have been shown to decline with age in normal male subjects[11], but there is contradictory evidence on age-dependant changes in $\overline{HR}$. Both an increase[12] and a decrease[11] in $\overline{HR}$ with age have been reported. In the present study no effect of age on $\overline{HR}$ was seen, and we conclude that HRV is especially sensitive to age-dependant factors.

Physiological mechanisms possibly controlling HRV have been discussed in detail elsewhere[7,8], and have yet to be precisely defined. The demonstrated reduction of HRV in multiple sclerotic and diabetic patients[4-7] has been equated with autonomic neuropathy and the present results may therefore indicate progressive change in autonomic function to be a component of the ageing process in man. Other authors, however, have suggested that HRV may be an index of the integrity of cerebral cardioregulatory centres[13] or may in fact reflect the general functional state of the central nervous system (CNS)[14,15]. Were this to be so, our results could be interpreted as indicative of subtle impairment of CNS function in man with increasing age.

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Steroidal effect in the resistance offered by wheat varieties to *Tribolium castaneum* (Herbst)

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Summary. The steroids present in the resistant, susceptible and intermediate wheat varieties to *Tribolium castaneum* (Herbst) were estimated quantitatively; β-sitosterol shows significant differences in these varieties. The contents of β-sitosterol in 4 varieties of wheat is hence correlated to the resistance of the varieties to the flour beetle.

The metabolism of phytosterol to cholesterol in tobacco hornworm is already shown[2], and in this conversion desmosterol is an intermediate product[3] which was isolated and indentified in a number of phytophagous and ominivorous species[4] through the use of several inhibitors of sterol metabolism.

The resistance to pests offered by the stored grains, specially wheat varieties, has been recorded by many authors[5-7] without indicating the cause of this resistance. In our previous study of cholesterol level at different developmental stages of *Tribolium castaneum,* fed on such resistant and susceptible varieties, significant differences in cholesterol level were obtained[8]. Considering that the resistant variety has an effect on the cholesterol, a metabolite of dealkylation of sterols, we tried to analyze total sterols present in the different wheat varieties by TLC. In addition to this separation of sterols, we also estimated each sterol quantitatively. The present work, therefore, reports the presence of sterols both qualitatively and quantitatively in the wheat varieties, partially throwing light on the cause of resistance offered by stored grains to their pests.

Materials and methods. The sterols were separated from 4 different wheat varieties; one was highly resistant (Kalyan Sona), one highly susceptible (Sonalika) and the remaining 2 were intermediate ones to the growth and development of *Tribolium castaneum.* These varieties, obtained from the Government Agricultural Experiment Station, Durgapura, Jaipur, India, were selected after conducting biological tests in our laboratory[9,10]. The varieties were conditioned at the temperature 30±2 °C and relative humidity of 65±5% for 7 days. They were ground by hand grinder and seived through 100 mesh. The dried wheat flour (2 g) of each variety was refluxed for 4 h with 5% (v/v) hydrochloric acid in 70% ethanol and extracted with ethyl acetate by the method of Tomita et al.[11]. The ethyl acetate extracts were filtered and then concentrated to dryness in vacuo. The dried residues were weighed and dissolved in chloroform. Four such replicates of each were examined and the mean values were determined. Thin-layer glass plates (20×20 cm) were coated with 0.4 mm to 0.5 mm Silica gel 'G' h) dried at room temperature and activated at 100 °C. The total extracts of various wheat varieties along with the known compounds were chromatographed on these plates with hexane-ethylacetate solvent system (3:1). Examination of dried chromatograms under UV-light showed 3 clear flourescent spots which were identified from their R_f-values (compared with the standards) then the fractions were scraped off the plates separately and collected in beakers. These sterols from the different wheat varieties were eluted with chloroform, dried and weighed.

Results and discussion. The analysis of free sterols in the

Quantitative analysis of free sterol in some wheat varieties of Rajasthan

Sample No.	Wheat varieties	β-Sitosterol (mg%)	Stigmasterol (mg%)	Lenosterol (mg%)
1	Kalyan Sona (R)	3.25	1.4	0.75
2	Lal Bahadur (MR)	4.3	1.6	0.77
3	D 134 (MS)	5.82	2.17	1.17
4	Sonalika (S)	6.3	2.35	1.42
	SE±	0.066	0.154	0.004
	CD at 5% level	0.243	0.568	0.014

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