# INTRODUCTION

*If the heart trembles,*
*it has little power and sinks,*
*the disease is advancing and death is near.*
*Ebers Papyrus ∼3500 BC*

As the translated words quoted above would indicate, the phenomenon is as old as our heart and, thus, it should not surprise us if now, many centuries away, cardiovascular disease (CVD) is considered the leading cause of death and serious illness, not only in the United States, but also all over the world, with relatively minor numerical variations from site to site. Early in time, not many people reached an age old enough to develop heart disease (they died rather young mostly of other causes), thus, its significant incidence started to show up when life expectancy grew to the levels we encounter nowadays in the more advanced societies. The Center for Health Statistics, Department of Health, USA (http://www.cdc.gov/NCHS/data/nvsr/nvsr57/nvsr57_14.pdf) gives, for the years 2003–2006, the rank of deaths due to heart disease by age group: deaths under 14 years of age fell well below and were not ranked; at age between 14 and 24 ranked 5; at age 25–44 ranked 4; at age 45–64 ranked 2; and only over 65 the number of deaths due to heart disease took the first place (see *National Vital Statistics Reports*, vol 57, number 14, April 17, 2009). Good figures are needed for world deaths due to malnutrition and car accidents, the latter in younger groups far exceed cardiac origin.

In 1948, the Framingham Heart Study, under the direction of the National Heart Institute (now known as the National Heart, Lung, and Blood Institute; NHLBI), embarked on an ambitious project in health research. At the time, little was known about the general causes of heart disease and stroke, but the death rates for CVD had been increasing steadily since the beginning of the century and had become an American epidemic. Since 1971, the Framingham Heart Study has been conducted in collaboration with Boston University.

**The town of Framingham** (≅70,000 people) is located in eastern Massachusetts, near Boston. In 1948, it was selected by the U.S. Public Health Service as a cardiovascular study site, and 5,209 healthy residents between 30 and 60 years of age, both men and women, were enrolled as the first cohort. It was the first major cardiovascular study to recruit women participants, so beginning the first round of extensive physical examinations and lifestyle interviews that they would later analyze. Since that date, the subjects have continued to return to the study every two years for a detailed medical history, physical examination, and laboratory tests. In its first year, the study responsibilities were assumed by the National Heart Institute, now the National Heart, Lung, and Blood Institute. Through a contract with the NHLBI, researchers from the Boston University School of Medicine (BUSM) have played an important role in the Framingham Heart Study. Both NHLBI and BUSM scientists have added to our knowledge about reducing disability and death from heart disease. In 1971, the study recruited 5,124 children (and their spouses) of the original cohort for a second study, the "Offspring Study." With two generations of data, the Framingham Project acquired an unmatched amount of information. These studies have become regarded as overestimating risk, but they are generally accepted as outstanding and useful.

The objective of the Framingham Heart Study was to identify the common factors or characteristics that contribute to CVD by following its development over a long period of time in a large group of participants who had not yet developed overt symptoms. Among the already well-established facts, the following should be listed as beyond discussion or without any hint of doubt: In 1960, cigarette smoking found to increase the risk of heart disease; in 1961, cholesterol level, blood pressure, and electrocardiogram abnormalities found to increase the risk of heart disease; in 1967, physical activity found to reduce the risk of heart disease and obesity to increase the risk of heart disease; in 1970, high blood pressure found to increase the risk of stroke; in 1976, menopause found to increase the risk of heart disease; in 1978, psychosocial factors found to affect heart disease; in 1988, high levels of high-density lipoproteins (HDL) found to reduce risk of death; in 1994, enlarged left ventricle shown to increase the risk of stroke; and in 1996, progression from hypertension to heart failure was described.

A similar longitudinal study has been carried out in a high proportion of the residents of Busselton, a town in Western Australia, over a period of many years; however, Framingham is more widely cited. Other references regarding risk factors include an editorial of the *British Medical Journal* (2003) and contributions as that of Levy and Brink (2005), to mention only a few. Available material for research is indeed abundant.

Fibrillation is a specific subject encompassed within the overall framework of cardiac pathologies. Moss (2003), for example, offered an account on the history of atrial fibrillation, while Wang *et al.* (2003) proposed a risk score for predicting stroke or death for individuals with atrial fibrillation. This book deals specifically with both types of fibrillation, atrial and ventricular, the former compatible with life and the latter fully incompatible, stressing that many of the frequently referred to as *he/she died of a heart attack* in the daily common language is nothing else than ventricular fibrillation. Since the previous condition of the patient and the circumstances surrounding the event may strongly influence the outcome (survival or death), it is appropriate here to cite a joint position paper authored by the American College of Sports Medicine and the American Heart Association (freely available in the WEB). It was published concurrently, in 2002, in *Medicine & Science in Sports & Exercise* and in *Circulation*, written by a group of experts (Gary J. Balady, Bernard Chaitman, Carl Foster, Erika Froelicher, Neil Gordon, and Steven Van Camp) under the title "Automated external defibrillators (AED) in health-fitness facilities". And why in health-fitness facilities? To answer the question, the report clearly says:

"Obviously, the risk of a cardiovascular event is greater among individuals with cardiovascular disease than among presumably healthy people. As the demographics of the more than 30 million individuals who exercise at health-fitness facilities demonstrate a steady increase in the number of members older than 35 yr (approximately 55% of current membership), it is reasonable to presume that the number of members with cardiovascular disease is rising as well. Although there are no data regarding the incidence of cardiac arrest at health-fitness facilities, two recent surveys provide some important insight. A large database consisting of more than 2.9 million members of a large commercial health-fitness facility chain demonstrates 71 deaths (mean age 52-13 yr; 61 men, 10 women) occurring over a 2-year period, yielding a rate of **1 death/100,000 members/year**. The death rate was highest among those members who exercised less frequently, such that nearly half of exercise-related deaths were in those who exercised less than once/week. A recent survey of 65 randomly chosen health-fitness facilities in Ohio reports the occurrence of sudden cardiac arrest or heart attack in 17% of facilities during a 5-year period. Notably, only 3% of facilities had an AED on site. Thus, it is prudent to conclude that health-fitness facilities should be considered among the sites in which Public Access Defibrillation (PAD) programs should be established." Well, all the

subjects barely anticipated above are covered in the following chapters, hopefully with enough detail and depth.

Quite interesting, but not surprising, patients with heart attacks and other forms of chest pain were found as three to five times more likely to experience serious complications after hospital admission when treated in a crowded emergency department (ED), according to Pines *et al.*'s (2009) report.

Life expectancy has significantly increased, daily habits along with quality of life have also changed, and large city technological facilities have improved making us envision deeper changes . . . at least in First World Countries . . . in the rest, the so-called Third World, things show a different picture, darker and less promising (Valentinuzzi, 2004). An overt and dear wish, as author well rooted in this beautiful and at the same time painful Latin America (part of that Third World, although politicians often try to sell a brighter picture), is that this book reach also the working desk of the many professionals, at all levels, working in hospitals and laboratories, health dispensaries and small industries, medical, engineering and technical schools, carrying not only information in this particular cardiology subject to contribute to its understanding and to assist in saving lives, but a message urging to,

LEARN ALL YOU ARE ABLE TO, BECAUSE YOU HAVE BRAIN;
MAKE THE DECISION, BECAUSE YOU KNOW;
DO IT, BECAUSE YOU CAN.

And finally, always remember and honor your teachers (even those that were not so good), simultaneously respecting and honoring your disciples, too (Valentinuzzi, 2008).