

CHANGES IN SKELETAL MUSCLE  
SARCOPLASMIC RETICULUM FUNCTION  
IN ADULT AND AGED FISHER 344 BROWN x NORWAY RATS

by

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**(ABSTRACT)**

The decline of physical ability that occurs with aging has been linked to reduced skeletal muscle function. It has been theorized that  $Ca^{2+}$  uptake and release by the sarcoplasmic reticulum (SR) is altered with aging. Data pertaining to the actual structural and functional changes of SR due to aging are limited; thus, this theory has not yet been fully proven.

The purpose of this research was to determine if SR function is altered as a result of aging in the following muscles: soleus, plantaris, and diaphragm. The soleus is composed of slow twitch muscle fibers. The plantaris is composed of fast twitch muscle fibers, and the diaphragm is composed of both slow and fast twitch muscle fibers.

Fisher 344 Brown x Norway Cross Rats were used as subjects for this project. A total of 12 animals were used: six in group 12 months and six in group 27 months. A Jasco CAF-110 Fluorometer and fura-2 were used to determine the rate of  $Ca^{2+}$  uptake and release by isolated SR vesicles. In the aged animals, mass of the soleus was reduced by 22%, while the plantaris was

reduced by 23%, and the diaphragm by 15%. However, these differences were eliminated when masses were normalized by body mass. In all three muscles examined, the rates of  $\text{Ca}^{2+}$  uptake were not significantly different between the young and aged animals. Rates of  $\text{Ca}^{2+}$  release, however, were reduced by 30% in both the plantaris and diaphragm of the aged animals. These results suggest that SR function is altered in “fast” muscles of the rat. It is possible that changes in SR Ca release may contribute to diminished muscle function and also lead to the decline in physical ability of older adults.

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