

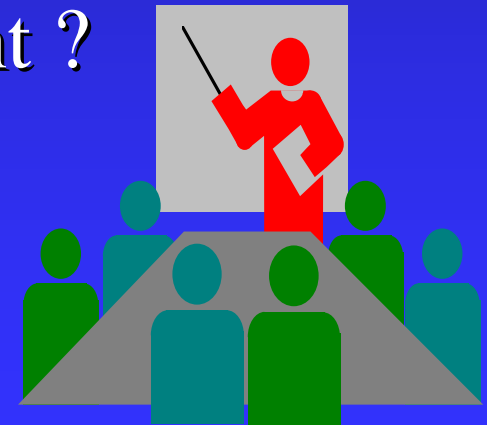
Living Donor Liver Transplant & PSC



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Overview

- What is meant by liver failure ?
- When should I get on the transplant list ?
- Once I'm on the list, then what ?
- What about after the transplant ?





What is meant by
"liver failure"?

Typical Features of Liver Failure

- Jaundice (yellow whites of the eyes & skin)
- Clotting problems (easy bruising/bleeding)
- Fluid build-up in ankles & stomach (ascites)
- Infection of the stomach fluid (peritonitis)

Typical Features of Liver Failure

- Kidney failure (also sometimes due to meds)
- Internal (GI) bleeding (varices, etc)
- Mental confusion/coma (encephalopathy)

Typical Features of Liver Failure

- One or more of these features may occur
- Other common symptoms in PBC or PSC:
 - ◆ Itching, fatigue, other autoimmune problems
(thyroid issues, altered skin pigmentation)
 - ◆ These do not reflect liver failure *per se*

Case: Mr RW

- 28 yo man with severe itching
- Abnormal liver tests: diagnosis ?
- Blood tests, liver biopsy, CT scan and ERCP confirmed the diagnosis of PSC
- Itching resolved on Ursodiol

Case: Mr RW (cont'd)

- Recently gained 20 lbs in weight and stomach protruding alot
- Started on a low sodium diet
- Also on water pills, but not much help

Case: Mr RW (cont'd)



Case: Mr RW (cont'd)

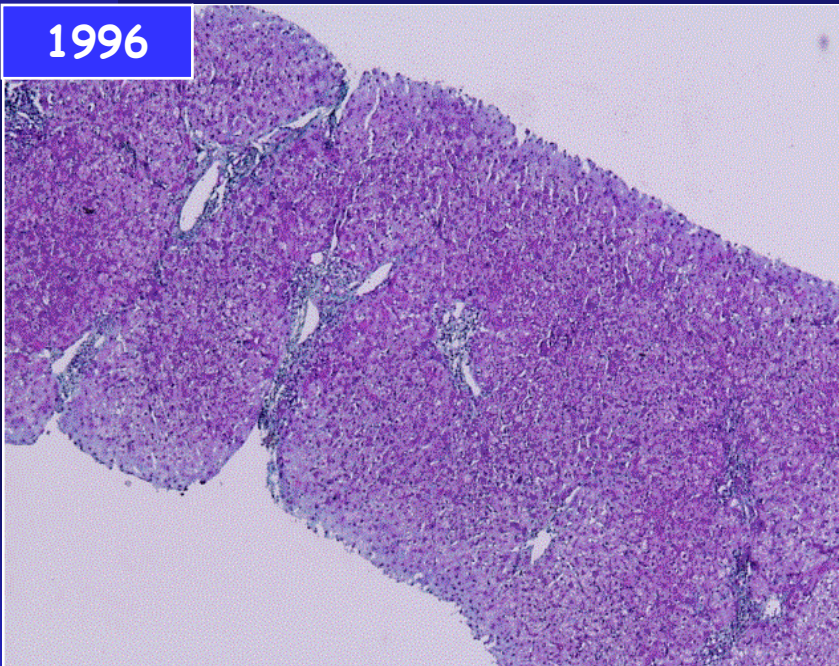
- CBC - normal apart from low platelets
- Total Bilirubin 4.2
- INR 1.2
- Alkaline Phosphatase 340
- AST 40, ALT 58

Case: Mr RW (cont'd)

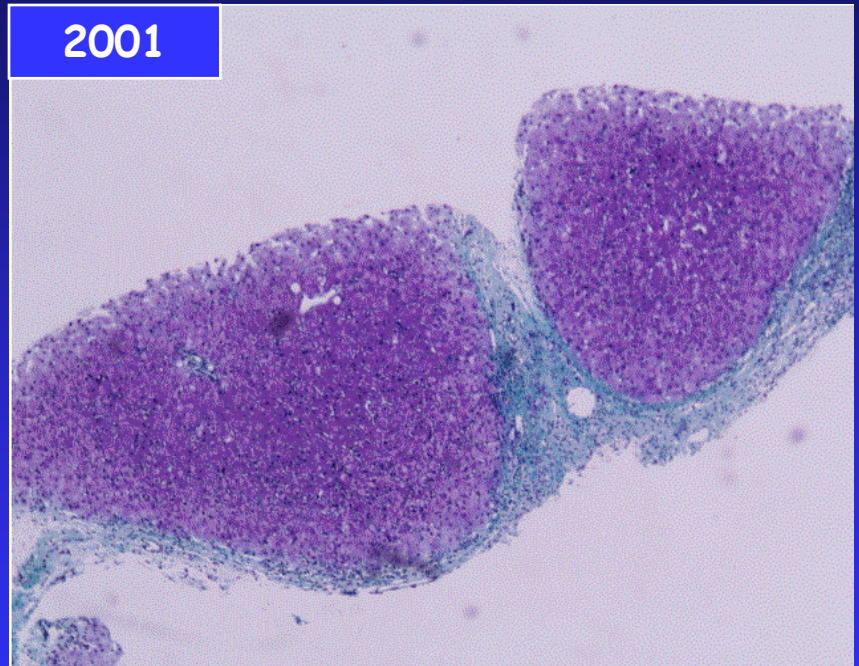
- Albumin 2.3
- Creatinine 1.9
- Alphafetoprotein 8 (normal < 10)
- Other tumor markers negative

Case: Mr RW (cont'd)

1996



2001



Previous Liver Biopsies



**Can we quantify
liver function and
predict patient
outcome ?**

Child's Score

Points →	1	2	3
<i>Encephalopathy</i>	None	Easily controlled	Difficult to control
<i>Ascites</i>	Absent	Easily controlled	Mod-Severe despite meds
<i>Total Bilirubin (mg/dL)</i>	< 2	2 - 3	> 3
<i>Albumin (mg/dL)</i>	> 3.5	2.8 – 3.5	< 2.8
<i>INR</i>	< 1.7	1.7-2.3	>2.3

Child's A = 5-6; Child's B = 7-9; Child's C = 10-15

Case (Mr RW)

- Fluid build up poorly controlled (3)
- No confusion (encephalopathy) (1)
- Total bilirubin 4.2 (3)
- Albumin 2.3 (3)
- INR 1.2 (1)

CTP Score = 11
(Child's C)

MELD Score

- Found to predict outcome of TIPS (shunt)
- 3-month mortality correlated with:
 - Serum Creatinine
 - Total Bilirubin
 - INR (Prothrombin time)
- Independent of excess fluid, confusion, etc
- Now used by UNOS to list patients for Tx

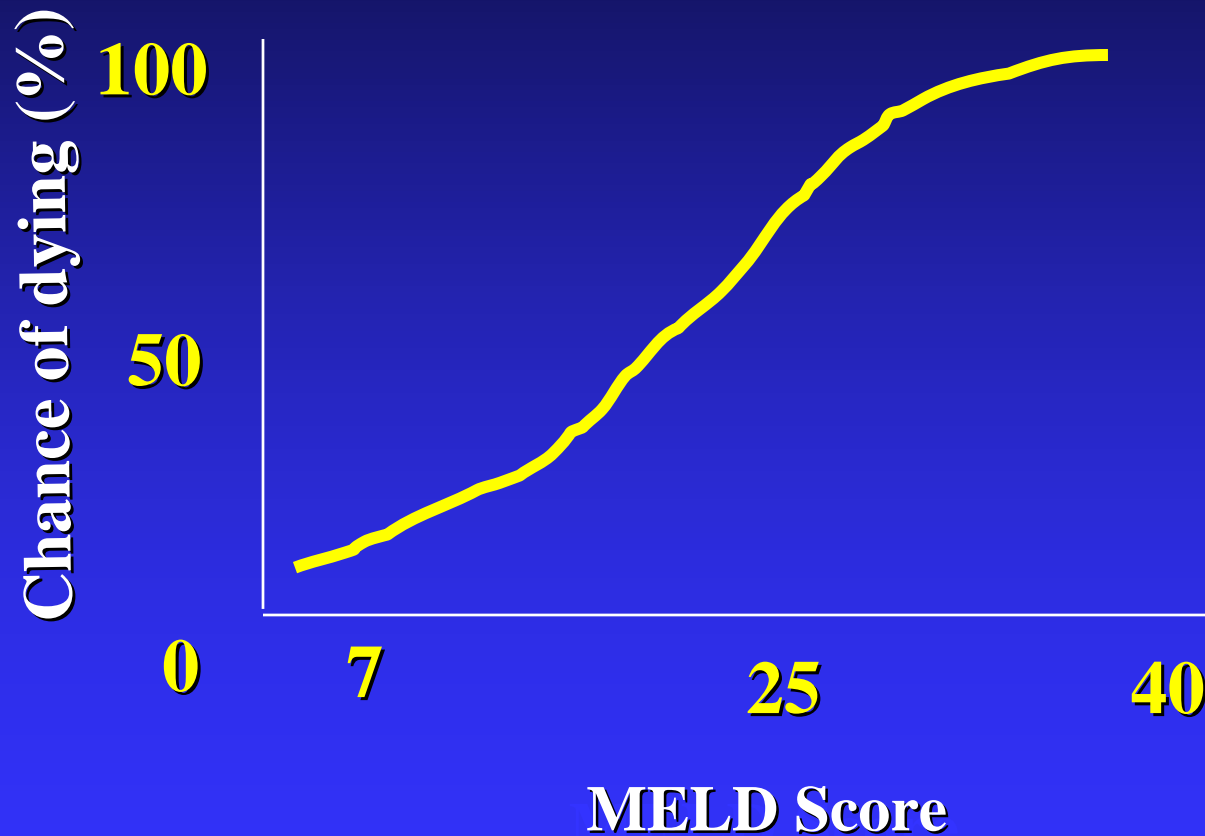
MELD it !

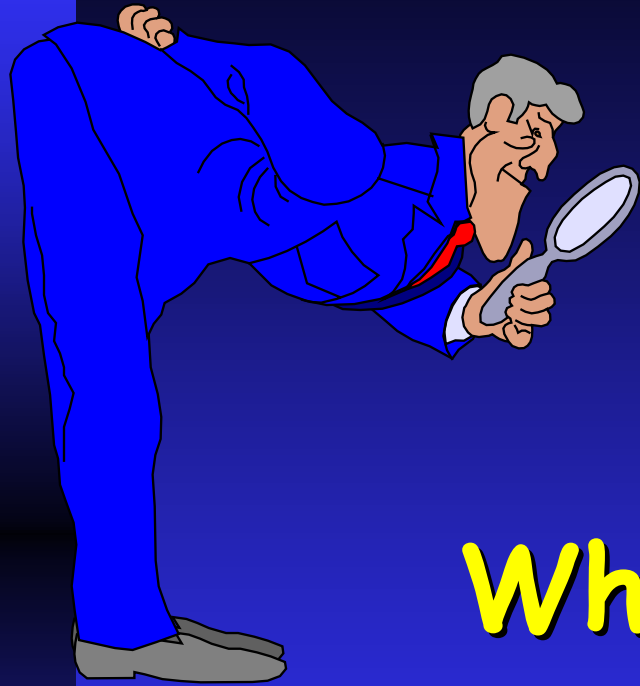
- Serum Creatinine (1.9 mg/dL)
- Total Bilirubin (4.2 mg/dL)
- INR (1.2)

$$\begin{aligned} \text{MELD Score} &= (0.957 \times \log_e 1.9) + (0.378 \times \log_e 4.2) \\ &+ (1.120 \times \log_e 1.2) + 0.643 = 2.039 \times 10 = \underline{\underline{20}} \end{aligned}$$

www.mayo.edu → search word MELD

MELD 3-Month Mortality



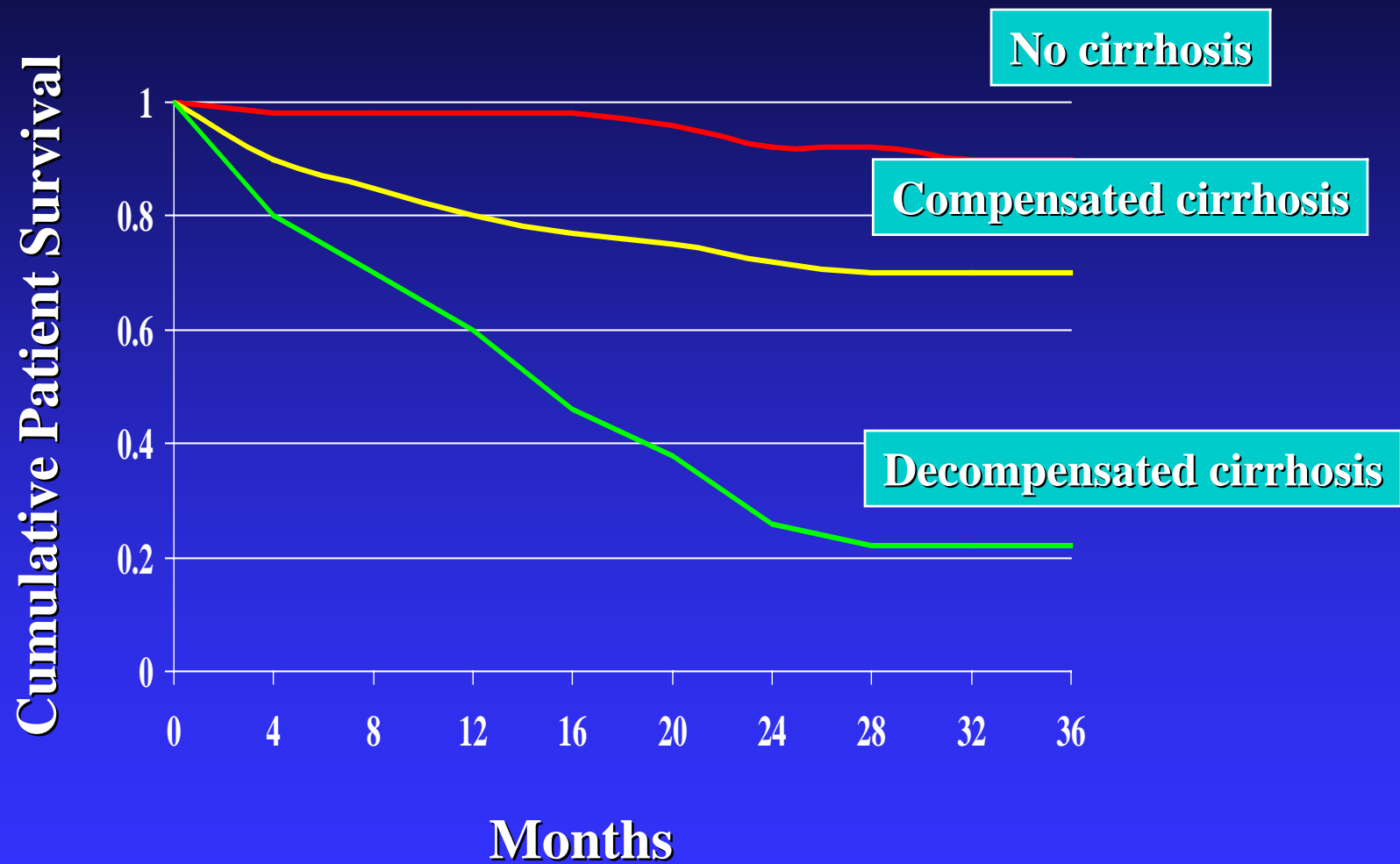


**When is it best to
proceed to a liver
transplant ?**

When is transplant best?

- When risk of dying without a liver Tx is higher than with a transplant
- Child's score of at least 7 (Child's B)
- MELD at least 7 (may soon change to 10)
- Usually taken as greater than 50% chance of not surviving more than 1 year

Outcomes with liver failure



Case: Mr RW (cont'd)

- Referred to liver transplant team
 - ◆ Hepatologist
 - ◆ Social Worker / Psychiatrist (selected cases)
 - ◆ Anesthesiologist
 - ◆ Transplant Surgeon

Case: Mr RW (cont'd)

- Blood work including blood type, HIV, etc
- Echocardiogram (stress in select cases)
- Breathing tests in select cases
- CT scan, Doppler Ultrasound, etc
- GI endoscopies as warranted

Case: Mr RW (cont'd)

- Eligibility decided by transplant team
- UNOS notified and patient "listed"
- Close follow-up by local physicians
- Any deterioration, team to be notified

Case: Mr RW (cont'd)

- MELD recalculated at specific times
- Waiting time only used as "tie breaker"
- Longest wait times for O+ and A+
- Surgeon factors in patient size, etc

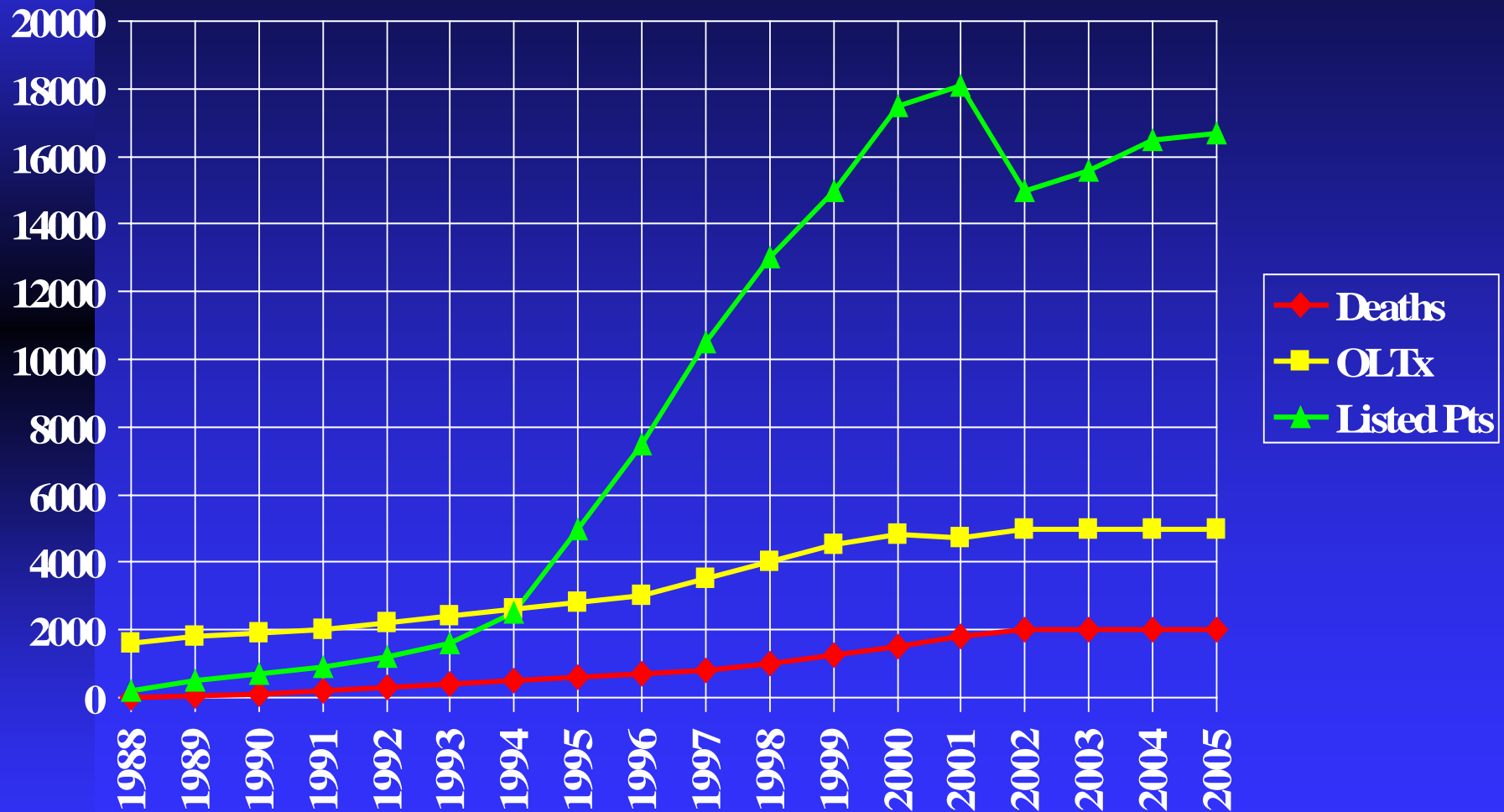


**Why consider living
donor liver transplant?**

Organ Crisis in the US (April 2006)

- 17,500 waiting for a liver transplant
- 4,500 will receive a cadaveric liver
- Hepatitis C epidemic the prime mover
- About 10% will die this year while
waiting for a new liver

Cadaveric Organ Crisis (US)



Problems specific to PSC

- Cholangiocarcinoma (cancer) occurs in PSC and very difficult to diagnose
- Cancer often advanced at time it's found
- Criteria used to upgrade MELD missing
- Low MELDs predict long wait times
- LDLT offers chance to remove “bad liver”



**Are there other options to
help the organ shortage ?**

Living Donor Liver Transplant

- 1984 Paris / Hamburg
- 1989 Chicago
- 1994 Japan
- 1997 Denver
- 2001 Rochester, NY
- Currently over 2500 done worldwide



Advantages of LDLT



- Less time waiting for the transplant
- More cadaveric organs for others on list
- Elective operation (rested team, etc)

Other advantages of LDLT

- New organ studied extensively
- Less concerns about preservation
- Similar or better outcomes than with CAD
- Acquisition costs equivalent to CAD

The downside of LDLT

- 5-15% complication rate (bile leaks)
- 0.1% risk of death (2 of 1500 donors in US)
- Financial burden to donor (\$3660 or more)
- Long-term donor health issues ?



**What are the logistics behind
a successful LDLT program?**

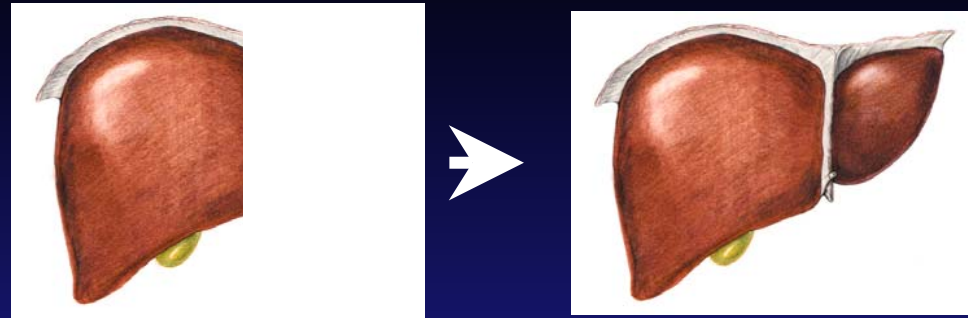
LDLT: Recipient Issues

- Recipient listed for transplant per UNOS criteria
- Outcome of transplant should not be futile
- Status 1 or status 2B (CTP); MELD 15-25 (?)
- Minimal functional mass - “small for size”

LDLT: Donor Issues

- Voluntary commitment (no “coercion”)
- No financial or other incentives
- Extensive work-up to exclude intrinsic disease and maximize donor safety
- Matching size of donor liver to recipient

Hepatic Regeneration



- Within 1 week, mass of graft and remnant left lobe increases by 87% & 101% (MRI)
- However, these findings are not universal
- Liver tests, INR & Bilirubin normalize by post-operative day 4 or 5

Workup of Potential Donor

■ Step 1

- Phone interview
- Blood type
- Routine labs

Informed Choice

■ Step 2

- H&P, Psych/Social work
- More extensive labs
- CXR, Echo, U/S, MRCP (?)

■ Step 3

- Angio (optional)
- Liver biopsy

Informed Choice

LDLT

Donor safety is the top priority

“First do no harm”

LDLT: Donor Deaths

- 3 donor deaths in Europe:
 - ◆ 1 in Germany
 - ◆ 2 in France
- 1 death in Japan in 2004 (but out of a total of 2000 donors)
- ? Other countries

LDLT: Donor Deaths

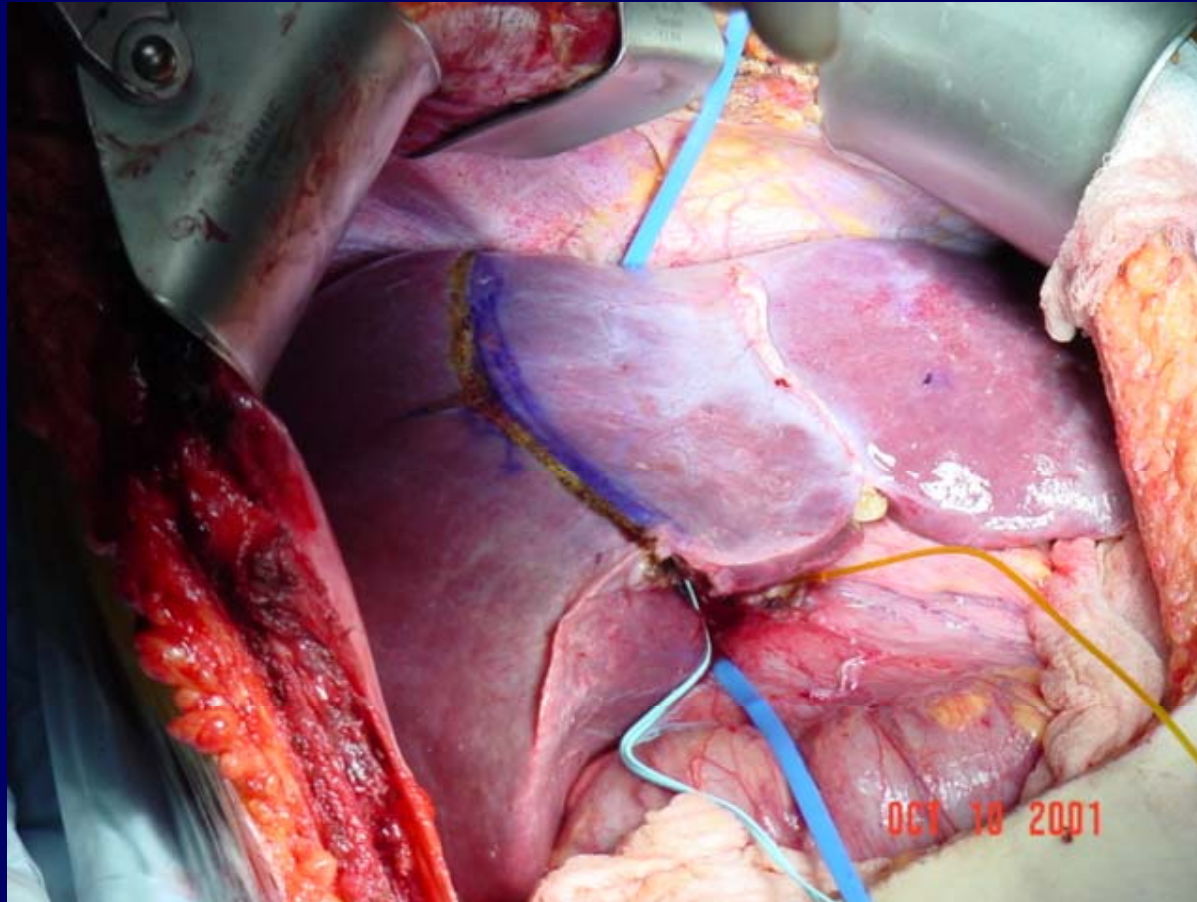
- 2 known deaths in the US
- Overall death rate (2 of 1500) = 0.1%
- 2 donors ill enough to be listed for liver transplant (1 transplanted), so overall death/liver transplant rate = 4 of 772 = 0.52%

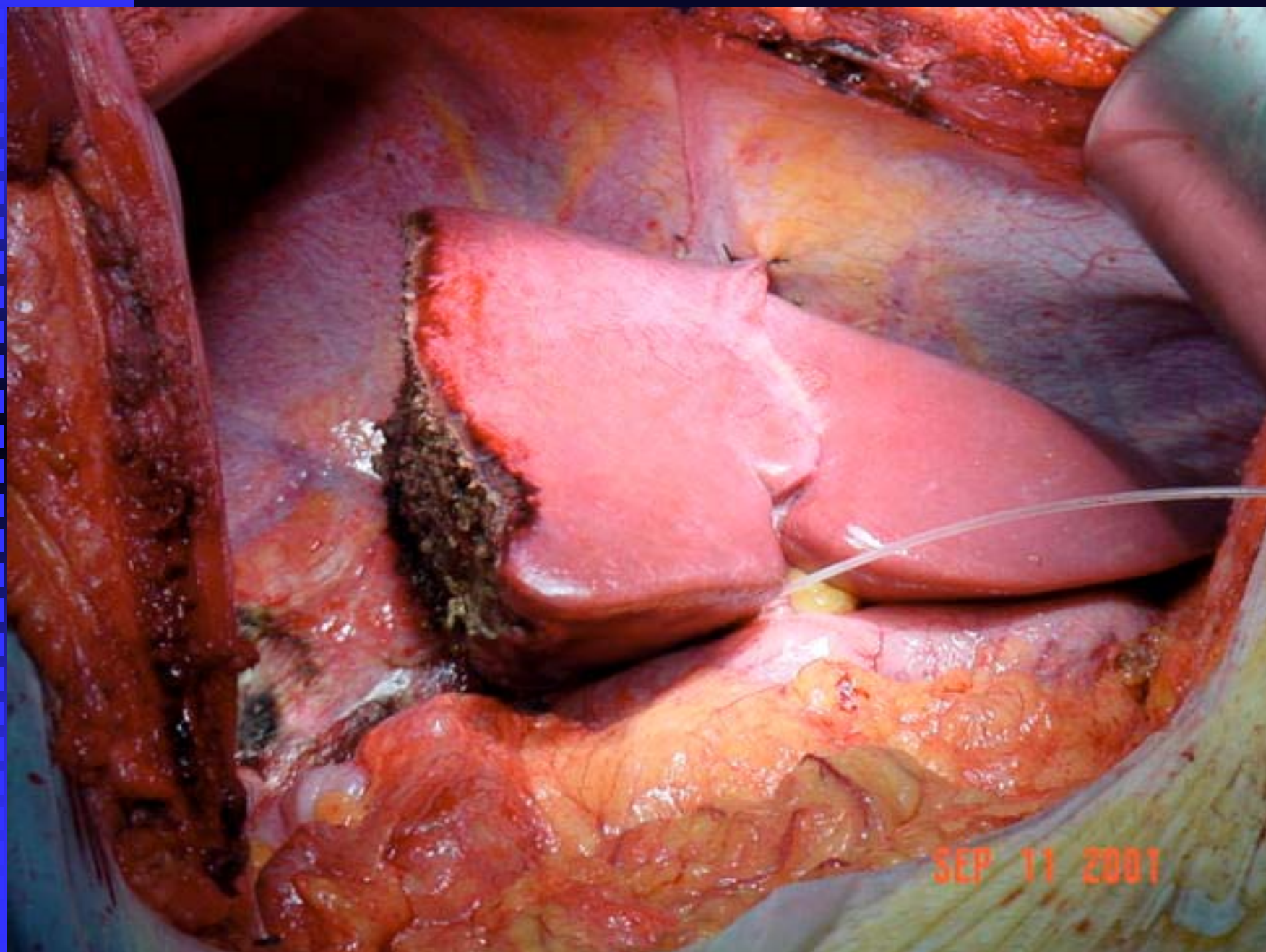
Case: Mr RW (cont'd)

- RW is listed for liver transplant
- His brother volunteers as a living donor
- Operation proceeds well
- Donor discharged home in 6 days and back at work in 6 weeks
- RW home within 3 weeks

PSC Recurrence Post-Tx

- How often does it occur ?
- Does Ursodiol help ?
- Do recurrence rates depend on the type of immunosuppression used ?
- Do living donor recipients do better ?





SEP 11 2001

Conclusions



- Ongoing gap between supply and demand
- Hep C crisis has worsened PBC waiting times
- MELD score has helped to limited degree
- Living donation now an option for about 10%
- Post-transplant issues remain controversial

Questions

