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## The impact of donor age on graft outcome after liver transplantation

**Key words** Liver transplantation · Donor age

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### Introduction

Increasing demand for organs for transplantation together with a stable or even decreasing quantity of donor livers offered has urged the need to increase the donor pool by expanding the criteria for donor selection. Liver transplant teams are consequently confronted with the need to use second choice donors. In the early days, an age of 40 years for donors was considered the upper limit. This limit moved to 50 years with time and has moved even higher more recently. It has been reported by several groups that livers from donors of 55 years of age may be transplanted with success [1]. This study evaluated the impact of acceptance of even older donors on liver function and outcome after transplantation.

### Patients and methods

Between May 1991 and May 1995, 83 orthotopic liver transplants (OLT) were performed in an elective manner in ABO-compatible patients. The age distribution of the donors ranged from 16 to 75 years, with 37 grafts from donors < 30 years of age (group I), 28 from donors between 30 and 50 years of age (group II) and 18 from donors > 50 years of age (group III). The mean age of the donors of group III was 65 years. Grafts with > 75% steatoses as evaluated by pretransplant biopsy were routinely discarded. All grafts were preserved with UW solution and all groups were treated with standard triple immunosuppression (cyclosporin A, prednisolone and azathioprine). During to a more restrictive policy of selection of older donors, the mean ICU stay, GGT, bilirubin, cold ischemic time, ALT, AST and prothrombin time (PT) were all lower in group III donors (the oldest group) than in group II donors.

These differences were, however, not statistically significant (Table 1).

Recipient data, including conventional liver function tests and indications for OLT, were similar in all groups, but there was a clear tendency for livers from older donors to be transplanted into older recipients. The function and outcome of grafts from the three groups were compared.

### Results

Liver biochemistry early after transplantation (Table 2) showed a significantly higher degree of hepatocellular injury during the first 48 h for group III. The increased levels of cytolysis during the first 6 h for group II were not significant and not recorded later during the postoperative evolution.

Postoperative PT was also clearly lower during the first 48 h in grafts from group III donors. Metabolism of lactate was, however, similar in grafts from all groups

**Table 1** Characteristics of the donor groups

	Group I	Group II	Group III	
Number ( <i>n</i> )	37	28	18	NS
ICU stay (days)	2.5	5	2.5	NS
GGT (IU/l)	29.4	50.6	22.6	NS
Bilirubin (mg/dl)	1	1.5	0.95	NS
Cold ischemic time (h)	797.5	845.4	707.4	NS
Sodium (mEq/l)	145	142.4	147.7	NS
ALT (IU/l)	46.8	43.3	32.5	NS
AST (IU/l)	33.0	47.3	17.0	NS
PT (%)	51.4	66.5	62.6	NS

**Table 2** Posttransplant ALT tests and prothrombin time (PT)

	Hours posttransplant						
	0	6	12	24	48	72	120
ALT (IU/l)							
Group I	633	619	615	709	795	617	273
Group II	814	750	578	421	508	764	178
Group III	970*	988*	1189*	1674*	1409*	839	410
PT (%)							
Group I	48	46	48	51	60	67	67
Group II	39	47	50	53	77	74	78
Group III	36	34*	34*	39*	49*	62	71

\*  $P < 0.05$ **Table 3** Posttransplant lactate levels

	Hours posttransplant			
	0	6	12	24
Group I	40	31	22	16
Group II	24	17	17.5	12.5
Group III	43	36	26	22

over the first 24 h (Table 3). The incidence of rejections showed no significant differences between grafts from the three groups, and 6-month graft survivals were 88 %, 85.8 %, and 74 % for group I, II and III grafts, respectively (Tables 2, 3).

No difference was observed in terms of primary non-function, retransplantation and graft survival up to 6 months posttransplant.

## Discussion

The increasing demand for organs for OLT has forced us to accept older donors. Our results show that grafts from older donors had substantial differences in function during the first 48 postoperative hours, despite a stricter donor selection which compensated for the preferential transplantation of these livers into older recipients. This difference in liver function was probably caused by a higher sensitivity to preservation in-

jury. However, graft outcome, as shown by the incidence of graft failure and graft survival demonstrate that the impaired initial graft function was transitory and did not lead to a significantly higher proportion of grafts lost.

It is important to stress the fact that the selection of older donors was more rigorous than that for the younger donors and that all measures were taken to minimize accumulation of risk factors. In the two cases in which ischemic time was prolonged for logistical reasons for more than 14 h, the immediate price to pay was primary nonfunctioning.

A review of recent literature concerning donor age in OLT [2] suggests that donor age is a risk factor for poor function after OLT. The effect of age on OLT outcome appears much more evident when the medical status of the recipient is poor (old UNOS grades 5 and 6) [3]. The age at which the risk begins to increase is not yet established, and results of long-term survival are still not available. Both of these aspects need further study and will be analysed in the future. Indeed, donors over 70 years of age (in our own experience the maximum is 75 years) are being used more frequently for OLT.

In summary, we found that provided preservation times were kept short, grafts from older donors who did not present other risk factors, showed only a transiently impaired initial graft function. Older livers recovered their full function after 48 h without affecting short-term graft and patient survival.

## References

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