Summary and Conclusion

Proton Magnetic Resonance Spectroscopy (^{1}H-MRS) is a non invasive technique that measures the biochemical contents of living tissues.

MRS is based on the phenomenon that the nuclei of certain atoms have a magnetic moment and that they interact with magnetic field. These alterations in the magnetic field cause small changes in the resonance frequency which are known as chemical shifts, and these allow distinction to be made between the same nuclei in different chemical environment.

While MR Imaging (MRI) produce a visual image, MRS obtains chemical information that may be expressed as numerical values.

Although the distinction between MRI and MRS has now been blurred by the development of MRS imaging (MRSI), the main drawback of ^{1}H-MRS is difficulty in interpretation as it provides graphs and not images to which radiologists are unfamiliar. So, with development of MRSI and ability to overly spectroscopic data on the conventional MR image in diagnostic room adding easier interpretation and better results.

With much technical development and more automated procedures MRS provides metabolic information in an imaging format which can be displayed as a color-coded map superimposed on the diagnostic image.

^{1}H-MRS is potentially sensitive to metabolic changes that occur before anatomical changes during disease progression and treatment, and it represent a bridge between imaging and metabolism. It offers methods for

early detection of new disease and can influence success or failure of therapeutic intervention.

MRS may be obtained with most clinical 1.5-T MR imaging units fitted with commercially available automated software. Adequate MR spectra may be obtained in period of time as short as 10 minutes. Therefore, MRS studies may be added on to routine magnetic resonance (MR) imaging without significant time penalties.

MRS provides therapeutic impact in brain tumors, metabolic disorders such as adrenoleukodystrophy and Canavan's disease, Alzheimer's disease, hypoxia, secondary to trauma or ischemia, human immunodeficiency virus dementia and lesions, as well as systemic disease such as hepatic and renal failure.

If we can, through MRS, at minimum cost and little inconvenience to our patients, add precision to existing diagnosis, make new and unexpected diagnosis, define responses to therapy rapidly and non invasively and in a time-frame that permits real-time modifications, alter our treatment regime or predict the neurological outcome early in a hospital stay, much is to be gained.

Finally, we ask ourselves why after more than 20 years of MRS in clinical neurology, and quite unlike positron emission tomography (PET), single-photon emission computer tomography, and electro-encephalogram (EEG), the technique of MRS has thus far failed to gain acceptance among clinicians? MRS, as a functional and chemical analytical tool, has not sat

easily within the MRI establishment where training and experience focus on structural anatomy. Treating physicians, in this case usually neurologists, must be responsible for the ordering, evaluation, and reading of the spectra on their own patients. The nuances of MRS are at least as complex as those of the electrocardiogram or EEG, both of which are firmly in the hands of clinicians of their specialties—cardiology and neurology, respectively.