

## Introduction

Intra-axial brain lesions could be neoplastic or non-neoplastic. Some non-neoplastic brain lesions can mimic the neoplastic ones clinically, radiologically and sometimes histopathologically. This may lead to misdiagnosis and hence mismanagement. MRS is usually used as a complementary to conventional MRI to refine the diagnosis of intra-axial parenchymal brain lesions. MRS is based on the chemical shift properties of atoms in the brain tissue. Stereotactic-guided needle biopsy is a well-established method to obtain tissues for histopathological diagnosis of intra-axial brain lesions.

## Methods

A prospective study conducted at the Department of neurosurgery, Alexandria University, Egypt, on 27 consecutive patients presenting with multifocal, diffuse, as well as deeply-seated intra-axial brain lesions. All patients had both brain MRI and MRS prior to stereotactic biopsy using Leksell Stereotactic System. Histopathological examinations of the obtained tissue specimens, using appropriate stains including immunostains, were performed.

## Results

MRS diagnosed neoplastic brain lesions in 15 (56%) cases and non-neoplastic brain lesions in 12 (44%) cases. Correlation between the preoperative diagnosis by MRS and the histopathological diagnosis following stereotactic biopsy of being either neoplastic or non-neoplastic lesion revealed matching in 25 out of 27 cases (sensitivity 88%, specificity 100%). Within the group of cases (n= 15) diagnosed preoperatively by MRS as being neoplastic, 12 cases were diagnosed having brain gliomas of different grades. The MRS grading of gliomas exactly matched the histopathological grading following stereotactic biopsy in 10 out of the 12 cases (sensitivity 89%, specificity 67%).

The Diagnostic Value of Brain MRS

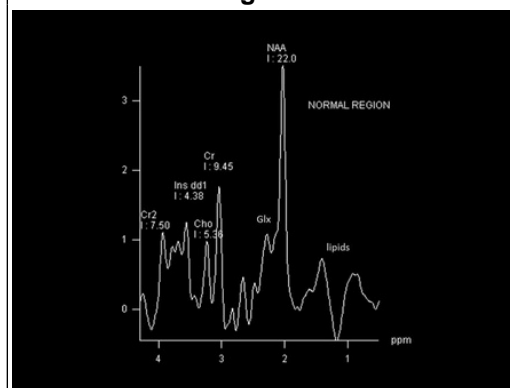
	Preoperative MRS diagnosis of brain tumors	Preoperative MRS grading of brain gliomas
Sensitivity	88%	89%
Specificity	100%	67%
PPV	100%	89%
NPV	82%	67%
Accuracy	92%	83%

\*Sensitivity: probability that a test result will be positive when the disease is present (true positive rate).  
\*Specificity: probability that a test result will be negative when the disease is not present (true negative rate).  
\*Positive predictive value (PPV): probability that the disease is present when the test is positive.  
\*Negative predictive value (NPV): probability that the disease is not present when the test is negative.  
\*Accuracy: proportion of true results (both true positive and true negative) in the selected population.

## Conclusions

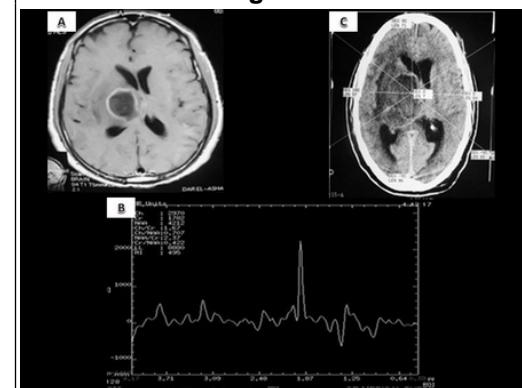
MRS may help with differential diagnosis, histologic grading, degree of infiltration, tumor recurrence, radionecrosis as well as differentiating between tumors and pseudotumors. Multiple voxel MRS may increase the diagnostic yield of stereotactic brain biopsy by determining the ideal site for biopsy. MRS maps may be integrated in neuronavigation surgical planning softwares and may be used intraoperatively to maximize tumor resection and hence reduce the need for subsequent operations.

Figure 1



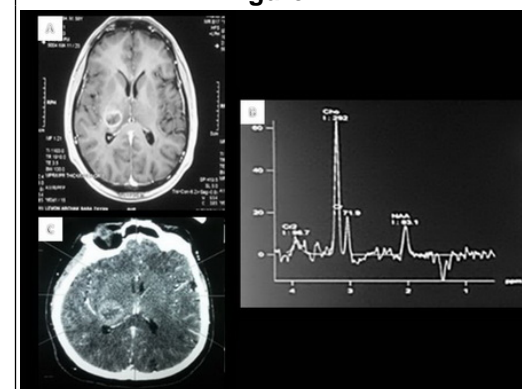
MRS Spectrum of Normal Brain

Figure 3



An illustrative case of right thalamic abscess

Figure 2



An illustrative case of right thalamic high grade glioma