

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

by

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Thesis submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Human Nutrition, Foods, and Exercise

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1997

Blacksburg, Virginia

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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 Ca^{2+} uptake were not significantly different between the young and aged animals. Rates of 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.

ACKNOWLEDGMENTS

My experiences at Virginia Tech can be best described as wonderful and challenging. I have been nurtured, understood, respected, pushed, encouraged and treated collegially. This acknowledgment serves to thank all the people I identify as contributing to the completion of my Masters degree.

My committee has been described as a supportive one. As a group I have always felt my committee members were there for me. Serving on my committee were Dr. Jay H. Williams, Dr. Kerry Redican, and Dr. Eleanor Schlenker.

Dr. Jay H. Williams served as my advisor. I felt blessed throughout this process because of his guidance. He has been a role model and a mentor for me. His kindness and sincerity will be remembered. Each time I made changes on my thesis, I felt my own growth.

I will be forever grateful for the support of Dr. Kerry Redican. Dr. Redican served as my undergraduate advisor as well as a member of my thesis committee. In both roles, Dr. Redican was extremely patient and helpful. His patience will always be remembered.

I would like to recognize and thank Dr. Eleanor Schlenker for playing an initial role in my success. She has given me full support and made herself available when I needed guidance from her. Dr. Schlenker proved to be a person of her word at critical times for me.

I would like to recognize three individuals whom I hold in the highest esteem: Dr. Bill Barbeau, Dr. Marjorie Norton, and Dr. Valerie Giddings. I worked with each of them as a graduate assistant on the Diversity Project. They were very encouraging and understanding throughout the entire time I worked with them. I always received smiles and positive comments from them.

I am grateful for the support of Dr. Beverlee Watford, who hired me as a graduate assistant during my final semesters. She is a role model for me. She is a kind person with genuine interest in students achieving their educational goals.

I am forever grateful for the support of Dr. Troy Stewart at Alcorn State freshmen chemistry professor at Alcorn. He is a professor who takes a personal interest in his students. He cares about their success and welfare as well as what they learn. I always remember him saying, "Now Rabon, you, know you can do it, I do not want to hear about what you cannot do." I have called Dr. Stewart a number of times during my college years. Every time I call him, he has given unconditionally his full support. I am forever grateful for he is the best.

An appreciation goes to Dr. Shala Davis, who encouraged me throughout my first semester. Dr. Davis has been very supportive.

Over and Over again, Dr. Christopher Ward, Talayia Perkins, and Espen Spangenburg who gave me words of encouragement and insight. Their patience and knowledge of the laboratory helped me complete my research.

I am also grateful to Dean Mary Ann Lewis. She has been kind, encouraging, and a strong support. She always responded in a timely fashion to

requests made. She has shown interest in how well I progress. I feel fortunate to have met Dean Lewis.

I would also like to recognize the secretaries of the Human Nutrition, Food and Exercise department who are Mary Taylor, Sherry Serville, and Sherry Terry. They have always been there to help me.

A special appreciation goes to my family, especially my mother, Dr. Frankie Rabon and my father, Henry Walter Rabon, Jr. for believing in me and encouraging me every step of the way. My grandparents Frank and Ruth Williams and Henry and Ethel Rabon have given me strength throughout my whole life.

Last, but definitely not least, I would also like to acknowledge Dettrick Stith, a special person, who remained patient through out this whole process and listened to my many complaints.

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