

Role of MRI in the Diagnosis of Different
Bone Marrow Lesions in Pediatric
Patients with Hematological
Malignancies

Thesis

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Presented By

Tamer Farouk El Naggar

Supervised By

Prof. Dr. Hanan Mohammed Eisa

*Professor of Radiodiagnosis
Faculty of Medicine, Ain Shams University*

Prof.Dr. Mostafa Mahmoud Gamal El Deen

*Professor of Radiodiagnosis
Faculty of Medicine, Ain Shams University*

A.Prof. Dr.Yosra Abdelzaher Abdullah

*Assistant Professor of Radiodiagnosis
Faculty of Medicine, Ain Shams University*

Dr. Ayda Aly Youssef

*Lecturer of Radiodiagnosis
National Cancer Institute, Cairo University*

**Faculty of Medicine
Ain Shams University**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(وَعَظَّمَكَ مَا لَمْ تَكُنْ
تَعْلَمُ وَكَانَ فَضْلُ اللَّهِ
عَلَيْكَ عَظِيمًا)

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List of Abbreviations

Abb.	Full term
ADC	Apparent Diffusion Coefficient
ALL	Acute Lymphoblastic Leukemia
AML	Acute Myelogenous Leukemia
AVN	Avascular Necrosis
BME.....	Bone Marrow Edema
BMI	Body Mass Index
BMN.....	Bone Marrow Necrosis
BMT	Bone Marrow Transplantation
CLL	Chronic Lymphocytic Leukemia
CML	Chronic Myelocytic Leukemia
CNS.....	Central Nervous System
DCE	Dynamic Contrast-Enhanced
DWI.....	Diffusion Weighted Image
FOPE	Focal Periphyseal Edema
FOV.....	Field of Vision
FSE	Fast Spin Echo
GRE	Gradient Echo
HL	Hodgkin Lymphoma
MRI	Magnetic Resonance Imaging
MRS	Magnetic Resonance Spectroscopy
NHL	Non-Hodgkin Lymphomas
ON.....	Osteonecrosis
ROI.....	Region of Interest
SI.....	Signal Intensity
SNR.....	Signal to Noise Ratio
STIR.....	Short TI Inversion Recovery
TE	Time to Echo
TI.....	Inversion Time
TIC.....	Time-Intensity Curves
TR	Time to Repeat
TrueFISP.....	Technique True Fast Imaging with Steady-State Precession

INTRODUCTION

Malignant tumors in marrow can arise from the myeloid elements of marrow (resulting in leukemia, lymphoma and myeloma), from the mesenchymal elements of marrow (resulting in primary sarcoma of bone), or from metastases to marrow (*Hwang et al., 2007*).

Leukemia is the most common of pediatric cancers accounting for about 30% of diagnoses (*Puumala et al., 2013*).

Lymphoma is the third most common childhood malignancy, and NHL accounts for approximately 7% of cancers in children younger than 20 years (*Sandlund et al., 1996*).

Lymphomas, Hodgkin's and non-Hodgkin's lymphoma, represent 3%–5% of all malignancies worldwide. By statistics, bone marrow involvement found in 5%-15% of patients with Hodgkin's lymphoma and in 20%-40% of non-Hodgkin's lymphoma patients (*Silva et al., 2013*).

The ability of CT to demonstrate enlarged lymph nodes throughout the body and detect associated pathology in soft tissue structures,, has contributed to CT becoming the modality of choice for the staging and follow-up of lymphoma (*Vinnicombe et al., 2010*).