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## Health characteristics of heart transplant recipients surviving into their 80s



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### ABSTRACT

**Background:** Heart transplantation (HTx) is the preferred treatment for patients with end-stage heart failure and has been successful for >30 y. The clinical course of recipients at the extreme of age is unknown. We reviewed our experience to determine the overall health and prevalence of Tx-related medical problems for recipients in their ninth decade. **Methods:** We reviewed the UCTP experience from 1985 to present to identify patients who survived into their 80s and matched (1:1) with other recipients for gender and age at HTx, but did not survive to ≥80 y. The end point was the prevalence of medical problems.

**Results:** Since 1985, 1129 adult HTx have been performed and 14 patients (1.2%) survived to ≥80 y old. The mean age at HTx was 63 ± 4 y. Of octogenarians, the majority were males with ischemic cardiomyopathy. The average survival after transplant was 19 ± 5 y in the octogenarians and 5 ± 5 y in the controls ( $P < 0.01$ ). Over time, the prevalence of comorbidities increased. Compared with nonoctogenarians, we observed higher prevalence of dyslipidemia ( $P = 0.02$ ), and chronic renal insufficiency ( $P = 0.02$ ) during follow-up. Cardiac function was normal (ejection fraction > 55%) for all octogenarians at age 80 y.

**Conclusions:** Despite improvements in posttransplant care, survival of HTx patients into the ninth decade is rare (1%). For those surviving into their 80s, cardiac function is preserved but dyslipidemia, renal insufficiency, and skin cancers are common. As the age of Htx patients continues to increase, posttransplant care should be tailored to minimize post-HTx complications and further extend survival.

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### Introduction

Heart transplantation (HTx) is a treatment for patients with end-stage heart failure. Without HTx, these patients were

relegated to medical management with a poor prognosis.<sup>1,2</sup> As experience has matured, graft survival, patient survival, and recipient age have increased. Between 80% and 91% of adult HTx recipients in North America survive the first year<sup>3</sup> and

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more than 80% survive 3 y.<sup>2,3</sup> Sixty percent of HTx are performed in recipients aged > 50 y and 17% are aged ≥65 y.<sup>4</sup>

We know very little about HTx recipients at advanced age with knowledge gaps in areas such as Transplant (Tx) and non-Tx-related medical comorbidities. The UCTP (Utah Affiliated Transplant Hospitals [UTAH] Cardiac Transplant Program) began in 1985, and we reviewed our experience examining the types and prevalence of Tx-related and non-Tx-related medical comorbidities.

## Methods

We performed a retrospective chart review of UCTP recipients aged ≥18 y at HTx from 1985 to present (University of Utah Medical Center, LDS Hospital/Intermountain Medical Center, and VA Salt Lake Medical Center). Institutional review board approval was obtained at all centers. Recipients surviving into their ninth decade were matched in a 1:1 manner with other recipients by gender, age at HTx, and decade of birth who did not survive to age 80 y. The octogenarian cohort was transplanted in 1986–2004, whereas the control group was transplanted in 1987–2008. We collected data about allograft and renal function and medical and surgical diagnoses and treatments.

For continuous variables, mean and standard deviation were calculated and reported. For discrete variables, the proportion of patients with the condition was reported and percentages calculated. JMP software (SAS Institute, Carey, NC) was used for statistical analysis. Given the small sample size, and assumed non-Gaussian distribution, Likelihood Ratio test was used for proportions and the nonparametric Wilcoxon/Kruskall–Wallis (rank-sum) test was used for survival.

## Results

UCTP performed its first HTx in 1985 and has done 1129 adult HTx. Fourteen (1.2%) survived to age 80 y or beyond. As seen in Table, most patients were Caucasian males with ischemic cardiomyopathy. Compared with control patients, the octogenarians had fewer comorbidities at transplant. In the octogenarian cohort, two patients each had one of the preoperative comorbidities we evaluated. The other 12 octogenarian patients had no preoperative comorbidities we collected. In the control group, two patients had three preoperative comorbidities, four patients had two comorbidities, two patients had one comorbidity, and six patients had none (Fig). Specifically, more control patients had diabetes mellitus 3/14 (21%) and left ventricular assist device 3/14 (21%) before HTx compared with octogenarians 0% ( $P = 0.04$  for both). Compared with control subjects, survival after transplant in the octogenarian cohort was an average of  $19 \pm 5$  versus  $5 \pm 5$  y with an average age of  $83 \pm 2$  versus  $68 \pm 7$  y ( $P < 0.01$ ). Median survival was 19.7 y (range 11.6–26.5 y) and 2.9 y (range 0.06–18.6 y), respectively. As a point of reference, median freedom from all-cause mortality for the 1129 transplant patients in our program since 1985 is 11 y while freedom from cardiovascular mortality is 17 y.

**Table – Patient data.**

Variables	Octogenarians (n = 14)	Controls (n = 14)	P
Preoperative demographics			
Age at transplant (y)	63.2 ± 4.5	63.1 ± 4.8	NS
Male	79%	79%	NS
Caucasian	93%	93%	NS
Preop LVAD	0%	21%	0.04
Ischemic cardiomyopathy	64%	75%	NS
Preop HTN	14%	36%	NS
Preop DM	0%	21%	0.04
Preop hyperlipidemia	7%	21%	NS
Preop CRI	0%	7%	NS
Malignancy	0%	7%	NS
Posttransplant comorbidities			
Age at death or last f/u (y)	83 ± 2 (80–86)	68 ± 7	<0.01
Average time after Tx (y)	19.6 ± 5	5.0 ± 5.4	<0.01
EF > 50% at 75	100%	21%	<0.01
EF > 50% at 80	100%	0%	<0.01
Hypertension	57%	43%	NS
Dyslipidemia	71%	29%	0.02
Chronic renal insufficiency	71%	29%	0.02
Diabetes mellitus	43%	21%	NS
Malignancy	71%	36%	NS

CRI = chronic renal insufficiency; DM = diabetes mellitus; EF = ejection fraction; HTN = hypertension; LVAD = left ventricular assist device; NS = nonsignificant; preop = preoperative.

There was an increase in Tx and non-Tx-related medical comorbidities among the octogenarians. Described in Table, the prevalence of all measured comorbidities during follow-up increased over time for the octogenarians. Only dyslipidemia and chronic renal insufficiency (10/14, 71% for both) were significantly increased compared with controls (4/14, 29%;  $P = 0.02$  for both). Also seen in Table, all octogenarians had normal cardiac function measured at age 80 y. Of the controls, the three patients who survived to 75 y of age also had ejection fraction > 50.

Medical diagnoses were appropriately treated in the octogenarians. Hypertension, dyslipidemia, and hypothyroidism were treated with beta blockers, statins, and thyroid hormone replacement, respectively. In rarer comorbidities ( $n = 1$  each), deep vein thrombosis was treated with warfarin and atrial arrhythmias were treated with oral antiarrhythmics. Dementia was treated with memantine and donepezil. Permanent pacemakers were required for two recipients. One octogenarian developed prostate cancer and received chemotherapy and radiation 22 y after transplant. Meanwhile, cutaneous malignancies ( $n = 10$ ) were resected by Mohs or complete surgical excision.

Diagnoses requiring surgical intervention resulted in appropriate management. Early surgical interventions

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