# Initial *in vivo* rodent sodium and proton MR imaging at 21.1 T


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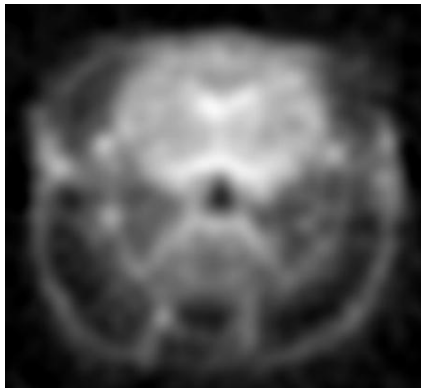

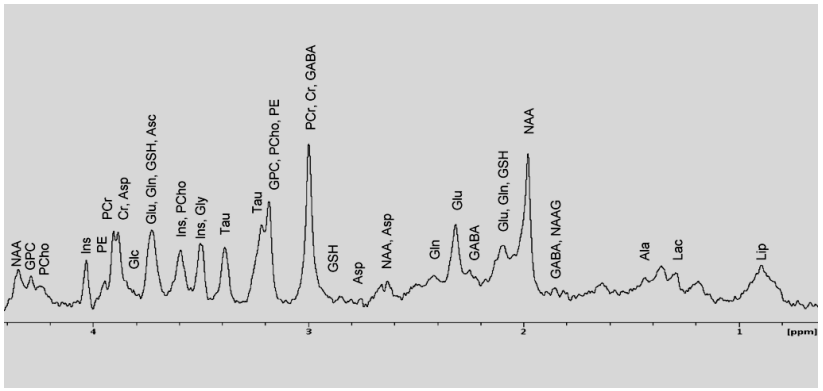


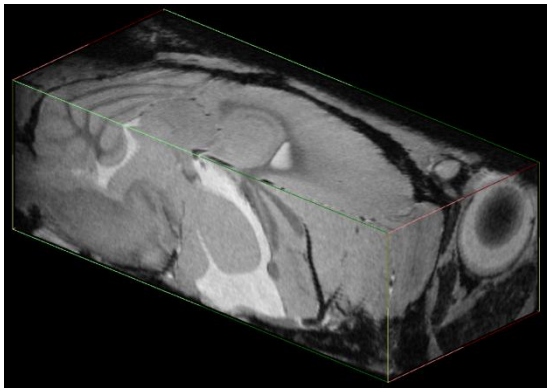

Sodium *in vivo* MRI of rat. *In vivo* localized (43µL) proton MR spectrum from rat brain. Proton *in vivo* MRI of mouse head.

The first *in vivo* sodium and proton MR images and localized spectra of rodents were attained using the wide bore (105 mm) high resolution 21.1 T magnet, built and operated at the National High Magnetic Field Laboratory (Tallahassee, FL). Head images of normal mice and Fisher rats (~ 250 g) were acquired with custom designed RF probes at frequencies of 237/900 MHz for sodium and proton, respectively. Sodium MRI resolutions of ~0.125 µL for mouse and rat heads were achieved by using a 3D back-projection pulse sequences. A gain in signal of ~ 3 for sodium and of ~ 2 times for proton were found relative to corresponding MR images acquired at 9.4 T. The novel MR imaging capabilities are especially advantageous for non-proton nuclei, where the gains in sensitivity are much higher. Both *in vivo* large rodent MR imaging and localized spectroscopy at the extremely high field of 21.1 T are feasible and demonstrate improved resolution and sensitivity valuable for structural and functional brain analysis. The capability to perform *in vivo* imaging of large animals, such as rats, at an ultra high magnetic field is expanding the frontiers for biomedical research.


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