Mitochondrial dysfunction in cardiac remodeling in rat models of hypertension

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Hypertension in humans is a complex disease leading to cardiac remodeling and heart failure. Reactive oxygen species (ROS) have emerged as a common pathway by which different diseases induce myocardial hypertrophy. Mitochondrial respiratory chain is a potential source of excessive ROS in hypertension. To approach the role of mitochondria in hypertension-induced cardiac remodeling, we studied mitochondrial respiration in three different rat models of hypertension: spontaneously hypertensive rats (SHR), two-kidney, one-clip Goldblatt-hypertensive rats (2K1C) and L-NAME-induced hypertensive rats (L-NAME). Wistar Kyoto male rats were used as controls. After 4 weeks of hypertension development, the three groups were equally hypertensive and presented significant left ventricle hypertrophy. Mitochondrial respiration supported by glutamate/malate was evaluated in saponin-permeabilized left ventricle samples (~3 mg) in high resolution oxygraphy. A significant reduction of resting (16 – 28%) and maximum ADP- (28 – 31%) or FCCP- (30%) stimulated mitochondrial respiration rates were observed in all hypertensive groups. Furthermore, a significant lower in citrate sintase activity was observed, indicating a decrease in tissue mitochondrial density. These data suggest that mitochondrial respiratory dysfunction is associated and may play a pivotal role in the development of left ventricular hypertrophy in hypertensive rats.

Word Keys: Mitochondrial function, Hypertension, Left ventricular hypertrophy

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