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PROGRESS IN CARDIOLOGY

PAUL N. YU

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PREFACE

Cardiovascular imaging using radionuclides has become an important diagnostic modality in cardiovascular medicine. We believe that it is timely and appropriate to review the progress in this field. We are privileged and pleased to invite Dr. George Beller to serve as the guest editor of a Symposium on Cardiovascular Imaging that includes contributions from a number of distinguished investigators who discuss recent advances in this area.

Dr. Beller writes a thoughtful and stimulating foreword in which he presents an overview of cardiovascular imaging in 1983 and summarizes the contents of the first six chapters of the book.

The second half of the book contains six chapters that cover other aspects of cardiovascular disease, contributed by investigators from the U.S.S.R., United Kingdom, Japan, Switzerland, and the U.S.A.

In Chapter 7 Professor Eugene Chazov describes the work of the U.S.S.R. Cardiology Research Center dealing with the role of changes in the arterial wall in the genesis of atherosclerosis and thrombosis. Starting with the assumption that the patchy nature of atherosclerotic plaques suggests an abnormality in the vessel wall rather than circulating factors such as lipids as a primary cause, Professor Chazov details the results of tissue culture studies of arterial wall cells, endothelial, and subendothelial layers. He presents data suggesting that "foam cells" are derived from arterial smooth muscle cells, and compares the characteristics of normal, early, and later atherosclerotic lesions with regard to proliferative activity and handling of low-density lipoproteins (LDL). Two populations of plasma cells, one with high rates of incorporation of LDL and the other with low rates of incorporation, are described. High-density lipoproteins (HDL) added to cultures of cells with lipid inclusions decreased the number of these cells but did not have the same effect on cells from the plaque. Studies of perfused arteries showed that HDL partially inhibited LDL

uptake in normal vascular areas but had no effect on the endothelialized zone. Professor Chazov and his colleagues conclude that an intact endothelial sheet is the site of the antiatherogenic action of HDL.

To those who are interested in the study of the cause of atherosclerosis, this chapter concentrates on the arterial wall but does not ignore other factors such as lipids and platelets. The chapter is also supported by an extensive bibliography.

In Chapter 8 Drs. Emanuel and Withers discuss the genetics of hypertrophic and dilated (congestive) cardiomyopathy. They describe their studies of 97 index cases of hypertrophic cardiomyopathy (HCM). They have examined the relationship of HCM to asymmetric septal hypertrophy (ASH) and conclude that the simplest genetic concept would be a single autosomal dominant gene that could be expressed in a mild (isolated ASH) or severe (HCM) form. The authors feel that this concept alone would not account for the presence of extremes within one family. Perhaps a gene for ASH could be expressed as HCM as a result of genetic or environmental modifications, or a gene for HCM could, with other genetic and environmental modifications, be expressed as ASH. The authors conclude that HCM is an autosomal dominant condition but suggest that the presence of modifying genes gives a polygenic threshold character to the presentation of the disorder. Their polygenic model requires an underlying continuously varying predisposition or liability to a disease that includes several genetic and environmental factors. Thus, above a certain threshold subjects show clinical evidence of HCM, and below this they show evidence only of ASH.

The authors also comment on work with the Syrian hamster with regard to dilated cardiomyopathy, and the possibility that a genetic predisposition might determine the development of dilated cardiomyopathy from virus myocarditis. The place of HLA antigens in hypertrophic and dilated cardiomyopathy is discussed, and it is suggested that HLA studies so far have been inconclusive. A study of phenotypes in molecular terms is needed before further advances are likely to be made. This chapter admirably summarizes what is and is not known in this important field of cardiovascular genetics.

In Chapter 9, Dr. Kawai and associates summarize the recent advances in the study of hypertrophic and dilated (congestive) cardiomyopathy. In hypertrophic cardiomyopathy (HCM), the characteristic features and mechanisms of left ventricular inflow obstruction, hyperdynamic ventricular contraction, diastolic properties, and filling of the left ventricle are reviewed. Immunogenetic analysis with new information gained from HLA studies in patients with HCM and studies of infectious-immune mechanism in experimental dilated cardiomyopathy may shed some light on the pathogenesis of cardiomyopathies. Biochemical studies of myocardial metabolism in patients as well as in animals have become increasingly important in elucidating the pathogenesis, structure, and function of both clinical and experimental cardiomyopathies.

There is currently no specific therapy for either hypertrophic or dilated cardiomyopathy. Beta-adrenergic blocking agents, calcium channel blocking agents, vasodilators, antiarrhythmic agents, and synthetic catecholamines, however, have been used successfully in relieving the symptoms, improving ventricular function, and possibly prolonging the lives of these patients.

In Chapter 10 Drs. Gersbach and Hahn report on their extensive experience in over 2,000 coronary endarterectomies in a group of 6,411 patients with coronary artery disease who underwent operations between 1968 and 1982. Surgical techniques, sites, and characteristics of the endarterectomies are described. The results of the endarterectomies, including mortality rate, five-year and ten-year survival rates, and perioperative infarction rates, are analyzed. The patency rate of bypass grafts is significantly

higher in patients with endarterectomy than in those without endarterectomy.

This is one of the largest reported series of coronary endarterectomies. The contributors' experience will be of great value to all readers, not because of differing views on the value and benefits of endarterectomy, but because of the excellent results in high-risk patients.

In Chapter 11 Dr. Frohlich reviews various aspects of antihypertensive therapy and lists the classification of the newer antihypertensive agents. Five groups are mentioned: diuretics, beta-adrenergic blocking agents, antiadrenergics, renin-angiotensin system inhibitors, and calcium antagonists. The newer diuretics include amiloride, indapamide, and bumetanide. Propranolol, metoprolol, atenolol, pindolol, nadolol and timolol are the six beta-adrenergic blocking drugs used in the U.S.A. There are three classes of antiadrenergics: centrally active agents, peripherally acting agents, and serotonin receptor antagonists. Captopril and enalapril are the two renin-angiotensin system inhibitors. Three calcium antagonists are available for clinical use: nifedipine, verapamil, and diltiazem.

In Chapter 12 Dr. Kennedy gives a report of the preliminary results of the Western Washington Intracoronary Streptokinase Trial in a series of 250 patients with acute myocardial infarction. This study involved the participation of 54 cardiologists in 14 different laboratories. Two groups of patients were included: (1) a treated group of 134 patients who received intracoronary streptokinase infusion, and (2) a control group of 116 patients who received no infusion. Among all 250 patients, 86% had total occlusion and 14% had 90% stenosis of the coronary arteries serving the infarcted area when observed. angiographically an average of 274 minutes following the symptoms of acute myocardial infarction. The treated group of patients received an average of 272,000 units of intracoronary streptokinase over a period averaging 72 minutes. In two thirds of the totally occluded vessels reperfusion was achieved, and in over 80% of the stenotic vessels improved perfusion was observed following the infusion. During the first thirty days the mortality rate was 3.7% in the treated group and 11.6% in the control group. The difference was statistically significant. At the time of discharge the patients in the treated group had significantly fewer anginal attacks and improved functional class as compared to those in the control group. The two major complications of the streptokinase treatment were bleeding and ventricular arrhythmia. The author concludes there is reason to believe that early and effective coronary artery thrombolysis can reduce mortality and improve the course of patients with acute myocardial infarction.

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