Table 2: Characteristics of donors older than 60 years according to period and transplant category.

Period	Pre-DKT[a]		DKT era[a]	
Tx category	SKT_{pre}	SKT_{lr}	SKT_{hr}	DKT
n	170	33	51	48
M/F	84/86	18/15	26/25	27/21
Low-risk ECD, *n*	48	33		
(i) Age, yrs	64.2 ± 2.8	63.8 ± 2.5		
High-risk ECD, *n*	103		51	48
(i) Age, yrs*	67.2 ± 4.7		71.2 ± 5.4	75.3 ± 4.8
(ii) Donors older than 70 yrs, *n* (%)	32 (31)		32 (63)°	43 (69)°
(iii) Donors older than 70 yrs, age	73.1 ± 2.0		74.4 ± 4.1	76.6 ± 3.7°
(iv) Arterial hypertension	55 (53)		23 (45)	30 (62)
(v) Diabetes	9 (9)		5 (10)	6 (12)
(vi) CV cause of death	60 (58)		17 (33)+	23 (48)

[a]"pre-DKT", 1 Jan, 2000, to 30 Nov, 2010; "DKT era", 1 Dec, 2010–31 Dec, 2015; SKT: solitary kidney transplant; suffix defines donor type: ECD: ECD from pre-DKT era, clinical risk undefined; lr, hr: ECD according to clinical low (no biopsy) or high risk (with kidney biopsy); DKT: dual kidney transplant; CV: cerebrovascular; *$P < 0.0001$ by ANOVA, and $P < 0.05$ or less by any intercategory comparisons; °$P < 0.01$ versus ECD_{pre}; +$P < 0.05$ versus ECD_{pre}.

a standard of care-based, anonymous study, no approval by ethics committee was needed in our institution.

2.2. Study Outcomes. For every donor-recipient pair, in each donor category, we collected and analyzed age, sex, HLA mismatches (loci A, B, and DRB1), type and length of dialysis, plasma creatinine and eGFR of donor, plasma creatinine and creatinine clearance (24-hour urine) at 3 months and 1 year after transplant, and biopsy-proven rejection of any type in the first 18 months after transplantation in recipients. Main outcomes were death-censored graft survival (i.e., freedom from dialysis or retransplantation) and overall graft survival (including death as a cause of graft loss, i.e., patients alive with functioning graft); as secondary outcomes we also evaluated PNF (no dialysis-freedom, or need for permanent dialysis within 3 months after transplant), DGF (need for dialysis for any cause in the first week after transplant), patient death with functioning graft, and renal function in recipients at 3 and 12 months after transplant. Additionally, mean number of functioning graft years by transplant reference, and of dialysis-free life years by donor reference, were also calculated at specific times (see below).

2.3. Immunosuppression Protocols. Immunosuppression protocols at our Centre did not change in all observation period (Jan 2000 to Dec 2015) and included in most patients rATG induction (3.5 mg/Kg in 7 days, 7 mg/Kg if ≥2nd transplant), cyclosporine-A starting from pretransplantation as a 10 mg/Kg oral load, Mycophenolate mofetil/Mycophenolic acid starting on p.o. day 1 (1 g or 720 mg bid), and corticosteroids (methylprednisolone 500 mg at reperfusion, rapidly tapered down to 8 mg/day on p.o. day 11 and 4 mg/day after 3 months); a minority of patients (less than 10%), enrolled in clinical studies, might have been induced with Basiliximab and/or treated with Tacrolimus, Everolimus, or Sirolimus as alternatives; Azathioprine was also substituted for Mycophenolate in gastrointestinal intolerant patients. Posttransplant heparin anticoagulation was started in 2011 only in DKT, and after that a higher than usual graft vein thrombosis was observed in this type of transplant, as described also by others [18].

2.4. Statistics. Descriptive statistics are given as numbers, percentages, and mean (±SD) or median (and IQR) according to data distribution; intercategory differences were checked by ANOVA followed by Scheffé post hoc test; the chi-square method was used for comparison of frequencies of categorical data. Survival analysis was estimated as event-free cumulative survival using the Kaplan-Meier method and compared using the log-rank Mantel-Cox test. Cox regression analysis was used to calculate hazard ratios of cumulative incidence of events within each transplant category, and to calculate relative risks associated with patient and donor characteristics.

We estimated the mean number of years in which the allografts were functioning before loss for any cause (failure or death with functioning graft) by the restricted mean survival analysis [19–21]; it is computed as the total area under the survival curve at specific times (we repeated the procedure at 1, 3, and 5 posttransplant years). Conceptually, this procedure indicates the mean time (years) each graft remained functional at any defined time and equals the mean dialysis-free life years for every recipient at any defined time. From this value we extrapolated total dialysis-free life years for every 100 donors at any time in our pre-DKT and the DKT protocols; for this calculation each donor was made equal to 1.6 SKT (according to data of our regional agency on utilization of overall retrieved grafts) [22] or 1 DKT according to allocation.

SPSS Statistics software v.21 was used for all analyses. Two-tailed P values < 0.05 were considered significant.

3. Results

Summary data of all ECD and transplant categories are given in Table 2: donor sex distribution did not differ within each transplant category; donor age was similar in "low-risk" donors of either era, while it was statistically different