MRI in Oncology

Magnetic Resonance Imaging is potentially useful in Oncology in a large number of ways. The possibilities include screening, diagnosis, staging, radiotherapy and surgery planning and the demonstration of recurrence and metastases.

The lack of harmful effects would make MRI highly suitable for screening if the technique was more widely available and less expensive. The STIR sequence, described in one of the following articles, is a method of demonstrating lesions with considerable contrast to the surrounding normal structures and as such may be applicable to screening for neoplasia. Because of the present cost of the technique the application of MRI in screening has not been explored.

The use of MRI in the primary diagnosis of suspected malignancy is already well accepted in the CNS. This is discussed, with many examples, in the article by Bradshaw and Lewis. The value of MRI in the primary diagnosis of malignancy in the body has not been clearly established.

Presently the main role of MRI in Oncology outside the CNS appears to be in the demonstration of extent of known disease for staging and treatment planning and the detection of recurrence and metastases. It has been shown that MRI is superior to CT when studying primary bone tumours and this can be very important now that prosthetic replacement is being offered in treatment rather than amputation. The detection of recurrence and metastases is described in the following papers on the pelvis and the spine. Determination of the extent of malignant disease is also discussed with regard to the chest.

Radiotherapy planning applications are already becoming clear. The facility of scanning in any desired plane, with equal resolution, is clearly an advantage over CT. This is demonstrated in the case of rhabdomyosarcoma of the orbit discussed in this issue in the paper by Berger et al. The high contrast between lesions and surrounding tissues enables decisions over radiotherapy fields to be made with greater precision.

The Stir Sequence in MRI of Neoplastic Lesions

P. Goddard MD, FRCR, J. Waring, A. Case, R. Yeats, J. A. Bullimore FRCR, E. Whipp FRCR, V. Barley FRCR

INTRODUCTION

The Short Tau Inversion Recovery or STIR sequence was devised by Drs Bydder and Young of the Hammersmith Hospital to enhance lesions and suppress surrounding fat (1). Experience with seventy patients studied with suspected neoplastic conditions has shown that the use of the STIR sequence increases the sensitivity of MRI scanning. It also has the potential to decrease scanning and reporting time (2).

Method

Seventy patients with suspected neoplastic disease were studied using a Picker Vista 2055 HP 0.5 T Magnetic Resonance Scanner. The STIR sequence was used in all patients in addition to spin echo sequences and the signal level of lesions compared with surrounding tissues was assessed visually.

Results

The results are shown in the Table. The STIR sequence showed a high signal intensity (white) in all malignant diseases studied. These included a large variety of carcinomas (including bronchus and breast), lymphoma, sarcoma and teratoma.

In benign disease the results were more variable with a high signal in lesions such as angiomata and a-v malformations and low signal (dark) in lipoma. An unusual, characteristic pattern was shown in uterine fibroids with a predominantly low signal mass with high signal septa or striation.

High signal was also shown on STIR images of abscesses and of normal structures such as the spleen, kidneys, gut wall and seminal vesicles.

The STIR sequence provides very good contrast between aggressive lesions and normal tissues such as fat, muscle, liver and fatty marrow.

Examples of the use of the STIR sequence are included in the papers in this issue on the detection of metastatic disease in the lumbar spine and in the pelvis.

Conclusion

The STIR sequence is extremely valuable in identifying areas of abnormality that could otherwise be missed on other sequences and in delineating the extent of abnormal tissue.

	Number of Patients	STIR appearance
Benign Tumours		
Lipoma	4	Very low signal
Uterine leio-myo-fibroma	2	Mainly low signal with high signal septa
Angioma	2	Very high signal
Malignant Tumours		All high signal
Carcinoma:		
Bladder	8	
Prostate	10	
Cervix	8	
Bronchus	7	
Breast	5	
Antrum	3	
Rectum	2	
Vagina	2	
Uterus	1	
Lymphoma	3	
Liposarcoma	2	
Multiple myeloma	1	
Mesothelioma	1	
Teratoma	3	
Rhabdomyosarcoma	2	
Uveal melanoma	1	
Glioma	2	
Chondrosarcoma	1	

REFERENCES

1. BYDDER, G. M. and YOUNG, I. R. (1985) "MR Imaging: Clinical use of the Inversion Recovery Sequence". *J. Comput Assist Tomogr*, **9**, 659–675
2. SUE NELSON (1987) "Clinical Advantages of STIR Imaging Vs. Conventional T2 Spin Echo Methods" *NVR (Picker Int.)* Vol 2, No. 3, pp 18–21.