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Regular Article

Absolute Quantitation of Water and Metabolites in the Human Brain. ▶ I. Compartments and ◀ Water ▶

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Abstract

A method is presented to determine the compartmentation of a localized region ◀ in the human brain in ▶ terms of CSF, tissue ◀ water, ▶ and an NMR-invisible rest, using a PRESS or STEAM sequence. Discrimination between CSF and tissue ◀ water ▶ is based on differences ◀ in ▶ their T_2 relaxation times. The NMR-invisible compartment is assessed using an external standard. The composition of three regions ◀ in the human brain ▶ is determined. The CSF content of specific regions can be used to quantify cortical atrophy. The method provides a means for measuring the ◀ water ▶ content of ◀ brain ▶ tissue ◀ in ▶ *vivo* with a precision of 1.5%. After appropriate corrections, the results are ◀ in ▶ close agreement with biochemical values. The method has major applications ◀ in ▶ localized quantitative spectroscopy. The compartmentation model can be used to correct for the CSF content of the selected volume and to properly define and interconvert all major concentration units.

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