Cardiac Hypertrophy in Spontaneously Hypertensive Rats

I. Chronological Changes in the Mitochondrial $\beta$-Hydroxybutyrate Dehydrogenase Activity in the Myocardium

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In the previous study presented at the 8th annual meeting an observation on the chronological changes of the various enzymes, such as glucose-6-phosphate dehydrogenase, lactate dehydrogenase, $\beta$-hydroxybutylate dehydrogenase ($\beta$-HBDH), succinate dehydrogenase, isocitrate dehydrogenase, ATPase and monoamine oxidase in the myocardium, was undertaken throughout the development of hypertrophy in SHR by the histochemical method, and it was found that the most noteworthy change was a remarkable rise in the activity of $\beta$-HBDH in SHR at the age of 5 to 9 weeks.

In order to observe the absolute change in the activity of $\beta$-HBDH in myocardial mitochondria in SHR as well as in control rats, a chemical assay was performed in this study.

SHR (F24) at the age of 4, 5, 6, 7, 9, 13, and 23 weeks, were used comparing with controls (Wistar Kyoto) of the corresponding age. The heart, removed immediately after decapitation, was homogenized with 0.25 M sucrose. The homogenate was centrifuged for 10 min at 600×g. The supernatant was centrifuged for 10 min at 8,000×g. After the supernatant was discarded, the sediment was again homogenized with 0.25 M sucrose and centrifuged for 5 min at 600×g. After the supernatant was centrifuged for 10 min at 8,000×g, the resultant supernatant was used for chemical assay as the washed mitochondrial suspension. The activity of $\beta$-HBDH was measured by the method described in the previous report and was corrected by the weight of mitochondrial protein.

No activity of $\beta$-HBDH was seen either in SHR or in controls at the age of 4 weeks. In SHR the activity increased after the age of 5 weeks and became maximum at the age of 7 weeks followed by a gradual decrease to the age of 13 weeks, when no difference of the activity was seen between SHR and the controls. In controls no activity was seen until the age of 9 weeks, when the activity started to increase gradually and reached to plateau at the age of 13 weeks. No change of the activity was seen after the age of 13 weeks till the age

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of 23 weeks both in SHR and in controls.

A forgoing rise in the activity of β-HBDH in the myocardial mitochondria of SHR prior to the development of cardiac hypertrophy suggests that certain metabolic changes concerning this enzyme may play a role in the development of cardiac hypertrophy in SHR.