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Clinical Assessment of Left Ventricular Regional Contraction Patterns and Ejection Fraction by High-Resolution Gated Scintigraphy

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Left ventricular ejection fraction and regional myocardial contraction patterns are important parameters of cardiac pump performance, which, until recently, have required invasive procedures for measurement. The Anger scintillation camera has been used in development of the atraumatic technique of radioisotopic angiography. In 1971, Strauss et al. used gated

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cardiac blood-pool imaging to assess ejection fraction and segmental contraction. Despite the value of these techniques, difficulties with precise delineation of the left ventricular silhouette were evident.

The present study describes improvements in the radionuclide gated blood-pool imaging techniques, which enhance delineation of cardiac margins by using a high-resolution collimator, greater information density, and a phonocardiographic

definition of gated intervals of the cardiac cycle. Validity is established by correlation with selective left ventricular cineangiography performed on 27 patients with a variety of cardiac disorders. The practicality and usefulness of this method is illustrated by selected examples from our experience with 79 patients.

In the 27 patients constituting the principal comparative group, the mean absolute difference was 8%. The mean ratio of the radioisotopic and radiopaque determinations was 0.98, indicating a lack of bias. The correlation coefficient was 0.93. In 14 of 22 patients with CAD, gated scintigraphy and cineangiography demonstrated regional abnormalities that were similar in location, nature, and technique. ■

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Evaluation and Management of the Heavily Irradiated Individual

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Considerable experience with the acute radiation syndrome in man, in varying degrees of severity, has been gained as a result of the exposure of the Japanese at Hiroshima and Nagasaki; of the Marshallese at the Pacific Proving Grounds; of patients given total-body irradiation for therapy of malignant conditions; of workers exposed accidentally in incidents involving fissionable material; and of workers involved in non-nuclear radiation accidents such as the recent Lockport Klystron-tube incident. This degree of experience in human beings, coupled with the vast amount of animal experimentation, removes any justification for surrounding the syndrome with an aura of mystery. The pathogenesis is better understood and handled more effectively than that of many routine clinical conditions seen in the course of medical practice.

The aim of the present paper is to develop guidelines for management of the heavily exposed individual based on the pathogenesis of the acute radiation syndrome and on the use of measures demonstrated to be beneficial. The disorder actually consists of a complex of overlapping syndromes, the presence and severity of which is dependent on the physical dose received. It is quite clear that therapy should not be based on physical dose, however, nor on the category in which a patient has been placed. Therapy is guided only by the daily appraisal of clinical and laboratory findings and should be given only when clearly indicated, and not prophylactically.

With the acute radiation syndrome, non-medical personnel generally expect a precise prognosis and therapeutic outline soon after exposure, in contrast to the usual systematic and continuing analysis of a disease course that is expected of the physician. Radiation exposure should not be considered an extreme emergency. There is no justification for hasty therapeutic procedures done without careful consideration. It will be apparent within hours or days whether the exposure was so low that

no therapy will be required, or so high that no therapy will help.

It has been shown that the therapies indicated involve no new principles but simply apply well known principles to physicians with experience in dealing with marrow hypoplasia or aplasia from any source. With vigorous functional replacement therapy, it is felt that human beings may survive a dose of radiation approximately twice that at which they would otherwise die. Such therapy involves, however, constant attention throughout the critical periods and the use of large amounts of antibiotics and fresh blood when indicated. By use of bone marrow, it may be possible for survival to occur at even higher doses; however, the efficacy of bone marrow transplants has not been adequately evaluated as yet.

It will be apparent that adequate care for even a relatively small number of heavily exposed individuals would tax the facilities of most hospitals. Thus, the conditions outlined in this present paper would not be applicable at all under major disaster conditions such as may pertain in the event of a nuclear war. ■