PROCEEDINGS

OF THE

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

VOL. 31. APRIL, 1934. No. 7.

Missouri Section.

St. Louis University School of Medicine, March 14, 1934.

7311 P*

Effect of Rate of Stimulation and Work Performed on Lactic Acid and Hexosephosphate Changes.

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Sixty isometric contractions of isolated frog gastrocnemii against a tension lever at a rate of 10 per minute increased lactic acid 38 and hexosemonophosphate (as hexose) 28 mg. % over resting values of 23 and 51 mg. %, respectively. Sixty contractions at a rate of 60 per minute increased lactic acid 42 and hexosephosphate 56 mg. %. The average amount of work produced in the 2 series of experiments was practically the same. It may be seen that the average amount of lactic acid formed per 60 twitches was not appreciably changed by the rate of stimulation, while hexosephosphate increased much more with rapid than with slow stimulation. A 10 second isometric tetanus produced on an average an increase in lactic acid of 37 and in hexosephosphate of 64 mg. %. For an about equal amount of lactic acid produced, the hexosephosphate increase was

* P represents a preliminary, C a complete manuscript.

greater in the tetanus than in the single twitches at a rate of 60 per minute.

Owing to variations in the amount of work performed by individual muscles, it was possible to construct curves by plotting lactic acid or hexosephosphate against work. Lactic acid was proportional to the work both in single twitches and in tetani and the curves intersected zero work at the basal value of lactic acid as determined experimentally. Hexosephosphate was not proportional to the work; it rose rapidly with small amounts of work and less so as more work was produced, both in single twitches and in tetani.

Oxidative removal of lactic acid and hexosephosphate was excluded by performing some of the experiments in nitrogen. The difference in time between slow and fast stimulation (5 minutes) is too small to allow hexosephosphate to disappear, as shown in experiments in which the rapidly stimulated muscle was fixed 5 minutes after the end of stimulation. Hexosephosphate and lactic acid account for most of the glycogen broken down during contraction. The greater increase in hexosephosphate with rapid stimulation represents an extra breakdown of glycogen, while the relation of hexosephosphate to work suggests that as work is increased proportionately less glycogen is broken down.

7312 P

Antigenic Relationships of Diphtheria Bacilli and Derived Variants.

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The antigenic relationships between diphtheria bacilli and certain derived variants have been investigated by means of the complement fixation reaction.

Two strains of virulent diphtheria bacilli, *No. 19* and *Park No. 18* and avirulent variant strains derived from these strains were used in the experiments, and in addition, a strain of *C. hofmanni.*

Two of the variant strains, *Park No. 8 phage a* and *Park No. 8 phage b,* were derived from young cultures of *Park No. 8* to which specific bacteriophage had been added. Four of the variant strains were derived in various ways from the *No. 19* culture and are designated as follows: *19 'antiserum',* derived from culture in broth con-