Hypothyroidism: how it affects cardiac function

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Introduction: A close relationship between thyroid status and cardiac function has been well established in adult mammals and humans. Several studies have been carried out to pinpoint those important variables whose manipulation in early postnatal life result in long-lasting effects upon cardiovascular function. In this context, induction of hypothyroidism in rats during the perinatal period leads to hormonal, neuronal, and metabolic disturbances that may influence heart function in adult life. The mechanisms underlying the repercussions of early events during the postnatal period on adult life are not fully known.

Objective: The aim of the present study was to examine: (1) whether postnatal hypothyroidism affects cardiac function during the second month of life in rats and (2) whether postnatal hypothyroidism alters cardiac calcium handling.

Material and Methods: Male Sprague–Dawley rats weighing approximately 50 g were used in this study and were randomly assigned to one of the two experimental groups: (1) euthyroid rats (received SC injections of 0.9 NaCl (0.1 ml/100 g body weight) or (2) hipothyroid rats (received 0.02% methimazole in drinking water during 60 days. Animals were sacrificed by cervical dislocation and hearts were rapidly excised. Cardiac myocytes were isolated by collagenase-based enzymatic digestion. Ca2+ transient and cardiomyocyte shortening measurements were performed.

Results: Perinatal hypothyroidism showed a reduced cardiac contractillity measuring by cell shortening and a reduced Ca2+ transient amplitude in isolated cardiomyocytes. Sarcoplasmic-reticulum Ca2+ content was reduced in hypothyroid animals. Hormonal deficit did not change its time to 50% Ca2+ decay. This negative inotropic effect was associated with an increase cardiomyocyte relaxation as revealed by a reduction in the time to 50% relengthening.

Conclusions: The number of spontaneous releases per minute was significantly increased in the cardiomyocytes of the hypo rats.

Keywords: Hypothyroidism, cardiac function, hypothyroid rats, inotropic effect, hormonal defficiency

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