



The Role of Whole-Body MRI Examination in Oncological and Non-Oncological Diseases

Essay

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Radio Diagnosis

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LIST OF ABBREVIATIONS

Abb.	Full term
ADC	Apparent diffusion coefficient
AngioSURF	Angiographic System for Unlimited Rolling Field-of background body signal suppression
BH	Breath hold
CAD	Computed aided diagnosis
CPSs	Cancer predisposing syndromes
CRMO	Chronic recurrent multifocal osteomyelitis
CT	Computed tomography
DCE	Dynamic contrast enhanced
DWI	Diffusion-weighted imaging
DWIBS	DWI with background body signal suppression
EPI	Echo planar imaging
FDG	Fluorodeoxyglucose
FISP	Fast imaging with steady procession
FLAIR	Fluid attenuated inversion recovery
FLASH	Fast low angle shot
FOV	field of view
FS	Fat saturated
FS	Fat saturation
GRE	Gradient echo
JDM	Juvenile dermatomyositis
LCH	Langerhans cell histiocytosis

List of Abbreviations

Abb.	Full term
MBH	Multi breath hold
MDS	Move During Scan
MIBG	Metaiodobenzylguanidine
MIPs	Maximum intensity projections
MPGs	Motion probing gradients
MPNSTs	Malignant peripheral nerve sheath tumors
MPRs	Multiplanar reformats
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
MS-CT	Multislice computed tomography
NF1	Neurofibromatosis 1
NHL	Non-Hodgkin lymphoma
NPS	Neonatal progeroid syndrome
PACS system	Picture archiving and communication system
PAT	Parallel imaging acquisition technique
PD	Proton density
PET	Positron emission tomography
RF	radiofrequency
SAR	specific absorption rate
SE	Spin echo
SKIP	Stepping Kinematic Imaging Platform
SNR	signal to noise
STIR	Short Tau Inversion Recovery
T	Tesla

List of Abbreviations

Abb.	Full term
TE	Echo time
TIM	Total imaging matrix
TIRM	Turbo Inversion Recovery Magnitude
TSE	Turbo spin echo
US	ultrasonography
VIBE	Volumetric interpolated breath-hold examination
WB-DWI	Whole body diffusion weighted imaging
WB-MRI	whole body magnetic resonance imaging

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Introduction

The introduction of whole-body magnetic resonance imaging (WB-MRI) has profoundly changed the diagnostic concepts for various systemic diseases. In clinical practice, whole-body imaging is increasingly being used as a routine alternative to incremental, multimodal diagnostic imaging, particularly for comprehensive evaluation of malignant diseases. Whole-body MRI achieves comprehensive imaging from head to toe in one single examination. Therefore, in common with PET-CT, WB-MRI seems in principal well suited to take the place of the current, often time consuming multimodal diagnosis of diseases with systemic or multilocular manifestations (*Schmidt et al., 2010*).

Whole-body MRI is increasingly used in the field of oncologic imaging as an adjunct or alternative to established multi-modality approaches (e.g., radiographs, MS-CT, ultrasound, scintigraphy) for initial tumor staging or screening for tumor recurrence after curative therapy. Promising results have been reported for the detection of distant metastatic disease, especially in tumors that frequently metastasize to the bone, liver, and brain (*Antoch et al., 2004*).

The use of WB-MRI appears promising in high-risk populations such as patients with diabetes mellitus, rheumatic

diseases, or primary benign bone tumors with potential for malignant transformation. Several studies have shown that WB-MRI is capable of high accuracy both in the staging of various tumor entities and in demonstrating or excluding recurrence. Especially metastases in the liver, the skeleton, and the CNS are demonstrated with greater accuracy than can be achieved with other imaging procedures. Because the bone marrow is imaged directly by MRI and often displays diffuse or multilocular involvement in multiple myeloma, WB-MRI is particularly sensitive to this disease; its findings are important for the prognosis and play a substantial role in therapeutic decision making. MRI has therefore been incorporated into the staging system for multiple myeloma (*Schmidt et al., 2010*).

Whole-body PET-MRI will be of particular medical importance because systemic disorders such as cardiovascular disease and cancer increasingly account for morbidity and mortality. Therapeutic success with these chronic and often incurable diseases is linked to early diagnosis, accurate staging, and therapy monitoring. This requires repeated whole-body assessment of the extent of the disease, relapses, complications, and concomitant diseases. Clinical studies comparing 18F-FDG PET-CT and whole-body MRI indicate that therapeutically relevant information is frequently obtained by PET or MRI but not necessarily by CT (*Pfannenberger et al., 2007*).

Aim of Work

The aim of the study is to evaluate the role of whole body MRI in assessment of various oncological and non-oncological diseases.