

## LETTER TO THE EDITORS

# Liver transplantation with geriatric liver allografts: the current situation in Eurotransplant

Jacob D. de Boer<sup>1,2</sup>, Jacob J. E. Koopman<sup>3</sup>, Herold J. Metselaar<sup>4</sup>, Andries E. Braat<sup>1</sup> & Joris J. Blok<sup>1</sup>

1 Division of Transplantation, Department of Surgery, Leiden University Medical Center, Leiden University, Leiden, The Netherlands

2 Eurotransplant International Foundation, Leiden, The Netherlands

3 Section of Gerontology and Geriatrics, Department of Internal Medicine, Leiden University Medical Center, Leiden University, Leiden, The Netherlands

4 Department of Gastroenterology and Hepatology, Erasmus MC – University Medical Center, Rotterdam, The Netherlands  
E-mail: J.J.Blok@lumc.nl

Dear Editors,

In light of the donor organ shortage and the high number of liver transplantation (LT) candidates on the waiting list, the number of extended criteria donors (ECD) increased over time. Among the criteria defining an ECD, donor age is stretched most, so that the use of septuagenarian, octogenarian, and even nonagenarian donors increasingly became common practice [1,2].

Also within Eurotransplant (ET), the number of LTs with “older” allografts has risen substantially in the past decade. Whereas both the number of donors aged 70–

79 years and those aged  $\geq 80$  years were negligible before 2000, they doubled since then. Utilization rates (percentage LTs out of all offered allografts) in the past two decades rose 10–14% in all age categories, with a utilization of 74% in the  $\geq 80$  years group, but overall utilization rates remained lower in the older groups (Table 1). This suggests that the acceptance criteria expanded in line with the expansion of the current donor pool with regard to donor age, but the opportunity to use “older” donors remained neglected. It could well be that the “older liver donor” is overlooked as potential donor by physicians who are involved in the selection process (e.g. the ICU department).

The days when an “ideal” donor was  $< 40$  years seem to be over. This parallels the aging of western populations and puts into question whether the present ECD should be adjusted to current practice. For example, donor age  $> 65$  years is one of the criteria of a “marginal liver donor” according to the ET guidelines. Such an age limit seems outdated when older donors are increasingly and successfully used for LT. We question whether an age limit for liver donors is necessary at all.

Several studies showed that outcomes after LT with livers of  $> 70$  years are comparable, and sometimes even

**Table 1.** Number of deceased donor liver transplants in the Eurotransplant region per donor age category per decade ( $N = 35\,082$ ).

Decade	Donor age category					Total (age $< 40$ included)
	40–49	50–59	60–69	70–79	$\geq 80$	
1970–1979	n/a	1 (5)	n/a	n/a	n/a	19 (100)
1980–1989	190 (11)	30 (1.7)	1 (0.06)	n/a	n/a	1747 (100)
1990–1999	1801 (20)	1237 (14)	442 (5)	52 (0.6)	1 (0.01)	8968 (100)
2000–2009	2996 (23; 79)	2839 (22; 74)	1970 (15; 68)	867 (6.6; 64)	142 (1.1; 64)	13 127 (100)
2010–present†	2068 (18; 83)	2697 (24; 78)	2055 (18; 78)	1568 (14; 78)	318 (2.8; 74)	11 221 (100)

N/a, not applicable.

\*Utilization is defined as the percentage of all reported relative to all offered liver allografts that were used for a liver transplantation in the same period. Data were only available for the last two decades.

†Data requested at 28.11.2016 at Eurotransplant office.

better, as compared to younger donors, with 1-year and 3-year patient and graft survival ranging 66–95% and 58–91%, respectively [3]. These favorable results for older donors are most likely due to stricter selection criteria, such as shorter cold ischemia times or more frequent pretransplant biopsies [4,5]. Nevertheless, donor age strongly determines outcomes when correcting for other donor and transplant risk factors, as was recently confirmed for the ET region [6].

A successful LT depends on the liver's structure and function, but these deteriorate with aging. For example, the liver's volume, metabolism, response to stress, perfusion, and regeneration capacity decrease with aging [7,8]. As the aging process is heterogeneous, different individuals age at different rates and in different manners. The higher an individual's chronological age, the less it corresponds with the individual's biological age. Geriatricians employ a set of measures to estimate an older individual's biological age by describing his body's structures and functions. Others have deservedly argued that these geriatric measures can be used to select donors at older chronological ages who have younger biological ages. Their livers supposedly are of biologically younger ages too [9].

Following the same principle, different livers age at different rates and in different manners and geriatric-like measures can be used to select livers that have remained biologically young. Like the measures used to

estimate an individual's biological age, they should describe the integrity of a liver's structure and function. These measures already exist: Biopsies, portal vein blood flow, liver enzymes, coagulation, and albumin level are routinely measured. Some studies have indicated that these measures can likewise be used to select livers from older donors that have remained their structural and functional integrity to enable successful LT at high age [4,10]. Livers from older donors should have, as much as possible, normal consistency, normal liver function tests, hemodynamic stability with small doses of vasopressors, absence of hyponatremia, and short intensive care unit stay.

Further research is necessary to confirm whether and which geriatric-like measures can be used to select livers of older donors for LT. Taking into account that western populations are aging and suffer increasingly from cerebrovascular disease, the use of chronologically old, but biologically young liver donors would expand the donor pool and, hopefully, reduce waitlist mortality.

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