Living kidney donor safety
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Document Version
Publisher's PDF, also known as Version of record

Publication date:
2009

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):

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Chapter two

Correspondence on age-related renal function decline
Significant negative association with age and both GFR and ERPF in male and female living kidney donors

*Nephrology, Dialysis and Transplantation*
2007; 22(1):283

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**Motive**
With ageing, functional changes occur within the kidney. In the general population, renal function is known to decline slowly over the years. Kidney donors however represent a part of the population that is in very good health. Does renal function decline with age in this group of subjects or is it preserved? Reports are conflicting, in particular when gender-related issues are addressed. In a population that is selected for good health, one should be careful in extrapolating results to the more heterogeneous general population.
Abstract manuscript by Berg

Differences in decline in GFR with age between males and females. Reference data on clearances of inulin and PAH in potential kidney donors

NDT 2006; 21(9):2577-82

To ensure that potential kidney donors have no renal impairment, it is extremely important to have accurate methods for evaluating the glomerular filtration rate (GFR). The golden standard, clearance of inulin, has been used in the present study. The aim was to evaluate the effects of age and sex on renal function and present reference data.

A total of 122 potential kidney donors, 62 females, aged 21–67 years, were investigated with the GFR and effective renal plasma flow (ERPF) determined by clearances of inulin and para-amino hippurate.

The mean±SD GFR and ERPF were 105±13 and 545±108 ml/min/1.73m², respectively, and we found no difference between the males and females. When relating GFR and ERPF to age, however, a significant decline was found in GFR and ERPF in males, but not in females in the age range of 20–50 years. GFR fell by a mean of 8.7 ml/min/1.73m² and ERPF by 90 ml/min/1.73m² per decade in male donors.

With adequate methods for determining GFR and ERPF, a clear difference in the effect of age was seen between the sexes. Males showed a significant decrease between 20 and 50 years of age, which was not seen in females. Females seem to be protected in the pre-menopausal period probably by oestrogens. These results confirm clinically those found in rats.

Sir,

With interest we read the manuscript by Berg. She reports that glomerular filtration rate (GFR) and effective renal plasma flow (ERPF) were unrelated to age in 62 female potential kidney donors, whereas in 60 male potential donors, GFR and ERPF were lower in older subjects [1]. She concludes that effects of ageing on the kidney are gender-related. This conclusion, however, is not warranted without longitudinal data.

Moreover, the age-range in her study was relatively narrow, with few subjects aged over 50. Furthermore, subjects evaluated for kidney donation represent a healthier-than-average population, in whom risk factors for renal function loss over time are less prevalent [2]. Finally, the number of subjects studied was relatively small.

These factors weaken the power to detect age related effects on renal function.

Therefore, we analysed our donor screening data (GFR: 125I-iothalamate, ERPF: 131I-hippuran) in 84 male (mean age 48, range 21–75) and 136 female (mean age 48, range 20–70) subjects.

In contrast to the data by Berg [1], a negative correlation between age and GFR and between age and ERPF was present not only in men, but also in women, which is shown in figure 1. The correlations persisted after exclusion of subjects aged over 50.

The slope in GFR was -8.7 ml/min per decade in male donors and -7.0 ml/min per decade in female donors. For ERPF, the slope was -52 ml/min per decade
in males and -30 ml/min per decade in females. Filtration fraction rose with age in men ($R^2=0.390$, $p \leq 0.0001$) but not in women ($R^2=0.046$, $p=0.596$), supporting the relevance of gender for age-related effects on the kidney.

Longitudinal studies are required to elucidate the impact of gender on the natural course of renal function during ageing and its mechanisms.

Figure 1. Renal function decline with ageing.

The negative association between age and both glomerular filtration rate (GFR) and effective renal plasma flow (ERPF) exists in both male (left panels) and female (right panels) prospective kidney donors.
References
