Biochemical studies on biopsies from normal and diseased cardiac tissue (Abstract)

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THE introduction of a technique for closed biopsy of the ventricular wall has permitted the morphological and biochemical properties of cardiomyopathic tissue to be studied. Morphological investigations have revealed varied pathological changes but have failed to demonstrate a clearly defined lesion in most of the cardiomyopathies.

In the present study enzymatic analysis and cell fractionation studies are being applied, for the first time, to investigate possible changes in the individual organelles in myopathic tissue. Using control tissue obtained during open-heart surgery, ultra-sensitive assays have been established for marker enzymes of the principal subcellular organelles of heart muscle. Fluorogenic or radioactively-labelled substrates are used in these assays and optimal and linear kinetic assay conditions have been obtained for each enzyme.

The marker enzymes studied, with the relevant organelle between parentheses, include: 5'-nucleotidase, Na^+ , K^+ -activated ATPase (plasma membrane); N-acetyl- β -glucosaminidase, cathepsin D, β -glucosidase, acid α -glucosidase (lysosome); cytochrome_c oxidase, malate dehydrogenase, glutamate dehydrogenase, monoamine oxidase (mito-

chondrion); neutral α -glucosidase (microsome); Ca^{2+} -activated ATPase (myofibrils); lactate dehydrogenase (cytosol).

The results of these studies in both control and diseased tissue may be summarized as follows:

Assaying microsomal, lysosomal or plasma membrane enzymes in biopsies from both right and left ventricles, from control and myopathic tissue revealed no significant differences. Assay of the mitochondrial dehydrogenases in the myopathic tissue showed reduced levels of these enzymes, particularly in biopsies from patients with poor left ventricular function. Similarly, low levels of the myofibrillary azide-resistant Ca^{2+} -activated ATPase were found in left ventricular tissue from patients with impaired left ventricular function. In contrast, significantly elevated cytosol lactate dehydrogenase levels were found in the myopathic tissue.

These studies would suggest that significant mitochondrial abnormalities are present in the myopathic tissue and thus more detailed studies of the function of this organelle are clearly indicated.

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