Living donor liver transplant

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Living Donor Liver Transplantation:

- Who
- What
- When
- Why

Registered U.S. Patients Waiting for Transplants

Kidney	98,383
Liver	16,863
Heart	3,171
Lung	1,653
Kidney/Pancreas	2,228
Pancreas	1,284
Heart/Lung	52
Intestine	277
Total patients	**123,911**

6,341 (2011)

Source: **www.unos.org 5/5/2012**

Deceased Donor Liver Allocation

February 2002 Changes

OLD UNOS POLICY: CTP

- Medical status ➲ ➲
- Waiting time ➲ ➲
- Local, regional, national
- Regional sharing for status 1
- Status 2A for ICU ➲ ➲ patients

NEW POLICY: MELD

- Probability of death
- No waiting time
- Local, regional, national
- Regional sharing for status 1
- No preference for ICU patients

Deceased Donor Liver Allocation

MELD Score = 0.957 x Log_e(creatinine mg/dL) + 0.378 x Log_e(bilirubin mg/dL) + 1.120 x Log_e(INR) + 0.643.

Predictive of 3 month mortality from liver disease--"sickest first"

http://www.unos.org/resources/meldPeldCalculator.asp

What is the INR ?

What is the bilirubin ?

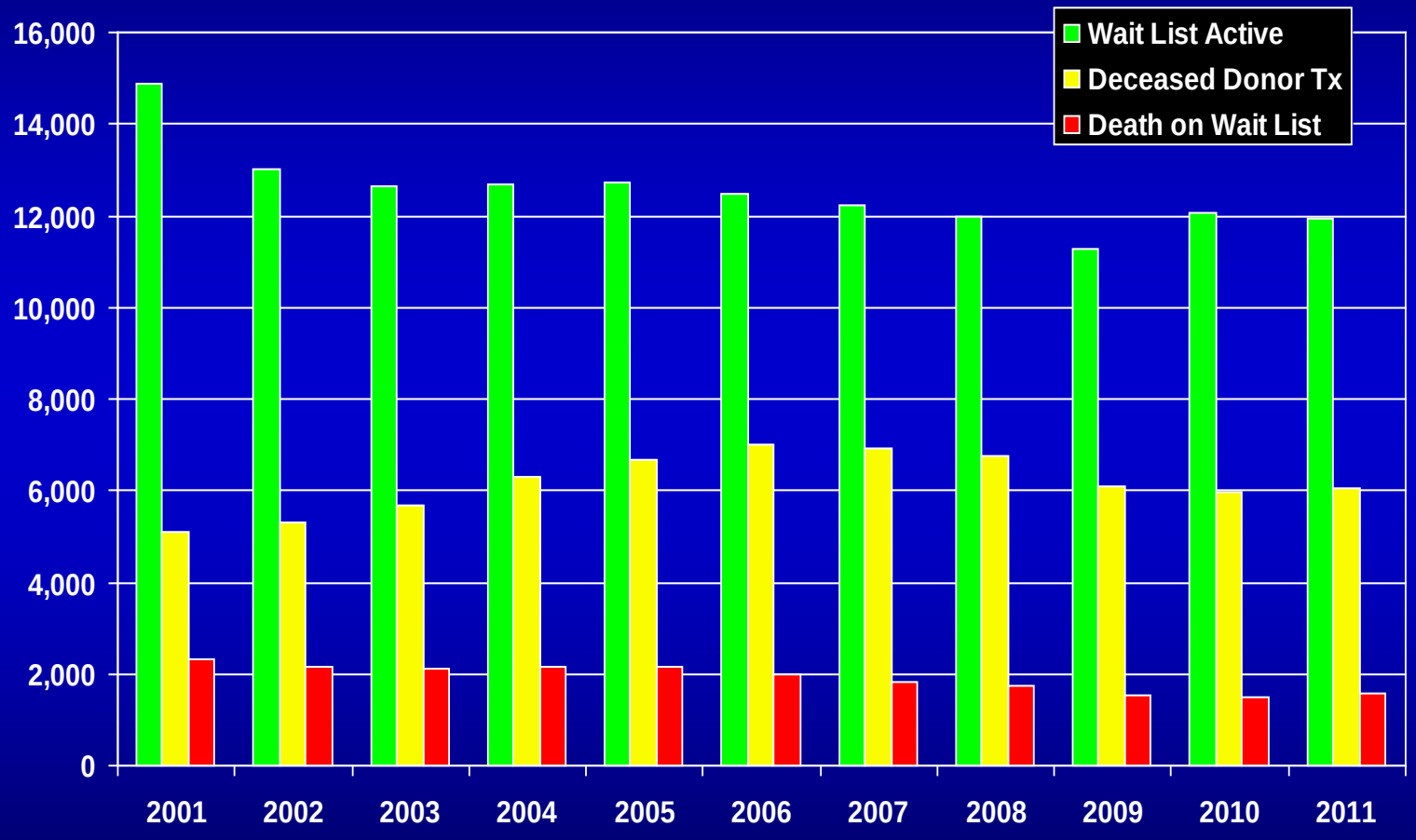
What is the serum creatinine?

Has the patient been on dialysis at least twice in the past week? yes no

calculate

MELD

Waiting List, Transplant, Deaths on List



UNOS 2009

Impact of MELD Allocation

“Too well for transplantation, too sick for life…”

JAMA, 2005

History of Living Donor Liver Transplantation

Left-lateral segment (pediatric)

Left lobe (adult)

Right lobe (adult)

Year	1989	1990	1998
Couinaud segments	II, III	II, III, IV	V, VI, VII, VIII
Graft weight	200-300 gm	300-500 gm	600-1100 gm
Recipient body weight	30 kg	30-60 kg	>60 kg

0041-1337/98/6610-1313$03.00/0
TRANSPLANTATION

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ADULT LIVING DONOR LIVER TRANSPLANTATION USING A RIGHT HEPATIC LOBE

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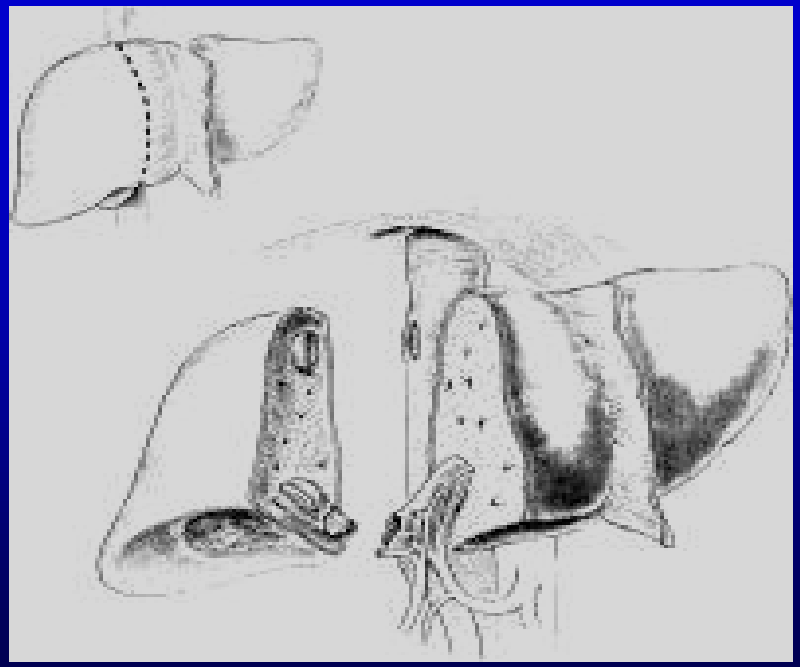
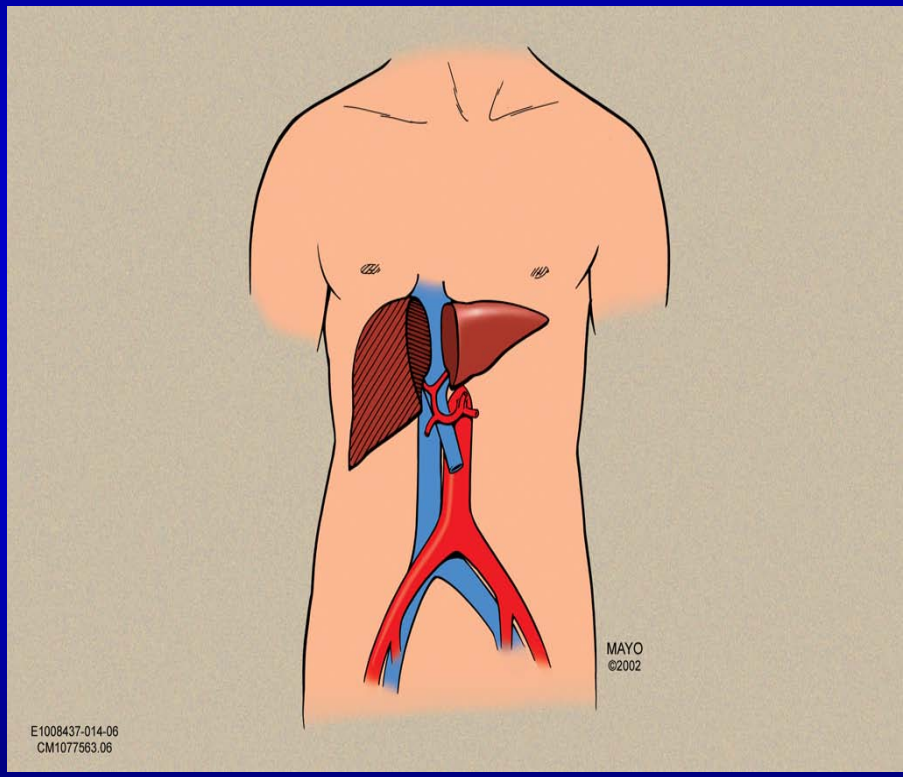


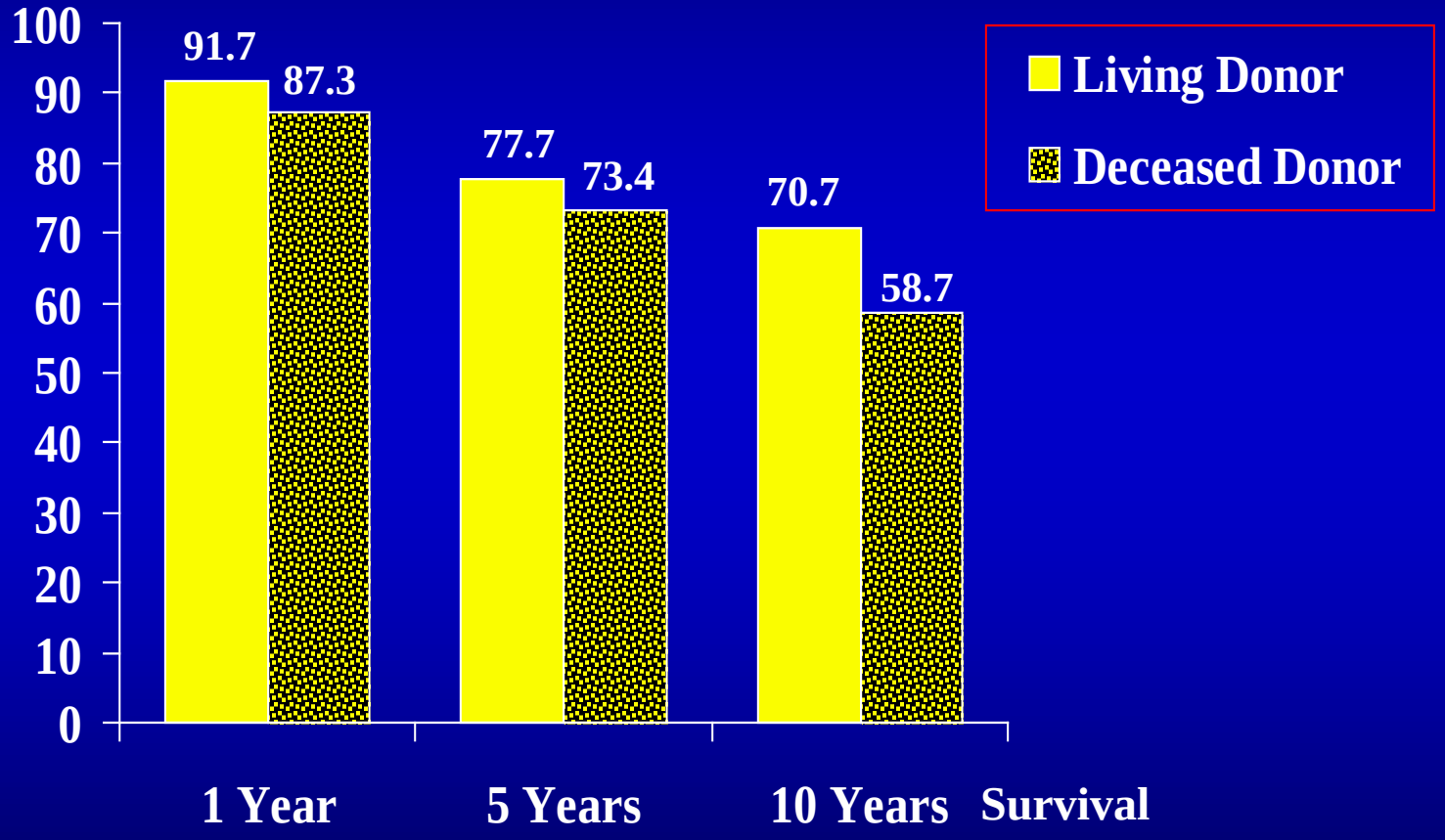
LIVING DONOR LIVER TRANSPLANTATION

Advantages

- Opportunity for timely transplantation, avoiding disease progression
- Reduces waitlist morbidity and mortality
- Healthy donor liver with short preservation time

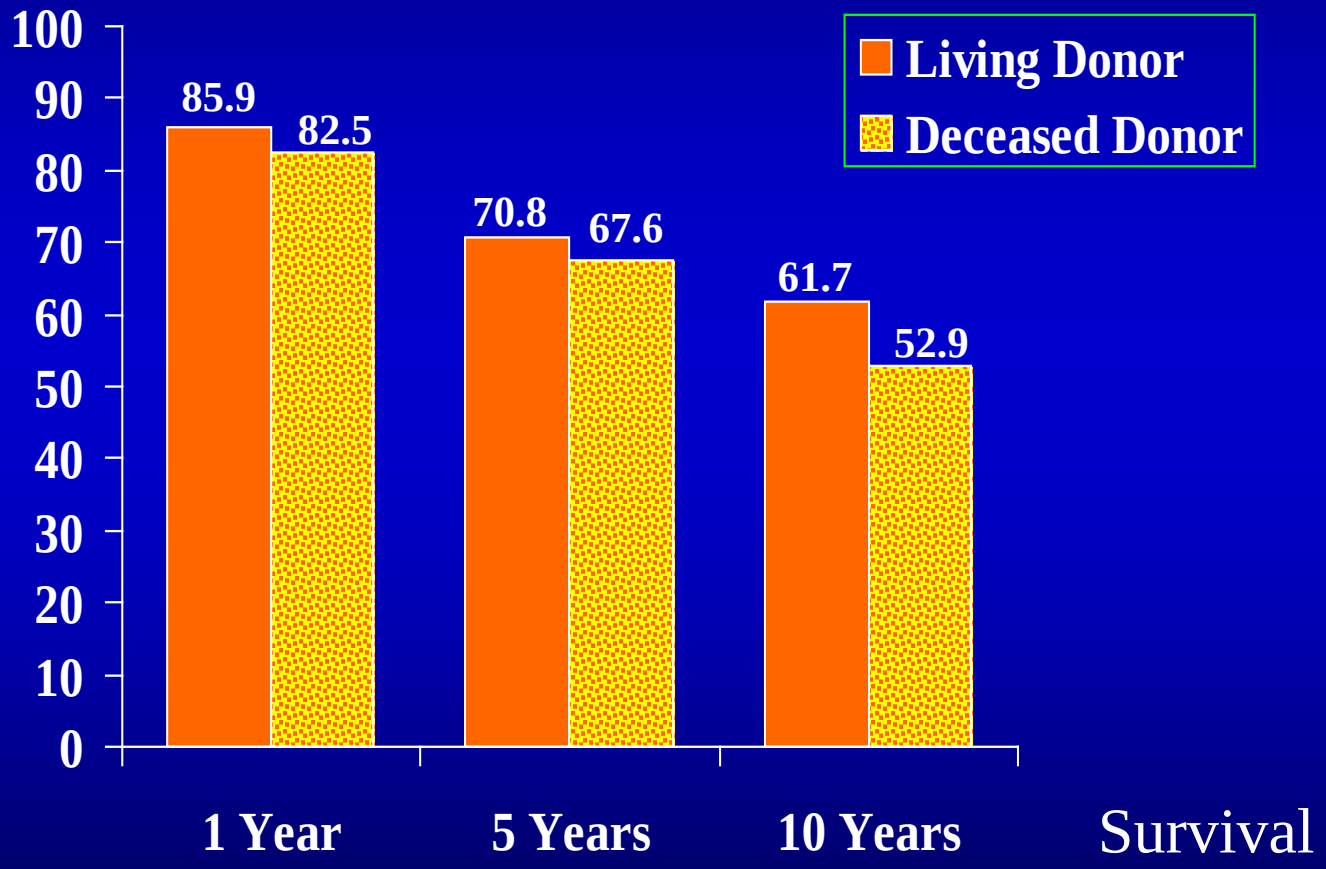


Recipient Survival Following Liver Transplantation



SRTR - 2008

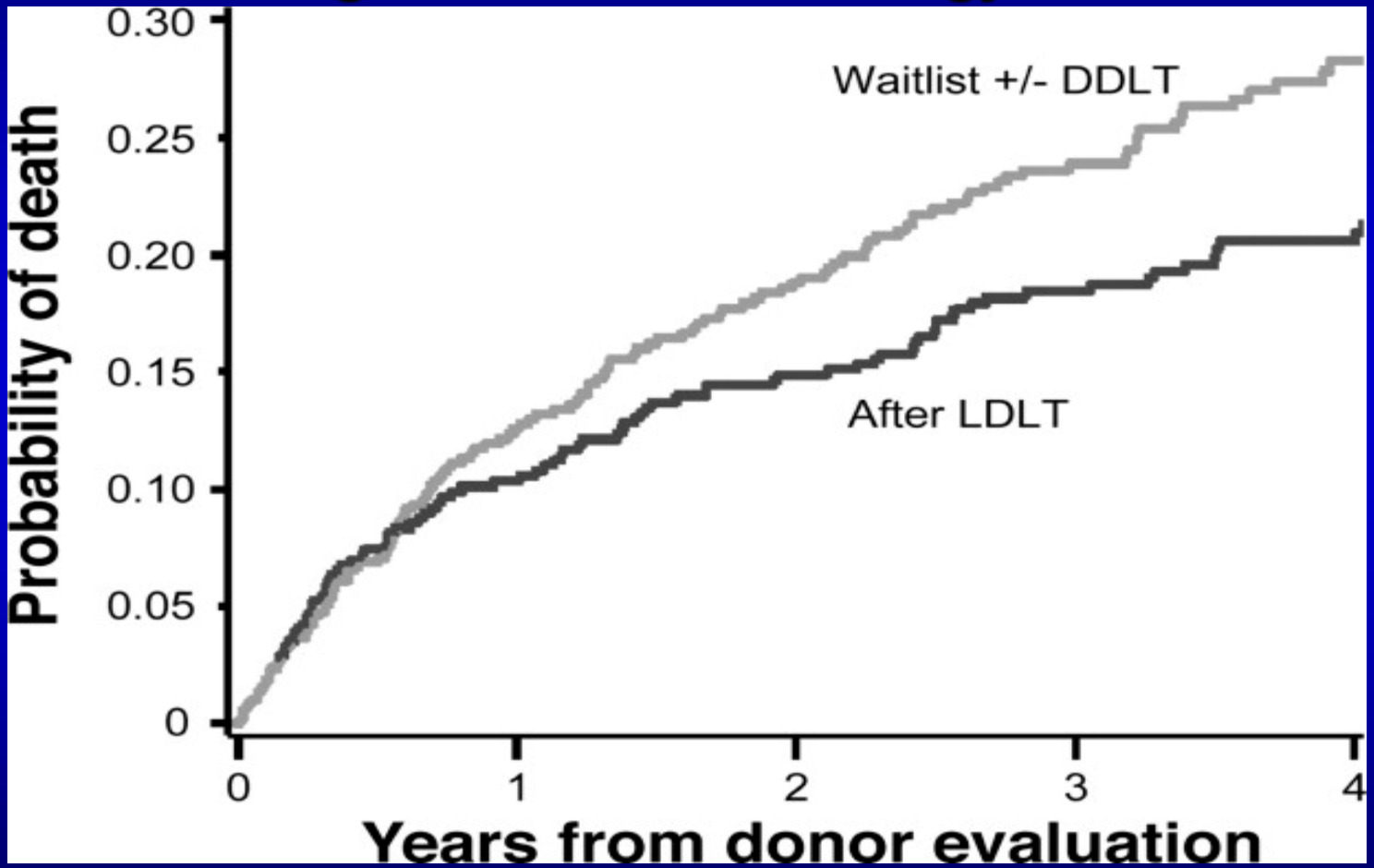
Graft Survival Following Liver Transplantation



SRTR - 2008

Improvement in Survival Associated with Adult-to-Adult LDLT

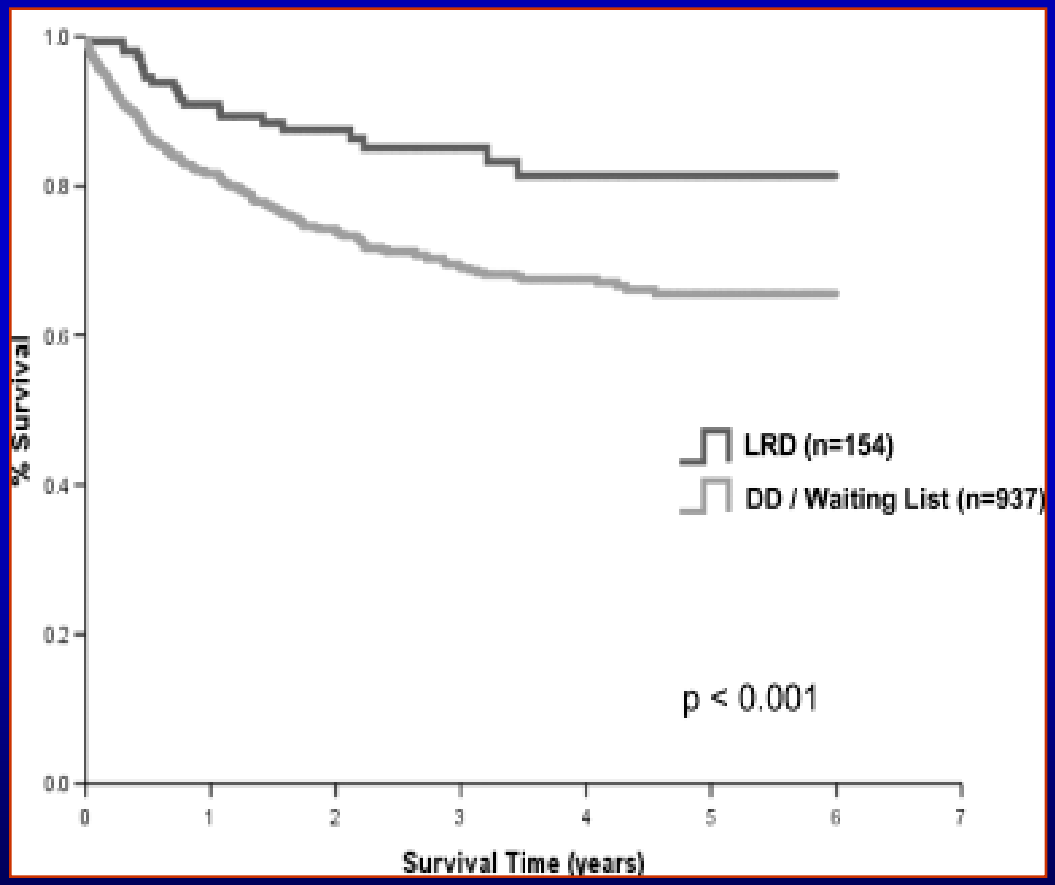
Berg et al Gastroenterology 2007



Adjusted for MELD, age, and HCC.

Patient Survival from Time of Listing

LDLT vs DDLT



Shah et al. Am J Transplantation 2007; 7:998

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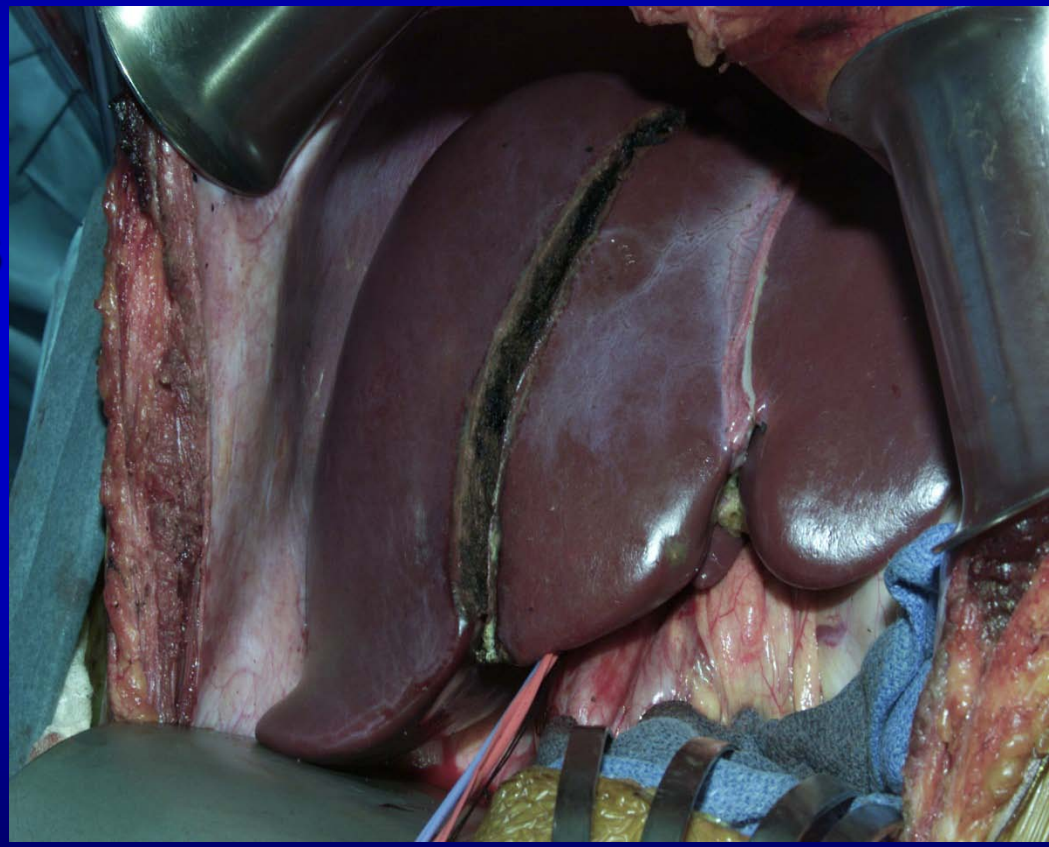
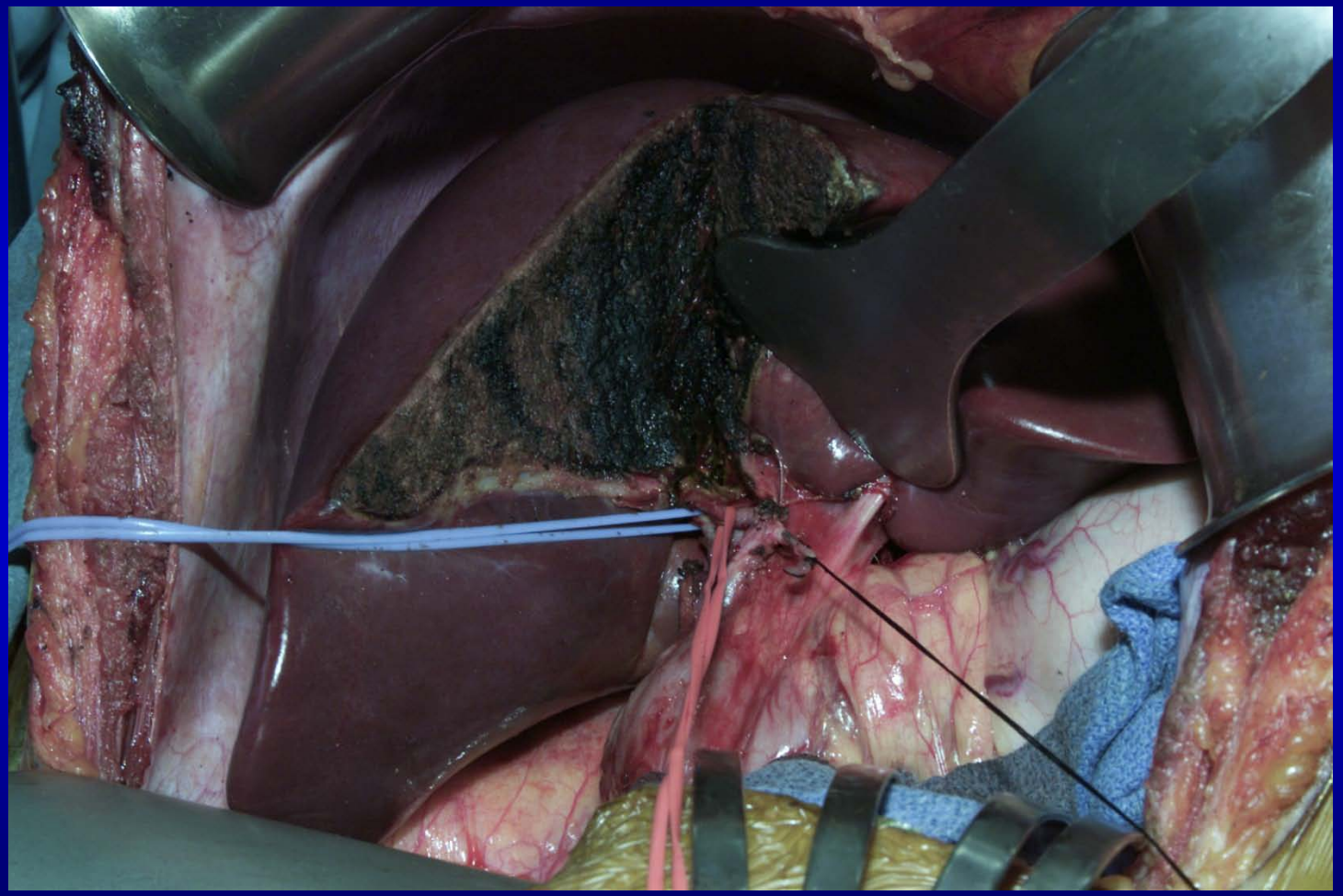
LIVING DONOR LIVER TRANSPLANTATION

Disadvantages

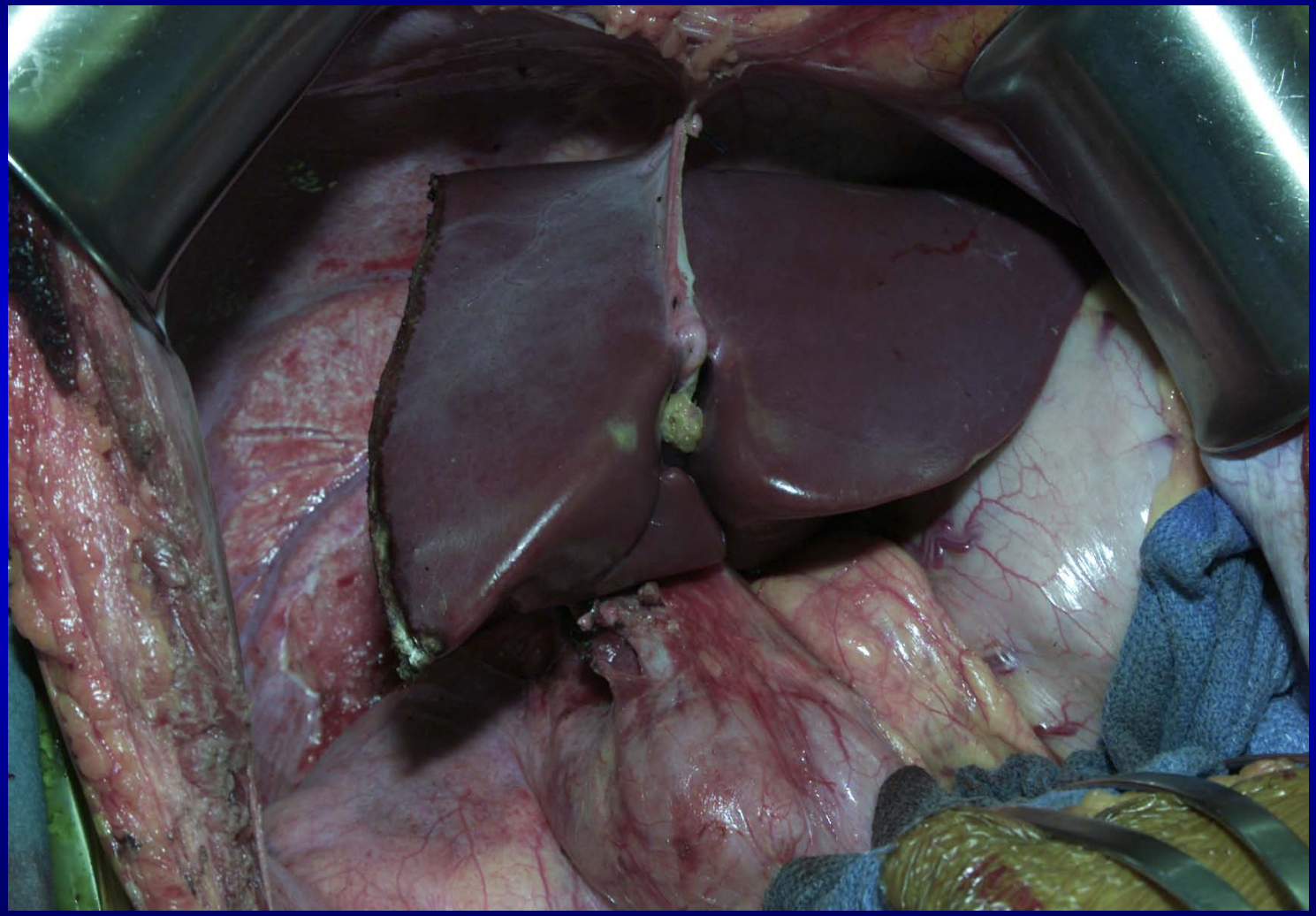
- Risk of donor death/need for transplant: 0.3-0.5%
- Donor complications (35%)
- Potential for donor coercion
- Recipient biliary complications (25-30%)



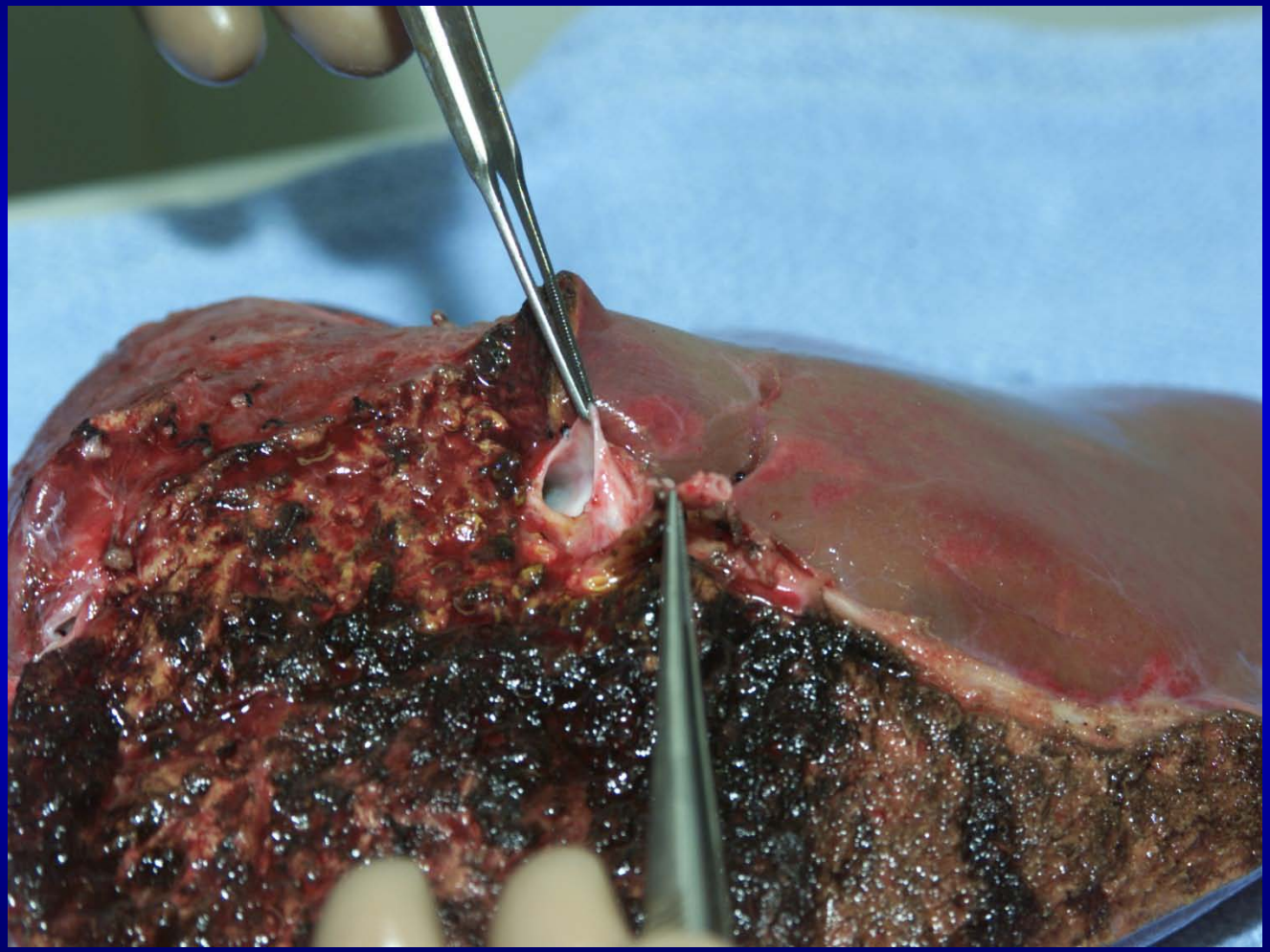
Living Donor Right Hepatectomy



Living Donor Right Hepatectomy



Living Donor Right Liver Graft



Donor Evaluation Team

- Hepatologist (uninvolved with recipient care)
- Transplant surgeon
- Dedicated LD nurse coordinator
- Psychiatrist (uninvolved with recipient)
- Social worker: also serves as donor advocate (uninvolved with transplant center)

Pre-Clinical Screening of a Potential Donor for Living Donor Transplantation

- Donor contacts transplant center
- Age 21-55 years
- Screening questions for:
  - Major chronic medical conditions
  - Substance abuse, psychiatric issues
  - Financial or social constraints
- Check blood type and labs

Medical and Psychosocial Evaluation of a Potential Donor for Living Donor Liver Transplantation

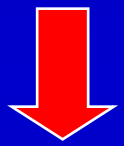
- **Medical evaluation**
  - Undiagnosed medical disorders
  - Cardiopulmonary evaluation (CXR, echocardiogram)
  - Undiagnosed hepatic disorders
  - Undiagnosed hyper-coagulable states
- **Psychosocial evaluation**
  - Motivation; screening for coercion and incentives
  - Health behavior assessment
  - Screening for psychiatric, cognitive, and coping problems
  - Meeting with the donor advocate

Anatomical Evaluation of a Potential Donor for Living Donor Liver Transplantation

- **Volumetric CT or MRI**
  - residual volume ≥ 30-40%
  - Graft-to-recipient body weight ratio ≥ 0.8%
- **CT or MR Cholangiography**
  - Biliary variants 40%
- **CT Angiography**
  - Vascular variants 65%
- **Liver biopsy (optional)**
  - steatosis (fat) in liver

Outcomes of Donor Evaluation for Adult-to-Adult LDLT

1011 Donor candidates



405 (40%) accepted

Trotter, A2ALL; Hepatology 2007; 46: 1476

Reasons for Disqualification of Potential Donors for LDLT in the A2ALL Consortium

	N (%)
Donor-related disqualifications	
Medical	173 (28%)
Anatomical	115 (19%)
Psychosocial	55 (9%)
Steatosis	65 (11%)
Declined to donate	68 (11%)
Recipient-related disqualifications	
Recipient received deceased donor graft	65 (11%)
Recipient too sick or died	43 (7%)
Recipient improved	8 (1%)
Other / Unknown	4 (3%)

Trotter, et al. Hepatology 2007; 46: 1476

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LIVING DONOR LIVER TRANSPLANTATION

Donor Considerations

- Recovery from major operation: (6-12 weeks for return to work)
- Incisional pain
- Potential morbidity (30%), mortality (0.3 - 0.5%).
- Economic considerations
- Adverse recipient outcome

Living Donor Liver Transplantation

Potential Donor Complications

- Wound infection
- Ileus
- DVT and PE
- Pleural effusion
- Vascular and/or biliary injury
- Bleeding, bile leak
- Hepatic insufficiency
- Estimated need for transplant/death: 0.3 to 0.5%

Donor Morbidity after LDLT in A2ALL:

62% none, 21% had 1, 17% 2 or more

Complication	% of Donors
Infections	13
Abdominal (bleeding, abscess, hernia, ileus, obstruction)	16
Biliary (leaks, strictures)	10
Cardiopulmonary: effusion, edema	8
Psychological	4
Intraoperative	3
Hepatic (ascites 3, PVT 2, IVC thrombosis 1)	2
Total	**38**

Ghobrial, et al. Gastroenterology. 2008; 135: 468

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Adult Living Donors Long-Term Followup

Canadian Experience

202 consecutive living donor (100% survival)

↓

39.6% medical complication in first year

↓

Only 3 medical complication after first year

1 keloid, 1 hernia, 1 SB obstruction

Adcock, et al Am J Transpl 2010; 10: 364

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Long term liver donor outcomes

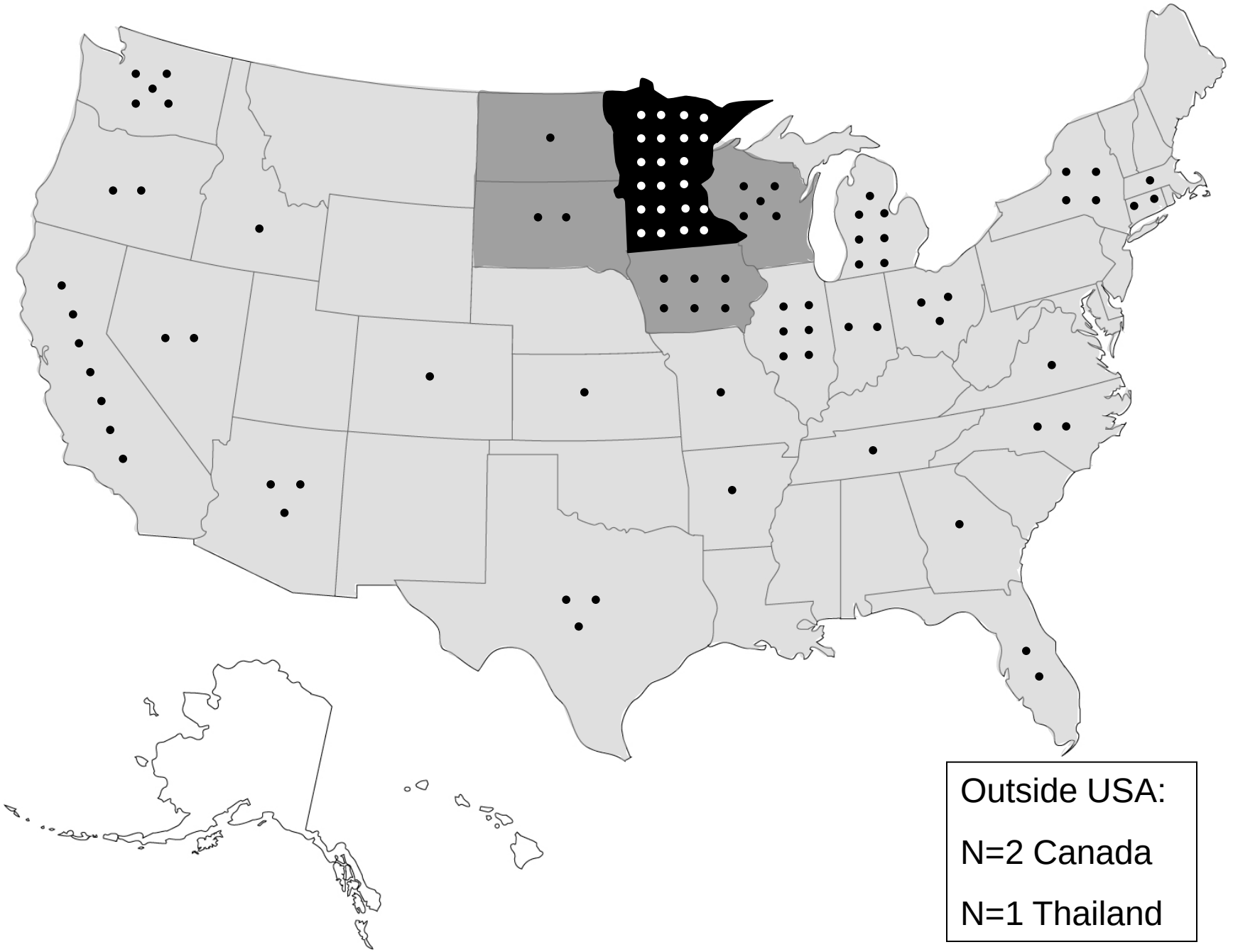
- **Short term risk of living donor hepatectomy have been well-defined**
  - **A2ALL (Ghobrial 2008, 2012), Lida et al (2010), Beaver et al (2002)**
- **Less is known about long-term donor health risks**
  - **Sotiropoulos et al, 2011 Ann Surg health questionnaire at 5 years**
  - **Adcock et al 2010 AJT, clinical follow-up mean 33 months (1-10 years)**

Aim

- **Perform systematic follow-up of all living liver donors at our center >1 year from donation to determine whether there are unanticipated long-term health or quality of life consequences of donor hepatectomy**

Methods

- **Invited all donors > 1 year from donation to return to transplant center for H&P, modified SF-12, routine labs, and MRCP.**
- **Those unable to return were invited to complete modified SF-12 and labs.**
- **Analysis via paired sample t-test and Wilcox log rank test.**


Outside USA:
N=2 Canada
N=1 Thailand

Results

- **98 eligible participants**
- **Follow-up obtained for partial or full participation from 64 donors (66%)**
- **Median follow-up 5.4 years (1.0-10.6 years) from donation**

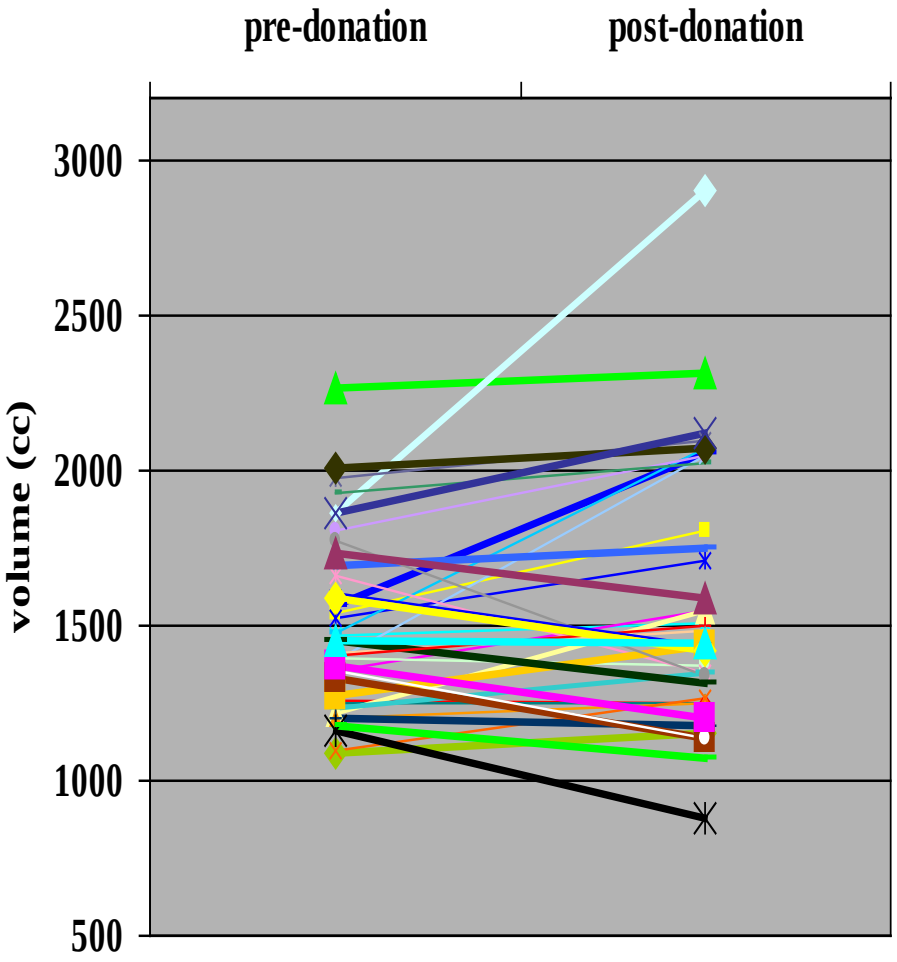
MRI Findings (N=45)

- **No occult biliary strictures.**

- **Diffuse biliary dilation, similar to post-cholecystectomy changes, in 6 donors (9 mm to 14 mm). Not correlated with GI symptoms or thrombocytopenia.**

MRI Findings (N=45)

- **Average volume: baseline: 1496 cc post: 1575 cc p=0.09**
- **25 donors had larger volume,14 had smaller– no correlation with gender or age, but larger volume correlated with more weight gain (p=0.02)**



H&P exam Results

- **Mean BMI increased from 25.6 to 27.2, p=0.001**
- **Most common complaint was numbness at incision (n=18), changes in bowel function (loose stool n=8, constipation n=2)**
- **1 patient was evaluated/treated for depression**
- **1 patient seen to have very large bladder on MRI and referred for evaluation**

Decision to donate:

- **If you had decision to do over, how likely would you be to donate? 62 definitely or probably donate again, 2 not sure, 0 no**

- **How comfortable are you with your decision? 64 very comfortable, 2 somewhat comfortable, 1 neutral**

Insurance difficulties:

- **No=55**
- **Yes=5 (9%)**
  - **High life insurance cost due to surgery**
  - **My premium was higher and it takes weeks to months longer to get qualified**
  - **When applying for new insurance, initially denied and had to provide proof from PCP that I was healthy**
  - **When trying to switch health insurance, was denied**
  - **Difficulty to get approved for individual plans**

Responses to questionnaire

- **Best thing:**
  - knowing that a life was saved/improved (57)
- **Worst thing:**
  - pain (20),
  - healing/recovery/physical limitations longer than expected (11)
  - being away from home (5)

Summary

- No occult biliary strictures
- Liver regeneration adequate
- No abnormal laboratory findings except mild thrombocytopenia in 5 donors
- 5 donors (9%) reported difficulty obtaining insurance post-donation
- Vast majority of donors who replied would donate again and were comfortable with decision

Conclusions

- **Long-term anatomic and functional outcomes following living donor hepatectomy appear satisfactory**

- **Further assessment of post-donation insurance difficulties is warranted**

Living Donor Liver Transplantation
Summary

- An option for patients who have a suitable living donor
  - Best for those with lower MELD score but significant symptoms, or high risk of death while waiting
- Equivalent or superior recipient survival
- Major operation for donor, with potential for serious complications and prolonged recovery