In Vivo Sodium MRI at 21.1T and Tumor Resistance to Therapy

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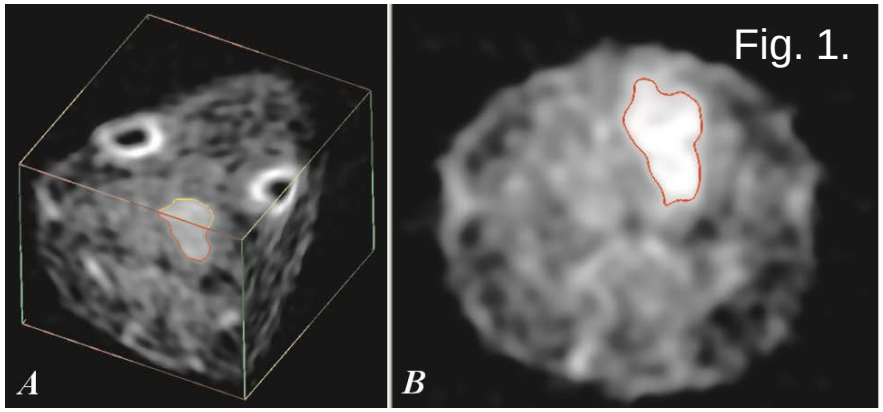
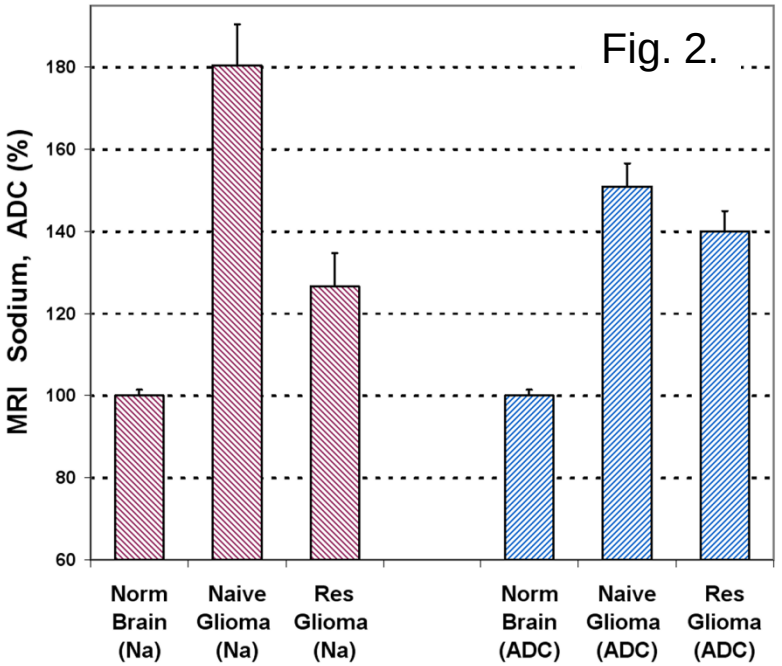


Sodium magnetic resonance imaging (MRI) provides an independent and physiologically relevant window for *in vivo* processes taking place in tumors (Fig.1). The value of sodium MRI is not yet established due to the weak sodium MR signals.

Advanced sodium imaging was achieved using 21.1 T magnet for rodent glioma model. It comprised the record high resolution of 0.5x0.5x0.5 mm and entire sodium signal detection. For the first time it was demonstrated that sodium concentration in tumors can be an indicator of tumor resistance to therapy (Fig.2). It also reveals the capability of sodium MRI to detect minor functional alterations in mitochondria which play a central role in the mechanism of tumor resistance.



The benefit of this *in vivo* tool is a quick and non-invasive evaluation of tumor resistance. Determining tumor resistance prior to therapy will prevent ineffective treatments. These findings are a basis for immediate and important clinical applications. The results demonstrate that sodium MRI can contribute dramatically to our fight with cancer.

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