AbstractID: 12719 Title: Improved Quantification of the CH2/CH3 ratio of lipids: Illustration In Vivo on Tibial Bone Marrow at 3 T

Purpose: To improve the accuracy of lipid CH_2/CH_3 ratios determined by proton magnetic resonance spectroscopy (MRS) by minimizing J-coupling modulations of the CH_3 lipid peak.

Method and Materials: Experiments were conducted *in vivo* on the tibial bone marrow lipids of four volunteers at 3 T. A regular PRESS (Point RESolved Spectroscopy) sequence was used to estimate the T_2 (transverse relaxation) of the CH_2 protons by acquiring spectra at five echo times (TEs) and plotting the areas as a function of TE. The curve was fitted to the function $M_o\exp(-TE/T_2)$, where M_o is proportional to the CH_2 proton concentration. The CH_3 response to a regular PRESS sequence is modulated due to J-coupling interactions and does not decay monotonically. To determine M_o of the CH_3 protons a narrow-bandwidth PRESS sequence was designed that rewinds the J-coupling evolution of the CH_3 protons in the voxel of interest and spectra were acquired with the same five TEs. The CH_2/CH_3 ratio was calculated by dividing the CH_2 M_o by that determined for CH_3 and the result was multiplied by 1.5 to compensate for the different proton multiplicities.

Results: The mean T_2 of the CH_2 protons was estimated to be ≈ 88 ms. Applying the narrow-bandwidth PRESS sequence minimized CH_3 signal variations due to J-coupling and resulted in a decay curve that could be described by a monoexponential T_2 decay function. The mean T_2 for the CH_3 protons was ≈ 133 ms. A mean ratio of 12:1 was calculated for the CH_2:CH_3 ratio of the tibial bone marrow lipids of all volunteers.

Conclusion: The presented PRESS sequence enables the T_2 of the CH_3 lipid protons to be measured with more accuracy than would be determined by using short-TEs thereby allowing a more accurate measure of the CH_2/CH_3 lipid composition ratio to be determined.