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Lown B & Wolf M. Approaches to sudden death from coronary heart disease. *Circulation* 44:130-42, 1971.

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Sudden cardiac death (SCD) claims over 400,000 lives annually in the US. If they are to be saved, the victims need to be identified prior to the fatal event. The presence of certain types of ventricular extrasystoles exposed by monitoring and exercise stress testing is an indicator of risk for SCD. [The SCD[®] indicates that this paper has been cited in over 415 publications since 1971.]

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"The article was based on the Lewis A. Conner Memorial Lecture delivered at the Annual Scientific Session of the American Heart Association in 1970 before more than 7,000 physicians. It represented a review of ten years of work in my laboratory at the Harvard University School of Public Health and the Peter Bent Brigham Hospital. The research concerned the problem of sudden cardiac death, the leading cause of fatality in the industrially developed world. In the US alone it claims over 400,000 lives annually. Yet, the medical profession remained largely indifferent to this enormous challenge. The reasons related to the facts that sudden death was unexpected, occurred in seemingly healthy individuals outside the hospital without prodromes, and appeared as an act of God for which no remedy was in sight. The underlying mechanism was established to be ventricular fibrillation (VF), which represented an electrical disorganization of the heartbeat. Our early work indicated that this was a reversible and preventable electrical accident.¹ In the coronary care unit, the patient who develops VF can be promptly reverted electrically to a normal rhythm.² But how is the individual at risk to be identified. None of the usual risk

factors such as smoking, high cholesterol, hypertension, or sedentary habits distinguished the individual prone to sudden death.

"Our hypothesis was that the occurrence of ventricular premature beats (VPBs) is associated with sudden death. This was a wild but not illogical conjecture. VPBs were ubiquitous and demonstrable among nearly 90 percent of patients with coronary heart disease. Therefore, it seemed unlikely that they could discriminate risk for fatality. However, VPBs are differentiated by attributes of frequency, by varying morphologies, by differed sites of origin within the heart, by occurring singly or in salvos, by their degree of prematurity, etc. Which of these attributes were of importance?

"To catapult the heart into VF requires that a strong electric current be delivered in the vulnerable period of the cardiac cycle. Thus, markedly premature VPBs were likely to discharge in their vulnerable period. But the energy content of VPBs was but one micro joule while it required 50,000 micro joules to induce VF. We solved this riddle by demonstrating that a sequence of closely coupled VPBs lowers the threshold for VF. And in the ischemic heart, a sequence of three early premature beats may prove sufficient to provoke VF. On the basis of these physiological observations, a grading system for VPBs, in relation to the risk of sudden death, was first proposed. By utilizing Holter monitoring and exercise stress testing, advanced grades of VPBs could be exposed. We also provided data showing that in the experimental animal sudden death could be prevented by the use of appropriate antiarrhythmic drugs. The VPB hypothesis has since been amply confirmed.³

"The importance of this work and the reason that it is highly cited is that for the first time it provided the clinician with an approach to the patient threatened with sudden death. The grading system for VPBs proposed in this communication continues to be employed worldwide to stratify patients at risk or to assess the efficacy of antiarrhythmic drug therapy."

1. Lown B, Fakhro A M, Hood W B, Jr. & Thoms G W. The coronary care unit: new perspectives and directions. *J. Amer. Med. Assn.* 199:188-98, 1967.
2. Lown B, Amarsingham R & Neuman J. New method for terminating cardiac arrhythmias: use of synchronized capacitor discharge. *J. Amer. Med. Assn.* 182:548-55, 1962.
[Citation Classic. *Current Contents/Clinical Practice* 7(17):18, 23 April 1979.]
3. Ruberman W, Weimblatt E, Goldberg J D, Frank C W & Shapiro S. Ventricular premature beats and mortality after myocardial infarction. *N. Engl. J. Med.* 297:750-7, 1977.