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

Essay

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Radio Diagnosis


Presented by

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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 |

| 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 |

| 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 ***(Pfannenberg 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.