

# RADIOLOGY

# RADIOLOGY

## *The Oral Boards Primer*

---

*By*

**AMIT MEHTA, MD**

*South Texas Radiology Group, San Antonio, TX*

**DOUGLAS P. BEALL, MD**

*Chief of Radiology Services, Clinical Radiology of Oklahoma  
and Associate Professor of Orthopedic Surgery,  
Oklahoma University Medical Center, Oklahoma City, OK*



**HUMANA PRESS**  
TOTOWA, NEW JERSEY

© 2006 Humana Press Inc.  
999 Riverview Drive, Suite 208  
Totowa, New Jersey 07512

**www.humanapress.com**

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording, or otherwise without written permission from the Publisher.

The content and opinions expressed in this book are the sole work of the authors and editors, who have warranted due diligence in the creation and issuance of their work. The publisher, editors, and authors are not responsible for errors or omissions or for any consequences arising from the information or opinions presented in this book and make no warranty, express or implied, with respect to its contents.

Due diligence has been taken by the publishers, editors, and authors of this book to assure the accuracy of the information published and to describe generally accepted practices. The contributors herein have carefully checked to ensure that the drug selections and dosages set forth in this text are accurate and in accord with the standards accepted at the time of publication. Notwithstanding, since new research, changes in government regulations, and knowledge from clinical experience relating to drug therapy and drug reactions constantly occur, the reader is advised to check the product information provided by the manufacturer of each drug for any change in dosages or for additional warnings and contraindications. This is of utmost importance when the recommended drug herein is a new or infrequently used drug. It is the responsibility of the treating physician to determine dosages and treatment strategies for individual patients. Further, it is the responsibility of the health care provider to ascertain the Food and Drug Administration status of each drug or device used in their clinical practice. The publishers, editors, and authors are not responsible for errors or omissions or for any consequences from the application of the information presented in this book and make no warranty, express or implied, with respect to the contents in this publication.

This publication is printed on acid-free paper. ∞

ANSI Z39.48-1984 (American National Standards Institute) Permanence of Paper for Printed Library Materials.

Cover design by Patricia F. Cleary

Cover illustrations from Chapter 2, "Chest Radiology" and Chapter 9, "Pediatrics."

For additional copies, pricing for bulk purchases, and/or information about other Humana titles, contact Humana at the above address or at any of the following numbers: Tel.: 973-256-1699; Fax: 973-256-8341, E-mail: orders@humanapress.com; or visit our Website: www.humanapress.com.

**Photocopy Authorization Policy:**

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Humana Press Inc., provided that the base fee of US \$30.00 per copy is paid directly to the Copyright Clearance Center at 222 Rosewood Drive, Danvers, MA 01923. For those organizations that have been granted a photocopy license from the CCC, a separate system of payment has been arranged and is acceptable to Humana Press Inc. The fee code for users of the Transactional Reporting Service is: [1-58829-357-2/06 \$30.00].

Printed in the United States of America. 10 9 8 7 6 5 4 3 2 1

eISBN: 1-59259-819-6

Library of Congress Cataloging-in-Publication Data

Mehta, Amit.

Radiology : the oral boards primer / by Amit Mehta, Douglas P. Beall.  
p. ; cm.

Includes bibliographical references and index.

ISBN 1-58829-357-2 (alk. paper)

1. Radiology, Medical--Examinations, questions, etc. 2. Oral examinations.  
[DNLM: 1. Radiology--United States--Examination Questions. WN 18.2 M498r 2006]

I. Beall, Douglas P. II. Title.

R896.M44 2006

616.07'572076--dc22

2006002111

# Preface

---

One of the most difficult and stressful times in the career of any diagnostic radiologist is in the preparation for the oral board exam given by the American Board of Radiology. Oral boards often engender more angst than the written boards because the potential questioning could include any possible question or combination of questions and because the exam requires physical participation.

*Radiology: The Oral Boards Primer* is designed to provide information that is typical of that found on the oral board examination for diagnostic radiology. Cases are provided to illustrate typical pathology and to provide a visual source for the construction of a differential diagnosis. Once the differential is mentally rendered, the mnemonics may be used as a memory aid and to augment any missing components of the differential that would be considered important. The chapters are organized as close to the oral boards exam format as possible. The cases should be examined, interpreted, and completed in a very rapid fashion, allowing for many cases to be reviewed in a single sitting. The vast majority of the cases contain prototypical representations of pathology allowing this text to be used as a memory aid and as a case reference source for many years after one has taken and passed the oral board examination.

The book can be used both during residency and at the time of review for the oral board examination. *Radiology: The Oral Boards Primer* will assist greatly in the preparation for this examination and will contribute to the assuredness and confidence that comes from being adequately prepared. As always, a text can only improve through evaluation and evolution, and we welcome your comments.

A CD-ROM edition of the book (ISBN 1-58829-928-7), sold separately, is available for use on the reader's PC or PDA.

*Amit Mehta, MD*  
*Douglas P. Beall, MD*

# Acknowledgments

---

The following authors are acknowledged for their helpful contributions:

Yong C. Bradley, MD  
Chief of Nuclear Medicine  
Brooke Army Medical Center  
San Antonio, TX

Nancy A. Brown, RT (R)(M)(M)(QM)  
Radiologic Technologist  
Wilford Hall Medical Center  
San Antonio, TX

Liem Bui-Mansfield, MD  
Chief of Musculoskeletal Radiology  
Brooke Army Medical Center  
San Antonio, TX

Neal Dalrymple, MD  
Assistant Professor  
Wilford Hall Medical Center  
San Antonio, TX

David R. DeLone, MD  
Wilford Hall Medical Center  
San Antonio, TX

Judy Estroff, MD  
Children's Hospital Boston  
Boston, MA

Brian J. Fortman, MD  
Assistant Professor  
Medical University of South Carolina  
Carolina Radiology Associates  
Myrtle Beach, SC

Robert B. Good, MD  
Chief of Interventional Radiology  
Wilford Hall Medical Center  
San Antonio, TX

David E. Grayson, MD  
Assistant Professor  
Wilford Hall Medical Center  
San Antonio, TX

Lawrence Hofmann, MD  
Assistant Professor of Radiology and Surgery  
The Johns Hopkins Medical Institutions  
Baltimore, MD

Melody E. Krumdieck, RT (R)(M)  
Radiologic Technologist  
Wilford Hall Medical Center  
San Antonio, TX

Joe C. Leonard, MD  
Professor of Radiology  
University of Oklahoma Health Sciences Center  
Oklahoma City, OK

Christopher J. Lisanti, MD  
Chairman, Department of Radiology  
Wilford Hall Medical Center  
San Antonio, TX

John C. Morrison, MD  
Division Chief, Nuclear Medicine  
Wilford Hall Medical Center  
San Antonio, TX

Fletcher M. Munter, MD  
Chief of Neuroradiology  
Brooke Army Medical Center  
San Antonio, TX

Dan L. Nguyen, MD  
Associate Professor of Radiology  
Chief of Ultrasound  
University of Oklahoma Health Sciences Center  
Oklahoma City, OK

Jeffrey James Peterson, MD  
Assistant Professor of Radiology  
Mayo Clinic Jacksonville  
Jacksonville, FL

David P. Raiken, MD  
Division Chief, Abdominal Imaging  
Wilford Hall Medical Center  
San Antonio, TX

Farid G. Ramji, MD, FRCPC  
Assistant Professor of Radiology  
Division of Pediatric Radiology  
University of Oklahoma Health Sciences Center  
Oklahoma City, OK

Todd S. Regier, MD  
University of Oklahoma Health Sciences Center  
Oklahoma City, OK

Randy Ray Richardson, MD  
Wilford Hall Medical Center  
San Antonio, TX

Richard Robertson, MD  
Director of Neuroradiology  
Children's Hospital Boston  
Boston, MA

Thomas M. Seay, MD  
Wilford Hall Medical Center  
San Antonio, TX

Ernesto Torres, MD  
Chief of Body Imaging  
Brook Army Medical Center  
San Antonio, TX

The following contributors were instrumental in gathering the images used throughout the volume:

Kevin P. Banks, MD  
Department of Radiology  
Wilford Hall Medical Center  
San Antonio, TX

Scot E. Campbell, MD  
Department of Radiology  
Wilford Hall Medical Center  
San Antonio, TX

Judy A. Estroff, MD  
Associate Professor  
Department of Radiology  
Children's Hospital Boston  
Boston, MA

Jason H. Eves, MD  
Department of Radiology  
Wilford Hall Medical Center  
San Antonio, TX

Brian J. Fortman, MD,  
Medical University of South Carolina  
Carolina Radiology Associates  
Myrtle Beach, SC

Chad W. Harston, MD  
Department of Radiology  
Wilford Hall Medical Center  
San Antonio, TX

Todd M. Johnson, MD  
Department of Radiology  
Wilford Hall Medical Center  
San Antonio, TX

Justin Q. Ly, MD  
Department of Radiology  
Wilford Hall Medical Center  
San Antonio, TX

Victoria Trapanotto, DO  
Department of Radiology  
Children's Hospital Boston  
Boston, MA

Eric E. Williamson, MD  
Department of Radiology  
The Mayo Clinic  
Rochester, MN



# Contents

---

Preface .....	v
Acknowledgments .....	vii
An Approach to the Oral Boards .....	xiii
1. Musculoskeletal Radiology .....	1
2. Chest Radiology .....	33
3. Gastrointestinal Radiology .....	59
4. Genitourinary Radiology .....	104
5. Head and Neck Radiology .....	135
6. Vascular and Interventional .....	161
7. Nuclear Medicine .....	177
8. Ultrasound .....	211
9. Pediatrics .....	303
10. Breast .....	333
11. Neuroradiology .....	347

# An Approach to the Oral Boards

---

The oral boards attempt to cover a large amount of material in a short period of time. It is to your advantage to cover as much material as you can so that if one case does not go well, you have a big denominator to limit the significance of that particular case. As such, it is important to have an organized approach to each case. This not only shows the examiner that you are prepared, but also allows for an intelligent discussion.

## THE 5Ds

**Data**  
**Detect**  
**Describe**  
**Differential**  
**Diagnose**

For each case use this approach.

### 1. Data

This is a quick description of the study and any pertinent data the examiner gives you: "This is a contrast-enhanced computed tomography scan of the chest in a 42-yr-old African-American female with a 1-yr history of shortness of breath."

### 2. Detect

After a quick review of the image, show the examiner you have found the pertinent abnormality: "The abnormality is throughout both lungs radiating from the hilar regions along the bronchovascular bundles."

### 3. Describe

Take a brief moment to describe the abnormality to show the examiner you are focusing on the correct finding. If you have incorrectly detected or described the abnormality, the examiner will redirect you to the correct path: "There is soft tissue opacity that spreads along the bronchovascular bundles from both hila. There is associated lymphadenopathy in both hilar regions and the mediastinum."

### 4. Differential

Use the mnemonics in this text to give a quick differential diagnosis: My top four considerations for this constellation of findings would include the following:

Sarcoidosis  
Histoplasmosis or TB  
Amyloidosis  
Metastasis

**5. Diagnose**

Of the differential diagnoses you have provided, give the examiner your top choice and a reason: "Of these differential diagnoses, my top choice is sarcoidosis. The combination of the patient's demographic data and the finding of spread along the bronchovascular bundles associated with lymphadenopathy best supports this diagnosis."

# 1

## Musculoskeletal Radiology

---

*Includes plain film diagnosis in all areas of the musculoskeletal system plus any related special or imaging procedures, including CT, interventional techniques, and MRI.*

### GENERAL CASE CATEGORIES

1. General including Metabolic
2. Congenital
3. Tumors
4. Arthritis

# General

---

## BASILAR INVAGINATION

### PF ROACH

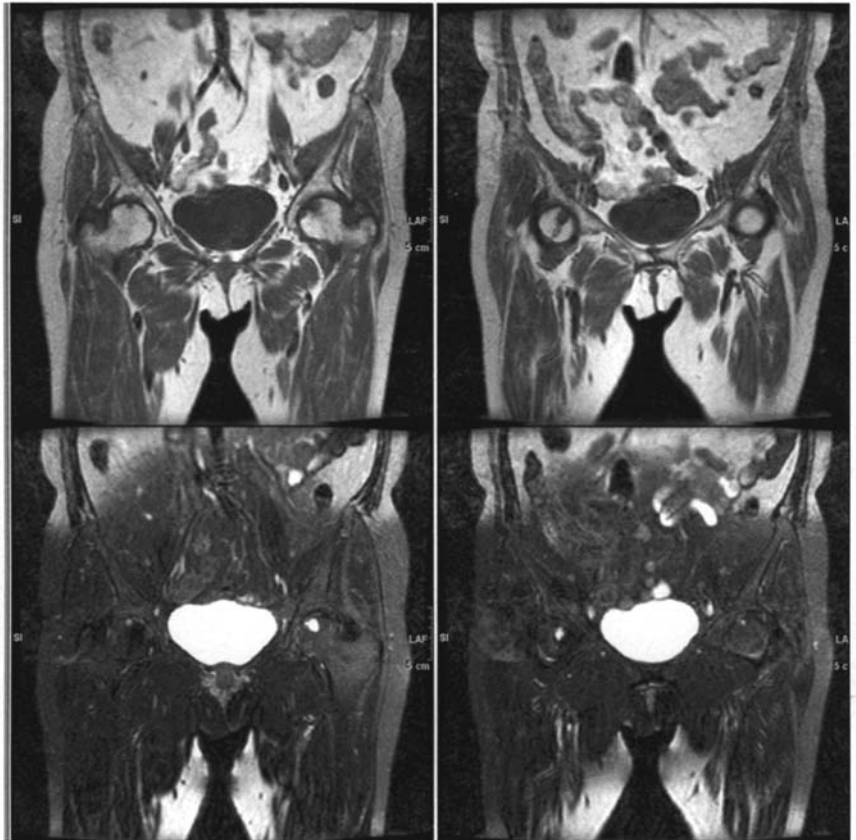
- P**aget disease
- F**ibrous dysplasia
- R**ickets
- O**steogenesis imperfecta, Osteomalacia
- A**chondroplasia
- C**leidocranial dysplasia
- H**yperparathyroidism, Hurler syndrome



# SUBCHONDRAL CYSTS

## COORS

- CPPD
- Osteoarthritis
- Osteonecrosis
- Rheumatoid arthritis
- Synovial-based tumors



# ACETABULAR PROTRUSION

## PROTrusion

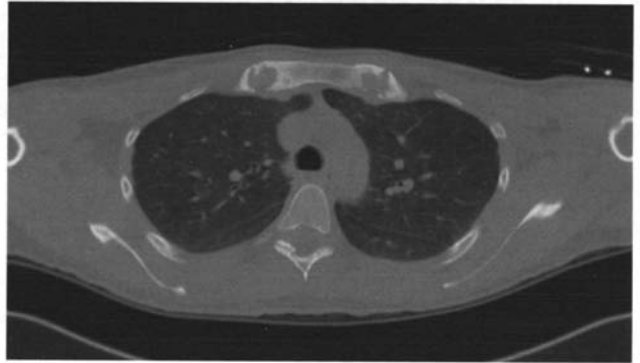
- Paget disease
- Rheumatoid arthritis
- Osteomalacia
- Trauma



## STERNOCLAVICULAR SCLEROSIS

### STOP

- SAPHO syndrome
- Traumatic osteolysis
- Osteomyelitis/Osteosarcoma
- Pagets



## DISTAL CLAVICLE EROSION

### SHIRT

- Scleroderma
- Hyperparathyroidism
- Infection
- Rheumatoid arthritis
- Traumatic osteolysis

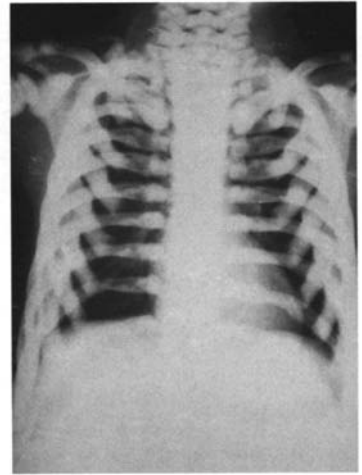




## SCLEROSIS-GENERALIZED

**R.S.M.O.P.M.M.P.F. (Regular sex mnemonic)**

Renal osteodystrophy  
 Sickle cell disease  
 Myelofibrosis  
 Osteopetrosis  
 Pyknodysostosis  
 Mastocytosis  
 Metastasis  
 Pagets  
 Fluorosis



## OSTEONECROSIS

### ASEPTIC

Anemias  
 Sickle cell disease/SLE  
 ETOH/Exogenous steroids  
 Pancreatitis  
 Trauma  
 Infection  
 Caisson's disease



## ACRO-OSTEOLYSIS

### PINCH FO

- Psoriasis
- Infection
- Neuropathic
- Collagen vascular disease
- Hyperparathyroidism
- Familial (Hadju Cheney)
- Other—polyvinyl alcohol



# CHONDRAL CALCIFICATION

## HOGWASH

- Hyperparathyroidism
- Ochronosis
- Gout
- Wilson's Disease
- Arthritis
- Pseudogout
- Hemochromatosis



# Congenital

## ERLYMEYER FLASK

### CHONGO

- Craniometaphyseal dysplasia
- Hemoglobinopathies
- Osteopetrosis
- Niemenn Pick
- Gaucher's Disease
- Other



## METAPHYSEAL BANDS

### DENSE

#### LINES

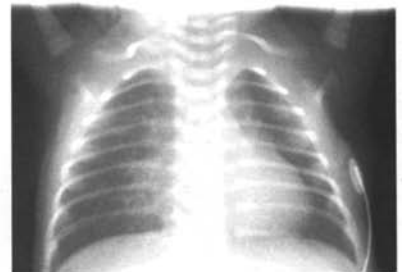
- Lead poisoning
- Infantile growth arrest
- Normal, 3 yr
- LEukemia treated
- Syphillis



### LUCENT

#### NORMAL TENDER LOVING CARE

- Normal (neonates)
- TORCH
- Leukemia
- Chronic illness



## GRACILE BONES

### NIMROD

- Neurofibromatosis
- Immobilization
- Muscular dystrophy
- Rheumatoid arthritis
- Osteogenesis imperfecta
- Dysplasias



## MADELUNG DEFORMITY

### HITDOC

- Hurler syndrome
- Infection
- Trauma
- Dyschondrosteosis
- Osteochondroma
- Congenital–Turner’s syndrome



## SHORT METACARPALS

### BIC PEN

- Basal Cell Nevus syndrome
- Idiopathic
- Chromosomal–Turner’s syndrome
- Pseudohypoparathyroidism/PseudoPseudo-hypoparathyroidism



# Tumors

## DIAPHYSEAL LESIONS IN GENERAL

### CEMENT

- Cysts
- Enchondroma
- Metastasis
- Eosinophilic granuloma (EG)
- Non-ossifying fibroma (NOF)
- TB/infections



## CORTICAL LESION

### MOFOS

- Metastasis
- Osteomyelitis
- Fibrosarcom
- Osteoid osteoma
- Stress fracture



## ILIAC WING LESIONS

- Fibrous dysplasia
- Unicameral bone cyst
- Chondrosarcoma
- Mets/Myeloma/Plasmacytoma
- Ewings



## VERTEBRA PLANA

### IMELT

- Infection
- Mets/Myeloma
- EG
- Lymphoma/Leukemia
- Trauma



## BONY SEQUESTRUM

### LIFE

- Lymphoma
- Infection
- Fibrosarcoma
- EG



## RIB LESION

### FAME

- Fibrous dysplasia
- ABC
- Metastatic/Myeloma/Lymphoma
- EG/Enchondroma





## EPIPHYSEAL LESIONS

### CIGS

- Chondroblastoma
- Infection
- Giant cell tumor/Granuloma (EG)
- Subchondral cyst



## FOCAL SCLEROTIC LESION

### HOME LIFE

- Healed NOF
- Osteoma
- Metastasis
- Ewing's sarcoma
- Lymphoma
- Infection/Infarct
- Fibrous dysplasia
- Enchondroma



## PERMEATIVE LESIONS

### FIRE

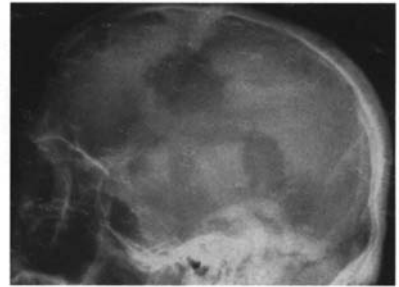
- Fibrosarcoma (Desmoid/MFH)
- Infection
- Round cell tumors
- EG
- Mets/Myeloma



## SKULL LESION

### MEL TORME

- Metastasis
- EG
- Lymphoma
- TB
- Osteomyelitis
- Radiation
- Mets
- Epidermoid



## TIBIAL LESION

### FOAM

- Fibrous dysplasia
- Osteofibrous dysplasia
- Adamantinoma
- Metastasis



## POSTERIOR VERTEBRAL BODY LESION

### GO TAPE

- Giant cell tumor
- Osteoblastoma
- TB
- ABC
- Paget disease
- EG



## CALCANEAL LESION

### BIG G

- Bone cyst-unicameral
- Intraosseous lipoma
- Ganglion
- Giant cell tumor



## FINGER TIP LESION

### GEMS

- Glomus tumor
- Epidermoid/Enchondroma
- Metastasis (lung almost exclusively)
- Sarcoid



## SOFT TISSUE CALCIFICATION/OSSIFICATION

### My GHOSTS

- Myositis ossificans
- Gout
- Hyperparathyroidism
- Ochronosis
- Scleroderma/connective tissue disease
- Tumoral calcinosis
- Sarcoma (synovial cell)



## SACRAL LESION

### CAN

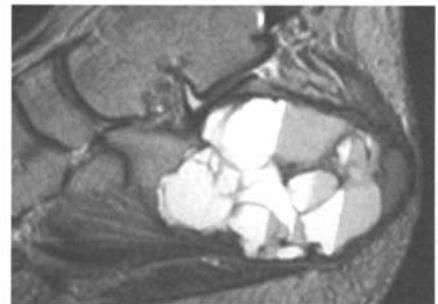
- Chondrosarcoma/Chordoma
- ABC/GCT
- Neurofibromatosis
- And always Mets/Myeloma/Lymphoma



## FLUID-FLUID LEVEL

### HOT MASS

- Hemangioma
- Telangiectatic osteosarcoma
- Metastasis
- ABC/GCT
- Synovial cell
- Sarcoma



# Arthritis

---

## INFLAMMATORY ARTHRITIS

### 1. RF+

#### *Rheumatoid Arthritis*

-Symmetric

#### *SLE*

-Subluxation/nonerosive

#### *Scleroderma*

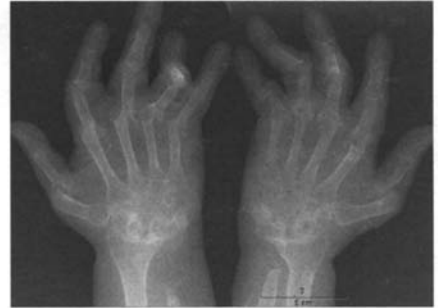
-DIP, PIP erosions

-Soft tissue Ca<sup>2+</sup>

-Acroosteolysis

#### *Dermatomyositis*

-Soft tissue Ca<sup>2+</sup>



2. RF-

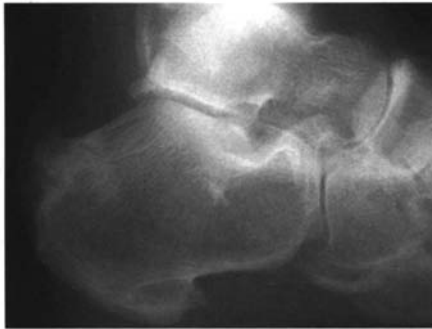
**Ankylosing Spondylitis**

- SI joint involvement



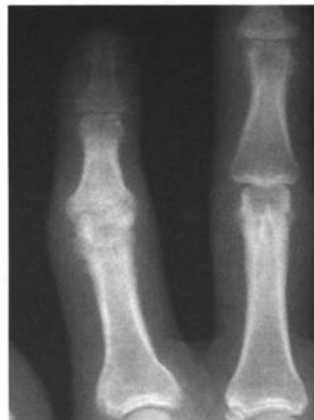
**Reiters**

- Foot > Hand
- Bony Proliferation



**Psoriasis**

- Erosive
- Bony proliferation
- Asymmetric
- Sausage digit
- Ivory phalanx
- Pencil in cup



**Inflammatory Bowel Disease (IBD)**

- Arthritis with IBD