

## Mauricio B. Rosenbaum... the Last of the All-Round Electrocardiographers

On 4 May 2003, close to his 82nd birthday, Mauricio Rosenbaum passed away in Buenos Aires (Figure 1). Admired, respected, and beloved both in and outside Argentina, the world-wide cardiology community is in mourning after the loss of the last of a breed of electrocardiologists. Loving quality more than quantity, Rosenbaum leaves behind a legacy full of originality, intellectual elaboration, and self-criticism. «*Like good wines, some research improves after resting for a while,*» wrote Rosenbaum in the preface to his book on hemiblocks.<sup>1</sup> In the latter book, published in 1968, Rosenbaum introduced a new paradigm in the field of intraventricular conduction defects without having previously published a single article on the subject.

Also like the very fine wine cellars, Rosenbaum produced during his life only a limited number of bottles, each of them memorable. Narrow ventricular extrasystoles, bidirectional ventricular tachycardia, phase 3 and phase 4 blocks, predivisional and fascicular left bundle branch blocks, concealed parasystole, and cardiac memory, along with hemiblocks, are mere samples of the exceptional vintages of the «*Rosenbaum cellar.*»

Born in Carlos Casares, in the province of Buenos

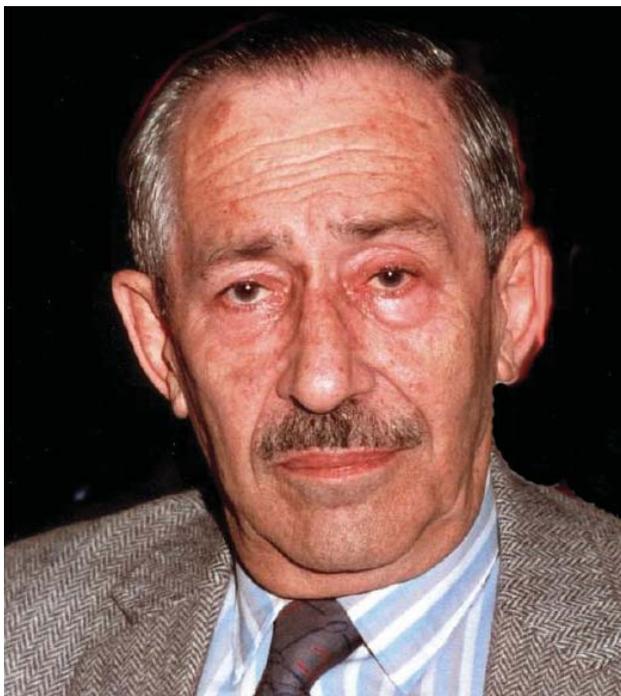


Fig. 1.

Aires, he studied medicine at the University of Cordoba in Argentina's Nueva Andalucia region. He inherited a love for symphonic music. During the intermission to a concert we attended during a scientific congress, «Don Mauricio» related how his uncle could unfailingly identify any fragment of symphonic music he would hear.

Rosenbaum was a brilliant speaker and a delightful conversationalist either in Spanish or in English, with his typical Argentine accent in both languages. As a well-bred Argentinian, his dislike of fish, his passion for soccer, and his fascination for intellectual speculation were typical. This latter issue deserves closer consideration. «There is a definite tendency in scientific research to overestimate the value of facts as compared to ideas,» wrote Rosenbaum at the end of his chapter on phase 3 and phase 4 blocks in the book entitled *The conduction system of the heart*, edited by Wellens, Lie, and Janse and published in 1976.<sup>2</sup> At that time, Rosenbaum complained of the policy of many journals accepting articles full of data but short of ideas, while rejecting some works with excellent ideas when data were scanty. Being a keen observer, he was able to identify what he could not interpret, a process that led him to search for ideas that might explain the unexplainable. In these endeavors Rosenbaum found the deep intellectual satisfaction that kept him active even beyond retirement. Through intellectual speculation he fixed his gaze on new horizons which he explored with an unparalleled rigor. Accordingly, in the preface to his book *Frontiers of cardiac electrophysiology*, he urged the authors contributing to the different chapters «to be speculative in their inter-

pretations to encourage exploration of related areas of investigation»...«not only to educate the reader but also to encourage and challenge him.»<sup>3</sup>

Rosenbaum had a fundamental interest in classical electrocardiography, the electrocardiology introduced by Einthoven, which Thomas Lewis successfully brought to the bedside over a twenty year period until his divorce from the galvanometer in 1926. Thirty years later, using a two-channel electrocardiographic machine that many people thought «had one channel too many,» Rosenbaum rescued the electrocardiogram from the lethargy into which it had sunk after Lewis' desertion of electrocardiology.

The way in which hemiblocks were discovered reflects what I call the «Rosenbaum method.» It all began in 1950, at the bedside of a patient whose electrocardiogram the young Mauricio Rosenbaum, aged 29 at that time, was unable to explain. The patient, a man who had suffered an anterior myocardial infarction with a right bundle branch block, had some electrocardiographic recordings during sinus rhythm showing a left axis deviation at  $-75^\circ$  while in others the axis was deviated to the right at  $+110^\circ$ . Rosenbaum's reasoning was simple: since the patient had a right bundle branch block, it was obvious that the supraventricular impulses could follow two pathways in the left ventricle, one producing a left axis deviation, and the other a right axis deviation. The problem was how to elucidate the two left ventricular conduction pathways. Rosenbaum started to speculate and his initial explanation was that the observed phenomenon could be due to the presence of paraspecific fibers as those described by Ivan Mahaim in the 1940's. He gave no further thought to the matter, but in 1954, 1955, and 1963 he learned of three more cases, all similar to his original patient. This led Rosenbaum to delve more deeply into the anatomy of the intraventricular conduction system: «soon after reviewing the literature and performing observations of our own, we found that the left bundle branch invariably had two major divisions.» Thus it was how Mauricio and his young, enthusiastic, coworkers discovered hemiblocks. The discovery, initially based on mere speculation, led to an active search for new cases, to a systematic study of the anatomy of the conduction system in various animals and in humans, and to the experimental production of hemiblocks. In addition, it opened the way for the clinical characterization of trifascicular, bifascicular and monofascicular (hemiblocks) blocks, the study of predivisional and peripheral left bundle branch block, aberrant conduction, the site of origin of ventricular extrasystoles, the mechanism of bidirectional ventricular tachycardia, and that of blocks complicating myocardial infarction. All this is described in a 742-page monograph published by Rosenbaum and his young pupils, Elizari and Lazzari, initially in Spanish in 1968, and then in English two years later.<sup>1</sup>

Rosenbaum has passed away, but the concepts he introduced in the field of electrocardiology are bound to stay. It will be harder to keep alive the flame of his spirit and

his approach to discovery and research. Observation, curiosity and rebellion against the inexplicable, the quest for information, a resolute personality, speculation on the possible and the probable, a catching enthusiasm, a natural and tireless perseverance...all this and much more constitutes the Rosenbaum spirit, that his friends will praise for ever, and that his pupils are called upon to maintain.

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