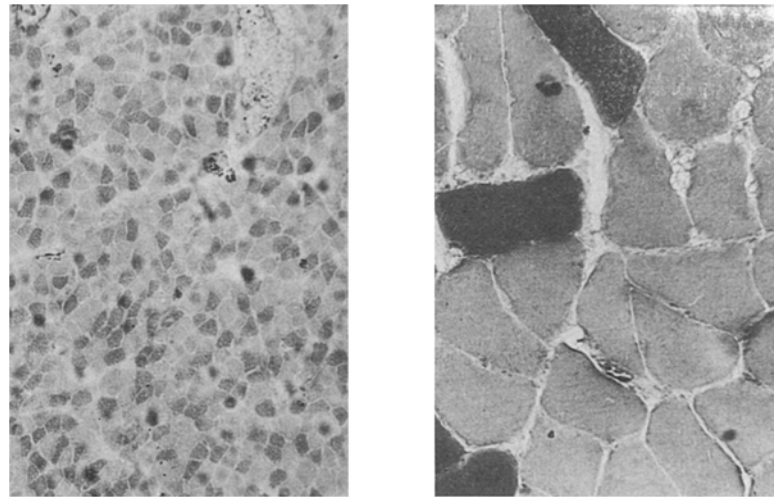

Cross-section through the soleus muscle of the 1-month-old (a) andadult (b) rabbit stained for myosin ATPase activity (× 155).

different degree or maturation of the motor system at birth. The rat has a very immature motor system at birth, similar to the rabbit, while the guinea-pig has a more mature one at birth. The temporary shortening, observed postnatally in the rat, may therefore occur prenatally in the guinea-pig. It has been suggested that the postnatal maturation process in muscle fibre pattern is of neurogenic origin[5,11]. The postnatal prolongation of CT and the change to a muscle of predominantly low myosin ATPase activity appears to be a developmental adaptation of the slow muscle to its antigravity function, the time course of this change being modified by different rate of growth of muscle, body size, and of maturation of the neuromuscular system.

Zusammenfassung. Postnatale Verlängerung nach temporärer Verkürzung der Kontraktionszeit und Zunahme von Muskelfasern mit niedriger ATPase-Aktivität im langsamen Soleus-Muskel wurde bei verschiedenen Säugetieren gefunden. Der schnelle extensor digitorum longus zeigt dagegen durchwegs postnatale Verkürzung der Kontraktionszeit.

E. GUTMANN, J. MELICHNA and I. SYROVÝ

Institute of Physiology, Czechoslovak Academy of Sciences, Praha 4–Krc (Czechoslovakia), 4 September 1972.

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Magnus Reflexes of the Chest Musculature in Man

MAGNUS[1] demonstrated that the position of the head modifies the tonus of the limb musculature of the decerebrate animal. The same phenomenon was observed in man also, in association with a variety of pathological states affecting the central nervous system. Since the tonic neck reflexes were not apparent in the normal human subject, their presence was thought to be pathognomic of central nervous system.

But in 1944 WELLS[2] demonstrated that all of the tonic neck and labirintine reflexes could be elicited in normal adults if extensor muscles were first hypertonic. This observation was confirmed by IKAI[3], TOKIZANE et al.[4].

MASSION et al.[5] demonstrated that the position of the head modifies not only the limb musculature of the decerebrated animal but the chest respiratory muscles too. Therefore it is of interest to investigate whether the neck reflexes could modify the respiratory muscles (as well as in the extensor limb muscle) in normal humans too.

The subjects of the investigation were 7 adults – 3 male and 4 female. The investigation was made with electromyograph DISA. The skin over the muscles to be studied was thoroughly cleansed with acetone. Cup-shaped silver electrodes approximately 1 cm in diameter were filled with electrode jelly and placed on the skin about an inch apart. A small piece of elasticized adhesive tape held the unit in place. Electrode pairs were placed over the intercostal spaces as follows: parasternally in the 2nd and midaxillary in the 10th.

There is usually no recordable electrical activity from the intercostals during eupnea (normal breathing) in adult subjects. In some subjects a weak inspiratory activity was recorded. The position of the head does not modify the phasic inspiratory activity. When the subject leaned forward from the standing position and put his hands on the floor, a tonic activity was recorded in the respiratory muscles. In this case the position of the head modifies the tonus of the respiratory chest muscles. Rotation of the head to the side results in an increase of the tonus of the respiratory muscles of that side. Bachward tilting of the head increases the tonus of the respiratory muscles in both – right and left sides. Forward tilting of the head produces opposite results (Figures 1 and 2).

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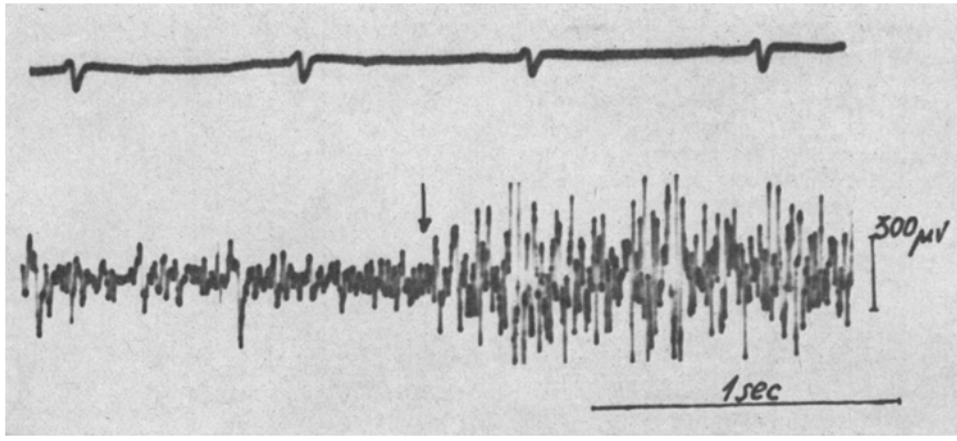

Fig. 1. Top record. While standing. There is no electrical activity from the intercostal (except ECG). Bottom record. While leaning forward. Tonic electrical activity from the same muscles. Rotation of the head to the left (row) results in increase the tonus of the muscles of that side.

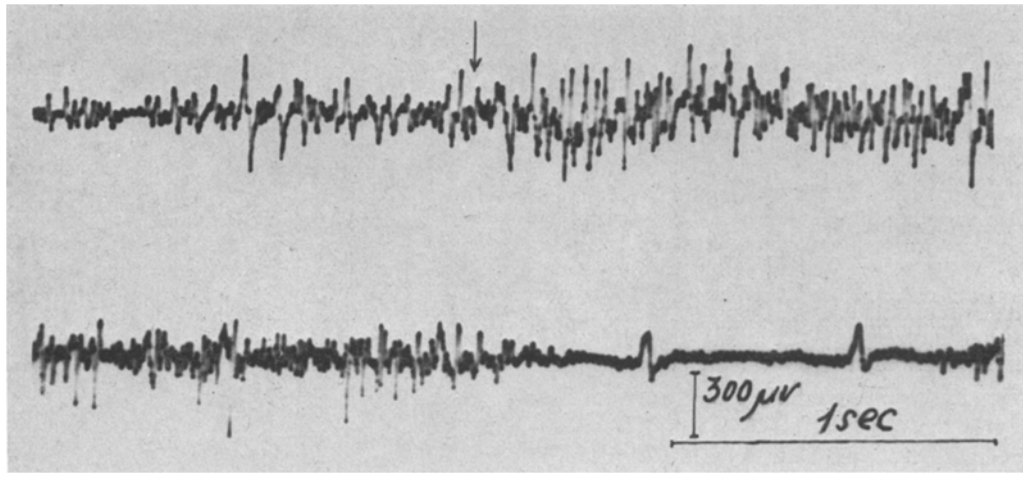

Fig. 2. Top record. While leaning forward. Tonic electrical activity from intercostal. Backward tilting of the head (row) increases the tonus of the muscles. Bottom record. Forward tilting of the head (row) decreases the tonus.

Thus the MAGNUS reflex may be demonstrated in normal adults, not only in the limb musculature but also in the chest musculature if the muscles were first hypertonic.

ВЫВОД. Рефлексы Магнуса могут быть вызваны в мышцах грудной клетки человека, но для этого надо, чтобы эти мышцы находились в состоянии повышенного тонуса.

S. I. FRANKSTEIN, Z. N. SERGEEVA and L. N.S ERGEEVA

Institute of Normal and Pathological Physiology, Academy of Medical Sciences, Baltijskaya 8, Moskwa (USSR), 1 September 1972.

Do the Respiratory Muscles and Lung Receptors Influence the Respiratory Sensitivity to CO_2?

According to CAMPBELL[1], breathlessness in man may be prevented by paralysis of respiratory muscles, and according to GUZ[2], by the vagal blockade. In connection with these observations it is of interest to know whether afferent impulses from the respiratory muscles and from the lungs change respiratory sensitivity to CO_2. Both the old and recently published results are contradictory[3–11].

Our investigations which are presented in this paper permit the following conclusion. Neither the impulses from the respiratory muscles nor the impulses from the lungs influence the respiratory sensitivity to CO_2. In fact the respiratory sensitivity to CO_2 depends on Pa CO_2. If the experimental operation increases Pa CO_2 in the animal, the respiratory sensitivity to CO_2 is decreased; if, on the contrary, the experimental operation in the animal decreases Pa CO_2, the respiratory sensitivity to CO_2 is increased.

The experiments were performed on 10 adult cats anaesthetized with 30–40 mg/kg nembutal. The animals were subjected to passive overventilation lowering the Pa CO_2 till the appearance of hypocapnic apnoe. Expired volumes were measured by connecting the tracheal