4 different wheat varieties show presence of 3 main sterols (table). Noticeable differences in sterol content in all the varieties is observed. β-sitosterol forms about 60% of total sterols in all. It has been shown by Svoboda and Robbins[2] that when β-sitosterol is added to the dietary sterol of Tobacco hornworm, cholesterol comprises about 85% of the natural sterols isolated from prepupae and also is a major tissue sterol. The dealkylation of β-sitosterol to cholesterol in *Tribolium confusum* has also been reported showing the pathway of its metabolism[12]. In our previous findings, the cholesterol level varies significantly at different developmental stages of *T. castaneum* when fed on these wheat varieties.

Further the cholesterol level at mature larvae and pupal stage in resistant Kalyan Sona was found to be just half that in Sonalika[8]. In the resistant variety, β-sitosterol is significantly low and is almost half compared to susceptible one (Sonalika). Since the resistant variety retards the growth, development[9] and oviposition[10] of the pest. There seems to be a direct relationship between the metabolism of β-sitosterol and the inhibition of growth, etc. Such type of relationship was shown by Svoboda et al.[13] by using hypocholesteralemic agents that inhibit the conversion of β-sitosterol to cholesterol. From this it may be concluded that, since β-sitosterol is inadequate in resistant variety of wheat, it resists or arrests the development of the pest.

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Interaction between human evoked electrospinograms elicited by segmental and descending volleys[1]

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Summary. Interaction between the slow negative-positive waves of human evoked electrospinograms produced by descending and segmental volleys was tested under general anaesthesia. A partial occlusion was demonstrated in these slow waves.

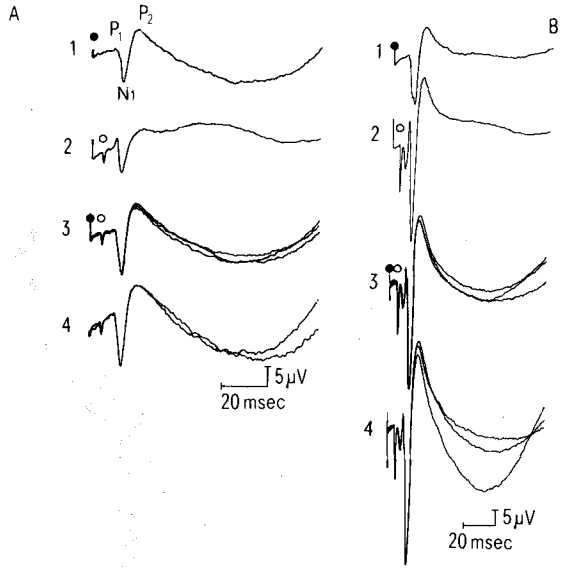
The slow positive wave of cord dorsum potential (CDP) elicited by the segmental nerves or rootlets is believed to originate from primary afferent depolarization (PAD), the causative agent for presynaptic inhibition[2,3]. PAD can also be produced in the cats by supraspinal stimulation[4,5]. We have previously demonstrated in conscious subjects that a slow positive wave preceded by a slow and sharp negative wave can be recorded from the lumbar enlargement elicited by descending volleys, suggesting existence of supraspinally produced PAD in the human spinal cord[6]. Here we report an occlusion phenomenon between slow waves of human CDPs elicited by segmental and descending volleys, providing evidence that there are some common elements in the paths producing these slow waves in the spinal cord by segmental and descending volleys.

Observations were made in 7 patients (16–54 years) who underwent spinal fusion under neurolept anaesthesia (60% nitrous oxide, 5–10 µg/kg fentanyl and 0.25 mg/kg droperidol) and complete muscle relaxation (0.1 mg/kg pancuronium). Informed consent was obtained from all patients prior to the study. No neurological deficits were found. A simple and safe method of recording human evoked electrospinograms (EESG), using an epidural catheter as a recording electrode, has been developed[7]. 2 pairs of epidural catheters were placed at the levels of the cervical and lumbar enlargements to monitor the spinal cord function during the spinal manipulations.

Segmental nerve stimulation produced the initially positive spike (P_1), followed by slow negative (N_1)-postive (P_2) waves in the posterior epidural space (figure A1 and B1)[8,9]. The waveform characteristics and time courses of the P_1, N_1 and P_2 potentials have been shown to be almost the same as the initially positive spike, slow negative and positive waves of CDP directly recorded from the cord surface in animals[10]. Therefore, the origins of P_1, N_1 and P_2 waves of human EESG are considered to be the incoming volleys along the roots, the synchronous activities of the interneurons and PAD, respectively[9,10]. Epidural stimulation of the cervical cord produced slow negative-positive waves which are very similar in waveform to the N_1 and P_2 waves evoked segmentally (figure A2 and B2)[6]. Therefore, the slow negative and positive waves evoked by the descending volleys may also represent the activities of the interneurons and PAD, respectively[6].

To determine whether there are some common elements in the paths producing these slow waves, we tested the interaction between the slow negative-positive waves produced by the segmental and descending volleys.

When the 2 stimuli (1.2× threshold) (segmental and descending volleys) were delivered at an interval to produce the 2 EESGs in the same time period, amplitudes of slow negative and positive waves (figure A3) were 88.6 ± 1.9 (mean ± SE) and 85.2 ± 1.1%, respectively, of those produced by a simple summation (figure A4). The amount of occlusion is expected to be greater when the same elements are excited by stronger stimuli. When the 2 stimuli were delivered at the intensity of 6.0× threshold, occlusions of the negative and positive waves amounted to 80.4 ± 1.3 and



Interaction of human EESGs, recorded from the posterior epidural space at the T_{12} level, elicited by segmental and descending volleys at 2 intensities (1.2× threshold in A and 6.0× threshold in B). 1: EESG elicited by tibial nerve stimulation at the popliteal space. 2: EESG elicited by epidural stimulation of cervical cord at the C_6 level. 3: EESG elicited by both tibial nerve and cervical cord stimulations. The timing of the 2 stimuli was adjusted to produce the 2 EESGs at the same time period. 4: Simple summation of EESGs in 1 and 2. The closed and open circles represent the stimulus artifacts of tibial nerve and cervical cord stimulations, respectively. Each trace is a computer average of 25 responses. Upward deflection denotes positivity in all traces.

77.6±0.8%, respectively. By contrast, there was a linear addition of the initial spike potentials without occlusion.

A greater occlusion in the slow positive waves than in the negative waves, demonstrated in both weak and strong stimulations, may indicate that there are more common elements in the paths producing PAD than in those producing the synchronous interneuronal activities.[9,11]. This occlusion phenomenon may partially account for the inhibitory effect of descending volleys on sensory inputs, such as pain, at the spinal level in man.

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Effects of monochromatic X-radiation on the membrane of nodes of Ranvier under voltage and current clamp conditions*

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Summary. Monochromatic Ag-K_α-radiation decreased irreversibly the peak sodium current in nodes of Ranvier. This decrease occurs only with a delay of about 1000 sec after a threshold dose of about 8 kR has been reached. Potassium current and resting potential are practically not affected.

Ionizing radiation has been used to study the mechanism of excitation in nerve membranes by altering their electrical properties[2-11]. Some of the investigators[2,4,5,9,11] reported a temporary enhancement of excitability at X-ray doses of less than 10 kR, while others[3,6,8,10] demonstrated that radiation doses below 10 kR were ineffective in changing action potential (rate of rise, amplitude), conduction velocity or membrane resistance. At higher doses a decrease of excitability was observed by all investigators.

Non-ionizing radiation exerts specific effects on the electrical properties of excitable membranes. The results of the first voltage clamp analysis of UV-radiation on nerve membranes[12] and of subsequent investigations[13,14] showed that UV-radiation specifically blocks sodium channels of the nodal membrane without altering the resting potential and the potassium channels. The blocking effect appeared to be due to alteration of the gating system of the sodium channels[14].

Using radiation of different energy it could be anticipated that specific alterations on a macromolecular or intermolecular scale would lead to further insights on the mechanisms of the excitation process. A further purpose of this investigation was to solve the contradiction of the results cited above.

This study represents the first voltage clamp analysis of X-irradiation effects on ion permeabilities of the nerve membrane using monochromatic X-radiation. The experimental procedures were described in detail elsewhere[13,15]; single nerve fibres were dissected from the sciatic nerve of *Rana esculenta*[16] and voltage- or current clamped according to the method of Nonner[17]. Membrane currents or voltages were digitized and recorded on-line using a Honeywell DDP-516 processing computer, and stored on magnetic-tape for offline data evaluation. Monochromatic Ag-K_α radiation was produced by an X-ray diffraction tube (RDF-50, Ag anode; Philops) and a constant potential generator (PW-1140; Philips). K_α-radiation was isolated and focussed (beam width < 0.1 mm) by a precision quartz monochromator (GM-8; AEG-Telefunken). High precision focussing avoided irradiation of the internodes and thereby induction of injury currents. A dose range up to 20 kR was studied. In addition, X-radiation of continuous energy was produced by an X-ray inspection tube (MCN-161, 1 mm beryllium window; Philips) operat-