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**Title:** The effects of swimming training on alterations in structure and function of sternohyoid muscle of model rats of metabolic syndrome

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**Body:** We investigated the effects of swimming training on alterations in structure and function of sternohyoid muscle in model rats of metabolic syndrome. Male Sprague-Dawley rats were randomly divided into 3 groups: control group(group A), MS group(group B), swimming training MS group(group C). The level of malondialdehy of sternohyoid muscles in group B was significantly higher than those of group A and group C. The Superoxide dismutase level of sternohyoid muscles in group B was significantly lower than those of group A and group C. The capillary density, capillary-to-fiber ratio(C/F), cross-sectional area of type I and II fiber, percentage of type I fibers of the isolated sternohyoid muscles in group B were significantly lower than those of group A and group C. In group B, mitochondrions were swelling, vacuolization and reduced, myofibril was dissolved focally. In group C, mternohyoid myofibril was arranged normally, ultrastructure of mitochondrion was normal roughly, occasionally vacuolization. The tensions of sternohyoid muscle of group B were significantly lower than those of group A and group C. In fatigue test, the tension percentages of sternohyoid muscle of group B were significantly lower than those of group A and group C. We concluded that the abnormalities in histological structure and ultrastructure of upper airway muscle induced by MS, via oxidative stress, led to reduction in contractile function in upper airway muscles, contributing to sleep apnea, and swimming training improved contractile dysfunction of upper airway muscles by inhibiting oxidative stress in MS.