

## Impact of Recipient and Donor Ages on Patient and Graft Survival After Kidney Transplantation

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### ABSTRACT

**Background.** The purpose of the study was to evaluate the impact of donor and recipient ages on patient and graft survival after kidney transplant.

**Methods.** Patients in a hospital database undergoing kidney transplant for end-stage renal disease (ESRD) during the period 1985 to May 2006 ( $n = 410$ ; mean age  $42 \pm 10$  years; 61% men and 39% women) were divided into two groups: group A, patients of 60 years or older (6%,  $n = 24$ ), and group B, those younger than 60 years (94,  $n = 386$ ). In 204 patients (49.8%) the pancreas was transplanted simultaneously with the kidney.

**Results.** Overall 1-, 3-, 5-year patient survivals were 92%, 90%, 88% in group A and 95%, 90%, 87% in group B ( $P = .6$ , NS). Overall 1-, 3-, 5-year kidney graft was 92%, 75%, 65% in group A and 92%, 84%, 79% in group B ( $P = .7$ , NS). Donors were divided into two groups: group 1, 55 years or older (15%,  $n = 62$ ), versus group 2, those younger than 55 years (85%,  $n = 348$ ). Overall 1-, 3-, 5-year patient survivals were 91%, 86%, 76% in group 1 and 97%, 94%, 90% in group 2 ( $P = .0009$ ). Overall 1-, 3-, 5-year kidney graft survivals were 87%, 82%, 76% in group 1 and 94%, 86%, 82% in group 2 ( $P = .02$ ).

**Conclusions.** Renal transplantation is an effective option for the treatment of ESRD in elderly patients. The overall rates of patient and kidney graft survival are comparable to those of younger patients. Donor age  $\geq 55$  years had a negative effect on patient and kidney graft survival.

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**T**HE WORLD POPULATION is aging. For this reason, the incidence of patients older than 60 years with end-stage renal disease (ESRD) is continually increasing.<sup>1</sup> The proportion of patients 60 years and older treated with renal transplantation has risen to 9.9% of the total renal transplantations. Thus, renal transplantation in the elderly with ESRD is becoming an issue of increasing importance. Nevertheless, renal transplantation has proven to be safe and effective in the treatment of ESRD in the elderly, because it improves the quality of life and has a positive effect on patient survival. Chronic allograft nephropathy together with patient death are the major determinants of late graft loss after renal transplantation. It has been appreciated that elderly renal transplant recipients show a higher intrinsic mortality rate. It is possible that age-related factors in the recipient may play a role in the development of chronic allograft nephropathy. But there are data suggesting that the increased number of graft losses, caused by the shorter life expectation in elderly renal transplant patients, may be weighed against a decreased number of graft losses caused by immunological problems compared

with younger renal graft recipients. The aim of our study was to identify the impact of donor and recipient ages on patient and kidney graft survival.

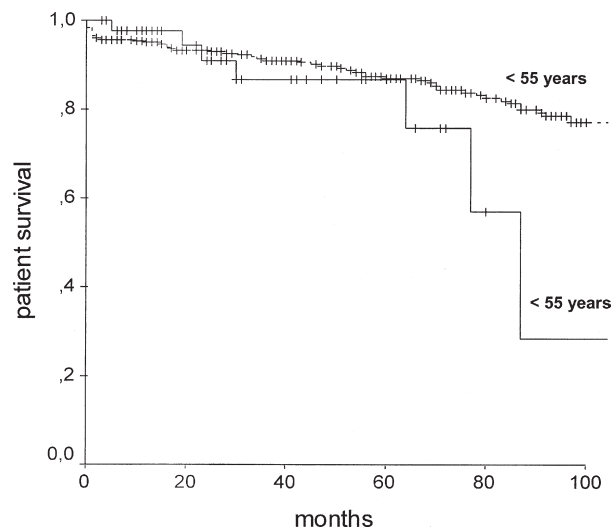
### PATIENTS AND METHODS

During the period 1985 to May 2006, 410 patients underwent kidney transplant for ESRD. Their mean age was  $42 \pm 10$  years with 61% men and 39% women. They were divided into two groups: group A, patients 60 years or older (6%,  $n = 24$ ), versus group B, younger than 60 years (94%,  $n = 386$ ). There were no differences in demographic characteristics between the two groups: gender, time of dialysis, time of diabetes, mean time on waiting list. Among 204 patients (49.8%) the pancreas was transplanted simultaneously with the kidney. The percentage of diabetic patients was

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**Fig 1.** Transplant patient survival based on recipient age (Kaplan-Meier); log-rank,  $P = .06$ , NS.

55% ( $n = 13$ ) in group A and 81% ( $n = 312$ ) in group B. Donors were divided into two groups: group 1, donors of 55 years or older (15%,  $n = 62$ ), and group 2, those younger than 55 years (85%,  $n = 348$ ). Analysis was performed using the Statistical Package for the Social Sciences (SPSS 11). The results were expressed as mean values  $\pm$  SD. Overall survival was established from the date of surgery to death from any cause or the date of the last follow-up visit. Overall survival was calculated according to the Kaplan-Meier method. The log-rank test was used to compare survival data between groups. Frequencies were compared by the chi-square method. Continuous variables were analyzed parametrically using student  $t$  test.

**RESULTS**

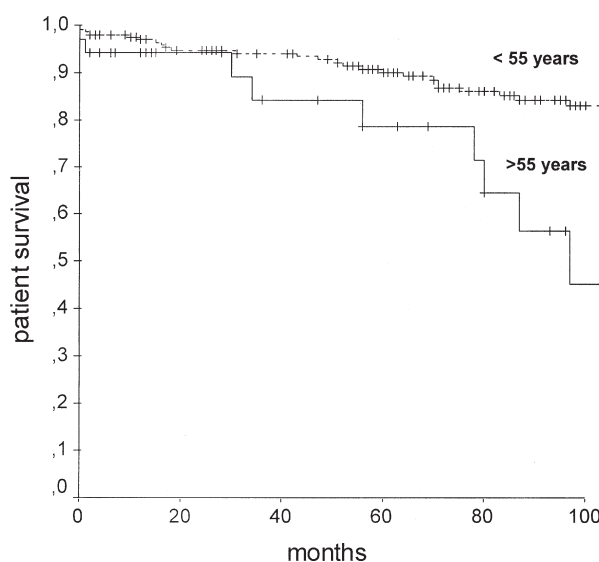
According to recipient age 1-, 3-, and 5-year patient survivals were 92%, 90%, 88% in group A and 95%, 90%, 87% in group B ( $P = .6$ , NS) (Fig 1). Moreover, overall 1-, 3-, and 5-year kidney graft survival in Group A were 92%, 75%, 65% and 92%, 84%, 79% in group B ( $P = .7$ , NS). According to donor age, overall 1-, 3-, and 5-year patient survivals were 91%, 86%, 76% in group 1 and 97%, 94%, 90% in group 2 ( $P = .0009$ ) (Fig 2); moreover, overall 1-, 3-, 5-year kidney graft survivals in group 1 were 87%, 82%, 76% and 94%, 86%, 82% in group 2 ( $P = .02$ ).

**DISCUSSION**

Due to increased life expectancy, the number of elderly patients suffering from ESRD is continuously rising. No standard definition of “elderly” exists, with different authors using thresholds of 60, 70, 75, 80, and 85 years.<sup>1</sup> In aged patients, the preoperative surgical risk is often high. Post-operative morbidity and mortality are significant sources of concern in the management of elderly patients with ESRD. The dialysis population is steadily getting older, and as the supply of donor kidneys remains insufficient, the life expectancy of elderly patients raises the question of whether allocating kidneys to them is justified,<sup>2</sup> which is why the

impact of recipient age on graft and patient survivals after kidney transplantation has become an important subject of investigation during the last years. Some studies have shown that long-term graft survival was not different among patients who underwent kidney transplantation over versus under 60 years. When data were censored for death, the probability of graft survival during the early posttransplant period increased with age.<sup>3-5</sup> This observation was ascribed to fewer acute rejection episodes among patients of advanced age. Probably this is due to changes in the immune system: The proportion of T-suppressor cells increases with age; elderly natural killer and polymorphonuclear cells show reduced responsiveness to interferon-gamma; and macrophages are less responsive to cytokines. In elderly humans, there is a reduction in mean levels of perforin, and elderly recipients may require less immunosuppression than younger recipients.

In our experience, recipient age  $\geq 60$  years had no influence on kidney or patient survival. Nevertheless, some studies have shown that donor age influenced graft survival. With advancing age, the kidney can develop progressive glomerular sclerosis, arterionephrosclerosis, and an overall decrease in mass. This can lead to decreased renal blood flow and glomerular filtration rate and to an overall deterioration in renal function. In addition, atherosclerosis, hypertension, or diabetes may occur in older individuals and aggravate morphological changes. According to our experience, donor age results in a significant prognostic factor that influences kidney and patient survival. The generalized phenomenon of poorer graft outcomes with older donors continues to be of some concern. For this reason, kidneys from older donors should be used with great selectivity. According to our results, we concluded that renal transplantation is an effective option for the



**Fig 2.** Transplant patient survival based on donor age (Kaplan-Meier); log-rank,  $P = .0009$ .

treatment of ESRD in elderly patients. The overall rates of patient and kidney graft survival were comparable to those of younger patients. Nevertheless, donor age  $\geq 55$  years had a negative effect on patient and kidney graft survival.

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