of HCl, UMP, proline, NaCl and NaSCN exceeds in magnitude that to sea water. Also, the nerve discharges elicited by these active taste solutions lasted for 1.5 sec or more after beginning of stimulation while the reaction to sea water ceased within 0.5 sec. The responses obtained here with these taste solutions were similar in every respect to those recorded more peripherally from the ramus maxillaris of the puffer, as seen from Figure 3. Detailed data dealing with the latter were reported elsewhere[9,10]. The results mentioned above suggest that the taste message from the upper lip of the puffer to the brain is transmitted by the communis fibres.

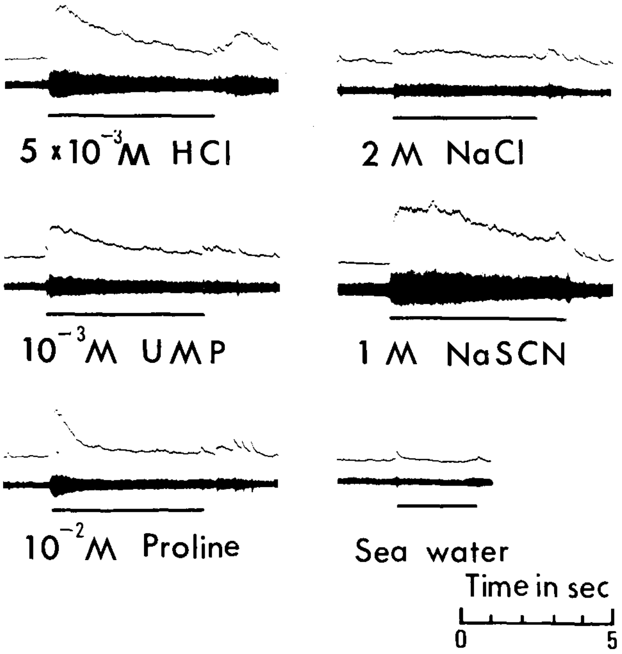

Fig. 3. Neural activity of ramus maxillaris in response to stimulation of the upper lip of the puffer. Impulse discharges (lower trace) and their integrated patterns (upper trace) are shown. Bar under each recording indicates duration of stimulation.

The trigeminus responded neither to 2 M NaCl nor to 1 *M* NaSCN, while the communis appeared to be responsive to both the salts solutions (Figure 2). Still, the trigeminus was found to be responsive to NaSCN at high concentrations such as 3 *M* or more. Similar responses to salts have been recorded from the lingual nerve (trigeminal) innervating the tongue of the rat[7]. In this case also, the threshold concentration for NaCl is several times higher than that of the chorda tympani (facial). In the puffer, it was also noted that the response to NaSCN developed more slowly than the responses of the communis to other taste solutions, and the response to NaSCN lasted for a long period after rinsing of the lip with sea water, causing irreversible damage to the preparations.

From the fact that no responses could be obtained inside the cranium from the trigeminus upon applying taste solutions to the lower lip, while positive responses were obtained from the mandibularis, it was concluded that communis fibres (i.e. facial nerve) are involved also in the transmission of taste messages from the lower lip.

Zusammenfassung. Mit Hilfe elektrophysiologischer Methodik wurde an *Fugu pardalis* geprüft, ob Geschmackssensationen von den Lippen über Trigeminus- oder Facialisfasern dem Gehirn übermittelt werden. Die Ergebnisse unterstützen die Ansicht, dass ausschliesslich der Facialisnerv bei diesem Vorgang beteiligt ist.

S. Kiyohara, I. Hidaka[11] and
T. Tamura[12]

Fisheries Laboratory, Faculty of Agriculture,
Nagoya University, Nagoya (Japan); and
Faculty of Fisheries, Mie University,
Tsu, Mie (Japan), 29 April 1975.

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[11] Faculty of Fisheries, Mie University, Tsu, Mie (Japan).

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Tendon Shortening in Striated Muscle

The adaptive response of oral striated muscle to a maintained stretch has important implications to dental practitioners. The length of oral muscles may changes as a result of dental restorative or orthodontic treatment procedures. Growth of bony parts also is accompanied by an increase in the length of associated muscles. However, only a few studies have attempted to deal with the adaptive response of skeletal muscle to maintained changes in length. The functional properties of rabbit limb muscles were shown by Crawford[1] to change directly with an increase or decrease in range of motion of the limb. Goldspink[2] demonstrated a reversible change in the number of serial sarcomeres in cat soleus muscle corresponding to a maintained increase or decrease in passive muscle tension. Shortening of the tendon of rat limb muscle by Schiaffino[3] resulted in only a temporary change in muscle length and sarcomere length. The present study describes changes in muscle belly length, tendon length, and muscle sarcomere length resulting from shortening of the tendon of an oral striated muscle.

Material and methods. The digastric (mandibular) muscle of the mature male, New Zealand white rabbit was the model of an oral muscle selected for this study. The paired digastric muscle has a simple fibre arrangement and a long, flat tendon. The tendon was shortened by tying a portion of it into a loop with black silk suture. Changes in muscle belly length and tendon length were observed in this chronic study by measuring the distance between metal markers that were implanted in the muscle and tendon. The markers were visualized with radiographs taken periodically. Details of the technique for placing, radiographing, and measuring the distance between the metal markers have been reported elsewhere[4]. Histologic slides were prepared of digastric muscles from

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[2] G. Goldspink, C. Tabary, J. C. Tabary, C. Tardieu and G. Tardieu, J. Physiol., Lond. *236*, 733 (1974).

[3] S. Schiaffino, Experientia *30*, 1163 (1974).

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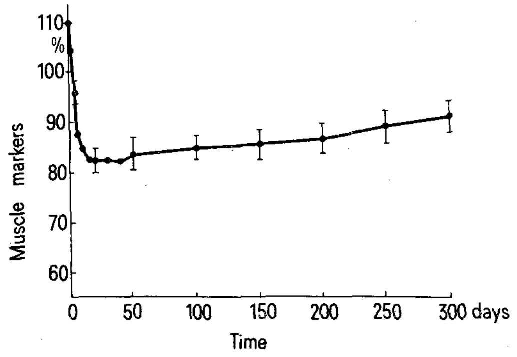
Rabbit digastric muscle sarcomere lengths (μm)

	Control (mean ± SD)	Experimental (mean ± SD)	Exp./Cont. (%)
Immediate post-shortening	2.75^a (4) ± 0.06	3.06 (4) ± 0.09	111
2–3 weeks post-shortening	2.67^b (12) ± 0.13	2.52 (12) ± 0.17	94
12 months post-shortening	2.62 (7) ± 0.13	2.55 (7) ± 0.12	97

$^a p < 0.01$. $^b p < 0.02$. Number of muscles measured in parentheses.

animals fixed by arterial perfusion of 10% formalin. The jaws of the rabbit were held in the closed position during fixation. Sarcomere lengths were measured directly from the slides with a micrometer eyepiece and an oil immersion objective. Sarcomeres were measured in rows of 10. At least 10 different fibres in each specimen were measured.

Results. The changes in muscle and tendon length following tendon shortening may conveniently be considered as short-term and long-term. These changes were determined by measuring the distance between the implanted metal markers in serial radiographs. Tendon shortening produced a significant short term increase in the length of the muscle belly (Figure). Within a day, the distance between the tendon markers began to increase, suggesting that the tendon was being pulled out. The tendon continued to lengthen until it had reached a length much greater than just prior to tendon shortening. The lengthening of the tendon is reflected in the shortening of the muscle belly in the Figure. Thus, the short term stretch placed on the muscle belly by tendon shortening is soon converted into a marked shortening of the muscle belly. Subsequently, the muscle belly tended to return toward its length prior to tendon shortening. Measurement of muscle sarcomere lengths revealed that tendon shortening produced a significant short term increase in muscle sarcomere length when compared to sarcomere lengths in the unshortened control muscle of the pair (Table). As the muscle shortened, the measured sarcomere lengths also reflected this change (Table). In the long-term, however, muscle sarcomere lengths were not significantly different from the controls, even though the muscle itself had not re-established its original length. This discrepancy between muscle length and muscle sarcomere length suggests that a mechanism exists to restore muscle sarcomere length to a normal or ideal functional length. Such a mechanism would have to add or remove serial sarcomeres as required to adjust total sarcomere number to total muscle length.



Change in muscle marker distance expressed as a percent. Vertical bars are SEM, $n = 7$ for each point on thg graph.

Summary. Tendon shortening in the digastric muscle of the rabbit resulted in a short term increase in gross muscle length and sarcomere length. Subsequently, muscle and sarcomere lengths decreased to less than control values. Long-term measurements suggested that a return to control sarcomere length may have been achieved by a reduction in sarcomere number.

Z. F. Muhl and A. F. Grimm

Departments of Orthodontics and Histology,
University of Illinois at the Medical Center Chicago,
P.O. Box 6998, Chicago (Illinois 60680, USA),
18 April 1975.

Facilitation by Imidazole of the Aqueous Flare Response to α-Melanocyte Stimulating Hormone

The eye responds monotonously to both chemical and mechanical local traumata with a break-down of the blood aqueous barrier[1]. The rabbit eye is especially liable to show impressive permeability disturbances. Even small traumata disturb temporarily the blood aqueous barrier and the increased protein content in the aqueous gives a flare which can be measured photoelectrically without touching the eye[2].

Local application of arachidonic acid (AA)[3] and prostaglandin (PG)[4] gives a similar trauma reaction. Aspirin-like drugs and indomethacin, which inhibit the conversion of AA to PG[3,5] are capable of blocking the effect of local traumatic agents[6]. PG is therefore suspected of being the common mediator of the inflammatory reaction to different traumata[7].

Apart from locally applied agents, it has also been shown that the melanocyte stimulating hormone (α-MSH) given in microgram doses subcutanously is capable of producing effects which are indistinguishable from those of a local trauma, even histologically[8,9]. In an unselected material of pigmented rabbits, the percentage of positive aqueous flare responses (AFR) to α-MSH is about 40%[10]. The ultimate reason for this variability in reaction is unknown but is to some extent dependent on the age of the animals.

The effect of α-MSH on the eye appears to be in accor-