

The aim of this work was to evaluate the possibility of using in vivo phosphorus magnetic resonance spectroscopy (^{31}P MRS) for diagnosis of kidney graft dysfunction after transplantation. In vivo ^{31}P MRS is a noninvasive imaging method which makes possible to assess energy metabolism.

A total of 68 patients with kidney grafts were examined on a 1.5T MR scanner.

^{31}P MRS was performed using the 2D-chemical shift imaging method. The patients were divided into four groups: acute rejection; acute tubular necrosis; late graft dysfunction; and patients with good renal function after transplantation. We measured the signal intensities of phosphomonoesters (PME), inorganic phosphate (Pi), phosphodiester (PDE) and β -adenosine triphosphate (with contribution of α -adenosine diphosphate) and their ratios.

Patients with acute rejection episodes showed significantly elevated PME/ β -ATP, PME/Pi and PDE/Pi signal ratios compared to the control group. The group with acute tubular necrosis has decreased these ratios: PDE/ β -ATP and PDE/Pi compared to the control group. Patients with late graft dysfunction revealed only significant decrease of PME/Pi ratio. The group of AR patients display higher ratios of PME/Pi and PDE/Pi compared to the group of ATN patients and display higher ratios of PME/Pi compared to the group of LGD. We conclude that ^{31}P MRS is capable to distinguish between the two main causes of graft dysfunction early after transplantation.