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Regular Article

Absolute Quantitation of Water and Metabolites in the Human Brain. II. Metabolite Concentrations

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Abstract

A method for determining absolute metabolite concentrations with *in vivo* ^1H magnetic resonance spectroscopy is presented. Using the compartmentation model introduced in the preceding paper of this series (*J. Magn. Reson. B* **102**, 1, 1993), it is possible to express NMR results in terms of most commonly used concentration units. The proposed scheme, involving the measurement of an external standard as well as of the localized water signal, is verified on cerebral spectra obtained from 22 subjects. Besides concentrations, longitudinal and transverse relaxation times are determined for parietal white and occipital gray matter. The determination of these quantities crucially depends on the analysis of the T_2 signal decay as a function of echo time. The *in vivo* concentrations of the four metabolites *N*-acetyl aspartate, creatine plus phosphocreatine, choline, and *myo*-inositol are in good agreement with biochemical determinations performed *in vitro*. Two clinical examples emphasize the relevance of absolute quantitation in the investigation of human neuropathology and normal development.

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