

Cardiomyopathies are cardiac diseases associated to cardiac dysfunction, characterized by structural alterations of cardiomyocytes and their tissutal organization.

Intercalated disks are adhesion structures between plasmatic membranes of cardiomyocytes, made of highly specialized membrane junctions: adherens junctions, desmosomes and gap junctions.

The present investigation evaluated intercalated disks remodelling during hypertrophic and dilatative cardiomyopathies, in UMX7.1 and TO2  $\delta$ -sarcoglycan-deficient hamsters.

Hamsters hearts ultrastructural analysis showed that the ordered organization is lost in UMX7.1 hearts, where intercalated disks appear chaotically located and structural swirling. In TO2 hamsters, desmosomes and gap junctions are located on the lateral plasmalemma.

Immunohistochemistry showed an increase in expression levels of N-cadherin and  $\beta$ -catenin in UMX7.1 hamsters, while connexin 43 appears located on the lateral plasmalemma in TO2 hamsters.

Myocardial tissue samples from 44 patients affected by idiopathic dilatative cardiomyopathy, genetic dilatative cardiomyopathy, secondary dilatative cardiomyopathy and hypertrophic idiopathic cardiomyopathy were analyzed by immunohistochemistry.

The analysis showed a high increased in N-cadherin in secondary dilatative cardiomyopathies and an uniform increase in  $\beta$ -catenin. Then, in most of the samples observed, connexin 43 appears located on the lateral plasmalemma.

Since a lot of clinical and experimental dates show omega-3 essential fatty acids anti-inflammatory and cardioprotective role, in the present investigation it the effect of an ALA- enriched diet on cardiac remodelling in UMX7.1 hamsters has been evaluated.

UMX7.1 hamsters and healthy hamsters were fed with standard diet, while a different group of UMX7.1 hamsters was fed with ALA-enriched diet.

Intercalated disk molecules expression was evaluated by western blotting, immunohistochemistry and ultrastructural analysis; on the whole, the ALA-enriched diet demonstrates its effects in counteracting the pathological alterations in cardiomyopathic hamsters.

Collectively, the present investigation evaluated cardiomyocytes remodelling during experimental and human cardiomyopathy and showed the beneficial effect of an ALA- enriched diet on cardiomyocyte intercalated disk structure and molecular composition; furthermore, it supported the potential use of  $\omega$ -3 polyunsaturated fatty acids in the prevention of potentially dangerous arrhythmias in cardiac diseases.

Key words: cardiomyopathy, intercalated disks,  $\omega$ -3 polyunsaturated fatty acids, arrhythmia, connexin 43.