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CAMERON STATION ALEXANDRIA, VIRGINIA

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Semi Annual Progress Report

(July 1 through December 31, 1952)

"Enzyme activity and protein changes in muscular atrophy"

T. O, II, N6ori-198 (Research project ¹²²NR~~20~~-101) with

Medical College of Virginia, Richmond, Va.

Responsible investigator: Ernst Fischer, M.D.

The mild edema produced by repeated weak ultrasonic irradiation of normal and denervated rabbit skeletal muscles (see last semi-annual report) can be further diminished and often completely avoided by changing from a 20 minute exposure period to two 5 to 10 minute periods per day. This change in exposure, however, does not diminish the beneficial effects on denervated muscles.

As reported previously, the treated denervated muscles have a higher content of the specific muscle proteins, myogen and myosin calculated per unit of "true muscle phase". It could be demonstrated in the meantime that the myogen from a treated muscle has about the same physico-chemical and enzymatic activity as that of the untreated denervated control. The increase in extractable myosin and acto-myosin is moderate but distinct, and the adenosine-triphosphatase activity of the myosin of a treated muscle is slightly higher than that of the denervated control muscle. However, the viscosity of the acto-myosin of a treated muscle is much higher than that of the untreated denervated control muscle, and reaches often values not much lower than that of acto-myosin from a normal muscle. Light-scattering measurements revealed too that the molecular configuration of acto-myosin from a treated denervated muscle is between that from normal muscle and that from untreated denervated muscle.

Recent pilot experiments gave some indications that the viscosity of acto-myosin from untreated denervated muscle is less diminished by added adenosinetriphosphate than acto-myosin from treated denervated muscle. although

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the latter's viscosity is not as sensitive to added ATP as normal acto-myosin. How far these differences in viscosity and its sensitivity to ATP of the acto-myosins are due to differences in the ratio actin/myosin has not yet been determined experimentally. However, since we found previously that the actin content of skeletal muscle is less diminished by denervation than its myosin content, different ratios of actin/myosin probably exist for extracted acto-myosin from normal, denervated, and treated denervated muscle.

Paper presented or to be presented:

- (1) "The effect of weak ultrasonic irradiation of skeletal muscle". South-Eastern Section of the Society for Experimental Biology and Medicine, Charlottesville, Va. Nov. 29, 1952.
- (2) "The effect of weak ultrasonic irradiation upon normal and denervated skeletal muscle". American Physiological Society, Chicago, Ill. April 6-10, 1953. Abstract submitted on December 19, 1952, for publication in Federation Proceed. 12, 1953.

Names and status of personnel:

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Richmond, Va., January 20, 1953

Ernst Fischer

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Research Professor of Physiology.