Assessing response of interferon treatment in hepatitis C virus (HCV)-related liver disease using ^{31}P magnetic resonance spectroscopy

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Introduction: ^{31}P MRS is able to assess the severity of HCV-related liver disease. Previous studies have shown that an increase in the ratio of the phosphomonoester resonance (PME) to the phosphodiester resonance (PDE) was associated with increasing severity of disease. We investigate the utility of this test as a marker of response to interferon and ribavirin treatment.(1,2)

Patients: 30 patients with biopsy proven HCV-related disease and undergoing treatment with interferon and ribavirin were studied. There were 20 males and 10 females.

Method: All had baseline pre-treatment scans and then had repeat scans at 6 months and 1 year after start of treatment. Hepatic ^{31}P MR spectra were obtained using a 1.5T Eclipse scanner (Philips Medical Systems, Eindhoven, Netherlands). An enveloping transmitter coil and separate surface receiver coil were used, both of which were double-tuned for protons at 64 MHz and phosphorus at 26 MHz. The proton signal was used to obtain a T_1-weighted image (TR 800ms, TE 16ms) in the axial plane to confirm patient positioning. The ^{31}P MR spectra were localized to the liver using an ISIS sequence, voxel size 70×70×70mm, repetition time (TR) 10000ms, 48 signal averages. Quantitation of the ^{31}P signals was carried out in the time domain by a blinded observer, using the AMARES algorithm (3), included in the MRUI software program (4) using prior knowledge (5). Patients were classified as responders based on viral clearance from PCR studies or normalization of liver function tests.

Results: To date, all 30 patients attended for follow-up scans at 6 months and 5 patients at 1 year after starting treatment. Based on the Ishak histological scoring system, there were 7 patients with mild hepatitis, 16 with moderate/severe hepatitis and 7 with cirrhosis. Seventeen patients responded to treatment and of these, 15 patients had PME:PDE ratios which had decreased at follow-up scans (Figure 1). The mean baseline PME:PDE ratio in responders ± s.e decreased from 0.24 ± 0.02 to 0.16 ± 0.06, six months post-treatment (paired t-test: p=0.001). In the 13 non-responders, the ratios had increased in 3, were similar in 9 but had decreased in 1 at follow-up scans. In this non-responder group, the mean baseline PME:PDE ratio was 0.22 ± 0.03 compared with 0.23 ± 0.04, six months post-treatment (paired t-test: p=0.78).

Discussion: The PME:PDE ratio decreases in patients who respond to treatment and remain similar in patients who are non-responders. Ultimately, the PME:PDE ratio needs to be compared to liver biopsy at the end of treatment however, these preliminary results are encouraging and indicate that this test could be used as a marker of response to treatment and may possibly obviate the need for repeat biopsies in future.

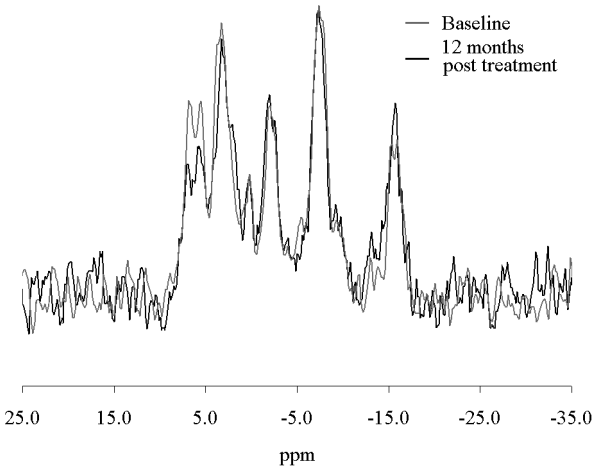

Figure 1 ^{31}P MR spectrum of a patient pre and post treatment.

References

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