

## 51. THE OBSERVATION OF THE ELECTROMYOGRAM IN CASE OF REPEATING EXERCISE

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The mutual activity of active muscles on exercise repeated once or twice in accordance with the method of electromyogram was observed and a few results were gained.

### § 1 On riding bicycle

1. The co-relation of the activities of the muscles especially the muscles of the leg on riding bicycle make some smooth motion in which each muscle cooperate each other in order to the same exercise, and in the beginning of the exercise, the activities of each muscle chiefly consist of the muscular groups of two joints but in the case of exhaustion after the long hour of repeating exercise, the muscles of the single joint seems to take place the initiative of the actual muscles.

Observing the whole active muscle in case of fatigue, the cooperative of the mutual activity is lost and the smooth motion of the muscle come to be impossible, the above mentioned activities is getting less.

2. The training effect of exercise between single joint-muscle and double joints-muscle on  $\bar{\pi}$ -S relation shows remarkable right bias of the curve-T of the double joints muscles.

Therefore, the training effect of the double joints-muscle is considered to be gained easier and sooner than that of the single joint muscle.

### § 2 In operation of tapper.

In operation of tapper the motion of the upper leg is observed the same tendency in case of riding bicycle.

## 52. ELECTROMYOGRAPHIC STUDIES ON THE SCHOOL DANCE

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In case of practising school gymnastics, we chose 10 kinds of preparatory gymnastics which adjust the conditions of body and compared the electromyograms of trainers and those of persons being trained.

Between the electromyograms of trainers doing various kinds of gymnastics, we

found no difference, while among those of persons being trained were seen much differences. Differences on electromyograms between trainers and persons being trained were conspicuous among various muscle in upper part of body and upper part of leg and these phenomena were observed in comparatively high degree gymnastics such as pushups, and at the time of repeating these motions by persons being trained, we noticed the electrical discharge of various types.

In the trainers' various muscles where no action current were noticeable, considerable electric discharge was observed in persons being trained and we found that their whole body were always strained under training.

In gymnastics having varied tempos, trainers' discharging gaps showed no difference, while persons being trained continued their stressed conditions when tempos were fast and when slow, they showed irregular discharges of electricity.

Trainers were repeating their gymnastics always rhythmically, showing the precise usage of the muscle which were requisite to execute the motions, while persons being trained were, because of their whole bodys' strain, repeating gymnastics unnatural and muscles which were not basically required to execute the motions were used.

Moreover, strains and looseness of the parts of trainers' body were dexterously done according to the requirements, while those of persons being trained were done in stiff manners and these difference were most conspicuously seen in one type of gymnastics done repeatedly and that under tempos having much variations.

### 53. ETIOLOGICAL STUDY OF SCIATICA IN SPORTSMAN

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The observation of sciatica that was considered to be sports impediment had been very few.

The observation was made under the 294 out patients who had sciatica and came here for consultation in due course of April, 1955 and March 1959, and as the result of that, the 19 patients whose cause were sports were found, and 8 patients in them were from 11 years to 20 years old, therefore, it's 30% of 27 patients of the same age who had sciatica. Accordingly, it's realized that the sports was considered to be the great cause of sciatica of youth.

Taking off both forelegs and tail from the root of the rat one week after his birth, the authors gave him training of walking with 2 legs forcibly from the childhood. The hernia of intervertebral disc, which was the same as human beings had, was observed on the 6 cases (25%) of 24 cases which had training for over one year.

The result let us know that the load of self-body weight, which was natural loading, was tried at this experiment, but if it tried on anti-physiological condition, destruction of motive organ of vertebra was caused and finally, caused hernia of intervertebral disc.