

HOSPITAL PHYSICIAN®

GERIATRIC MEDICINE BOARD REVIEW MANUAL

PUBLISHING STAFF

PRESIDENT, PUBLISHER
Bruce M. White

EXECUTIVE EDITOR
Debra Dreger

SENIOR EDITOR
Becky Krumm, ELS

CONTRIBUTING EDITOR
Ellen M. McDonald, PhD

ASSISTANT EDITOR
Laurie Garrison

EDITORIAL ASSISTANT
Amanda Arkles

SPECIAL PROGRAMS DIRECTOR
Barbara T. White, MBA

PRODUCTION DIRECTOR
Suzanne S. Banish

PRODUCTION ASSOCIATES
Tish Berchtold Klus
Christie Grams

PRODUCTION ASSISTANT
Mary Beth Cunney

ADVERTISING/PROJECT MANAGER
Patricia Payne Castle

NOTE FROM THE PUBLISHER:

This publication has been developed without involvement of or review by the American Board of Internal Medicine or the American Board of Family Practice.

 **Endorsed by the
Association for Hospital
Medical Education**

The Association for Hospital Medical Education endorses HOSPITAL PHYSICIAN for the purpose of presenting the latest developments in medical education as they affect residency programs and clinical hospital practice.

An Understanding of Osteoporosis

Series Editor and Contributing Author:

T. S. Dharmarajan, MD, FACP, AGSF

Associate Professor of Medicine

New York Medical College

Valhalla, NY

Chief, Division of Geriatrics

Director, Geriatric Medicine Fellowship Program

Our Lady of Mercy Medical Center

Bronx, NY

Contributing Author:

Michelle M. Manalac, MD

Senior Fellow, Geriatric Medicine

Our Lady of Mercy Medical Center

Bronx, NY

Table of Contents

Introduction	2
Physiology of Bone	2
Types of Osteoporosis	5
Risk Factors for Osteoporosis	6
Clinical Presentation	7
Making the Diagnosis	7
Management	9
Summary	11
References	12

Cover Illustration by Christie Grams

Copyright 2000, Turner White Communications, Inc., 125 Strafford Avenue, Suite 220, Wayne, PA 19087-3391, www.turner-white.com. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of Turner White Communications, Inc. The editors are solely responsible for selecting content. Although the editors take great care to ensure accuracy, Turner White Communications, Inc., will not be liable for any errors of omission or inaccuracies in this publication. Opinions expressed are those of the authors and do not necessarily reflect those of Turner White Communications, Inc.

An Understanding of Osteoporosis

INTRODUCTION

A common chronic disease seen by primary care physicians, osteoporosis is a major health issue that affects more than 20 million Americans, 80% of whom are women.^{1,2} Because osteoporosis increases in incidence and severity with age, it promises to become an even greater health problem as the absolute number and proportion of the elderly population increases. Of particular concern is the cost associated with the disease; in 1990, the total cost of treating osteoporosis and osteoporotic fractures resulting in loss of independence in this country was estimated to exceed \$10 billion annually.³

Although better means of diagnosing osteoporosis, as well as preventing and treating it, have been introduced in recent years, the disorder often remains unrecognized until late in its course. The following article will provide a comprehensive overview of osteoporosis, discussing its physiology and clinical features and cataloguing the existing tools for diagnosis and treatment. Definitions of, risk factors for, and various types of osteoporosis also will be reviewed.

PAST AND PRESENT DEFINITIONS

A decade ago, the term osteoporosis was used to describe the condition of patients who had hip fractures or compression fractures of the spine. However, the World Health Organization (WHO) now defines osteoporosis as a condition characterized by low bone mass and microarchitectural deterioration of bone tissues, both of which lead to enhanced bone fragility and a consequent increase in risk for fractures.⁴ The current WHO definition uses young women at peak bone mass as a reference point.

To help in the diagnosis of osteoporosis, the WHO offers the following guidelines^{5,6}: (1) a bone mineral density (BMD) measurement that is within 1 SD of the mean value for young healthy adults is considered normal; (2) a BMD measurement that is 1 to 2.5 SD less than the mean value in young adults indicates osteopenia; (3) a BMD measurement that is at least 2.5 SD less than the mean value in young healthy adults denotes osteoporosis; (4) a BMD measurement more than 2.5 SD less than the mean value in young healthy adults in a patient with fragility fractures indicates established or severe osteoporosis.

BMD findings are reported as T scores or Z scores. The T score compares the patient's bone mass determined by bone mineral densitometry with peak bone mass in healthy young adults (ie, 25- to 30-year-old women),⁵ whereas the Z score compares the patient's bone mass determined by bone mineral densitometry with that of age- and sex-matched controls.⁶ A T score on bone mineral densitometry that is 1 SD less than the set mean value is equivalent to a BMD value approximately 10% less than the mean for young healthy adults. T scores that are 1 to 2.5 SD less than the set mean value reflect BMD values that are 10% to 25% less than the mean for young healthy adults; these scores indicate the presence of osteopenia. A T score that is at least 2.5 SD less than the set mean value equals a BMD value that is approximately 25% less than the mean for young healthy adults; this score confirms the presence of osteoporosis.

The Z score may be clinically useful to determine whether secondary (eg, drug-related) causes of osteoporosis are present but should not be used to make treatment decisions. Older adults whose Z scores are normal for their age can in fact have osteoporosis.⁶

OSTEOPOROSIS VERSUS OSTEOMALACIA

Osteoporosis and osteomalacia both cause osteopenia, or thinning of the bones. Distinguishing between these disorders is essential because the pathology and therapy of each differ. Osteoporosis is characterized by an imbalance between bone formation and resorption, which results in net bone loss and fractures.^{2,4} Decreased density of normally mineralized bone matrix follows. In contrast, osteomalacia is a qualitative rather than a quantitative disorder of bone metabolism. With osteomalacia, bone density may be increased, normal, or (most commonly) decreased.⁷ Osteomalacia is a metabolic bone disease characterized by inadequate mineralization of bone, resulting in a syndrome marked by bone pain, myopathy, and fractures.^{2,4} The most common cause of osteomalacia in older adults is deficiency of vitamin D (**Table 1**).⁴

PHYSIOLOGY OF BONE

BONE STRUCTURE

Bone is composed of organic and inorganic (or mineral) components. The organic component is primarily