Liver Transplant: Candidate Evaluation

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Liver Transplantation

- First attempts: 1963
- Reasonable mortality: early 1980s
  - Organ preservation
  - Immunosuppression
  - Patient selection
  - Surgical technique
- Current:
  - 1 Year Survival ≥ 85%
  - 5 Year Survival ≥ 70%

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Frequency & Need

- 1983 NIH Consensus Conference:
  Therapeutic Modality for End-Stage Liver Disease
- More than 100 Liver Transplant Centers
- There were 6650 Liver Transplants in 2006.
- 16,686 Liver Transplant Candidates in waiting list in 2006

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Consequences

- Longer waiting time
- Greater “waiting-list mortality”
- More pressure to use “extended criteria” organs.
- Maximal utilization of organs: split livers
- Need for living donors
- Tighter selection of recipients
- Need for early referrals – (for problem correction)

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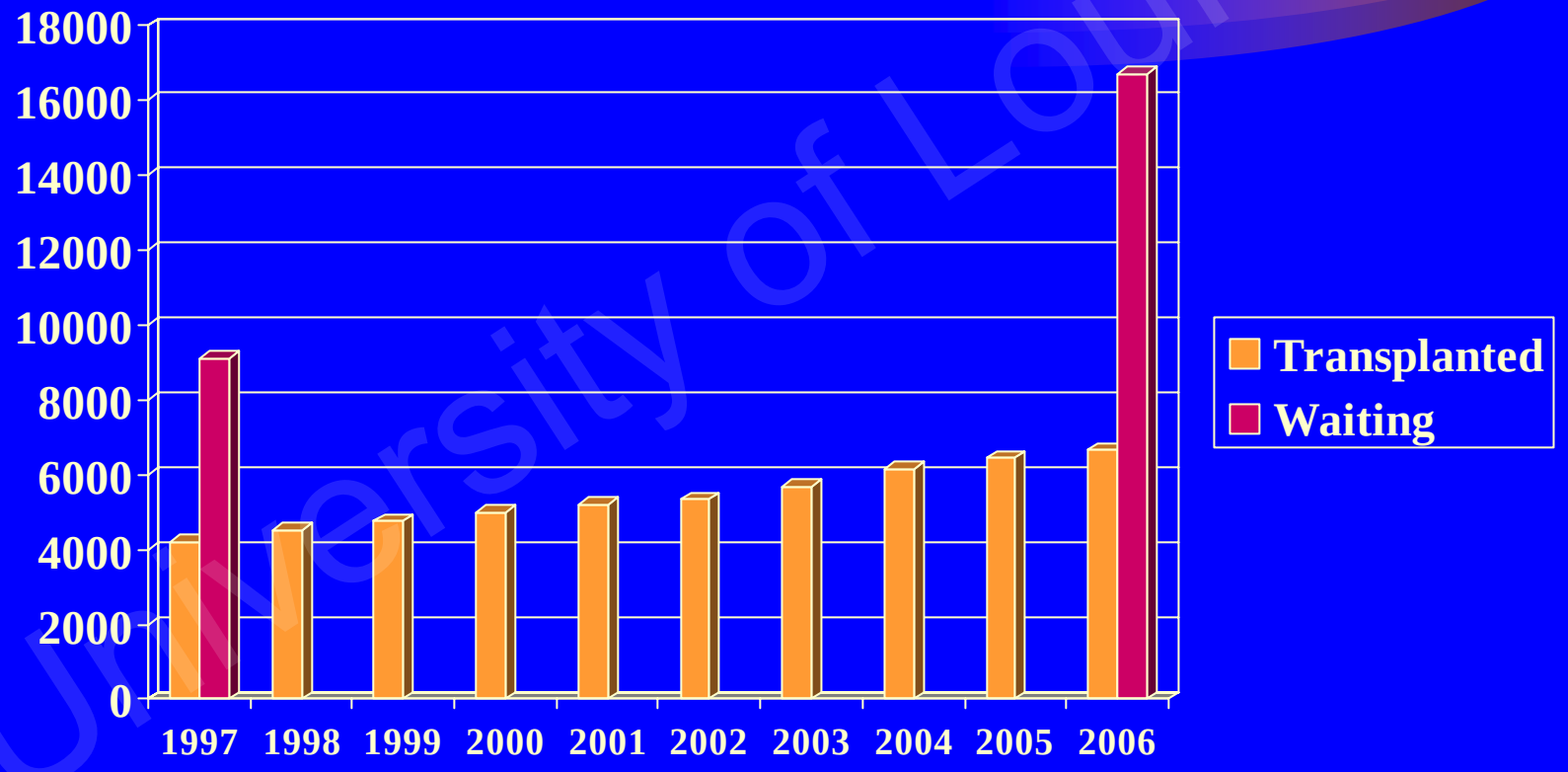
Liver Transplants per Year



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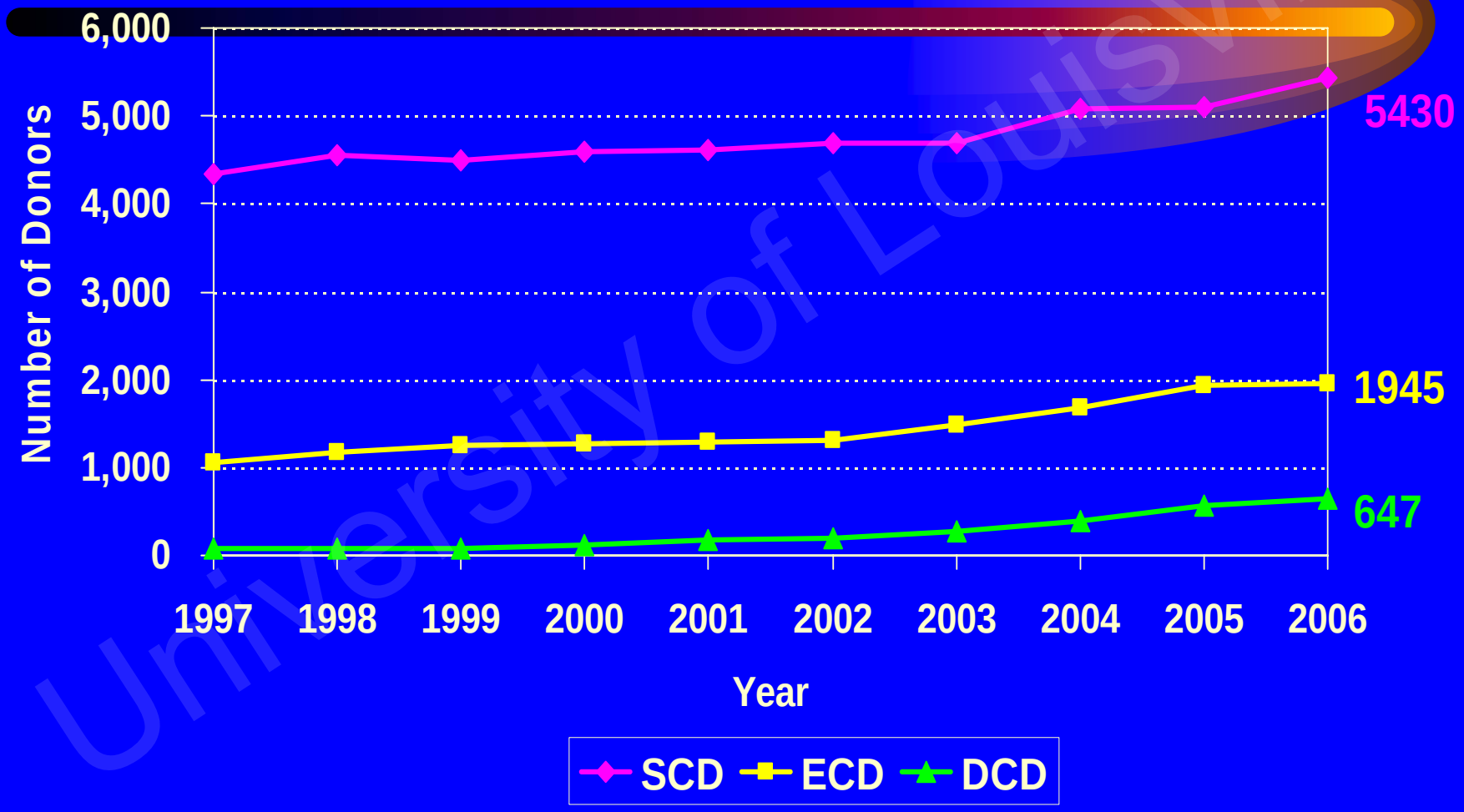
Deceased Donors by Type

1997 - 2006



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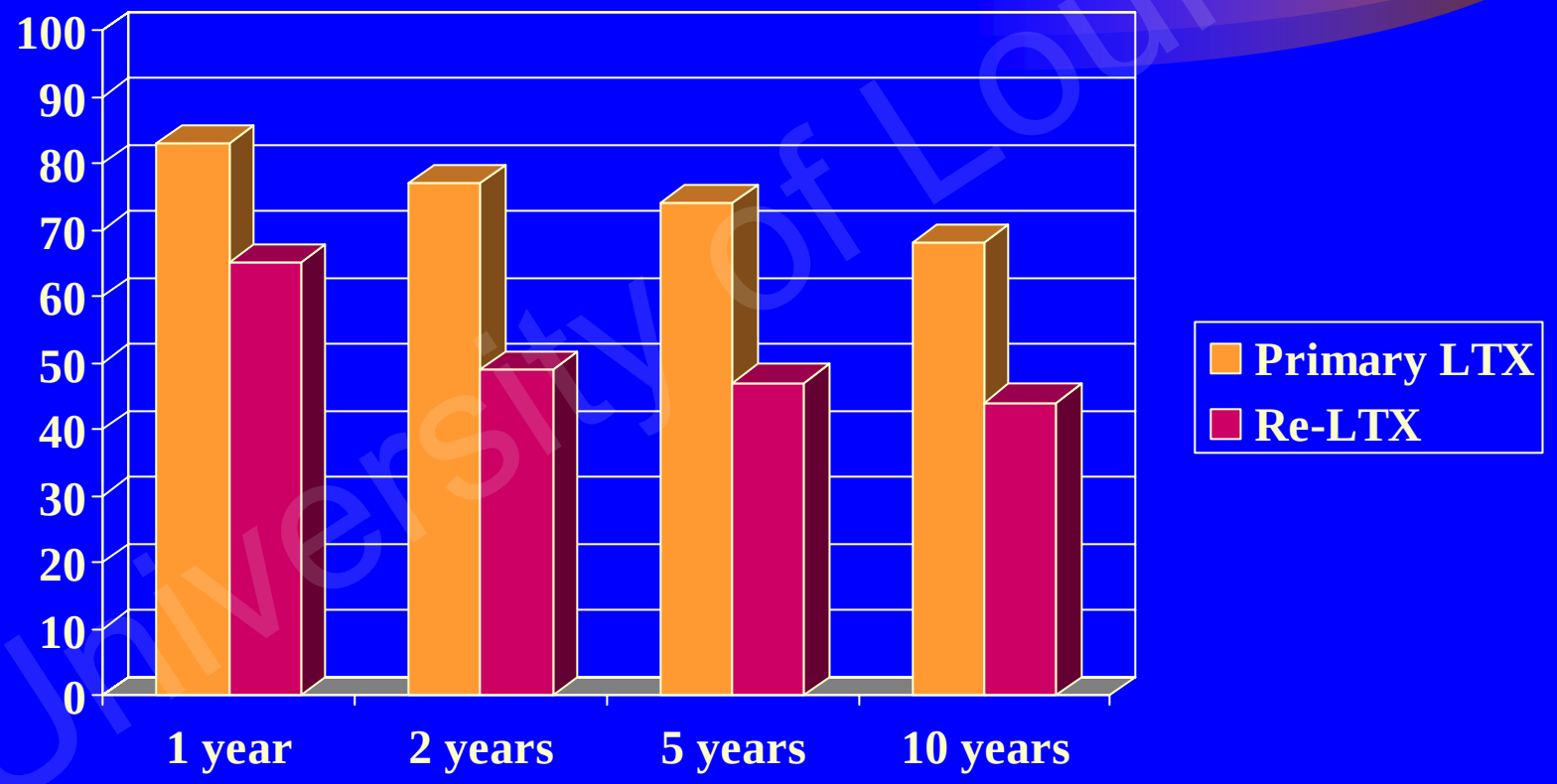
Survival after Liver Transplant & Re-Transplant



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Balancing Needs

Need to Care for the Patient

and

Need to Care for the Organ

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Need to Care for the Patient

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Indications for Liver Transplantation

- End Stage Chronic Liver Disease (91%)
- Fulminant Hepatic Failure (6%)
- Extremely poor Quality of Life, or Serious Metabolic Disorder with Early Mortality (2-3%).

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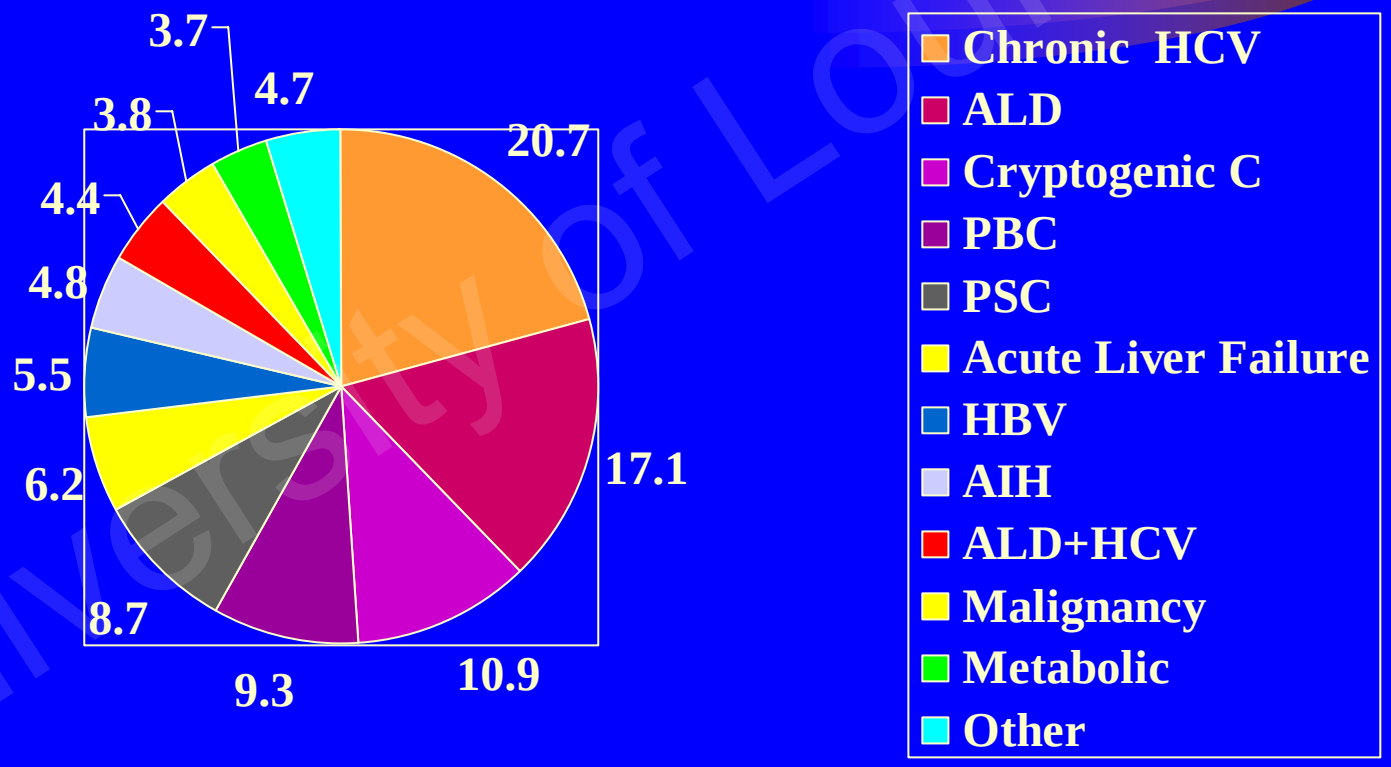
Etiology of Liver Disease
Adult Liver Transplant Recipients



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Non-Disease-Specific Minimal Listing Criteria

Liver Transpl Surg 1997;3:628-637

- Immediate need for Liver Transplantation (Acute & Subacute Hepatic Necrosis)
- Estimated 1-year Survival < 90% in ESLD.
- Child-Pugh score = or > 7 (Child B or C)
- Portal HTN Bleed or single episode of SBP, irrespective of Child class

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End Stage Chronic Liver Disease

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Indications

End-Stage Chronic Liver Disease

- **Hepatocellular Disease:**

	Child-Pugh B (7-9) or C (10-15)		
	1	**2**	**3**
Encephalopathy Grade	None	1-2	3-4
Ascites	None	Mild	Moderate
Bilirubin (mg/dL) <	1-2	2.1-3	≥ 3.0
(Cholestasis)	(< 4)	(4-10)	(>10)
Albumin (mg/dL)	≥ 3.5	2.8-3.5	≤ 2.7
Protime elevation or	1-4	4.1-6	≥ 6.1
(INR <)	(<1.7)	(1.7-2.3)	(> 2.3)

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Fulminant Hepatic Failure (Acute & Subacute)

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Fulminant Hepatic Failure
Definitions & Incidence

- ***Classic:*** Development of hepatic encephalopathy within 8 weeks of initiation of *symptoms* in a patient without known chronic liver disease.
- ***Practical:*** Development of hepatic encephalopathy and coagulopathy (INR > 1.5) within 26 weeks from the onset of *jaundice*, in patient without known chronic liver disease.
- ***Incidence***: 2300-2800/ year in USA;
  - 6% of adult transplants;
  - 6% of liver-related deaths;
  - 0.1% of deaths in USA.

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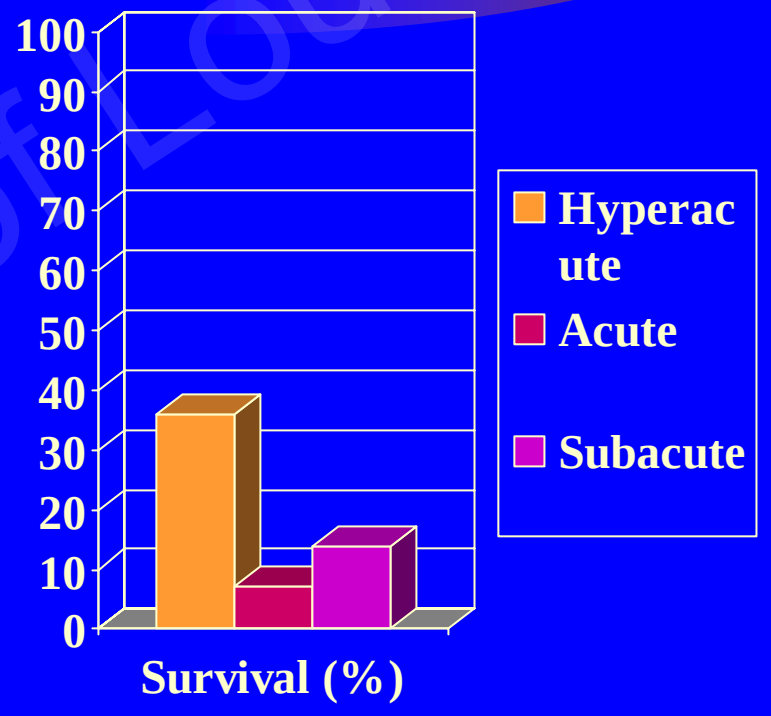
Subtypes of Fulminant Hepatic Failure

- ***Hyperacute***: encephalopathy in < 8 days from jaundice.
- ***Acute:*** encephalopathy from 8 – 28 days.
- ***Subacute:*** encephalopathy from 29 days to 26 weeks after onset of jaundice



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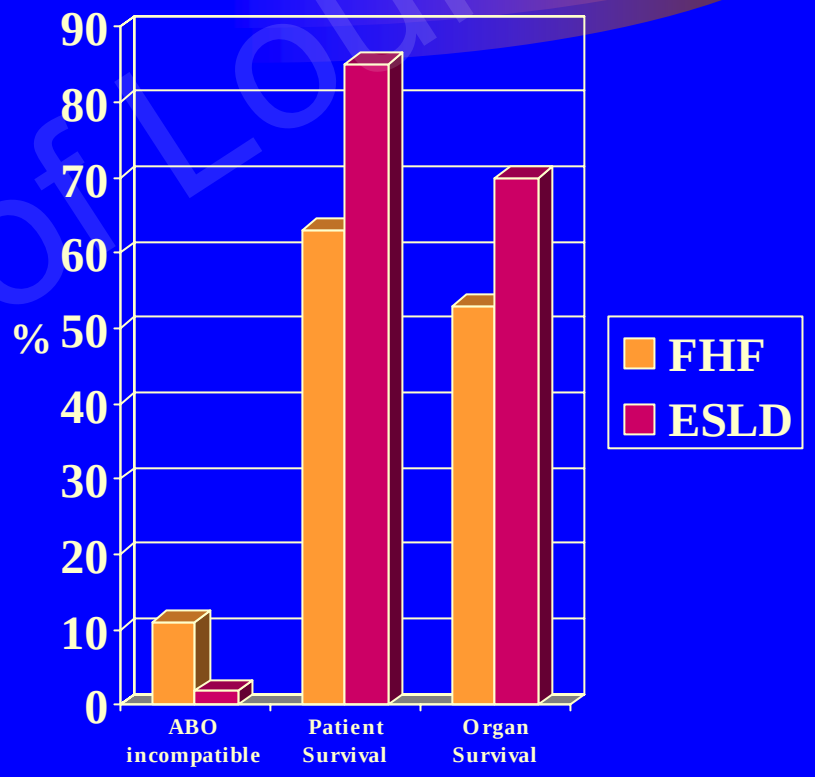
Fulminant Hepatic Failure & Liver Transplantation

- Mortality: 75% with grade III-IV encephalopathy
- Median age = 28 (vs. 44 for chronic ESLD)
- Mean waiting time = 5.3 days



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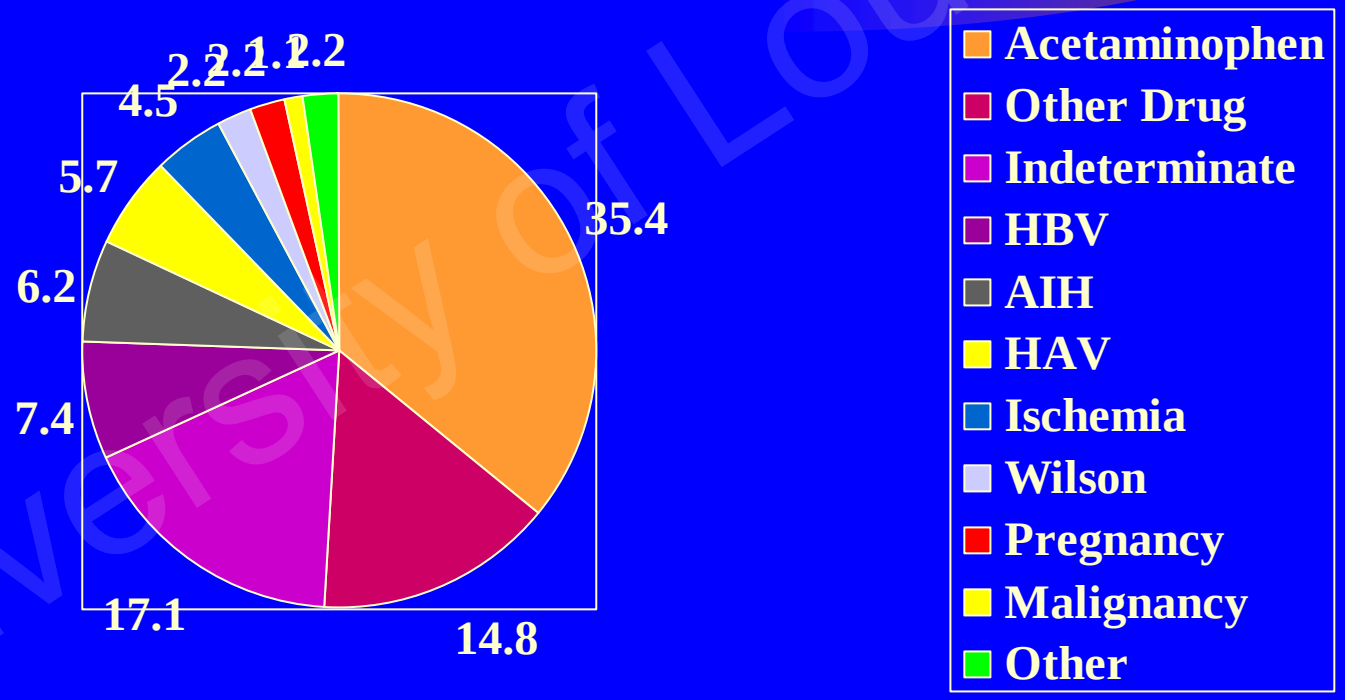
Etiology of Acute Liver Failure 1998-1999



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Indications

Fulminant Hepatic Failure

- ***King's College Criteria***

- ***<u>Acetaminophen</u> (PPV 0.95, NPV 0.78)***
  - pH < 7.3 or
  - PT with INR > 6.5 + creatinine > 3.4 mg/dL

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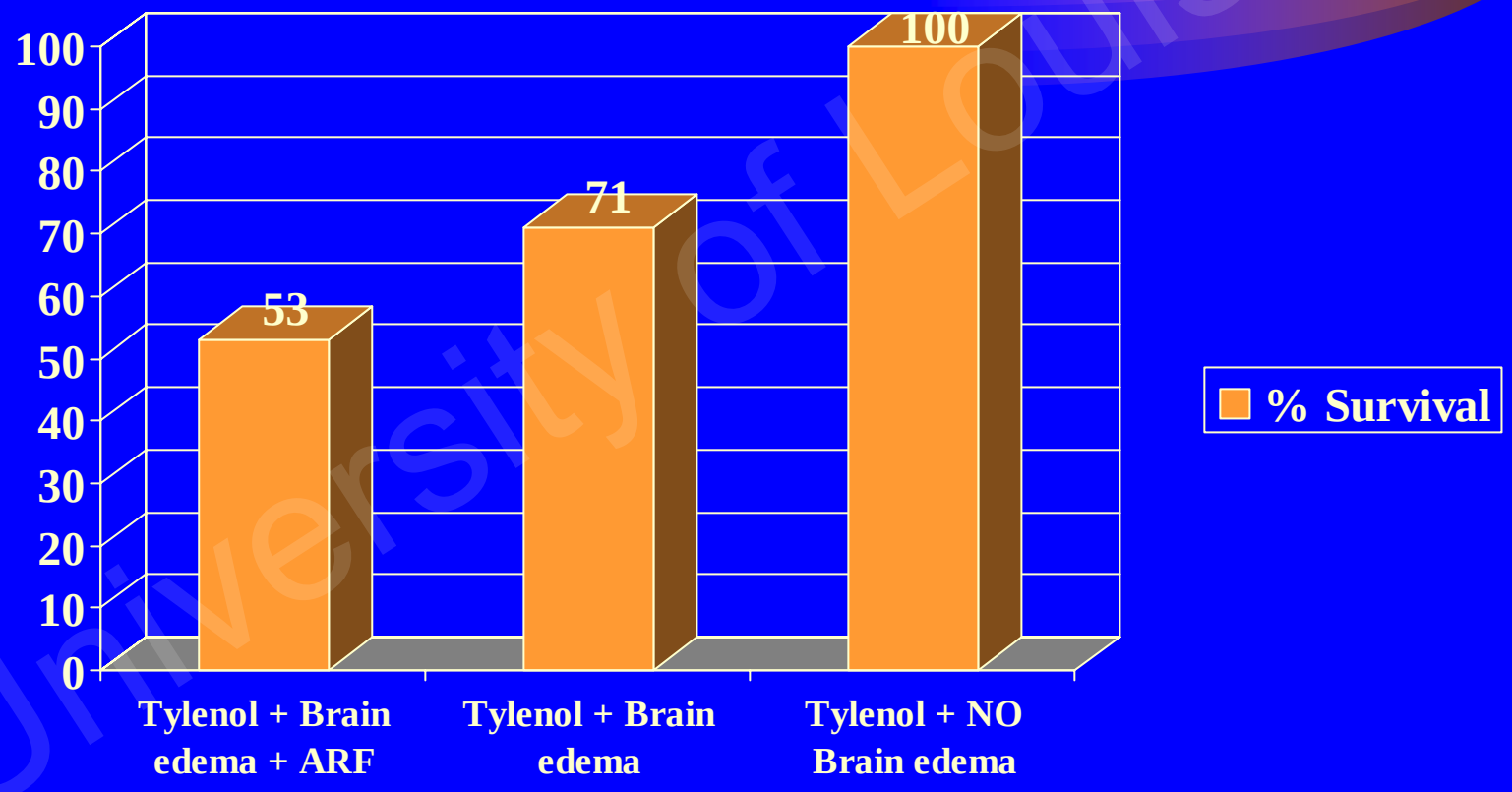
Acetaminophen-related FHF

Expected Survival



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Indications

Fulminant Hepatic Failure

- ***Non-Acetaminophen*** ***(PPV 1, NPV 0.3)***
  - Age < 30 & Factor V < 20 mg/dL, or
  - Age > 30 & Factor V < 30 mg/dL
  - Patient with INR > 6.5, or
  - Three of the following:
    - Age < 10 or > 40
    - Drug reaction or FHF of indeterminate cause
    - Jaundice > 7 days before encephalopathy
    - PT with INR > 3.5
    - Bilirubin > 17.6 mg/dL

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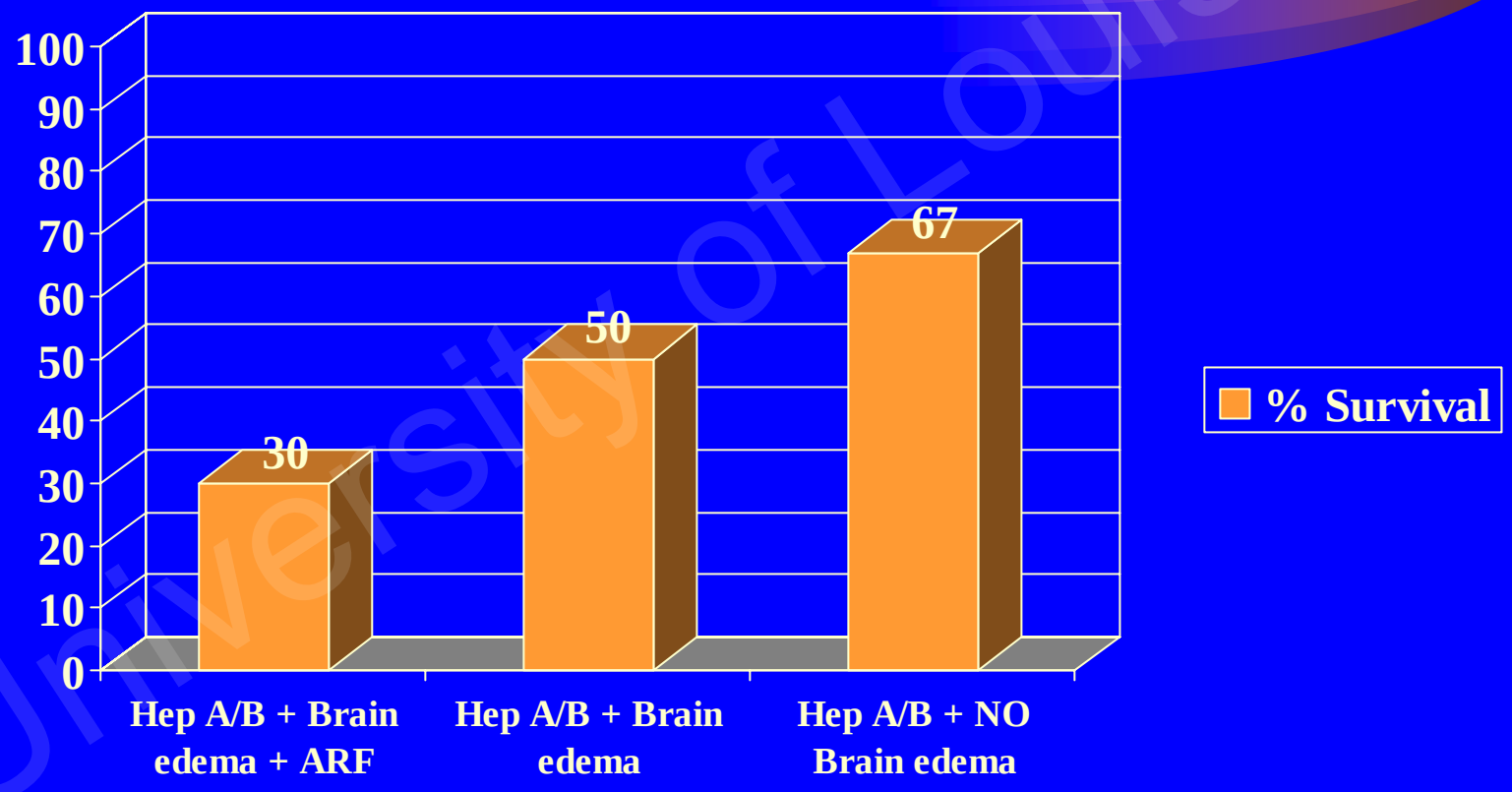
Hepatitis A- or B-related FHF

Expected Survival



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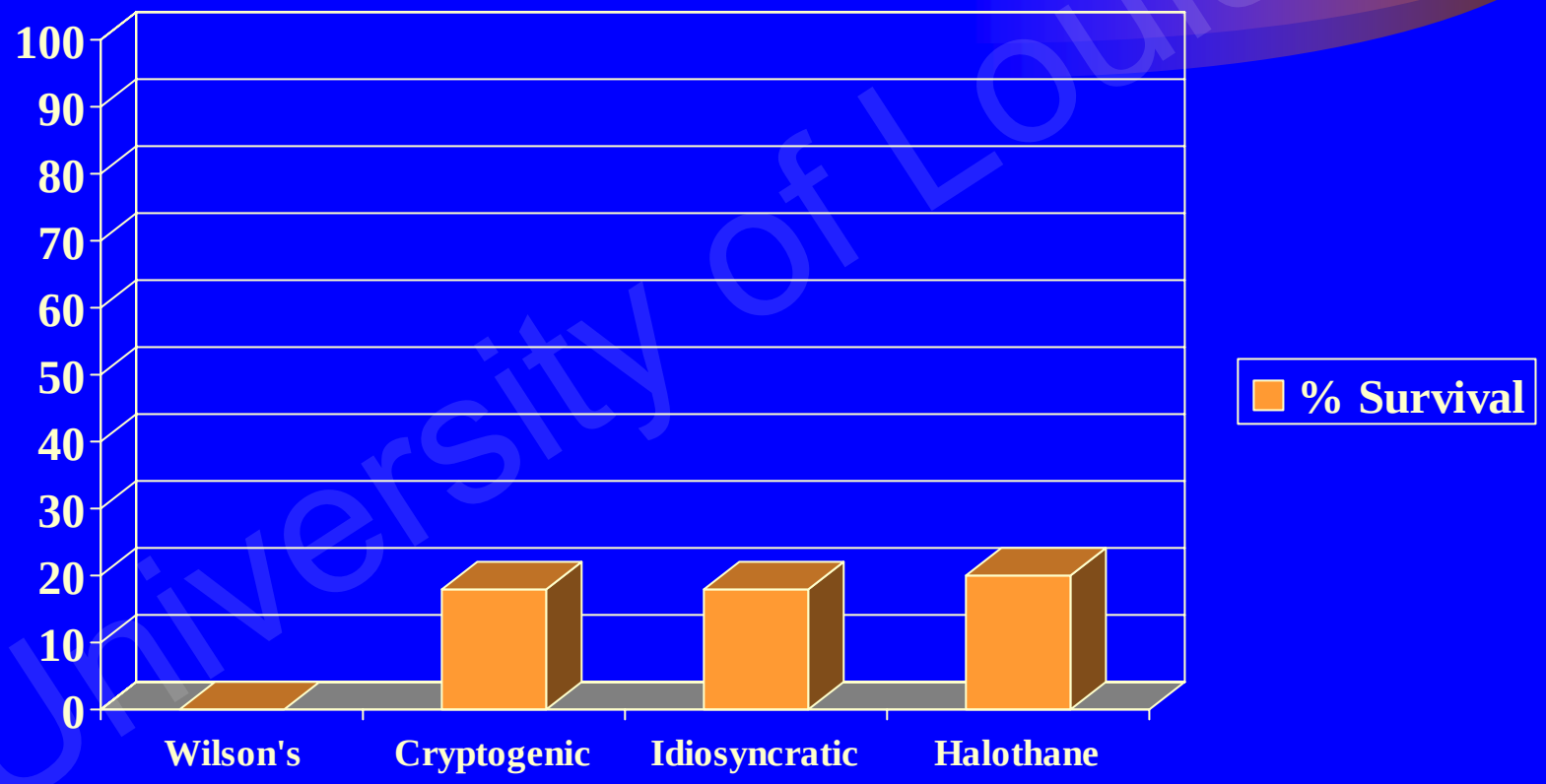
FHF

Expected Survival by Etiology



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Fulminant Wilson's Disease

Modified Nazer's score

- Validated in children **(Liver Transpl 2005;11:441-448)** & adults **(Liver Transpl 2007;13:55-61)**
- **Score =/> 11, or INR =/> 7 needs OLTx**; all other can receive chelation therapy.

Points	Bili	AST	INR
0	**<5.84**	**<100**	**<1.3**
1	**5.85-8.7**	**100-150**	**1.3-1.6**
2	**8.8-11.6**	**151-200**	**1.6-1.9**
3	**11.7-17.5**	**201-300**	**1.9-2.4**
4	**>17.5**	**>300**	**>2.4**

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Poor Quality of Life with Early Mortality

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Indications
Q of L

- **Quality of Life**
  - Correction of extrahepatic manifestations of metabolic or chronic liver disease likely to cause early mortality
    - recurrent biliary sepsis
    - primary hyperoxaluria,
    - familial homozygous hypercholesterolemia,
    - urea cycle defects,
    - familial amyloid polyneuropathy,
    - hepatopulmonary syndrome,
    - portopulmonary HTN, etc

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Contraindications

- *Absolute*
- *Relative*

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Contraindications: Absolute

- Extrahepatic Malignancy (except in Hepatic Epithelioid Hemangioendothelioma)
- Cholangiocarcinoma (unless in approved special protocol)
- Hemangiosarcoma
- Uncontrolled Sepsis
- Portopulmonary HTN with PAPm > 35 mmHg despite therapy

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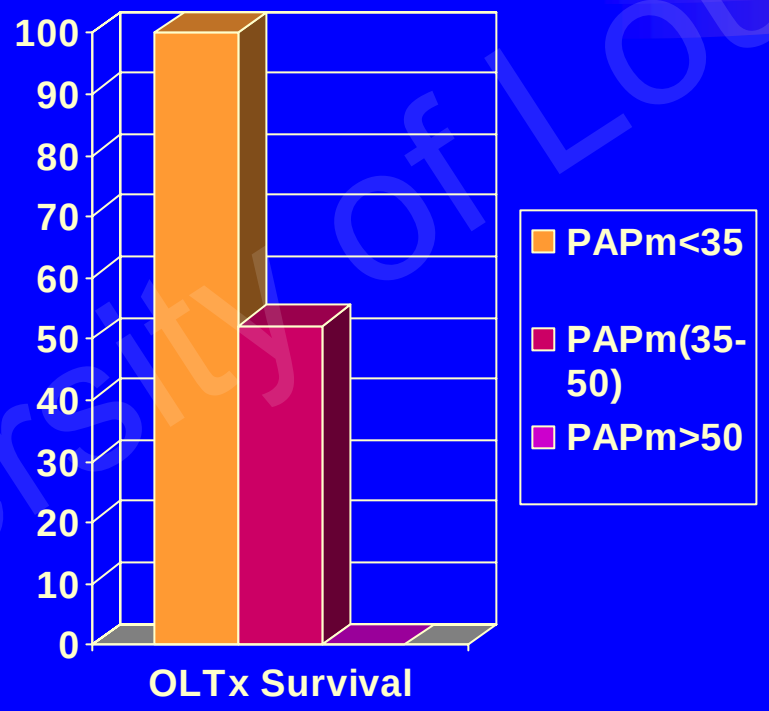
Transplant Survival in PPHTN



Expected Survival less than 62% are a contraindication for OLTx

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Contraindications: Absolute

- Active Alcoholism/Substance Abuse
- Advanced Cardiac or Pulmonary Disease
- Inability to Comply w. Immunosuppression
- Anatomic Abnormality Precluding Treatment
- Irreversible Neurologic Complication *(ICP > 50 mmHg x 2h, or cerebral perfusion pressure < 40 mmHg x 2h)*

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Contraindications: Absolute

- BMI 40 or higher
- BMI 35-39.9 + [Diabetes Mellitus OR Hyperlipidemia] + any of the following:
  - Macroalbuminuria
  - Microalbuminuria > 300 mg/L
  - Renal Insufficiency (other than HRS)
  - Retinopathy
  - Coronary Artery Disease
  - Peripheral Vascular Disease
  - TIA / Stroke
  - Autonomic Neuropathy

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Obesity and OLTx

- 20% of OLTx recipients are obese.
- Obesity increase risk of HCC & other tumors
- Severe obesity: higher infections, respiratory failure, systemic vascular complications, hospital LOS, & cost.
- Mortality in Obese (BMI 30-34.9) & Severely-Obese (BMI 35-39.9) is similar to non-obese when adjusted by co-morbidities.
- Morbid-Obesity (BMI > 40) increases mortality.

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Contraindications: Relative

- AIDS
- Advanced age: well motivated and active 65-70
- Poor social support
- Previous extrahepatic malignancy:
  - 2 years free in most malignancies.
  - 4-5 years free in melanoma, breast ca, colon ca
  - Send consult to: Israel Penn International Transplant Tumor Registry (www.ipittr.uc.edu)
- Hepatopulmonary S with $PaO_2 < 50$ mmHg

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Hepatopulmonary Syndrome

- Extra MELD points may be given (24 points) if $PaO_2 < 60mmHg$
- Worsens 5 mmHg PaO_2 per year.
- LTx mortality increases to 34% with $PaO_2 < 50$ mmHg or MAA shunt > 20%; data is not conclusive yet.
- TIPS is controversial; Coil embolization of discrete A-V fistulas may help (but is uncommon)

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Contraindications: Relative

- Prior portosystemic shunt
- Renal failure
  - FHF = higher mortality
  - ESLD = if requiring dialysis or liver-kidney Tx → higher mortality, ICU stay and cost
- Obesity: more wound infections (BMI > 35)
- Malnutrition: increases L.O.S., cost and mortality

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Need to Care for the Organ

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Transplant Candidacy
Psychosocial Aspects

- Non-compliance is responsible for 25% of late deaths post organ transplant.
- Adherence has several components:
  - medication use, - clinic visits,
  - laboratory tests, - self-monitoring,
  - exercise, - use of harmful substances.

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Transplant Candidacy Psychosocial Aspects

- **Factors affecting adherence:**
  - hostility,
  - poor caregiver-support,
  - poor friend-support,
  - lack of active coping strategies,
  - use of avoidant coping strategies;

  Risk of non-adherence:
    - **0-1 factor: 30%,**
    - **2-3 factors: 50%,**
    - **>/=4 factors: 80%**

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Psychosocial Aspects
Social Support

- Should be able to provide:
  - basic care, - transportation,
  - medication verification, - emotional support.
- Sources of support: family, friends, work relations, faith & community organizations.
- More than one support person must be identify.
- Must be willing to be involved during evaluation, hospital care, & post-operative care.
- **Good support correlates with: better adherence, low recidivism, less depression, better graft survival.**

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Psychosocial Aspects
Alcohol Abuse & Dependence

- Chronic medical problem with relapsing-remitting course.
- Only 75% of patients transplanted for ALD have alcohol dependence.
- Dependence is strong predictor for relapse.
- Dependence requires 3 or more within 12 mo:
  - 1. Tolerance,
  - 2. Withdrawal Syndrome,
  - 3. Larger amount & longer use than intended,
  - 4. Persistent desire to cut down,
  - 5. Excessive time using,
  - 6. Important activities affected b/o use,
  - 7. Use continues despite physical/psychological problem.

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Psychosocial Aspects Alcohol Abuse & Dependence

- **Stable sobriety**: if lasting > 5 years.
- Sobriety < 6 months does not consistently predicts alcohol relapse.
- **Relapse rate in LTx waiting-list**: up to 25%
- All relapses are serious; very few can go to “social use”: Complete abstinence (even from “non-alcoholic beer/wine” is recommended
- Pre- & post-LTx patients should have routine alcohol screening

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Psychosocial Aspects
Alcohol Abuse & Dependence

- **Patterns of alcohol relapse post-LTx**:
  - complete abstinence: 69%,
  - occasional (<14 units/wk & < 4 units in a day): 10%,
  - heavy (>14 units/wk or > 4 units/d for any period): 21%
- No difference in 8-y survival among the 3 groups, but alcohol contributed to death in 15% of "heavy" group.
- **Any relapse post-LTx**:
  - 1 year = 8-22%;
  - 5 years = 30-50% (vs 60-80% in non-LTx alcoholics)

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Psychosocial Aspects Alcohol Abuse & Dependence

- **Predictors of post-LTx alcohol use**:
  - Alcohol dependency
  - Short pre-Tx sobriety
  - Hx polysubstance abuse
  - Family Hx alcoholism
  - Previous addiction rehabilitation
  - Personality disorders

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Urine Tests for Drugs of Abuse

Test Drug	Detectability duration	False Positives
Amphetamines	2-3 days	Ephedrine, Pseudoephedrine, phenylephrine, selegiline, chlorpromazine, trazodone, bupropion, desipramine, amantadine, ranitidine
Cocaine	Light: 2-3 days; heavy: 8 days	Topical anesthetics with cocaine
Marijuana	Light: 1-7 days; heavy: 1 month	Ibuprofen, naproxyn, dronabinol, efavirenz, hemp seed oil
Opiates	1-3 days	Rifampin, fluoroquinolones, poppy seeds, quinine in tonic water
Phencyclidine	7-14 days	Ketamine, dextrometorphan

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Psychosocial Aspects
Prescription-Drug Abuse

- May be using medication to treat the wrong indication (narcotic for anxiety), or at excessive dose.
- Chemical dependency program is recommended.
- Should:
  - get controlled substances from only one prescriber,
  - use single pharmacy,
  - be followed by psychiatrist or addiction specialist

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Psychosocial Aspects Prescription-Drug Abuse

- Remember that Methadone once a day is appropriate for opioid dependency but not for pain control (q 3-6 hours for pain control)
- Tapering Methadone in “stable methadone-maintained opioid addicts”, results in relapse of up to 80%.
- Relapse of illicit-opioid use < 10% in “methadone patients”, and LTx outcome and nonadherence to medication is similar to “non-methadone patients”.

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Psychosocial Aspects
Mood & Personality Disorders

- Up to 63% of cirrhotics have depression.
- Depression increases physical complaints & pain, decreases quality of life & coping skills.
- Treatment of depression can help compliance
- Patients with suicidal ideation or attempt need intense evaluation from all sources; isolated act is not contraindication for LTx; patterns of self-destructive behavior are contraindication for LTx.

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Psychosocial Aspects
Mood & Personality Disorders

- Schizophrenia, schizoaffective disorder, bipolar disorder, and personality disorder which are stable, controlled, with good adherence, good family support, and good working relation with the transplant team, are not contraindication for LTx.

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Obesity and OLTx

- 20% of OLTx recipients are obese.
- Obesity increase risk of HCC & other tumors
- Severe obesity: higher infections, respiratory failure, systemic vascular complications, hospital LOS, & cost.
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  - Renal Insufficiency (other than HRS)
  - Retinopathy
  - Coronary Artery Disease
  - Peripheral Vascular Disease
  - TIA / Stroke
  - Autonomic Neuropathy

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Drug Coverage/ Medical Insurance

- One time costs:
  - Physician cost from day 0 to 90 (total):
    - Surgeon = $ 3100 - Hepatologist = $ 570
    - Anesthesia = $ - Hospital $$$$$
- Recurrent costs:
  - Cost of Immunosuppressive drugs and laboratory monitoring: $ 2000/month.
  - Management of co-morbidities and anti-rejection treatment complications.
  - Surveillance for organ damage (ultrasound + doppler, liver biopsy, ERCP, …)

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Deciding Transplant Priority

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Model for End-stage Liver Disease (MELD) ***HEPATOLOGY 2001;33:464-470***

- Predicts 3-month & 1-year mortality for:
  - a) Hospitalized,
  - b) Ambulatory non-cholestatic,
  - c) Ambulatory cholestatic (PBC)
- No affected by: SBP, PSE, Ascites, or Variceal bleed
- ***3.8 log(e) bili (mg/dL) + 11.2 log (e) INR + 9.6 log(e) creatinine (mg/dL)***
- www.mayo.edu/int-med/gi/model/mayomodl.htm

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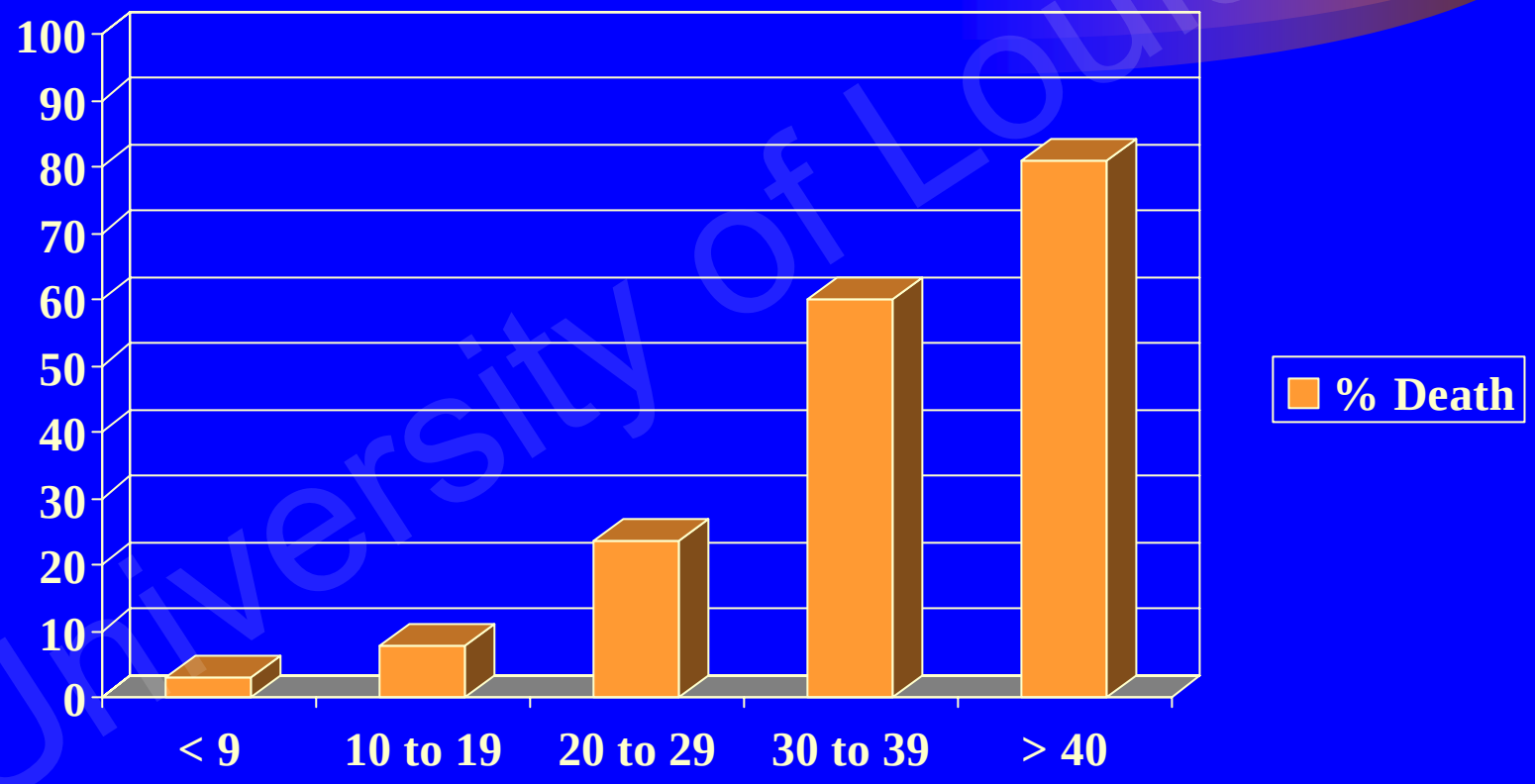
MELD - 3500 patients

Three-month Death Rates



MELD 15-17 is equivalent to surgical death-rate

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Effects of MELD implementation

- Current MELD score at OLTx is higher than in pre-MELD era.
- Removal from list due to “death/too sick” decreased from 25.9% to 6.7%
- Patient survival: no-change/slightly better.
- OLTx for HCC has increased from 7% to 22%
- Waiting time for HCC decreased from 2.3 to 0.6 y

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Correcting for Mortality not Measured by MELD

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Factors that may Modify MELD points

Liver Transpl. 12:S85-136, 2006

- **Hepatocellular Carcinoma**:
  - single lesion > 2cm & < 5cm, **OR**
  - up to 3 lesions </= 3 cm each, **OR**
  - chronic liver disease + AFP > 500ng/mL

  - POINTS: increases the MELD to 22

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Hepatopulmonary Syndrome**:
  - Sitting-up ABG@RA with PaO_2< 60 mmHg, **AND** (+) Echo bubble study, with normal CXR & PFTs.
  - If CXR or PFTs is abnormal, must have MAA scan with shunting > 20%.
  - POINTS:
    - PaO_2 56-59 mmHg = MELD 22;
    - PaO_2 51-55 mmHg = MELD 24;
    - PaO_2 = 50 mmHg = MELD 26 baseline, plus 2 points every 3 months.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Recurrent Bacterial Cholangitis** (PSC, Caroli's, ischemic cholangiopathy, etc):
  - =/> 2 culture (+) bacteremia over 6 months, **OR**
  - any septic complication not related to PTC/ERCP, without stent/tube, and not suppressed despite antibiotic therapy, in the absence of correctable lesion.

  - POINTS: At Regional Review Board discretion. Add points to MELD equivalent to 8% death-risk now and every 3 months.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Portopulmonary HTN**:
  - PP hypertension defined as:
    - MPAP 26 to 35 mmHg, AND
    - PVR >240dynes/sec/cm^{-5}, AND
    - [MPAP-PCWP] >12mmHg
  - POINTS: At Regional Review Board discretion.
  - If MPAP > 35 mmHg AND 12 wks of therapy (prostacyclin) achieve:
    - MPAP <35 mmHg AND
    - PVR <400 dynes/sec/cm-5, AND
    - Satisfactory RV function;
  - MELD of 26, with additional points after 6 months.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Refractory Ascites**:
  - Definition = massive ascites **AND** 2 of the following:
    - a) =/>3 therapeutic paracentesis > 2 L each in last 60 days;
    - b) =/> 2 episodes of SBP;
    - c) Persistent despite previous TIPS;
    - d) Unresponsive to Spironolactone 400 + Furosemide 160,
    - e) =/> 2 therapeutic thoracentesis;
    - f) Serum Na =/< 125 mEq/L
  - POINTS: At the discretion of Regional Review Board.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Refractory Portal HTN GI bleeding**:
  - Apply if:
    - bleeding > 6 units in 24 h, **OR**
    - > 2 units/d for 3 days, **OR**
    - > 2 units/week for > 6 weeks in patient with patent TIPS or in whom TIPS is contraindicated (bili > 5 mg/dL, portal v. thrombosis, portopulmonary HTN)
  - POINTS: MELD exception according to Regional Review Board.

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Other MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- Small-for-size syndrome
- Cystic Fibrosis
- Familial Amyloidotic Polyneuropathy
- Primary Hyperoxaluria type 1
- Hereditary Hemorrhagic Telangiectasia
- Polycystic Liver Disease
- Cholangio Ca (for UNOS approved protocol with neoadjuvant therapy)
- Carcinoid Neuroendocrine tumors, after removal of primary tumor, and without extrahepatic disease.

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Other MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- Hepatic Epithelioid Hemangioendothelioma, despite extrahepatic disease.
- Adenoma in patient with Glycogen Storage Disease
- Tyrosinemia type 1
- Crigler-Najjar type 1
- Homozygous Familial Hypercholesterolemia
- Maple Syrup Urine Disease (domino LT)
- Mitochondrial defects confined to liver
- Disorders of Fatty Acid metabolism.

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No MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- Hepatic Encephalopathy
- Biliary Dysplasia in PSC
- Intractable pruritus
- Budd-Chiari Syndrome
- Non-carcinoid Neuroendocrine tumors
- Biliary Cystadenocarcinoma

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Conclusions

- Liver Transplantation is a well established treatment modality for Fulminant and Chronic End Stage Liver Disease, as well as some metabolic diseases with high mortality.
- Long term survival is very good.
- Shortage of organs requires strict adherence with principles of fair distribution, giving priority to the sickest person who has a reasonable expectation of survival and who is likely to take good care of the grafted organ.

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Questions ?

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Treatment of HCV in the "waiting list"

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Pre-LTx Treatment of HCV-Cirrhosis Candidates

- **Best Candidates:**
  - **Child-Turcotte score =/< 7**
  - **MELD =/< 18**
- **Best response:**
  - **genotype 2 & 3**
- Patients with Child-Turcotte 8 to 10, or MELD 18 to 24 are controversial.
- **Patients with Child-Turcotte =/> 11, or MELD =/> 25 are not treatment candidates.**

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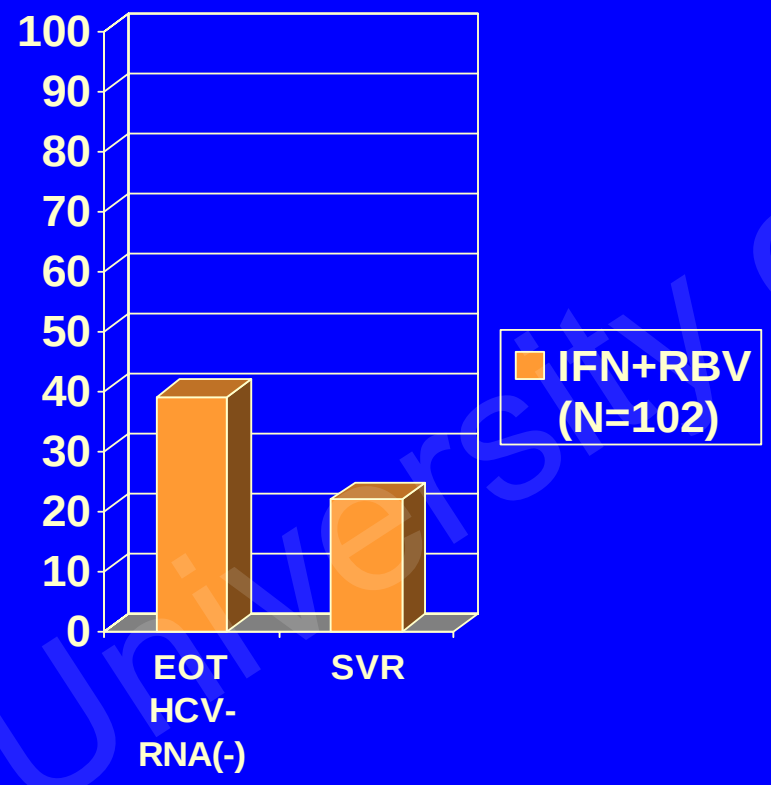
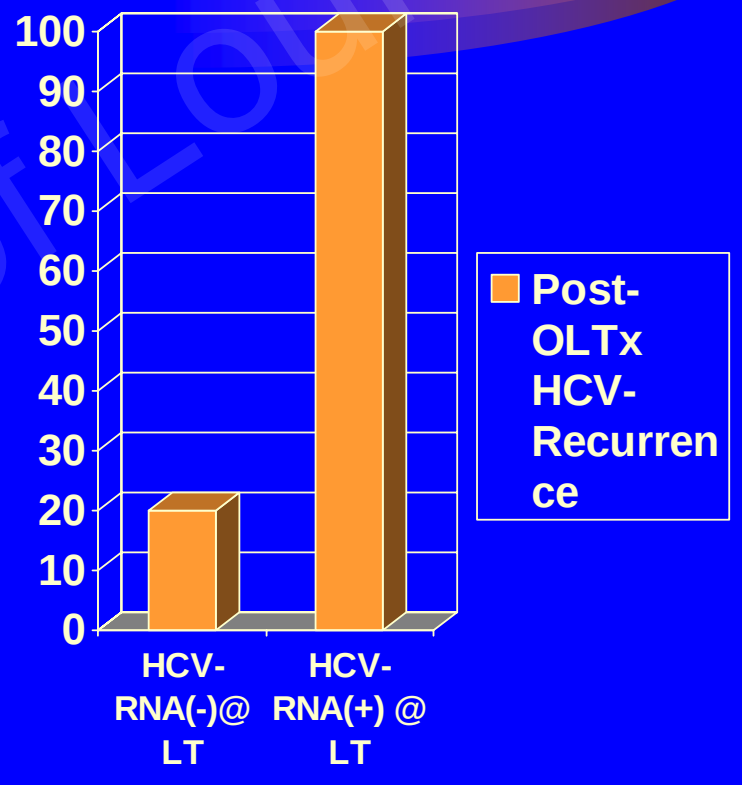
Effect of pre-LT Therapy on Post-OLTx Outcome in Cirrhotics listed for LT

Everson et al. Rev. Gastrointest Disord 2004;4 Suppl 1:S31-38





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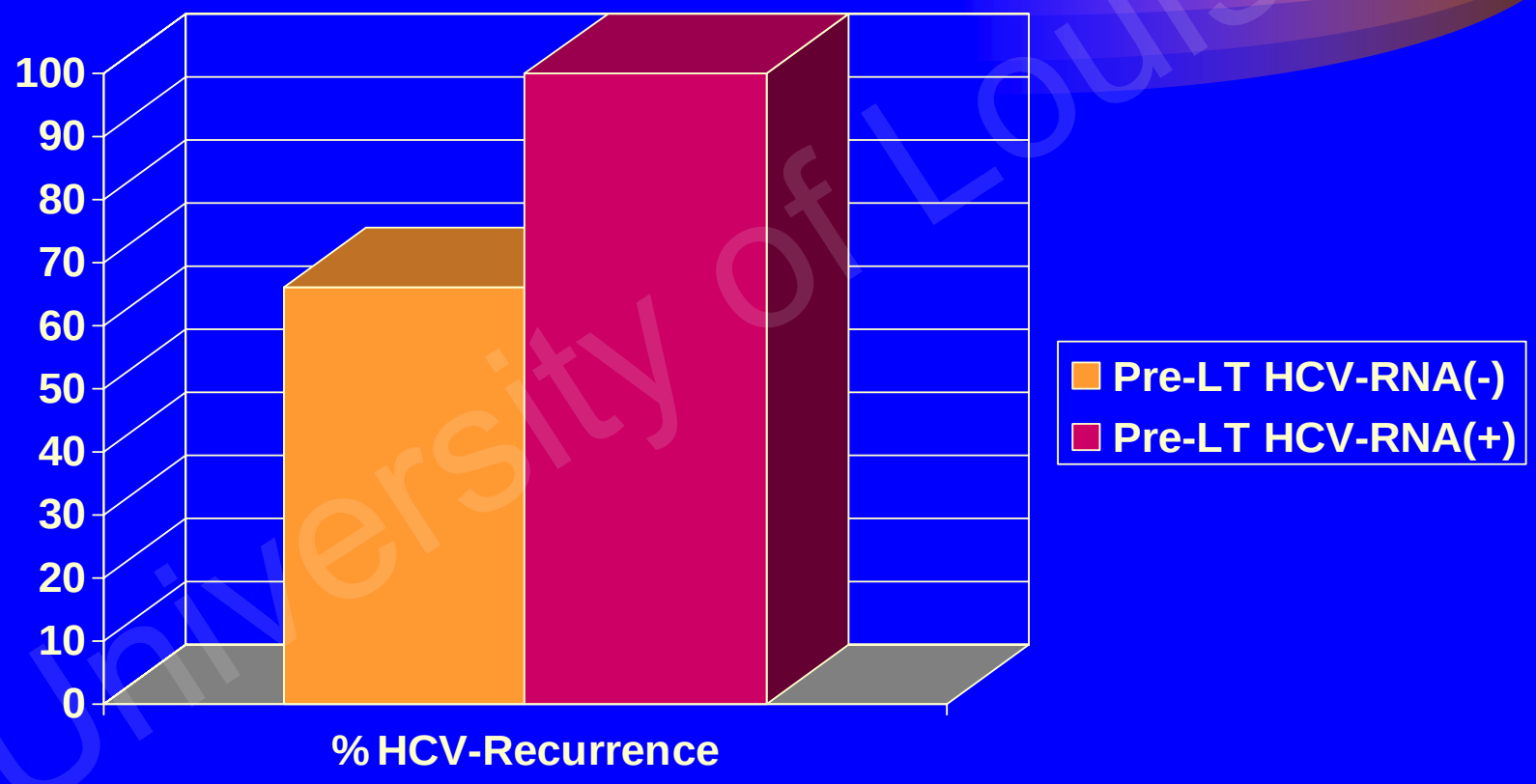
Post OLTx HCV-Recurrence in Listed Cirrhotics Treated with Daily IFN Monotherapy

Thomas et al. Liver Transpl 2003;9:905-915



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Live-Donor Adult Liver Tx

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Live-Donor Adult Liver Tx

- 5% of transplants in USA. (learning curve = 20 cases)
- Donor: (30-45% of potential donors donate; aborted hepatectomy in 5%)
  - 30% offspring, - 20% sibling,
  - 20% parent, - 20% unrelated,
  - 10% other relative/unknown.
- Donor age: 50% > 50 years old.
- Donor risk: (14 death, 1 vegetative state, 2 LT/ 6-7000 live-donors)
  - 0.4% mortality,
  - 0.4-0.6% catastrophic complication, &
  - 35% morbidity
- Patient survival: equal to cadaver-donor.

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Live-Donor Adult Liver Tx

Disease-Specific Considerations

- HCC: Must fulfill Milan Criteria
- HCV: Is acceptable indication, but appropriate timing needs further investigation (not too early).
- FHF: Acceptable indication for emergency transplantation.

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Live-Donor Adult Liver Tx

Donor Evaluation

- Complete history & physical with “ideal & actual body weight”.
- CBC, CMP, serologic testing, comprehensive coagulation profile, markers of liver disease, other tests as indicated by Hx & PE.
- Psychosocial evaluation.
- Radiology: liver volume & vascular anatomy; biliary anatomy pre-op or intra-op.
- Pre-op liver Bx is controversial (do if: abnl. enzymes, or steatosis by imaging, or BMI > 30, donor genetically related to patient with AIH, PSC, or PBC)

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Live-Donor Adult Liver Tx

Donor Evaluation

- Donor age-limit of 60 is considered appropriate.
- BMI > 30 may increase risk to donor, but is not absolute contraindication.
- Volumetric imaging analysis may overestimate liver volume by 10%.
- Calculated donor-remnant should be at least 30% of original liver volume & with complete venous drainage.
- Graft-liver-volume to recipient-body-weight ratio (GWBWR) should be =/> 0.8%.

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Live-Donor Adult Liver Tx

Donor Evaluation

- ABO compatibility is recommended.
- ABO incompatible only in:
  - a) infants,
  - b) child < 1y/o without isoagglutinins,
  - c) emergency situation where no deceased-donor available
- Lab contraindications: HIV, HCV, HBsAg(+), anti-HBc(+)
- Thromboembolism prophylaxis recommended.
- Autologous blood storage should be offered.

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“Small-for-Size” Syndrome (SFSS)

- Partial liver graft unable to meet functional demands of recipient: poor early graft function in absence of ischemia.
- Prevention: in cirrhotic GWBWR must be =/> 0.85%
- Manifestations:
  - Poor bile production
  - Prolonged cholestasis
  - Significant ascites
  - Coagulopathy

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"Small-for-Size" Syndrome

- Biochemical profile:
  - Elevated Direct (& total) bili
  - Mild/moderate elevation of ALT & AST
  - Prolonged PT
- Histologic Features:
  - Cholestasis with "bile plugs"
  - Areas of regeneration & ischemia with patchy necrosis.
- Prognosis: 50% of recipients will die of sepsis within 4-6 weeks.

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"Small-for-Size" Syndrome

- Recipient Factors Predictive of poor-outcome/ SFSS
  - Graft mass
  - Poor metabolic & physical recipient condition
  - Advanced chronic liver disease & severe portal hypertension
  - Impaired venous inflow and/or outflow.

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Questions ?

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Hepatopulmonary Syndrome

- Extra MELD points may be given (24 points) if $PaO_2 < 60mmHg$
- Worsens 5 mmHg PaO_2 per year.
- LTx mortality increases to 34% with $PaO_2 < 50$ mmHg or MAA shunt > 20%; data is not conclusive yet.
- TIPS is controversial; Coil embolization of discrete A-V fistulas may help (but is uncommon)

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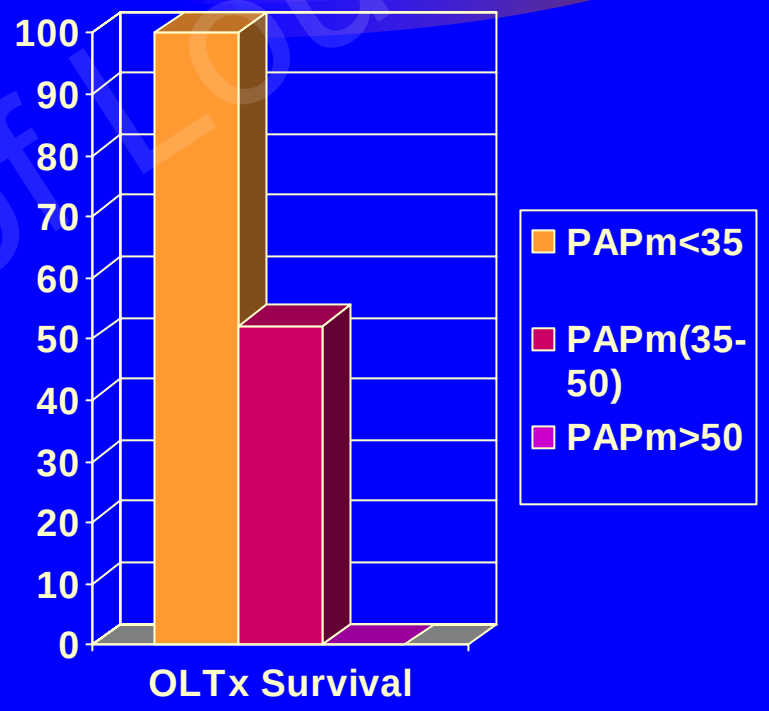
Caution in PPHTN

- Avoid Beta-blockers
- Avoid Ca channel blockers
- Avoid Anticoagulation



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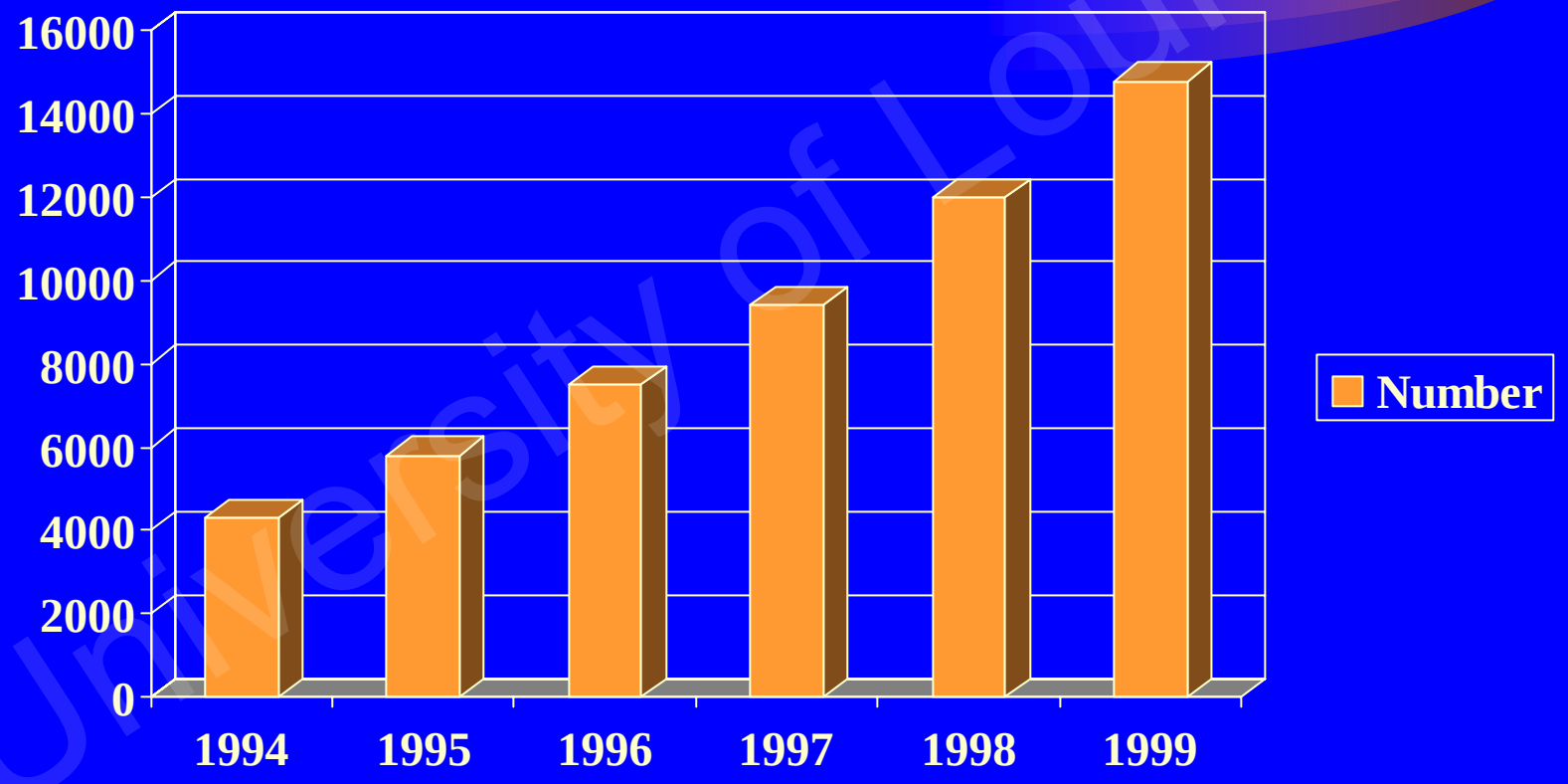
Liver Transplant Waiting List



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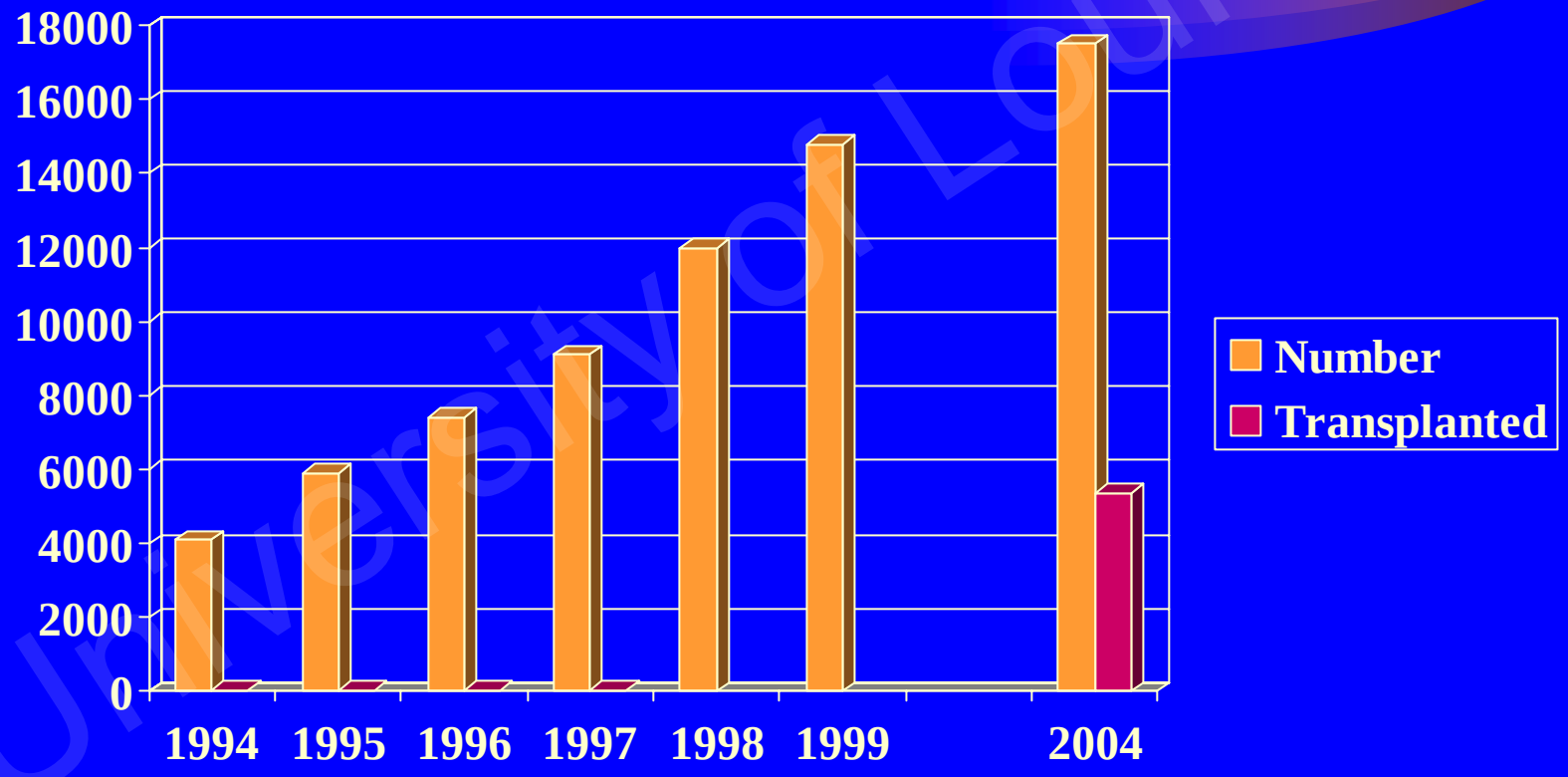
Liver Transplant Waiting List



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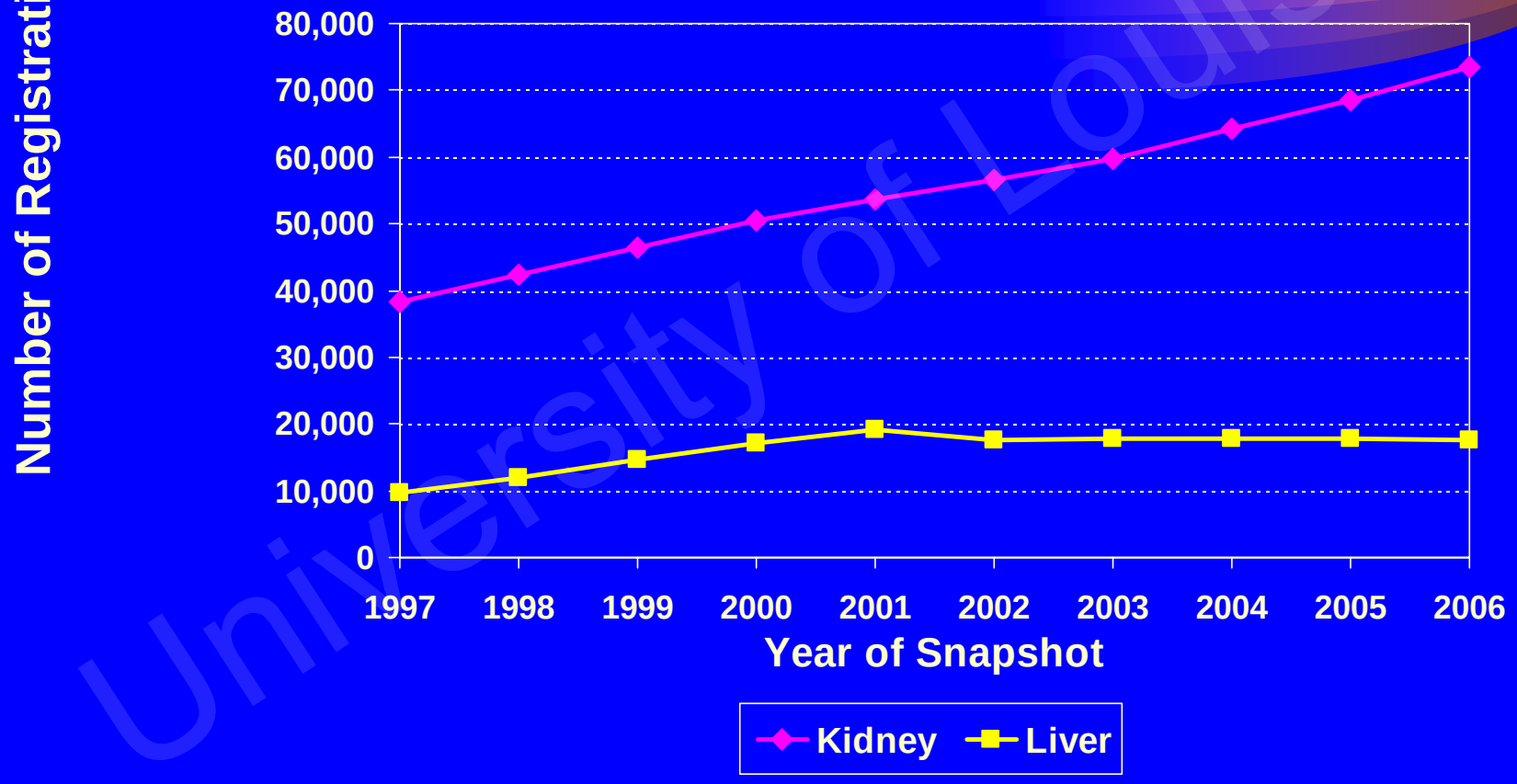
Waiting List Registrations 1997-2006

U.S.



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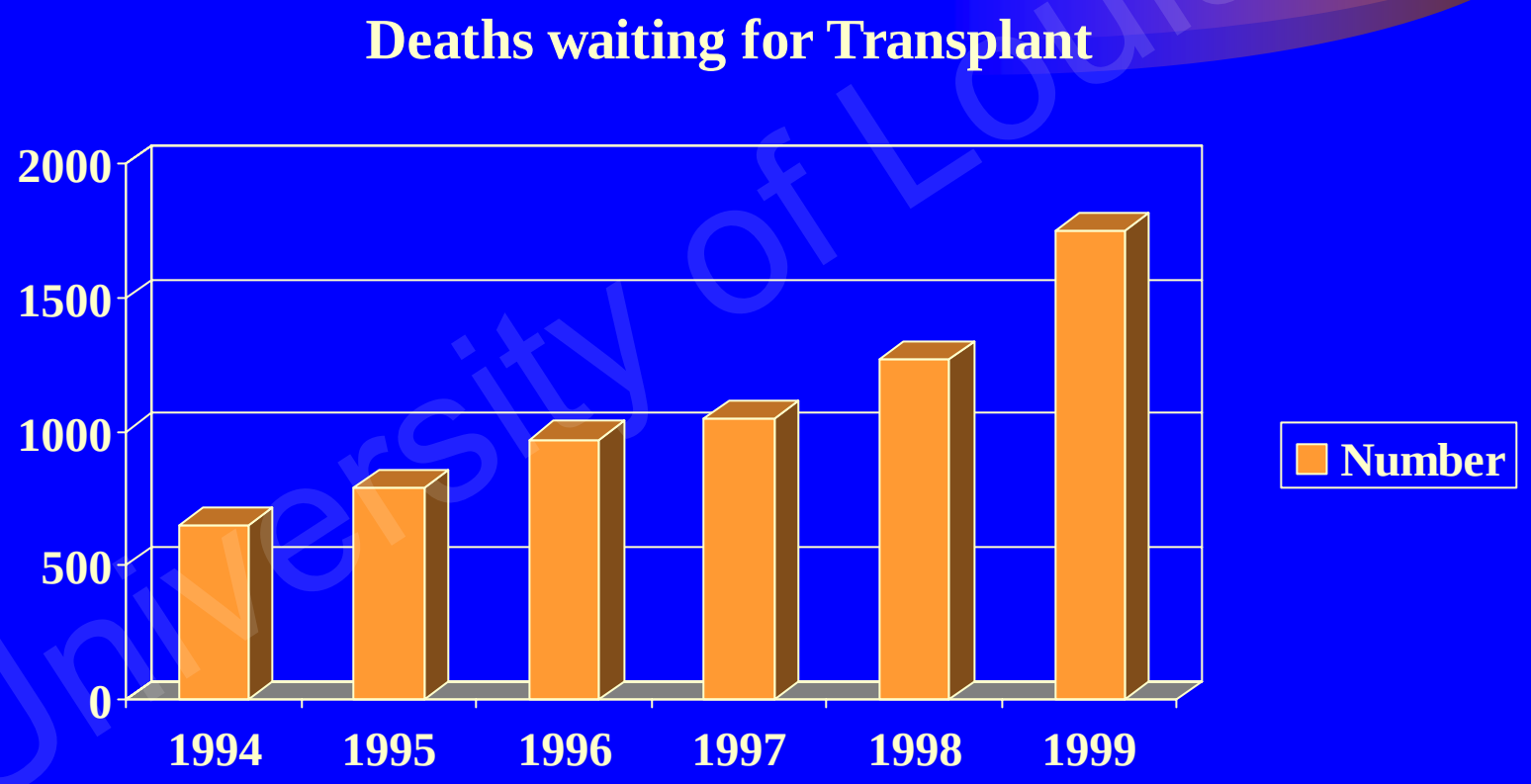
Liver Transplant Waiting List Deaths



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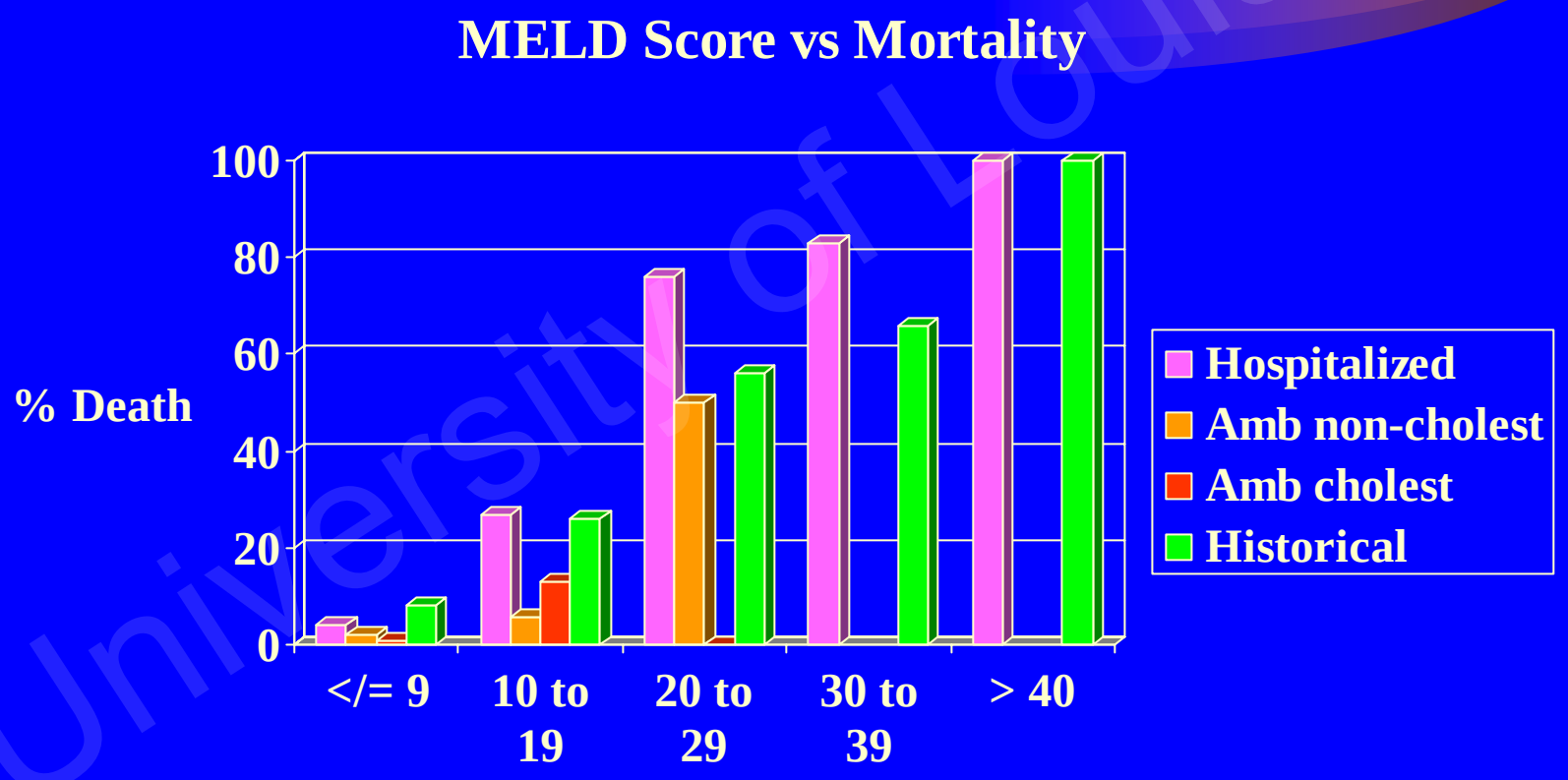
MELD

Three-month Death Rates



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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Small-for-Size Syndrome**:
  - Four of 6 criteria:
    - a) >5 days post-LDLT;
    - b) Bili >10 mg/dL without obstruction/rejection;
    - c) Bile-duct ischemia/leak;
    - d) INR =/>1.5;
    - e) Significant ascites;
    - f) Liver Bx with centrilobular ballooning, necrosis, and cholestasis.
  - POINTS: MELP/PELD equivalent to 50% mortality, with increase of 10% mortality every 3 months.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Cystic Fibrosis**:
  - Liver alone: If FEV_1<40%: add MELD points equivalent to 10% mortality now and every 3 months.
  - Liver-Lung: If FEV_1<40%: 40 MELD points.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Familial Amyloidotic Polyneuropathy**:
  - Diagnosis confirmed by TTR gene mutation by DNA analysis or mass spectrometry in tissue
  - POINTS: Initial MELD of 15% mortality, then MELD increase equivalent to 10% mortality every 3 months (for “domino transplant”.)

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Primary Hyperoxaluria type 1**:
  - Proven deficiency of alanine:glyoxylate aminotransferase (AGT) by liver Bx analysis
  - POINTS:
    - a) Less than 1y/o: PELD 40;
    - b) > 1y/o with ESRD on HD, for Liver-Kidney: MELD/PELD equivalent to 15% mortality, with increase in 10% mortality every 3 months;
    - c) OLTx before renal injury or Liver-Kidney before ESRD: MELD/PELD equivalent to 10% mortality, with increase in 10% mortality every 3 months.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Hereditary Hemorrhagic Telangiectasia**:
  - Diagnosis: by abdominal CT with characteristic changes (diffuse heterogeneous enhancement & enlarged hepatic artery)
  - POINTS: At Regional Review Board discretion;
    Consider MELD 40 for acute biliary necrosis, and MELD 22 for intractable heart failure.

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MELD Exceptions

Liver Transpl. 12:S85-136, 2006

- **Polycystic Liver Disease**:
  - Massive PLD (cyst/parenchyma ratio > 1), **AND**
  - Have either cachexia, ascites, variceal bleeding, hepatic outflow obstruction, biliary obstruction, albumin < 2.2mg/dL, low Mid-Arm Circumference (<23.1 cm in females, <23.8 cm in males), cholestasis, or recurrent cyst infection.
  - POINTS: At Regional Review Board discretion.
    - 1) Without renal insufficiency: initial MELD of 15; add 3 points every 3 months ***with reapplication***.
    - 2) With renal insufficiency CrCl < 30: initial MELD 20; add 3 points every 3 months ***with reapplication***.

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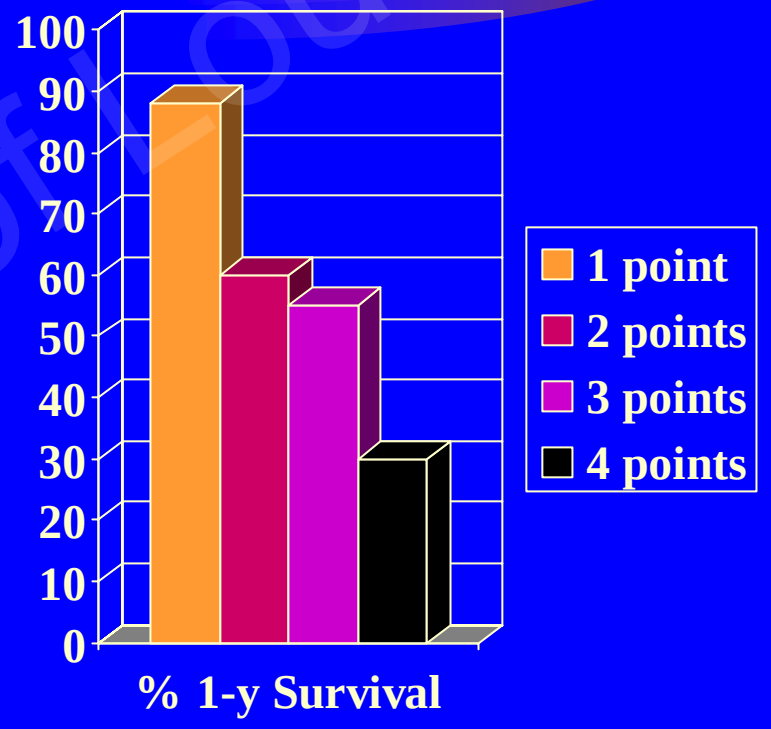
Re-LTX 1-year Survival by UCLA Class

- **POINTS (1 each)**
- Age > 18
- Liver ischemia > 12 h
- Pre-op in ventilator
- Creatinine > 1.6 mg/dL
- Bilirubin > 16 mg/dL



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Predictors of Alcohol Relapse
(Kelly 2006)

- Depression
- Lack of stable partner (family & friends)
- Tobacco use
- Lack of insight
- Amount of alcohol (gm/day) before evaluation
- **LENGTH OF ABSTINENCE WAS NOT A PREDICTOR**

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