

PREFACE

The past century heralded a significant shift in the age composition of the world's population. Both as a nation and a world community, we are aging. Currently, older Americans (age 65 years and over) constitute approximately 13% of the population and this group is its fastest growing segment. As the "Baby Boom" generation ages, the role of the gerontologist and other practitioners caring for the elderly will become increasingly important. The demand for clinicians to become proficient in elder care is great. Issues unique to the elderly span the gamut, from the medical challenges they must meet to the vast life experience they contribute to society, their loved ones, and their caregivers. Older adults, often having "weathered many storms," merit the highest level of deference and care in the clinical setting. The challenge for caregivers is to consistently show respect and caring for their elderly patients while dealing with complex clinical, technical, economic, social, and ethical issues. Perhaps what is most alarming is that despite the vast number of older individuals with cardiovascular disease and the complexity involved in providing their care, providers often do so in the absence of any data to guide their treatment strategies. Indeed, a review of all clinical research articles in four premier medical journals determined that less than 50% had enough elderly participants to enable any conclusions to be drawn from these studies concerning older patients themselves (1). With this in mind, we have collaborated with experts in various clinical fields to bring you this textbook. The primary purpose of *Aging, Heart Disease, and Its Management: Facts and Controversies* is to highlight what is presently known and not known in the arena of cardiovascular medicine and cardiac surgery as it pertains to the elderly patient.

The text is organized into four sections, which are described in greater detail below. Section I delineates the epidemiologic and demographic imperative that we face in caring for the rising tide of elderly individuals with cardiovascular disease and specifically highlights health care policy issues that arise. Section II provides the practitioner with several chapters covering fundamental concerns outside of the cardiovascular domain that are essential in providing care for the elderly subject, including nutritional, neurological, pharmacologic, psychiatric, ethical, and rehabilitative issues. Section III, after delineating age-related changes in cardiovascular structure and function as well as the role for risk factor modification, goes on to highlight cardiovascular syndromes that disproportionately afflict the older individual including arrhythmias (particularly atrial fibrillation), syncope, heart failure (particularly diastolic heart failure), and ischemic heart disease. Finally, in Section IV, the surgical management of the elderly cardiac patient is delineated including postoperative management and complications as well as specific surgical procedures such as coronary artery bypass grafting, valve surgery, pacemaker, and defibrillators as well as surgical management of heart failure.

PRINCIPLES OF AGING

Aging is an inevitable process common to all species. The physiologic changes that accompany aging form a natural part of the maturation process. As the numbers of elderly individuals continue to rise at staggering rates, continued study of biological, clinical,

sociological, ethical, and economic factors is essential to accommodate our elders and improve our systems of care for them and the ensuing generations.

Several important principles of geriatrics have been delineated and are an essential backdrop for this text. First, as individuals age they become more dissimilar. Thus, attributing age-related changes to a particular patient's clinical syndrome should be accompanied by a healthy amount of skepticism. Second, an abrupt decline in any system or function is always caused by disease and not by "normal aging." Though many providers and even patients will attribute their symptoms or conditions to "getting old," a practitioner well versed in the principles of geriatric medicine will often find a precipitating pathophysiologic condition. Third, "normal" aging can be attenuated by modification of risk factors. Thus, many of the proposals for a healthy lifestyle, such as exercise, a well-balanced diet, and avoidance of tobacco products, are equally important in attenuating the ill effects of aging. Finally, "healthy old age" is not an oxymoron. It is quite possible for people to live healthy, active, productive lives well into their eighties and nineties.

BASIC TENETS OF GERIATRIC MEDICINE

The basic tenets of geriatric medicine that have been described to reflect the fundamentals of geriatric care offer the clinician both a set of "cardinal" rules and a practical guideline for the management of elderly patients. In the reading of various chapters, we encourage the reader to keep these principles in mind.

Tenets of Geriatric Medicine

- The onset of new disease in the elderly generally affects an organ system made vulnerable by physiologic and pathologic changes.
- Because of an impaired physiologic reserve, older patients often present at an earlier stage of their disease.
- Since many homeostatic mechanisms may be compromised concurrently, there are usually multiple abnormalities amenable to treatment, and small improvements in each may yield dramatic benefits overall.
- Many findings that are abnormal in younger patients are relatively common in older patients. They may not be responsible for a particular symptom but only be incidental findings that result in misdiagnosis or misdirected therapy.
- Since symptoms in older people are often due to multiple causes, the diagnostic "law of parsimony" often does not apply.
- Because the older patient is more likely to suffer the adverse consequences of disease, treatment (and even prevention) may be equally or more effective than in younger patients.

REVIEW OF HUMAN AGING

From a physiologic standpoint, aging can be described as the progressive decline in homeostatic reserve (homeostenosis) of every organ system. As humans age a number of physiologic changes occur that are related to senescence and many of the aging theories. Essentially, each and every organ system becomes modified to some degree, though the aging process is selective. Generally speaking, these modifications occur in the negative direction, reflecting loss of organ reserve capacity. Notably, there is considerable overlap between physiologic changes and pathophysiologic processes. Often, one or more organ systems will fail secondary to some pathophysiologic mechanism, and the remaining

healthy yet senescent components of the body may respond inadequately to other insults. In this sense the organs’ interdependence upon one another is truly illustrative.

The aging human organism undergoes a series of general and organ-specific changes. The overall body composition changes, manifest by a loss of lean body mass and a decrease in total body water. Body fat is subsequently redistributed. Various organs are also affected. The cardiovascular system experiences vascular calcification and increased stiffness, as well as reduced vessel compliance. Pulmonary changes include a decrease in vital capacity, chest wall strength, and forced expiratory volume per one second (FEV1), resulting clinically in an increased work of breathing, diminished pulmonary reserve, decreased effective cough needed to clear secretions and microbes, and overall chronic obstruction. In the aged kidney, total nephron mass is decreased, renal blood flow is slowed, creatinine clearance is diminished, and the ability to concentrate urine is decreased. Clinically, elderly individuals are prone to dehydration and experience reduced clearance rates of drugs and drug metabolites. This latter feature is partially responsible for the sensitivity of this subpopulation to drug therapy. There are high rates of drug interaction and increased likelihood of toxicity and organ damage secondary to drug intake and the potential side effects from drug interactions. The elderly immune system demonstrates decreased T-cell function and decreased antibody production, leaving individuals more susceptible to infectious illness. As humans age, progressive bone loss, particularly in postmenopausal females, ensues. This leads to brittleness of bones and an increased risk of hip fracture and its associated morbidity. The gastrointestinal tracts of aged individuals also experience changes, including gastric atrophy as well as decreased gastrin activity and parietal cell secretion of hydrochloric acid. There is a high incidence of dysphagia among the elderly as well, a clinical syndrome leading to morbidity secondary to aspiration of gastric contents. Integumentary changes include thinning of the skin with a reduction of subcutaneous fat. Thinning of the skin often puts older adults at risk for developing decubitus ulcers, or bed sores, resulting in marked discomfort and associated morbidity. Additionally, these people become intolerant to colder temperatures, manifesting increased susceptibility to experiencing hypothermia, particularly when undergoing cardiopulmonary bypass. Individuals commonly experience neuropsychiatric and neurocognitive changes as they age. Cortical atrophy is prominent. Nerve conduction velocity declines. The incidence of Alzheimer's disease in the elderly is notably high. Figure 1 demonstrates declining organ function with age.

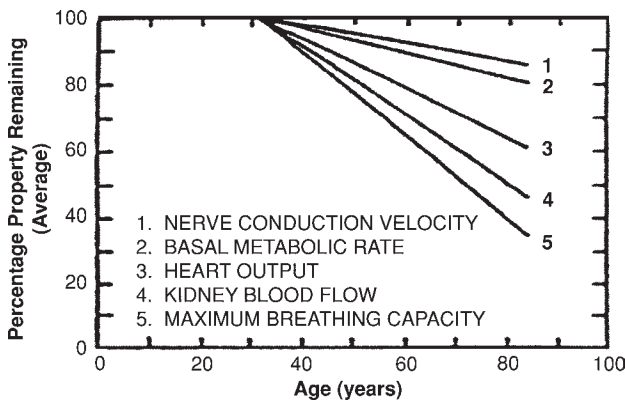


Fig. 1. Linear decline of organ function with age (1).

IMPACT OF AGE ON CARDIAC SURGERY AND CARDIAC DISEASE

In the setting of an intensive care unit or under perioperative circumstances, advanced age often translates into high risk. Elderly individuals have altered drug excretion caused by their 25% decrease in renal mass and decline in renal blood flow. Often surgery increases the risk of renal failure. For example, cross-clamping and cardiopulmonary bypass cause a reduction in blood flow, further compromising renal perfusion pressure. Accumulation of certain drug products, particularly anesthetic agents and opioids, results in prolonged intubation time. Weaning an elderly patient off of a ventilator becomes increasingly difficult with multisystem decompensation (2). Patients undergoing cardiac surgery are typically instrumented with a transesophageal echocardiogram (TEE) probe. Advanced age and TEE instrumentation increase an elderly person's risk for developing dysphagia. In turn, the risk of aspiration pneumonia increases, creating a complex picture of co-morbidity. Since human organ systems are intrinsically connected, damage to one system invariably affects other systems, particularly in an elderly individual whose organ reserve capacity is diminished.

These various alterations in cardiac function in the older individual often create the need for polypharmacy and potentially multiple interventions. For example, a person with hypertension, atherosclerosis, and an arrhythmia will require treatment with a series of pharmaceutical agents. Often, employing one medication to treat a single disease creates the need to use another medication to counterbalance the effect of the first drug. For example, a hypertensive elderly patient placed on beta-blockers who has intrinsic conduction defects may experience symptomatic bradycardia, necessitating the placement of a pacemaker. Dealing with older individuals often creates complex scenarios. Our hope is that after reading this text, providers will be better able to tackle the multitude of issues they and their patients face.

EPIDEMIOLOGY, DEMOGRAPHICS, AND HEALTH CARE POLICY

Americans are living longer, healthier, more active lives than ever before. Longevity has increased by 28 years since 1900, and recent studies indicate that many older citizens have fewer disabilities today than people the same age had just 15 years ago. Nevertheless, older Americans who do require medical attention tend to have multiple and complicated problems. The ever-increasing population of older patients who have cardiovascular disease parallels the demographic imperative that is changing the face of the world's population. Last year, 6,145,000 patients discharged with cardiovascular disease were over the age of 65 years. This same age group contributed to eighty-five percent of all myocardial infarction deaths. Fifty-six percent of coronary artery bypass graft (CABG) patients and 51% of the percutaneous transluminal coronary angioplasty (PTCA) procedures were performed in individuals over 65. The numbers of elderly patients comprising the cardiac patient population are staggering.

Section I of the text provides the backdrop for the rest of the text. In Chapter 1, the demography and epidemiologic data are described drawing attention to the crisis looming in health care. Subsequently, Drs. Ridge and Cassell describe the history of health care policy specifically as it pertains to the elderly in the United States in Chapter 2.

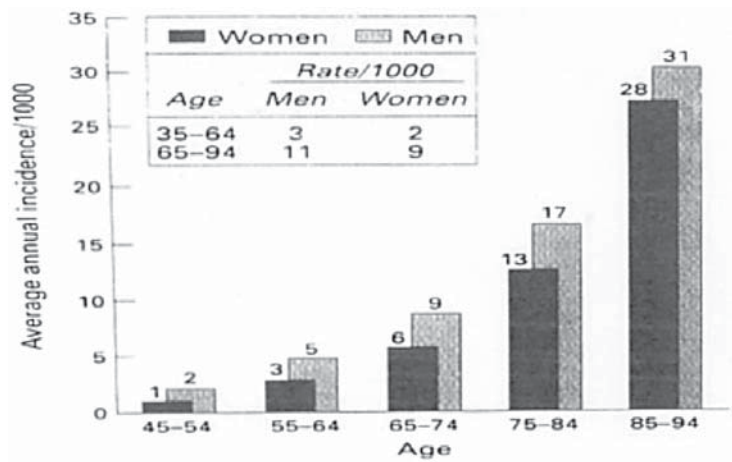


Fig. 2. Increasing incidence of heart failure in the aging population (3).

FUNDAMENTALS OF CARE FOR THE ELDERLY

Caring for the elderly patient with cardiovascular disease requires a multidisciplinary approach. Therefore, in this section of the text, we have asked our contributing authors to delineate age-related changes in organ systems outside of the cardiovascular system and how they impact on the manifestations and management of the cardiovascular disease in the elderly. Drs. Elkind, Kenny, Muskin, and Shapiro as well as Dr. Chong and colleagues provide valuable information regarding neurologic, psychiatric, and nutritional issues, respectively. Subsequently, Dr. King provides insights into the process of rehabilitation, an essential step in improving the quality of life in the elderly subject with cardiovascular disease who has undergone cardiac surgery. As our pharmacopoeia enlarges and the benefits of various agents are realized, concerns regarding the appropriate use of pharmacologic agents are of paramount importance in the elderly as described by Drs. Odeh-Ramadan and Remington. Finally, with all of the ethical issues that surround the care of our older patients, we would be remiss without considering carefully the concerns presented by Dr. Prager in his chapter on ethical issues.

CARDIOVASCULAR CARE FOR THE ELDERLY

Changes in cardiovascular structure and function are selective, with some portions of the cardiovascular system affected dramatically even as others are well maintained during normal human aging. In this section of the text, Drs. Maurer and Weisfeldt delineate these normative age-related changes and place them in clinical context. Subsequently, Dr. Wenger emphasizes the role of preventive strategies that can attenuate many of the disorders that disproportionately afflict the elderly. Finally, Drs. Reiffel, Bloomfield, Kitzman, Zieman, Schulman, and Fleg provide a comprehensive evaluation of the current facts and controversies that surround the management of dominant geriatric cardiovascular syndromes: atrial fibrillation, syncope, heart failure, and ischemic heart disease, respectively.

CARDIAC SURGICAL CARE FOR THE ELDERLY

A crucial aspect of surgical management of the elderly is the ability to make the right decision when one is faced with a multitude of imperfect options. The decision to operate should not be based on age alone, but reflect an assessment of the risk–benefit ratio of individual cases. Though it has been demonstrated that cardiovascular reserve capacity decreases with aging, chronological age alone should not be relied upon as a predictor of outcome. Instead, more emphasis should be placed on the functional status of the patient. In the earlier days of cardiac surgery, advanced age was considered a relative contraindication for revascularization procedures. However, as surgical techniques and perioperative management have improved, more elderly patients are now accepted for surgical intervention.

With an increasingly aging population, surgeons can expect a greater proportion of their workload to include patients aged over 75 years. During the 1990s we performed cardiac surgical procedures on 1448 subjects 75 years of age and older at our institution. This represented more than 10% of all cardiac surgical procedures. The number of patients over 75 years old presenting to a cardiac surgeon in our institution has increased over the past five years resulting in the initiation of the AGE (American Geriatric Experience) Program. This program is designed to foster clinical care, research, and education in the arena of cardiovascular disease in the elderly.

Our contributing authors in this section define the issues essential to providing cutting-edge surgical management of the elderly cardiac patient. Drs. Garrido, Argenziano, and Rose describe the surgical management of ischemic heart disease, while Drs. Oz and Smith cover the surgical management of heart failure and valvular disorders, respectively. Inasmuch as indications for pacemakers and defibrillators have expanded, Dr. Spotnitz provides a practical guide regarding the application of these technologies to the older individual. Finally, Dr. Edwards delineates the outcomes, both positive and negative, that accompany the expansion of cardiac surgical procedures for the elderly, and Dr. Playford provides instructions regarding postoperative management.

CLOSING THOUGHTS

You will find throughout your reading of the various chapters of *Aging, Heart Disease, and Its Management: Facts and Controversies* that there are perhaps far more “controversies” than “facts.” This leads us to our second purpose, namely, to delineate the present issues that require immediate attention by the clinical and research community in order to improve the quality of care that we provide to our older patients with cardiovascular disease. To that end, we hope our book will serve as a simple step in the right direction.

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REFERENCES

1. Clarfield AM, Friedman R. A survey of the eye structure of “age-relevant” articles in four medical journals. *J Am Geriatr Soc* 1985;33:773–778.
2. Cope S, Hawley R, et. al. Needs of the older patient in the intensive care unit following heart surgery. *Prog Cardiovasc Nurs* 2001;16(2):44–48.
3. Kannel WB, Ho K, Thorn T. Changing epidemiological features of cardiac failure. (Framingham). *Br Heart J* 1994;72(Supp.2): 53.

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Facts and Controversies

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