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## **STRUCTURAL CHANGES IN TRANSPLANTED KIDNEYS EVALUATED BY TIME-ZERO BIOPSY AND MAGNETIC RESONANCE IMAGING BETWEEN EXPANDED AND NON-EXPANDED CRITERIA DONORS**

### **Introduction:**

With an ageing population and shortages of organs from deceased donors, more transplantation centers are using kidneys from expanded criteria donors (ExCDK). ExCDK exhibits worse graft survival and higher rejection rates.

### **Aim:**

To compare structural changes of transplanted kidneys (kTx) from ExCDK and non-ExCDK using magnetic resonance imaging (MRI) and time-zero biopsy.

### **Method:**

Following ethics committee approval, we conducted a prospective study at the Hospital of Lithuanian University of Health Sciences Kaunas Clinics. We performed MRIs of transplanted kidneys using a 3T Siemens Skyra scanner (Table 1) for 34 recipients 7-10 days post-kTx. Radiologists and a nephrologist scored the MRI images. Parametric Magnetic Resonance Imaging v1.2.31-b was used for T1, T2 Map, and apparent diffusion coefficient (ADC) analysis. The interclass correlation coefficient between investigators was 0.96, with measurements averaged across two observers. Time-zero kTx biopsy was evaluated according to Banff-2019 criteria. We compared structural changes assessed by MRI and biopsy between ExCDK and NExCDK. Clinical and laboratory data were collected (Table 2) and analysed using IBM SPSS Statistics version 29.

### **Results:**

Recipients were categorized into ExCDK (n=20) and NExCDK (n=14). Differences in T1 maps relaxation times for the cortex (1591.122 [1429.06-1743.21] ms vs. 1618.27 [1568.35-1731.59] ms, p=0.359), for medulla (1778.91 [1584.78-1860.65] ms vs. 1793.90 [1723.73-

1887.05] ms,  $p=0.341$ ), and cortico-medullary differentiation (CMD) (-143.06 [60.51] ms vs. -146.56 [74.05] ms,  $p=0.539$ ) were not significant. T2 maps and ADC sequences showed no significant differences. Zero-time biopsy data were similar.

### Conclusion:

The study found no significant structural differences in transplanted kidneys from ExCDK compared to NExCDK as evaluated by MRI and zero-time biopsy.

**Table 1.** Imaging modalities and corresponding parameters

	T1 MAP	T2 MAP	ADC
Sequence t.	GRE/separate	GRE/separate	EPI/separate
Orientation	Coronal	Coronal	Transversal
Res. control	Breath-hold	Breath-hold	-
TR/TE (msec)	357.73/1.01	294.62/1.22	5800/61
Voxel (mm <sup>3</sup> )	2.0 x 2.0 x 8.0	2.6 x 2.6 x 8.0	1.0 x 1.0 x 5.0
FOV (mm <sup>2</sup> )	500 x 500	500 x 500	380 x 380
Flip ang. (deg)	35	12	-
Slices	3	3	35
EPI fac.	-	-	113
Fat suppression	Off	Off	SPAIR
Acceleration fac.	2 (GRAPPA)	2 (GRAPPA)	2 (GRAPPA)
Scan time (min)	0:45	0:39	3:40

(-) not applicable, GRE gradient echo sequences, EPI Echo planar imaging, GRAPPA Gene Realized Autocalibrating Partially Acquisitions, SPAIR Spectral Attenuated Inversion Recovery

**Table 2.** Relationship between demographic and clinical data between the expanded and non-expanded criteria donors' kidneys

	ExCDK <sup>1</sup>	NExCDK	<i>p</i>
<b>Recipients</b>	<b>n = 20</b>	<b>n = 14</b>	
<b>Gender male (%)</b>	32.4	41.2	0.577
<b>Age (years)</b>	42.64 (14.02)	46.37 (13.37)	0.234
<b>Duration of kidney replacement therapy (months)</b>	35.5 (14.5-148)	12 (6.25-39.75)	0.043
<b>Creatinine before kTx (μmol/L)</b>	804.57 (276.02)	775.85 (339.77)	0.796
<b>BMI before kTx (kg/m<sup>2</sup>)</b>	26.9 (5.40)	26.59 (6.60)	0.884
<b>Delayed graft function<sup>2</sup> (%)</b>	20.6	20.6	0.382
<b>mGFR<sup>3</sup> on the day of discharge (mL/min/1.73 m<sup>2</sup>)</b>	52.18 (23.26)	70.84 (20.77)	0.003
<b>Hemoglobin on the day of discharge (g/L)</b>	97.57 (12.59)	107.25 (15.26)	0.06
<b>Hematocrit on the day of discharge (%)</b>	29.24 (3.95)	32.1 (4.74)	0.078
<b>SpO<sub>2</sub> on the MRI day (%)</b>	97.5 (96-98.25)	98.0 (96-99)	0.743
<b>Cold ischemic time of transplanted kidneys (min)</b>	875.21 (246.50)	748.6 (214.60)	0.121

<sup>1</sup>Expanded criteria donor—60 years old and more or more than 50 years old with two criteria: arterial hypertension, serum creatinine > 130 μmol/L, death underwent cerebral vascular damage.

<sup>2</sup>DGF was defined by at least one HD session within 7 days of transplant. <sup>3</sup>Measured glomerular filtration rate. Data given as a number (%), mean (SD) or median (IQR).