

In vivo Potassium MR-Spectroscopy at 7 T. Establishment and first Applications in Human Muscle.

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Potassium and sodium play vital roles in numerous cellular processes. Low potassium intake associates with cardiovascular disease and mortality, while beneficial effects of higher potassium intake have been demonstrated. Since serum or urine potassium levels correlate poorly with tissue potassium, its specific determination in different organs would be very valuable. Existing methods are invasive, associated with radiation exposure and lack spatial resolution.

In vivo determination of ^{39}K was not possible until very recently. By using ^{39}K MRI and MR spectroscopic imaging (MRSI) at ultrahigh magnetic fields for the first time a non-invasive and spatially resolved method for *in vivo* investigation of the important K^+ ion homeostasis and of normal cell membrane function i.e., $\text{Na}^+\text{-K}^+\text{-ATPase}$ function in humans has become feasible which has recently been convincingly demonstrated [1,2].

Here we present our implementation and initial results on using ^{39}K MR spectroscopy. Initial applications include the spatially resolved measurement of quadrupolar splittings in human calf muscles based on previous studies [1,3] using a modified CSI-FID sequence. This may prove valuable for ^{39}K quantification in MRSI investigations. Furthermore, an initial exercise study within the magnet was performed, suggesting fast potassium decrease during exercise followed by fast recovery afterwards.

References:

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