



# Is preoperative weight reduction of living-donor liver transplant recipients and donors harmful to postoperative outcomes?

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## Abstract

### **Introduction.**

Although the incidence of overweight and obese recipients and donors is increasing worldwide, few reports have focused on outcomes of preoperative weight reduction (WR) in living-donor liver transplantation (LDLT). We therefore examined the outcomes and the impact of WR on the postoperative course.

### **Methods.**

We analyzed 217 consecutive LDLT procedures performed from 2017 to 2022. We divided the recipients and donors into a WR group and non-WR group.

### **Results.**

Twenty-two recipients (10.1%) achieved WR (preoperative recipient WR [RWR] group), reducing their weight by  $6.8\% \pm 6.0\%$  within  $2.2 \pm 1.4$  months with a significant decrease in body mass index (BMI) ( $p < 0.0001$ ).

The RWR group showed no significant differences in short-term postoperative outcomes (operative factors, postoperative liver function tests, amount of ascites, and morbidity) or in the graft survival rate as a long-term outcome ( $p = 0.24$ ) compared with the non-RWR group.

Forty-one (18.9%) donors achieved WR (preoperative donor WR [DWR] group), reducing their weight by  $9.7\% \pm 6.3\%$  within  $3.2 \pm 5.8$  months with a significant decrease in BMI ( $p < 0.0001$ ). Compared with the non-DWR group, the DWR group showed no significant differences in short-term postoperative outcomes between themselves and recipients or in the graft survival rate ( $p = 0.49$ ). Furthermore, WR resulted in an increase to 32 donor-eligible and 6 recipient-eligible patients.

### **Conclusion.**

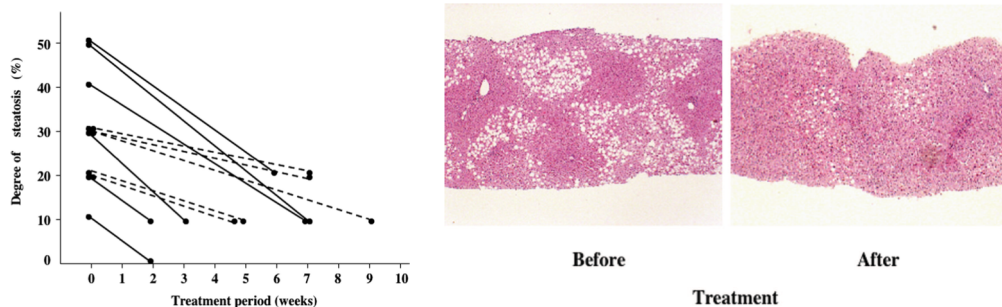
WR in LDLT recipients and donors had no harmful effect on postoperative outcomes and could play an important role in increasing recipients' chance of undergoing LDLT and expanding the donor pool.

# Introduction

- ✓ An important issue that has been recently raised is the increasing incidence of overweight and obesity worldwide. This trend has been accompanied by an increasing number of overweight and obese living donor liver transplantation (LDLT) donors. *Tsochatzis EA, et al. J Hepatol. 2023*
- ✓ Obesity is a strong risk factor for hepatic steatosis and 76% of potential LDLT donors with a body mass index (BMI) of >28 kg/m<sup>2</sup> had at least 10% steatosis based on a liver biopsy. *Rinella ME, et al. Liver Transpl. 2001*
- ✓ The negative effects of steatotic grafts are well known, including a higher incidence of severe ischemic damage resulting in primary graft dysfunction or nonfunction, biliary strictures, and decreased graft survival. *Imber CJ, et al. Liver Transpl. 2002*  
*Chu MJ, et al. J Gastrointest Surg. 2015*
- ✓ Our institute previously reported that short-term intensive intervention consisting of a protein-rich diet, exercise, and drug therapy for LDLT donors with fatty liver reduced steatosis based on a liver biopsy and contributed to good post-LDLT outcomes. *Nakamuta M, et al. Transplantation. 2005*

## Short-Term Intensive Treatment for Donors with Hepatic Steatosis in Living-Donor Liver Transplantation

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## Aim

- ✓ To elucidate the outcomes of preoperative weight reduction and the impact of this intervention on the postoperative course of LDLT recipients and donors.

- Indications for preoperative weight reduction in LDLT donors (DWR)
  - ① Confirmation of fatty liver by US, positivity of hepatorenal echo contrast
  - ② BMI of > 25 kg/m<sup>2</sup> at the time of the initial outpatient visit
- The goal of preoperative weight reduction
  - ① To achieve negative hepatorenal echo contrast by US
  - ② BMI of ≤ 22 kg/m<sup>2</sup> (20 kg/m<sup>2</sup> if possible)
- The weight reduction strategy
  - Aerobic exercise regimen centered on strength training under collaboration with the rehabilitation department
  - +
  - 1000 kcal/day diet under collaboration with the nutrition department

## Methods

- ✓ We analyzed 217 consecutive LDLT procedures (2017 ~ 2022).
  - (1) the impact of recipient WR (RWR) on postoperative course
  - (2) the impact of DWR on donor and recipient postoperative course

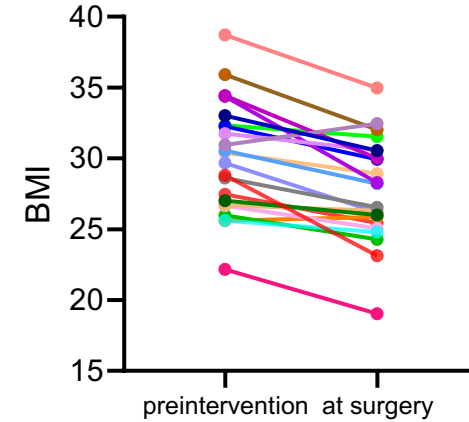
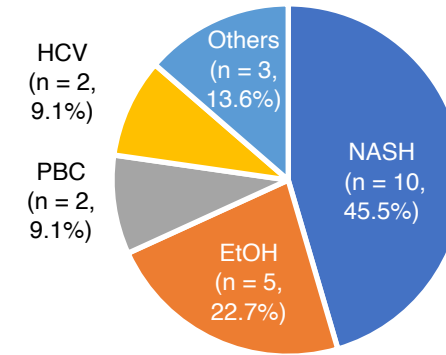
# The impact of RWR on recipient postoperative course

✓ The results of RWR (n=22)

Their body weight decreased by  $6.8 \pm 6.0\%$  within  $2.2 \pm 1.4$  months, leading to a significant decrease in their BMI from  $30.0 \pm 4.0 \text{ kg/m}^2$  to  $27.7 \pm 3.6 \text{ kg/m}^2$  at the time of surgery. Only 2 recipients (9.9%) were unable to achieve BMI decrease due to difficulty continuing weight reduction because of worsening condition or increased ascites.

## Clinical characteristics of preoperative weight reduction in LDLT recipients

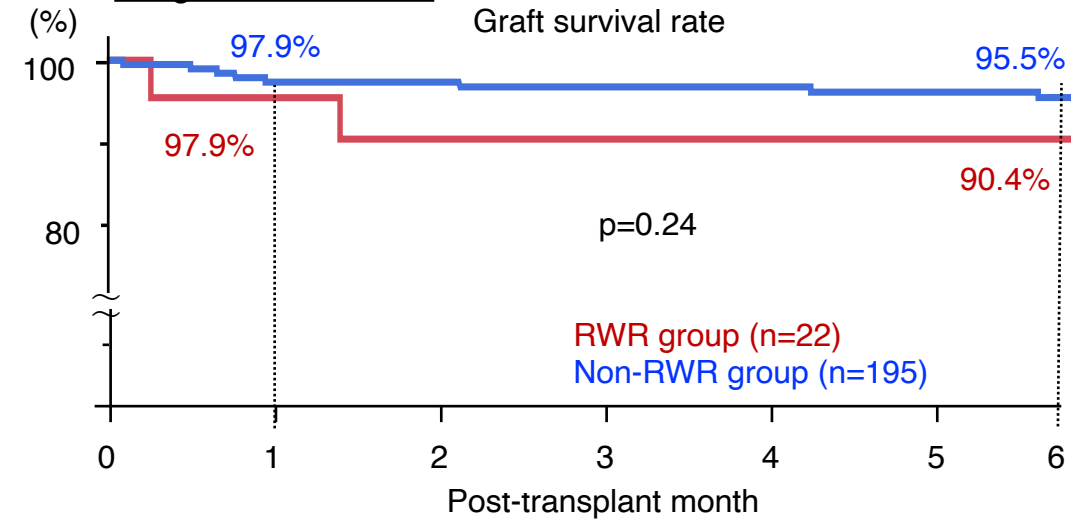
Factors	RWR group (n = 22)	Non-RWR group (n = 195)	p-value
<b>Recipient factors</b>			
Age, years	57.4 ± 9.1	56.2 ± 12.1	0.68
Male sex	12 (54.6)	81 (41.5)	0.25
BMI, kg/m <sup>2</sup>	27.9 ± 3.6	23.8 ± 3.6	<0.0001
MELD score	17.1 ± 7.1	17.1 ± 7.2	0.99
Primary disease, NASH	10 (45.5)	34 (17.4)	0.0056
<b>Donor factors</b>			
Age, years	41.2 ± 9.7	40.2 ± 10.2	0.67
Male sex	12 (54.6)	123 (63.1)	0.44
ABO-incompatible graft	12 (54.6)	55 (28.2)	0.015
Graft type, right lobe	18 (81.8)	121 (62.1)	0.055
GV/SLV	43.7 ± 9.0	43.3 ± 10.4	0.86
GRWR	0.75 ± 0.16	0.83 ± 0.21	0.11



## Short-term outcomes

Factors	RWR group (n = 22)	Non-RWR group (n = 195)	p-value
Operative time, min	655 ± 300	648 ± 178	0.88
Blood loss, L	6.7 ± 6.2	4.8 ± 4.5	0.075
T.Bil on POD 7, mg/dL	5.1 ± 4.6	4.9 ± 3.2	0.84
PT-INR on POD 7	1.11 ± 0.10	1.09 ± 0.12	0.55
T.Bil on POD 14, mg/dL	4.7 ± 7.1	4.5 ± 5.6	0.91
PT-INR on POD 14	1.07 ± 0.13	1.07 ± 0.11	0.80
Total amount of ascites on POD 14, mL	242 ± 408	355 ± 530	0.34
Sepsis	1 (4.6)	13 (6.7)	0.68
Acute cellular rejection	1 (4.6)	7 (3.6)	0.74

## Long-term outcomes

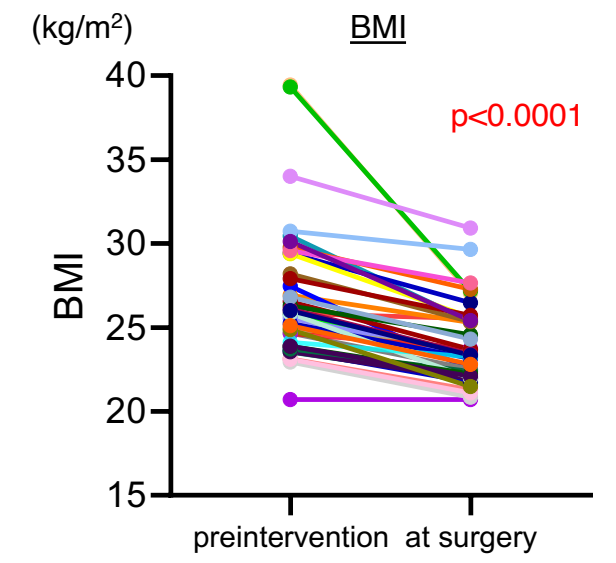


# The results of DWR

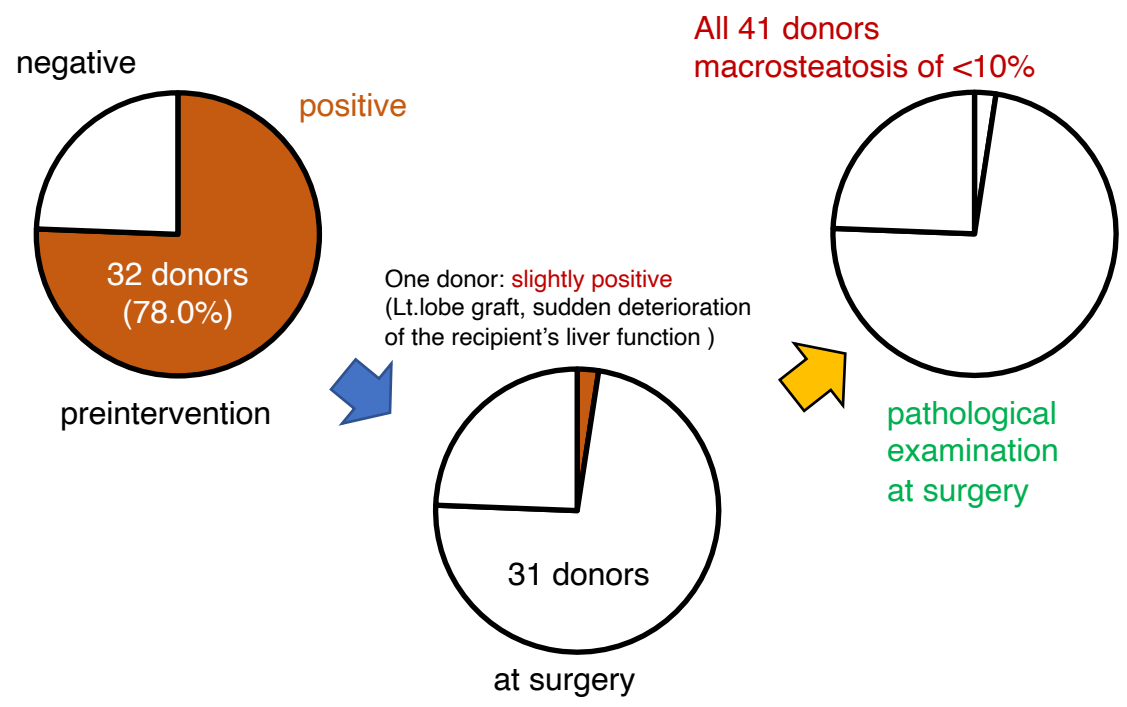
✓ The results of donor weight reduction (DWR) (n=41)  
 Their body weight decreased by  $9.7 \pm 6.3\%$  within  $3.2 \pm 5.8$  months, leading to a significant decrease in their BMI from  $26.8 \pm 3.9$  kg/m<sup>2</sup> before the intervention to  $24.0 \pm 2.4$  kg/m<sup>2</sup> at the time of surgery

### Clinical characteristics of donors

factor	DWR group (n = 41)	Non-DWR group (n = 174)	p value
Donor age (years)	42.9 ± 9.4	40.0 ± 10.2	0.070
Donor gender, male (%)	29 (70.7)	106 (60.2)	0.20
Rt. lobe graft (%)	25 (61.0)	114 (64.8)	0.65
Donor preoperative BMI (kg/m <sup>2</sup> )	24.2 ± 2.2	21.9 ± 2.1	<0.0001



✓ Positivity of hepatorenal echo contrast



## The impact of DWR on donor postoperative course

Factors	Right lobe graft (n = 139)			Left lobe graft (n = 78)		
	DWR group (n = 25)	Non-DWR group (n = 114)	p-value	DWR group (n = 16)	Non-DWR group (n = 62)	p-value
<b>Clinical characteristics</b>						
Age, years	45.4 ± 10.9	42.2 ± 10.5	0.18	39.1 ± 4.5	35.2 ± 8.0	0.064
Male sex	15 (60.0)	56 (49.1)	0.32	14 (87.5)	50 (80.7)	0.51
BMI, kg/m <sup>2</sup>	23.8 ± 2.4	21.5 ± 1.8	<0.0001	24.8 ± 1.7	22.5 ± 2.5	0.0010
<b>Short-term outcomes</b>						
Operative time, min	270 ± 40	280 ± 54	0.37	330 ± 53	301 ± 51	0.051
Blood loss, mL	237 ± 212	227 ± 233	0.84	217 ± 144	235 ± 155	0.68
Maximum T.Bil, mg/dL	2.1 ± 0.8	2.3 ± 0.9	0.20	1.7 ± 0.9	1.5 ± 0.5	0.39
Maximum PT-INR	1.38 ± 0.16	1.39 ± 0.14	0.61	1.23 ± 0.10	1.22 ± 0.09	0.55
Maximum ALT, U/L	407 ± 150	384 ± 186	0.57	411 ± 169	408 ± 178	0.95
PHLF	3 (12.0)	24 (21.1)	0.28	1 (6.3)	1 (1.6)	0.35
Morbidity	6 (24.0)	30 (26.3)	0.81	3 (18.8)	7 (11.3)	0.44
CD grade >III	0 (0.0)	9 (7.9)	0.054	0 (0.0)	1 (1.6)	0.50

# The impact of DWR on recipient postoperative course

## Clinical characteristics of recipients

Factors	DWR group (n = 41)	Non-DWR group (n = 176)	p-value
<b>Recipient factors</b>			
Age, years	55.6 ± 12.1	56.5 ± 11.8	0.63
Male sex	16 (39.0)	77 (43.8)	0.58
BMI, kg/m <sup>2</sup>	23.9 ± 3.8	24.3 ± 3.8	0.57
MELD score	17.0 ± 4.7	17.2 ± 7.7	0.87
Primary disease, NASH	9 (22.0)	36 (20.5)	0.83
<b>Donor factors</b>			
Age, years	42.9 ± 9.4	39.8 ± 10.2	0.070
Male sex	29 (70.7)	106 (60.2)	0.21
ABO-incompatible graft	13 (31.7)	54 (30.7)	0.90
Graft type, right lobe	25 (61.0)	114 (64.8)	0.65
GV/SLV	44.5 ± 11.2	43.0 ± 10.1	0.39
GRWR	0.85 ± 0.23	0.81 ± 0.20	0.27

## Conclusion

WR in LDLT recipients and donors had no harmful effect on postoperative outcomes and could play an important role in increasing recipients' chance of undergoing LDLT and expanding the donor pool.

*Yoshiya S, et al. J Gastrointest Surg. 2024*

## Short-term outcomes

Factors	DWR group (n = 41)	Non-DWR group (n = 176)	p-value
Operative time, min	651 ± 217	648 ± 188	0.93
Blood loss, L	5.0 ± 4.8	5.0 ± 4.7	0.96
T.Bil on POD 7, mg/dL	4.8 ± 3.0	5.0 ± 3.5	0.78
PT-INR on POD 7	1.10 ± 0.13	1.10 ± 0.12	0.99
T.Bil on POD 14, mg/dL	4.0 ± 3.7	4.7 ± 6.1	0.47
PT-INR on POD 14	1.08 ± 0.11	1.07 ± 0.11	0.64
Total amount of ascites on POD 14, mL	325 ± 398	348 ± 545	0.80
Sepsis	2 (4.9)	12 (6.8)	0.64
Acute cellular rejection	1 (2.4)	12 (6.8)	0.26

## Long-term outcomes

