Additional Abstracts *

PS. Single fiber action potential recorded in verified volume conduction circumstances. – B.A. Albers, J.H.M. Put, T.J. Van der Reijden-Dikstaal and W. Wallinga (Biomed. Eng. Div., Twente Univ., 7500 AE Enschede, and * Dept. of Cytol. and Histol., Univ. of Nijmegen, Nijmegen, The Netherlands)

An important aspect in the origin of the single fiber action potential (SFAP) is the structure of the volume conductor between the stimulated fiber and the recording position. A new method has been developed for the determination of the position of the stimulated fiber and the recording electrodes from cryosections of skeletal muscle (see abstract of Wallinga et al.). Other data obtained with this method concern the fiber type, fiber dimension and the actual structure of the volume conductor.

Experiments were done in vivo with the rat. A set of about 14 wire electrodes were inserted in the m. EDL in such a way that SFAPs would be recorded with some of the electrodes (electrodes transversely close together and also dispersed longitudinally). If SFAPs are recorded on two or more electrodes, the longitudinal conduction velocity of the AP is derived from these recordings and the position information from the cryosections. The SFAP time domain (amplitudes, duration of phases) and frequency domain parameters are analyzed taking into account and in relation with the aspects mentioned.

PS. Brachial motor neuropathy with onion-bulb formations. – R.N. Auer, R.B. Bell and M.A. Lee (Dept. of Pathology and Clinical Neurosciences, University of Calgary, Calgary, Alberta, Canada)

A 38-year-old man presented with a 6 year history of upper extremity wasting and weakness in the absence of sensory complaints. Electrophysiologic abnormalities were confined to motor nerve conduction and supported a demyelinating process involving the brachial plexus and major proximal upper extremity nerve trunks bilaterally. Biopsy of the proximal right ulnar nerve revealed onion-bulb neuropathy.

We report the first such case of onion-bulb neuropathy localized to the brachial plexus, with purely motor manifestations.

* These abstracts arrived after the submission deadline, due to industrial action by the post office.

SKi. The control of force development in the motor unit. – F. Baldissera (Dip. Scienze e Tecnologie Biomediche, Università dell'Aquila, L'Aquila, Italy)

The mechanical (muscle fibers) and the neural (motoneuron) elements of the motor unit respond in a different way to rapid changes to their input. In response to impulse trains whose rate is modulated sinusoidally, the muscle behaves like a low-pass filter, i.e., the force changes induced by the rate modulation drastically decrease when the frequency of the sinusoidal modulation becomes higher than 0.5–1.0 Hz.

In response to sine-wave currents (injected intracellularly, as substitutes of synaptic currents) motoneurons discharge impulse trains whose rate is sinusoidally modulated. When the sine-wave modulation frequency increases above 0.5–1.0 Hz, the changes in impulse rate become large, revealing a special sensitivity of motoneurons to the velocity of the input variations.

By virtue of its dynamic sensitivity, which develops over the same range of modulation frequencies where the muscle response is abated, the current-to-impulse conversion operated by the motoneuron provides a pre-compensation for the muscular losses and moves to around 10 Hz the cut-off frequency of the motor unit as a whole.

Within a pool of motoneurons, the dynamic sensitivity was found to be higher in those motoneurons with a lower rheobase and connected with the weaker motor units. Weak motor units seem therefore to need less excitation (synaptic current) than the strong ones both to be recruited and to reach the maximal speed of force development when their input is supraliminal.

PS. Evaluation of local analgetics by pain related cortical responses. – P. Bjerring * and L. Arendt-Nielsen ** (* Dept. of Dermatology, Marselisborg Hospital, 8000 Aarhus and ** Aalborg University, 9000 Aalborg, Denmark)

Cortical evoked responses were elicited by noxious argon laser and strong mechanical stimuli applied to the dorsum of the hands. The stimuli were applied before and after injection of lidocaine on the one hand and application of an epicutaneous eutectic mixture of local anesthetics (EMLAs) on the other. Five minutes after lidocaine injection and 1 h after EMLA application the pain and tactile elicited responses were recorded. The mechanical related cortical response contained a tactile and a pain related complex. The tactile related complex remained unattenuated after analgesia. The tactile and laser elicited pain complexes were abolished by injected lidocaine.