Purpose:
To improve lipid composition determination by localized proton magnetic resonance spectroscopy (MRS) at 9.4 T by minimizing J-coupling modulations of the 2.1 ppm, 2.3 ppm, and 2.8 ppm lipid peaks.

Methods:
Experiments were conducted on corn oil and sesame oil phantoms at 9.4 T. A regular PRESS (Point RESolved Spectroscopy) sequence was used to obtain spectra from the oils with echo times (TEs) of 20, 30, 40, 50, 80, 120, 180, and 240 ms. A modified PRESS sequence designed to minimize signal losses due to J-coupling was also utilized to acquire spectra of the 2.1 ppm, 2.3 ppm, and 2.8 ppm resonances of the oils with TEs of 40, 50, 80, 120, 180 and 240 ms. The areas of the three lipid resonances obtained by both sequences were plotted as a function of echo time and the resulting curves were fitted to the function Moexp(-TE/T2), where Mo is proportional to the proton concentration of the target resonance. Oil compositions (% linoleic acid, % oleic acid, and % saturated fatty acids) were determined from extrapolated Mo values for the three resonances and from equations established in the literature.

Results:
The responses of the three proton groups to a regular PRESS sequence were modulated due to J-coupling interactions. However, the responses to the modified PRESS sequence fit well to monoexponentially decaying functions. Oil compositions determined with the PRESS sequence designed to minimize J-coupling effects agreed with results reported in the literature unlike those calculated from spectra acquired with the regular PRESS sequence.

Conclusions:
Lipid compositions determined by localized proton MRS can contain significant errors (as high as 49 %), even if they are determined from short-TE PRESS spectra corrected for T2 relaxation, if the influence of J-coupling is not considered.