題名:MRI assessment of drug-induced fluid accumulation in humans: validation of the technology

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上傳時間:2009-08-24T03:32:12Z

摘要:PURPOSE: The purpose of this study was to evaluate the feasibility of using proton and sodium magnetic resonance imaging (MRI) to detect fluid accumulation produced by fludrocortisone and nifedipine - two drugs known to cause salt/water retention by different mechanisms. MATERIALS AND METHODS: Twelve young healthy male subjects were randomly assigned to one of two groups and treated with either fludrocortisone or nifedipine for 14 or 25 days, respectively. The change in sodium MRI, as well as in proton T(2) value and T(1)-weighted signal intensity in the calf following postural change [referred to here as 'postural delta signal'(PDS)], was evaluated before, during and after drug administration. The changes in MRI PDS were compared to conventional physiological parameters, including body weight, calf volume and pitting edema. RESULTS: When compared to the baseline pretreatment values, the subjects treated with fludrocortisone showed a 5.5% increase in sodium MRI PDS (P=.01), a 2-ms increase in proton T(2) PDS of the gastrocnemius muscle (P=.06) and a body weight gain of 2.3% (P=.001) within 1 week. In the nifedipine-treated subjects, the sodium MRI PDS increased by 6% versus baseline (P=.03), while the proton T(2) PDS of the gastrocnemius muscle increased by 3.7 ms (P=.01), associated with a 0.5% weight gain (P=.55), within 3 weeks. No significant changes were noted in the T(1)-weighed images following postural

change. Measurements of calf circumference, volume and pitting edema did not show consistent changes associated with the drug administration. CONCLUSION: The postural change in sodium MRI and proton T(2) signals provides a sensitive method for detecting the fluid accumulation produced by fludrocortisone and nifedipine. The MRI results are consistent with treatment-induced increases in extracellular fluid volume and correlate well with the observed weight gain. These findings support the potential utility of MRI for the evaluation of medication-induced fluid retention.