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Editorial

# The Octogenarian Donor: Can the Liver Be ''Younger Than Stated Age''?

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*To the Editor*:

Although estimated life expectancy is steadily rising in the United States (1), utilization of livers from older deceased donors has not paralleled the population trend. The proportion of liver donors over 65 years has remained stagnant at 8% for the last decade (2), and for rational reasons. The physiologic reserve of all organs, including the liver, declines with age. Older age is associated with a higher prevalence of medical comorbidities including diabetes, hypertension and hyperlipidemia. Multiple studies have clearly shown that older donor age is associated with higher rates of primary nonfunction, graft loss and mortality.

Older donors, however, are undoubtedly heterogeneous. Among older individuals of the same age, general health status and physiologic reserve vary markedly. It is therefore plausible that differences in the functional reserve of livers from older persons impact transplant outcomes. To this point, in this issue of *American Journal of Transplantation*, Ghinolfi et al report favorable outcomes achieved with a select group of even the ''oldest old'' (to borrow the term from the field of geriatrics) donor livers. Specifically, this Italian center transplanted 85 livers from donors ≥80 years old from 2000 to 2010, representing 10% of their transplant volume (3). While the incidence of biliary complications and recurrent hepatitis C was higher in recipients of livers from octogenarian donors, patient survival was acceptable: 86% at 1 year and 78% at 5 years. This report is all the more remarkable when framed in this context: during the same period, the >130 U.S. transplant centers performed only 328 transplants with livers from donors ≥80 years old, representing <1% of the national transplant volume (2). Clearly, this Italian center has experience with selection and transplantation of livers from the oldest old. Can we successfully *systematically* transplant ''octo-livers'' in the United States?

Ghinolfi et al delineate their center's algorithm to evaluate livers that resulted in utilization of 59% of the 186 octogenarian donors referred. Donor age ≥80 years was not important *per se*, but only in combination with other negative factors: aminotransferases >250 IU/L, bilirubin >3 mg/dL and cold ischemia time >8 h. Interestingly, the algorithm did not consider, at least explicitly, donor comorbidities, challenging our understanding of what makes the older donor old. Rather, information from preprocurement liver biopsy and back-table evaluation was incorporated into the decision to accept or decline the liver offer. In other words, if a liver can withstand the stressors of 80+ years of life—without fibrosis, steatosis or atherosclerosis—*and* death—without necrosis—then it may be successfully transplanted with acceptable long-term outcomes.

We believe that there are two major barriers to achieving similar liver acceptance rates and recipient outcomes with this octogenarian donor selection algorithm in the United States. First, rates of obesity, elevated glucose and tobacco use (but not hypertension)—factors that are associated with hepatic steatosis, fibrosis and atherosclerosis—are higher among Americans among Italians (Figure 1). Furthermore, hepatic physiologic reserve may be dictated by lifestyle factors that differ across countries and cultures. Could the Mediterranean diet, red wine consumption and/or physical activity contribute to slower physiologic decline and, therefore, optimized organ function from the octogenarian Italian versus American donor? Second, what has not been captured in this algorithm is clinical judgment—performed by the transplant surgeon upon initially receiving the offer and/or seeing the liver—that undoubtedly played a strong role in this center's success with transplantation with octogenarian donor livers and improved with experience (it is notable that over half of these livers were transplanted in the last 3 years of the study period).

For widespread implementation of a selection algorithm for the oldest old of donors, we need well-defined, reproducible





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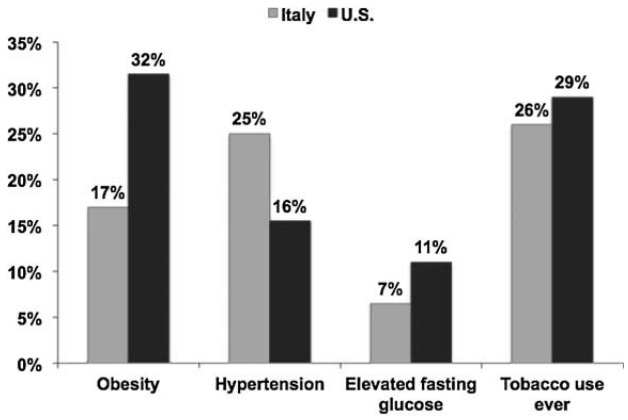


**Figure 1: Rates of mortality risk factors among individuals in Italy versus the United States.** *Source*: Data obtained from the World Health Statistics 2013 (4).

criteria for physiologic reserve that can be applied systematically and across all centers. Can we perhaps borrow metrics from geriatrics such as frailty and disability and ask (of the living relative)—''Prior to this event, did he/she live independently?'' ''Did he/she walk without assistance?'' ''Was he/she losing weight in the months prior to death?'' Such questions, aimed at determining the physiologic fitness of the *donor*, may characterize the physiologic fitness of the *organ* more accurately than either chronologic age or the presence/absence of comorbidities.

Increased utilization of ''octo-livers'' represents a logical means of donor pool expansion. Such an effort will require rigorous multi-site cooperation to define the characteristics among older donors that lead to better transplant outcomes. Some of these factors will be liver-specific, but characterization of the donor's overall health and physical function may prove invaluable to ascertaining the organs' physiologic age. This is a goal worthy of pursuit. With over two million individuals in the United States $\geq$80 years old, even marginal proportional increases in organ acceptance from donors within this age group could substantially increase the number of organs available for transplantation and, ultimately, reduce waitlist mortality.

## Disclosure

The authors of this manuscript have no conflicts of interest to disclose as described by the *American Journal of Transplantation*.

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