bout Eligibility for Accelerated Evaluation

- If not a first-time event – must be sober for at least 3 months
- Must have entered into a monitored program
- Insight that alcohol caused their predicament
- No other substance abuse
- Stable mental health
- Good social supports
- Willing to sign a treatment contract and commit to ongoing pre and post transplant rehab

# SLK – Simultaneous Liver and Kidney Transplant

- Concept of defined criteria before granting dual organ donation from same donor
- Involvement of Transplant Nephrology in decision process
- Creation of safety-net for kidney after liver if the patient does not receive SLK



| Category for SLK   | Criteria to Meet   |
|--|--|
|  | At least one of the following:   |
| Chronic Kidney Disease (CKD) with a measured or calculated glomerular filtration rate (GFR) less than or equal to 60 mL/min for greater than 90 consecutive days | <p>That the candidate has begun regularly administered <b>dialysis</b> as an end-stage renal disease (ESRD) patient in a hospital based, independent non-hospital based, or home setting.</p> <p>At the time of registration on the kidney waiting list, that the candidate's most recent measured or calculated creatinine clearance (CrCl) or <b>GFR is less than or equal to 30 mL/min.</b></p> <p>On a date after registration on the kidney waiting list, that the candidate's measured or calculated CrCl or GFR is less than or equal to 30 mL/min.</p> |
| Sustained acute kidney injury  | <p>At least <i>one</i> of the following, or a combination of <i>both</i> the following, for the last <b>6 weeks:</b></p> <p>That the candidate has been on <b>dialysis</b> at least once every 7 days.</p> <p>That the candidate has a measured or calculated CrCl or <b>GFR less than or qual to 25 mL/min at least once every 7 days.</b></p> <p>If the candidate's eligibility is not confirmed at least once every seven days for the last 6 weeks, the candidate is not eligible to receive a liver and a kidney from the same donor.</p>                 |
| Metabolic disease  | <p>A diagnosis of at least <i>one</i> of the following:</p> <p>Hyperoxaluria Atypical hemolytic uremic syndrome (HUS) from mutations in factor H or factor I</p> <p>Familial non-neuropathic systemic amyloidosis Methylmalonic aciduria</p>   |

# Safety Net Qualification

- The candidate is registered on the kidney waiting list prior to the one-year anniversary of the candidate's most recent liver transplant date.
- On a date that is at least 60 days but not more than 365 days after the candidate's liver transplant date, at least one of the following criteria is met:
  - The candidate has a measured or calculated creatinine clearance (CrCl) or glomerular filtration.
  - Rate (GFR) less than or equal to 20 mL/min.
  - The candidate is on dialysis.

Thank You for Your Attention!

