

# THE EFFECT OF VOLUNTARY EYE MOVEMENTS ON THE ELECTRICAL ACTIVITY OF THE HUMAN NECK MUSCLES

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Numerous investigations have shown that reflex eye movements take place in response to the change of tone of the neck musculature [1-4]. We have found no reports dealing with the influence of voluntary eye movements on neck-muscle tone.

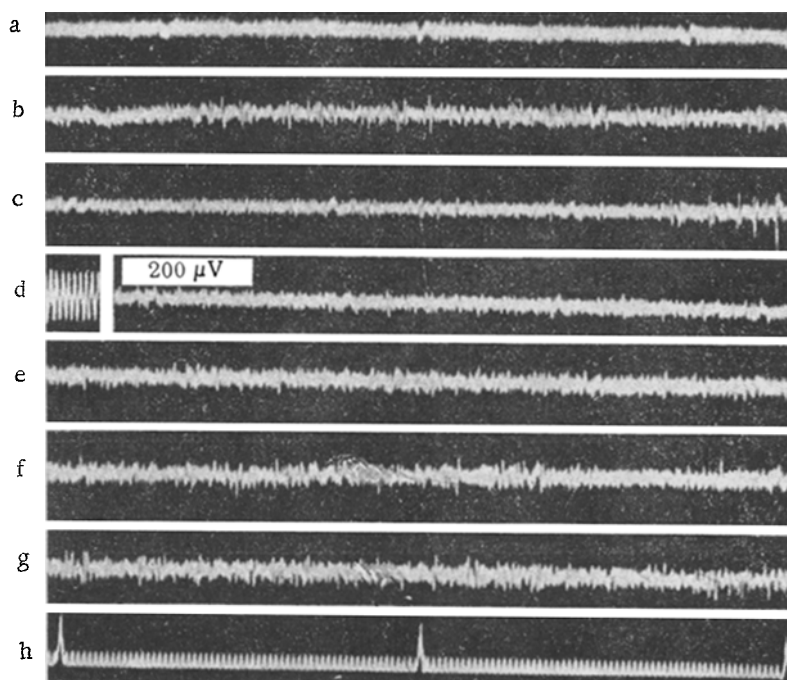


Fig. 1. Electromyograms of the right sternocleidomastoid muscle. a) Spontaneous activity; b) voluntary tension of neck muscles; c) subject looks to the right; d) looks to the left; e) looks upwards; f) looks downwards; g) convergence; h) time marker (1 second, 1/50 seconds).

The present investigation deals with the influence of voluntary eye movements on the electrical activity of the human sternocleidomastoid muscle.

## EXPERIMENTAL METHODS

The work was carried out on healthy men aged 19-38 years. The subject was seated, and head movements were entirely eliminated by an orthopedic head clamp. Potentials from the sternocleidomastoid muscles were picked up by silver plate electrodes 10 mm in diameter having carefully polished contact faces. Bipolar leads were used, and both electrodes were placed 2-2.5 cm apart on a piece of carefully degreased skin over the belly of the muscle to be studied. The subject was in a screened room from which light was excluded, and was carefully

instructed. The records of the potentials were made with the gaze directly forward (initial readings), with the neck muscles tensed, with the gaze directed to the right, to the left, upwards, or downwards, and with the eyes converged towards the tip of the nose. Altogether 23 subjects were involved in 34 investigations.

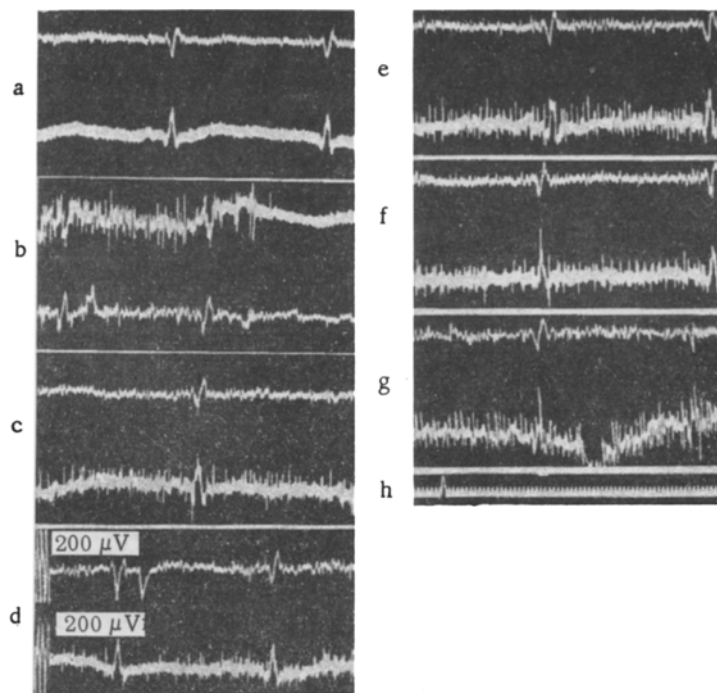


Fig. 2. Electromyograms of the left (upper) and right (lower) sternocleidomastoid muscles. Indications as in Fig. 1.

#### EXPERIMENTAL RESULTS

An analysis of the electromyograms obtained showed that even with the head accurately fixed in the original position, the muscles studied were in a state of excitation (Fig. 1a; Fig. 2a). The voluntary tension established at the command of the experimenter considerably increased the recorded electrical activity, which returned to the original level when the tension was relaxed.

Out of 34 experiments a marked increase of electrical activity of the sternocleidomastoid muscles was found to accompany voluntary eye movements in 21 cases (see Figs. 1, 2). The most marked changes in electrical activity occurred when the subject obeyed the command to converge (see Figs. 1, 2g); in such cases the amplitude and frequency of the oscillations approached those recorded during voluntary tension of the neck muscles. We were not able to establish any correlation between the direction of the gaze and the electrical activity of the left or right sternocleidomastoid muscle.

The results of the experiments show that voluntary eye movements increase the electrical activity of both sternocleidomastoid muscles.

#### SUMMARY

An electrophysiological investigation on man showed that electrical activity of both sternocleidomastoid muscles was caused by voluntary eye movements.

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.

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