The changes which appear in the pulse rate and blood pressure when normal persons assume
the upright position have often been carefully studied and are well known.

It has also been reported that certain murmurs, particularly those of rheumatic mitral stenosis, often disappear in the erect
posture. David Scherf, Holmes & Weill have shown that there is diminution or disappearance of

...
the A-V block when the patient assumes the standing position. Therefore, we studied the effect of change of posture on A-V conduction in normal subjects in order to be able to estimate their incidence and to ascertain whether any cause could be ascribed to them.

The investigations were done in 30 normal young medical students. The electrocardiogram was recorded in recumbent position and immediately after standing, concomitantly pulse rate was also recorded in both postures.

The results show significant shortening of P-R interval in upright posture with rise in pulse rate. The underlying mechanism has been discussed.

1.4
CARDIOVASCULAR RESPONSES TO SUSTAINED HANDGRIP IN ALTERED NUTRITIONAL STATES IN MAN

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The cardiovascular responses of 20 healthy young adult male volunteers (age range: 18-32 yrs), to isometric stress during sustained handgrip were studied. The subjects were divided into 3 groups based on their Body mass index (BMI, W/H²): normal-weight subjects of BMI 19 to 22.5 (n=5), underweights of BMI 16 to 19 (n=9) and undernourished labourers of BMI 16.4 to 17.5 (n=6). The normal and underweight subjects were on ad libitum food intakes and from good socio-economic backgrounds. The undernourished individuals were on significantly lower daily energy intakes (P<0.05) compared to the other two groups. All subjects were euthyroid as assessed by radio-immunoassay of serum total T₄, T₃ and free T₃ levels. The cardiovascular responses to sustained handgrip in underweights and normal-weight controls were similar. Undernourished subjects had significantly lower (P<0.05) resting systolic and diastolic blood pressures compared to normal-weight controls. The peak pressor responses to isometric handgrip were significantly lower (P<0.05) in the undernourished compared to the normal-weight controls, while the increase in heart rate during static hand exercise was greater in the undernourished subjects; the latter was however not statistically significant. These results imply a depressed adrenergic neurotransmitter release and also an enhanced vagal tone in undernourished subjects, in response to isometric stress.

1.5
A COMPARATIVE STUDY OF THE EFFECT OF NALOXONE AND CATECHOLAMINES ON LACTIC ACIDOSIS AND SURVIVAL IN DOGS SUBJECTED TO HEMORRHAGIC SHOCK

R. Raghunandan, R. K. Morya, B. K. Man & V. Raghunandan
Department of Physiology, Medical College, Rohtak (Haryana)

A comparison of the effect of naloxone (an opiate receptor antagonist) with clinically used drugs like dopamine and noradrenaline on the lactic acidosis and survival of dogs subjected to hemorrhagic shock was made in this study. Anesthetised animals were bled into a heparinised
Schoenfield and Goldberger (1963) found a positive correlation between uric acid and cholesterol in ischaemic heart disease. The present study was carried out with the aim to find out whether any correlation exists between these two parameters in normal healthy adults belonging to different socio-economic status. 42 medical students, 32 rikshaw pullers and labourers, 11 doctors and 16 engineers were selected for the above study. They were grouped according to their age, per capita income, dietetic habits and educational status.

It was observed that with increase of age uric acid and cholesterol level rises slightly (p > .01). Persons of high socio-economic group have higher serum uric acid and cholesterol levels. The higher values being 4.61 ± 1.05 mg.% and 190.46 ± 38.33 mg.% and lower values being 2.90 ± 0.93 mg.% and 133.93 ± 35.33 mg.% respectively (p < .01). On further analysis it was observed that vegetarians have 3.91 ± 1.02 mg.% serum uric acid and 148.09 ± 25.00 mg.% serum cholesterol while non-vegetarians have 4.39 ± 1.5 mg.% and 191.06 ± 36.92 mg.% respectively (p < .01). Further it was observed that uneducated persons have lower serum uric acid and serum cholesterol levels, the values being 3.53 ± 1.05 mg.% and 142.52 ± 35.92 mg.% in educated and 4.30 ± 1.05 mg.% and 187.21 ± 21.58 mg.% respectively (p < .01).

Systolic time intervals (STI) were evaluated non-invasively in a group of 38 patients suffering from chronic severe anaemia with haemoglobin level less than 6 g% and duration of anaemia more than three months. STI were also studied in 30 age and sex matched normal healthy controls.

Various STI studies were electro-mechanical systole (Q2), left ventricular ejection time (LVET), pre-ejection period (PEP) and PEP/LVET ratio. The heart rate (HR) in cases of anaemia showed an increase of 22.12%. The STI were corrected at zero heart rate as they are influenced by HR. The rate corrected LVET was appreciably prolonged (P < 0.02) with significant reduction (P < 0.001) in PEP in cases of anaemia as compared to controls. However, the duration of Q2 was not affected.

The changes observed in STI in cases of anaemia indicate an increase in myocardial contractility of the left ventricle associated with increased cardiac output.

Schoenfield and Goldberger (1963) found a positive correlation between uric acid and cholesterol in ischaemic heart disease. The present study was carried out with the aim to find out whether any correlation exists between these two parameters in normal healthy adults belonging to different socio-economic status. 42 medical students, 32 rikshaw pullers and labourers, 11 doctors and 16 engineers were selected for the above study. They were grouped according to their age, per capita income, dietetic habits and educational status.

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PLATELETS, PROSTAGLANDINS AND THROMBOSIS
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The platelet release reaction was considered essential for irreversible aggregation and formation of thrombi. Discovery of the novel metabolites of arachidonate, including prostacyclin and thromboxane, suggested a modulating role for these bioactive lipids in platelet-endothelial interaction. Based on this knowledge, drug trials were designed to reduce clinical complications associated with ischemic heart disease using cyclooxygenase (CO) inhibitors, particularly aspirin. Recent studies from our laboratory have demonstrated that irreversible platelet aggregation could be achieved without release of granule contents. Furthermore, we have demonstrated that platelet activation could be secured without requiring mediation of arachidonate metabolites. In addition, alpha adrenergic receptor stimulation can completely reverse the inhibitory effects of cyclooxygenase inhibitors. Studies with an intracellular calcium chelator suggest that irreversible aggregation of platelets does not depend upon the elevation of cytosolic calcium. Our studies provide a reasonable explanation for the inability of cyclooxygenase inhibitors to completely prevent complications associated with heart disease. A thorough understanding of the specific mechanisms involved in platelet activation will facilitate better management of platelet function in health and disease.
HAEMATOLOGIC ALTERATIONS IN DIABETES MELLITUS

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El-Fatah University of Medical Sciences (Libya)

Fasting blood glucose, erythrocyte count, haematocrit, haemoglobin and mean corpuscular volume levels of 304 Libyan diabetic women attending the outpatient clinic of the Diabetes Hospital, after overnight fasting were determined. The respective mean values were 234 ± 4.7 mg/dl, 4.96 (X10⁰ mm³) ± 0.02, 43.5 ± 0.18%, 14.5 ± 0.08 g/dl and 88 ± 0.27 µl. Significant correlations were found between fasting blood glucose and erythrocyte count (r = 0.38)/ haematocrit (r = 0.45)/haemoglobin (0.35)/ mean corpuscular volume (r = 0.3). Positive correlations were found between surface body surface area and fasting blood glucose/erythrocyte count.

The significance of the role of elevated haematologic values in the genesis of diabetic microangiopathy is discussed.

2.1 ELECTRO CARDIOGRAPHIC STUDIES IN NEONATES, INFANTS AND YOUNG CHILDREN

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The present study was designed to evaluate the heart rate, P–R interval, QRS axis and polarity of T–waves by recording ECG in 25 neonates (I), 11 each of up to 1 year (II) and 2 year (III) and 53 ranging from 2–5 years (IV). It has been shown that except IV group in all other three groups the maximum heart rate is significantly higher than earlier reports. Excepting group I in all other groups P – R interval is shorter and correlates with heart rate.

QRS axis in infants from second month onwards follows the adult pattern and in group I it is + 130°

T–wave in group I was positive in 88% and from first month onwards showed adult pattern of negativity. (Right precardial leads)

Electrocardiographic studies in the healthy newborn babies have always held the interest of investigators and it is considered to be a sensitive indicator of circulatory adaptation following birth. During the first hour of life, it has been reported that prolongation of intervals, higher QRS deflections and also T–wave alteration occur. Very scanty information regarding ECG in Indian infants and children is available hence the present study has been undertaken to establish the physiological normal values in heart rate, P. R. intervals, QRS axis and T–wave polarity.

2.2 A STUDY OF JUVENILE T WAVES IN ELECTROCARDIOGRAM OF NORMAL MALE AND FEMALE SUBJECTS IN THE AGE GROUP – 17 YEARS TO 20 YEARS.

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Department of Physiology, Miraj Medical College, Miraj.

Juvenile pattern of T wave inversion in the standard and precordial leads of electrocardiogram was studied in normal healthy Indians of 17 to 20 years age in 60 subjects.

Incidence was compared with weight/height ratio.

Results are compared and discussed.
The sodium content of the perfusion fluid was gradually decreased and the isotonicity was maintained by addition of disaccharides and subsequently the buffer tris. The present work was undertaken to study if the mg have any beneficial effect when sodium ions were reduced and isotonicity was maintained by addition of Mgcl2.
The total number of subjects studied were 35 foundry workers, 37 blacksmiths and 30 Jaggars. Each subject was investigated clinically as well as by conventional spirometry on a Vitalograph.

Lung Function Studies were conducted by spirometry to assess the respiratory disability and also the presence and magnitude of the risk to respiratory health caused by specific occupational exposures viz. lagging, foundry work and blacksmithery in Dockyard workers.

B.R. Goyle and A.M. Madhwal
Pravara Medical College

2.7 SPIROMETRIC ASSESSMENT OF PERSONNEL ENGAGED IN DIFFERENT HAZARDOUS OCCUPATIONS

B.R. Goyle and A.M. Madhwal
Pravara Medical College

Lung Function Studies were conducted by spirometry to assess the respiratory disability and also the presence and magnitude of the risk to respiratory health caused by specific occupational exposures viz. lagging, foundry work and blacksmithery in Dockyard workers.

The total number of subjects studied were 35 foundry workers, 37 blacksmiths and 30 laggers. Each subject was investigated clinically as well as by conventional spirometry on a Vitalograph.
In early stages of tobacco smoking though a number of changes can be detected in lung parenchyma, functional impairment can be detected only with sensitive pulmonary function tests. Measurement of TICO is recommended as a sensitive test to detect functional and structural lung diseases. The present study is aimed at to find out the effect of mild to moderate tobacco smoking (2-15 pack years) on lung transfer components participating in gaseous exchange at pulmonary level (TICO, KCO, DM and VC). These were studied in 50 healthy asymptomatic 20-47 years male smokers alongwith 50 healthy non-smokers matched to each smoker for age (± 1 year), height (± 2 ems), socioeconomic status and physical activity using Morgan Transfer Test Model C and Computer Magna 88. Pulmonary diffusion functions as assessed by TICO, KCO(TICO/VA) and VC showed significant reduction. Though DM increased in the beginning but gradually declined later. KCO and VC showed progressive decrease with increasing duration and pack years of smoking. Decrease in TICO is probably due to reversible bronchoconstriction, reflex vasospasm and irreversible emphysematous changes in lungs. Decrease in KCO and VC are more sensitive indicators of impairments of lung functions than TICO in smokers.

Both the static and dynamic tests were recorded by standard techniques. The extent of ventilatory defect was assessed in each agewise subgroup of the subjects by plotting the data on a Miller's Prediction Quadrant chart.

A mild degree of obstructive ventilatory defect was detected in blacksmiths, foundry workers and lagger in the agegroup of 31-50 years and in addition to that a moderate combined obstructive/restrictive ventilatory defect was found in foundry workers and lagger of the same agegroup. All the three groups in between 51-60 years of age were affected, foundry workers and blacksmiths showing moderate obstructive ventilatory defect, while lagger having a severe degree of combined obstructive/restrictive ventilatory defect.

2.8
SOME OBSERVATIONS ON PULMONARY FUNCTION TESTS IN RICE MILL WORKERS

Department of Physiology K.G.S. Medical College Lucknow (U.P.)

Pulmonary function tests were done on twenty five male subjects working in rice mill and an equal number of control subjects of practically same age group, by employing computerised dry spirometer (Med-spirometer).

The results show that the duration of exposure of rice mill dust in the workers is related to the degree of decline in F.V.C., F.E.V.1, F.E.V.3 and P.E.F.R. This could be attributed to allergic or inflammatory reactions of Broncho pulmonary tissues and probable cause could be rice mill endotoxin.

The fall in V.C. & F.V.C. indicate restrictive lung changes and decline in F.E.V.1, F.E.V.3 & P.E.F.R. along with other flow rates indicate towards obstructive lung changes. The observations in this study indicate that there are both types of changes and these are mixed type.

2.9
PULMONARY DIFFUSION TESTS AND SMOKING

K. K. Mahajan
Department of Physiology
Medical College, Rohtak

In early stages of tobacco smoking though a number of changes can be detected in lung parenchyma, functional impairment can be detected only with sensitive pulmonary function tests. Measurement of TICO is recommended as a sensitive test to detect functional and structural lung diseases. The present study is aimed at to find out the effect of mild to moderate tobacco smoking (2-15 pack years) on lung transfer components participating in gaseous exchange at pulmonary level (TICO, KCO, DM and VC). These were studied in 50 healthy asymptomatic 20-47 years male smokers alongwith 50 healthy non-smokers matched to each smoker for age (± 1 year), height (± 2 cms), socioeconomic status and physical activity using Morgan Transfer Test Model C and Computer Magna 88. Pulmonary diffusion functions as assessed by TICO, KCO(TICO/VA) and VC showed significant reduction. Though DM increased in the beginning but gradually declined later. KCO and VC showed progressive decrease with increasing duration and pack years of smoking. Decrease in TICO is probably due to reversible bronchoconstriction, reflex vasospasm and irreversible emphysematous changes in lungs. Decrease in KCO and VC are more sensitive indicators of impairments of lung functions than TICO in smokers.
M. Ramesh Bhat, C. Ramaswamy and N. J. Anthony

Department of Physiology
Kasturba Medical College, Mangalore.

2.10 EFFECT OF PHYSICAL FITNESS ON VC & FEV₁

50 students of both sexes between 19 and 21 years performed the Harvard-step test. Their VC & FEV₁ were recorded, before exercise and 5 and 8 minutes after. Their Physical fitness score was calculated and they were divided as low group (29), scoring 54 and below, and high group (21) scoring 55 and above.

Resting VC in the high group was significantly higher than in the low group, whereas there was no difference in the FEV₁.

The high group showed a significant increase in VC5 minutes after exercise, which came back to normal after 8 minutes, whereas the low group did not change after 5 or 8 minutes.

The FEV₁ in the low group is reduced significantly 5 minutes after exercise, which came to normal after 8 minutes, whereas in the high group did not change after 5 or 8 minutes.

While resting VC of the low group may have been lower because of lesser surface area, the failure of increase in VC in the low group after exercise may be attributed to the reduced FEV₁ during this period.

2.11 EFFECT OF EXERCISE (HARVARD-STEP TEST) ON VC & FEV₁

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Department of Physiology, Kasturba Medical College, Mangalore.

In this study, 30 male and 20 female students between the age group of 19–21 years were made to perform Harvard-step test exercise after recording their normal VC and FEV₁. After the exercise was completed, again their VC and FEV₁ were recorded after 5 minutes and 8 minutes interval. Their Physical fitness score was also calculated.

VC, in males increases significantly after 5 minutes of exercise and comes back to normal after 8 minutes; whereas in females, VC decreases significantly after 5 minutes and remains so even after 8 minutes of exercise.

The FEV₁ in males and females is reduced significantly after 5 minutes of exercise, the fall being more marked in females, but after 8 minutes the FEV₁ values come back to normal in both the sexes.

The decreased VC in females after exercise may be attributed to their reduced FEV₁ as well as to their poor physical fitness score compared with males.
For the detection of small airway changes in various disorders several tests like frequency
dependence of lung compliance, determination of closing volume, comparison of maximal flows
with helium and air and evaluation of maximum expiratory flow volume curves have been used.

More recently, the evaluation of terminal part of forced expiratory spirogram has been
suggested as a sensitive indicator of airway obstruction. The Forced End expiratory flow rate
(FEF 85% – 75%) has been commonly used to assess the small airway involved, and has been
reported to be lower in lying down posture than sitting posture except the inspiratory capacity which was found
to be more in lying down posture (15%). These changes in lung volume were more prominent in
female. However, decrease in FEV1 which occurs in lying down posture was more marked in males
as compare to females.

**FORCED EXPIRATORY SPIROGRAM IN ASSESSING SMALL AIRWAYS**

B. V. Deskar
Department of Physiology
Medical College, Nagpur.

For the detection of small airway changes in various disorders several tests like frequency
dependence of lung compliance, determination of closing volume, comparison of maximal flows
with helium and air and evaluation of maximum expiratory flow volume curves have been used.

Another simpler evaluation of the lung volume (expressed as % of FVC) at which the expiratory
flow rate of 1 lit/sec and .5 lit/sec occurs has been found out from forced expiratory spirogram.
Since these flow rates usually occur at the terminal part of forced expiratory spirogram.

The findings of these tests are compared with those of normal healthy individuals of the same
age group and the difference was found to be statistically significant. These tests might prove simple,
but useful for diagnosis, prognosis & Therapeutic evaluation of conditions in which small airways
are likely to be involved.
11

In diving animals, as soon as the head was dipped into the water, there is cessation of respiration along with bradycardia, hypotension, decrease of cardiac output and also vasoconstriction in muscle, liver, kidney, intestine, and skin. This study is also well documented with the increase of vagal tone. Detail studies in intact avian species, particularly in diving birds, like domestic duck are still lacking. Thus attempt has been made to study in intact anaesthetised domestic duck, the influence of vagus and the neurotransmitters involved in the esophageal motility, heart rate and blood pressure by immersing the head of the duck under water.

It was observed that in such condition there was bradycardia and hypotension along with significant increase in esophageal motility. The volume range over which the inspiratory time constant is more than that during the expiratory phase has been defined as ACTIVE VOLUME. The active volume together with average expiratory and peak inspiratory time constant data clearly differentiate different lung diseases.

2.14
FOURIER AND TIME CONSTANT FUNCTION ANALYSIS OF MAXIMUM EFFORT FLOW VOLUME LOOP.

A. K. Bandyopadhyay and S. V. Rao
Gandhi Medical College, Bhopal.

P. N. Janardanan
Maulana Azad College of Technology, Bhopal.

The maximum effort flow volume loop have been found useful in qualitative differentiation of mechanical status of lungs but quantitative representation of the differentiating parameter has remained a problem. An approach for quantifying the mechanical parameters utilising the complete flow volume loop has been presented. Ten flow volume loops of subjects; normal, mild obstructive, moderate obstructive, severe obstructive and severe restrictive; were analysed. On numerical fourier analysis of flow as a function of lung volume, the normalised second and third harmonics adequately describes the flow volume curve demarcating lung disorders. Assuming the respiratory system to be linear over small volume range the inverse of the slope of the flow volume curve is considered as time constant function which is the product of lung resistance and compliance at specific volumes. Such linearised time constant functions over the vital capacity range have been found to portray in greater detail the mechanical characteristics of the lung system. The volume range over which the inspiratory time constant is more than that during the expiratory phase has been defined as ACTIVE VOLUME. The active volume together with average expiratory and peak inspiratory time constant data clearly differentiate different lung diseases.

2.15
CHANGES OF OESOPHAGEAL MOTILITY DURING HEAD IMMERSION OF DOMESTIC DUCK.


Electrophysiology Unit, Department of Physiology,
University of Calcutta, 700 009.

In diving animals, as soon as the head was dipped into the water, there is cessation of respiration along with bradycardia, hypotension, decrease of cardiac output and also vasoconstriction in muscle, liver, kidney, intestine, and skin. This study is also well documented with the increase of vagal tone. Detail studies in intact avian species, particularly in diving birds, like domestic duck are still lacking. Thus attempt has been made to study in intact anaesthetised domestic duck, the influence of vagus and the neurotransmitters involved in the esophageal motility, heart rate and blood pressure by immersing the head of the duck under water. It was observed that in such condition there was bradycardia and hypotension along with significant increase in esophageal motility. These effects were abolished by bilateral vagotomy or atropinising the animal. These reflex effects could be reproduced by stimulating the peripheral cut end of the vagus and was antagonised by atropine. This study indicates that the vagal cholinergic efferents are involved for the reflex increase in esophageal motility during head immersion.
Distension of the venoatrial junction with warm (37°C) saline (0.5 - 1 ml) produced hypotension, bradycardia during the first 30 seconds which is followed by hypotension and tachycardia during the rest period of distension (total distension period being 3 min.). With the onset of dis-

Effect of stimulation of cardiac receptors on cardiovascular changes was studied in chloralose (60 mg/kg body wt. i.v.) or nembutal (35 mg/kg body wt. i.p.) anaesthetised cats. The studies were performed in open-chested animals and the respiration maintained artificially by Starling’s ideal respiratory pump. Blood pressure was recorded through pressure-transducer in Beckman RM Dynograph. Heart rate was counted from ECG or blood pressure wave. A small latex balloon was inserted into the veno-atrial junction and was distended by saline at 37°C. Movement of nictitating membrane was recorded through Beckman force displacement transducer, connected with Beckman RM Dynograph. The ribs (1st-5th) were opened for bilateral surgical removal of thoracic sympathetic rami (T1 - T3) and bilateral stellectomy. Drugs were administered intravenously.

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2.17

CARDIOVASCULAR REFLEXES OF CARDIAC ORIGIN

B. N. Koley, Basabi Pathak and J. Koley

Electrophysiology Unit, Department of Physiology
University College of Science, Calcutta - 700 009.

Effect of stimulation of cardiac receptors on cardiovascular changes was studied in chloralose (60 mg/kg body wt. i.v.) or nembutal (35 mg/kg body wt. i.p.) anaesthetised cats. The studies were performed in open-chested animals and the respiration maintained artificially by Starling’s ideal respiratory pump. Blood pressure was recorded through pressure-transducer in Beckman RM Dynograph. Heart rate was counted from ECG or blood pressure wave. A small latex balloon was inserted into the veno-atrial junction and was distended by saline at 37°C. Movement of nictitating membrane was recorded through Beckman force displacement transducer, connected with Beckman RM Dynograph. The ribs (1st-5th) were opened for bilateral surgical removal of thoracic sympathetic rami (T1 - T3) and bilateral stellectomy. Drugs were administered intravenously.

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2.16

REFLEX RELAXATION OF THE STOMACH ELICITED FROM STIMULATION OF LEFT VENTRICULAR RECEPTORS IN THE CAT

J. Koley, Chandana Majumder, J. K. Saha and B. N. Koley

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Application of nicotine (100 µg/ml) or veratridine (100 µg/ml) over the left ventricle, opened through the 5th costal interspace, produced an immediate hypotension and bradycardia which were accompanied by reflex relaxation of the stomach and inhibition of spontaneous gastric motility at a latency of 4–6 s after nicotine. The spontaneous gastric motility reappeared within 50 s. Nicotine (20 µg/kg) administered intravenously produced similar reflex gastric relaxation and inhibition of spontaneous motility at a latency of 14–18 s. Application of xylocaine (2%) over the left ventricle or sectioning of the cervical vagus bilaterally abolished the reflex response of stomach to either nicotine or veratridine applied locally or to intravenous nicotine. Stimulation (2 Hz, 5V, 2mS) of the peripheral end of cut cervical vagus produced relaxation of the stomach provided the other vagus remained intact. The reflex relaxation of the stomach induced either by nicotine, veratridine or by vagus stimulation remained unaffected by atropine, neostigmine or propranolol. Sectioning of the vagus below the heart, at the level of diaphragm abolished the reflex gastric relaxation. The results suggest that excitation of cardiac sensory receptors with vagal afferents from the left ventricle is responsible for the reflex relaxation of the stomach and that the vagal non-cholinergic non-adrenergic nerve is involved for the manifestation of the reflex response.
The pulmonary function tests are measured by various authors in Western and Indian subjects, but the data for Indian healthy subjects are not much available. For the reason we have carried out the different pulmonary function tests, in 300 male medical students, in age group of 17 to 21 years with an average age of 19.8 years to set the physiological norms.

I. A. Khan, M. Shiralkar, H.L. Jain, A. Joshi and H.C. Gupta

Department of Physiology, M.G.M. Medical College, Indore

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Deaths due to Indian red Scorpion (Buthus tamulus) stings are common. Electrocardiographic and metabolic changes causing death due to scorpionism is investigated. Healthy dogs and rabbits of either sex were used. 4 mg/kg lyophilised crude scorpion venom was given and limb Lead II

2.20
CARDIOVASCULAR RESPONSES OF GALLBLADDER ORIGIN.

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Calcutta-700 009.

The clinical examination and family history of the subjects were taken to exclude any organic disease. The pulmonary function tests carried out were T.V., R.M.V., E.R.V., V.C., and M.V.V. The average T.V. 510 ml, R.M.V. 7.21 lit./min., E.R.V. 950 ml., V.C. 3.45 lit. and M.V.V. 98.7 lit/min. were observed.

The pulmonary function tests were carried out on Toshniwal's Expirograph in the morning, after measuring height, weight and body surface area of the subjects. The average height of the subjects was 162 cms. and the average weight of the subjects was 51.2 kgs. The average body surface area of the subjects was 1.57 sq. meter.

The vagus and sympathetic, both innervate the gallbladder. In the present study attempts have been made to study whether the visceral afferents of the gallbladder have any chemosensitivity towards reflex modification of cardiovascular function. Attempts have also been made to study the type of nerve fibres involved in the process. Chemicals like nicotine (1 & 5 ug/ml), Bradykinin (10 ug/ml) capsaicin (200 ug/ml), N/10 HCl, N/10 NaOH, phenyl diguanide (0.2 mg/ml) and lactic acid (100 ug/ml) had been applied over the serosal layer of the gallbladder to study the chemosensitive properties of the gallbladder afferents. Except PDG and lactic acid all the other chemicals produced reflex hypertension. Bradykinin and capsaicin also showed alteration in heart rate.

PDG and lactic acid failed to produce any alteration in blood pressure and heart rate. To study the type of fibres and receptors involved in such reflex hypertension, nicotine was applied in animals pretreated with Guanithedine sulphate, propranolol, phenotamine, prazosine and yohimbin. It was observed that the nicotine induced hypertension was absent in Guanithedine sulphate, phenotamine and Yohimbin treated animals. This indicates that the L2 sympathetic afferents are involved in such visceral-vascular reflexes. Nicotine (1 & 5 ug/ml) was also applied over the mucosal layer of the gallbladder but there was no associated alteration in blood pressure or heart rate.

2.21
PHYSIOLOGICAL MECHANISMS BEHIND THE CARDIOVASCULAR AND METABOLIC DISTURBANCES IN ACUTE MYOCARDITIS INDUCED BY INDIAN RED SCORPION (BUTHUS TAMULUS) VENOM AND ITS REVERSIBILITY WITH INSULIN ADMINISTRATION.

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Department of Physiology, L.T.M. Medical College, Sion, Bombay 400 022

Deaths due to Indian red Scorpion (Buthus tamulus) stings are common. Electrocardiographic and metabolic changes causing death due to scorpionism is investigated. Healthy dogs and rabbits of either sex were used. 4 mg/kg lyophilised crude scorpion venom was given and limb Lead II
ROLE OF CENTRAL ADRENOCEPTORS IN THE CONTROL OF WATER INTAKE

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Experiments were carried out to study the effect of intra-hypothalamic as well as intraventricular microinjection of norepinephrine (NE) on water intake in albino rats. Electrodes constructed from 24 gauge needle were implanted in various locations of the hypothalamus, and in the lateral ventricle. Norepinephrine microinjection into the lateral hypothalamus and lateral ventricle both produced a decrease in water intake. The study indicates that adrenergic receptors of the lateral hypothalamus inhibit feeding through the stimulation of alpha₁ and alpha₂ adrenoceptors of the lateral hypothalamus. From the present investigation it is implied that appetite depressant drugs like amphetamine may produce hypophagia through the liberation of NE from the terminals of noradrenergic fibres of the hypothalamus.
ventricle. Normal saline, NE and the various blockers viz. prazosin (pfizer Ltd.), Yohimbine (Sigma Lab), Metoprolol (Astra–IDL Ltd.) and butoxamine (The Welcome Research Laboratories) were injected in a dose of 1.5 microgram by introducing microsyringe needle through the implanted electrode. The effect of Chemical stimulation of hypothalamus and lateral ventricle with NE on water intake was measured before and after microinjection of alpha1, alpha2, beta1, and beta2 blockers. The results indicated that microinjection of NE into the lateral ventricle as well as into the lateral hypothalamus led to much lesser water intake, whereas microinjection of NE into other areas of the hypothalamus did not alter water intake. The inhibitory effect of NE on water intake was blocked by yohimbine. Thus the present study demonstrates the inhibitory effect of central adrenoceptors on water intake which acts by stimulating alpha2 adrenoceptors of the lateral hypothalamus.

4.3
EFFECT OF GANGLIONIC STIMULATING AND BLOCKING AGENTS ON THE COLONIC MYOELECTRICAL ACTIVITY IN THE RAT

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The presence of two types of fast activities, Medium Fast Activity (MFA) and Fast Activity (FA), has been demonstrated in the electromyogram (EMG) of colon in normal children and in the rat by the authors. An absence of MFA in Hirschsprung’s disease and in experimental aganglionosis of colon in the rat has also been described. In the present study the fast components of colonic myoelectrical activity were analysed during the procedures affecting ganglionic transmission. It was observed that ganglionic stimulants like balloon inflation and intra-arterial injections of acetylcholine and small amounts of nicotine increased the amplitude and frequency of MFA without affecting FA. The intra-arterial injections of ganglionic blocking agents, like nicotine in large amounts and pentolinium tartrate, completely abolished the MFA. These observations suggest that the ganglionic activity is responsible for the genesis of MFA and that the absence of cholinergic ganglionic transmission is the most important single factor for the reported altered pattern of EMG in aganglionosis.

4.4
GASTRIC VAGOTOMY - INDUCED CHANGES IN TASTE BEHAVIOUR OF CHRONICALLY FOOD-DEPRIVED RATS

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Taste behavioural studies were conducted in three different groups of adult male albino rats: (1) ad libitum fed rats (FD0 group), (2) rats maintained for 6 wks on 25% food deprivation schedule (FD25 group) and (3) rats maintained for 6 wks on 50% food deprivation schedule (FD50 group). The 1-hour intakes of sapid test solutions like sucrose (3%), glucose (13%), saccharin (0.2%) and sodium chloride (0.9%) were significantly greater in the food-deprived animals compared to the intakes of ad libitum fed animals and also the rise in intakes was proportionate to the degree of deprivation. The intakes of citric acid (0.16%), quinine sulphate (0.001%) and tap water were not significantly affected. Selective gastric vagotomy led to significant reductions in the intakes of
Slovent-SLO is a potent streptococcal exotoxin released during recurrent infections with group A haemolytic streptococci. Besides its haemolytic and cytotoxic activities, SLO has also been shown to produce morphological cardiac damage, derangement of cardiac activity and neuroexcitation in experimental animals.

In the present study the effect of intracerebroventricular (ICV) administration and intravenous administration of SLO on ECG in intact, vagotomized and/or spinal dogs has been investigated. The ICV administration of small doses of SLO (1 to 2 U/Kg) in intact animals did not produce any changes in the ECG. However, larger doses instantaneously produced marked sinus bradycardia soon followed by nodal rhythm leading to further defects in intracardiac conduction system, terminating in cardiac stand still, and death within 5 to 7 minutes after the injection. Bilateral cervical vagotomy and/or spinal transection did not alter these changes. Essentially similar ECG changes were produced after IV SLO in intact, vagotomized and/or spinal dogs.

On the basis of these observations it is suggested that the observed cardiotoxic effects of SLO (ICV) are not likely to be centrally mediated and would rather appear to be due to direct cardiotoxicity of SLO consequent to its peripheral leakage.
Changes in brain biogenic amines after ethanol has been reported in literature. Our previous work has shown that methanol also produces changes in brain biogenic amines which are different from the changes produced by ethanol. Since no data is available for isopropanol (IPA) in this aspect this work was undertaken.

IPA (1.85 g/kg) was administered to male albino rats by intraperitoneal route and the following parameters were measured when the blood level reached the maximum (after 30 minutes) in various discrete areas of the brain.

Our results show that the maximum blood level of IPA was reached at 30 minutes after the administration and at that time the following changes were noticed in the brain biogenic amines.

- The norepinephrine level showed a significant decrease in all areas except striatum and cerebral cortex where the level remained unchanged. The epinephrine level was increased in striatum, decreased in hippocampus and cerebellum, and unaltered in other areas. The dopamine was elevated in striatum, decreased in hypothalamus and cerebellum, unchanged in other areas. 5HT was increased in hypothalamus and mid brain regions whereas in striatum, hippocampus, pons medulla, and cerebral cortex it showed a decrease. 5HIAA showed a decrease in striatum and hippocampus and unchanged in other areas.
The volume induced changes of the pressure in cerebrospinal spaces gives important clinical information related to a variety of neurological diseases. The present experiments were conducted on anaesthetized dogs to design a method for determining the pressure volume curves of ventricle and epidural space in response to rapid injection of fluid in the ventricle. Ringer solution was injected at a constant rate of 0.1 ml/sec in the lateral ventricle and the ventricular (Pv) and epidural (Ps) pressures were monitored simultaneously. The pressure volume (PV) curves of the two spaces
were determined by repeated and rapid continuous injection of 2 and 4 ml of Ringer solution in the ventricle. A sigmoid shaped PV curve was obtained for both P1 and P2 with initial small slope followed by a plateau and a sudden sharp increase in pressure. These pressure changes were short lasting and returned to basal level after 18–20 minutes. Repeated injection into the ventricle altered the PV curve to exponential. The maximum and critical ventricular Pressure achieved was 120 mm of H2O as beyond which there was respiratory arrest. This method seems to be sensitive and reproducible for studying the effect of acute and chronic increase in the ventricular load in animals. The shift in the curve can indicate the alteration in the mechanical response of the brain tissue.

4.12
EFFECT OF INJECTION OF 6- HYDROXYDOPAMINE IN THE MEDIAL PREOPTIC AREA ON SLEEP-WAKEFULNESS IN RATS.

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The medial preoptic area has adrenergic nerve terminals. Local injection of norepinephrine in this area brings about arousal. The role of adrenergic inputs in the medial preoptic area for the regulation of sleep-wakefulness was assessed in this study. Sleep-wakefulness was studied in rats on the basis of EEG, EMG and EOG, recorded through chronically implanted electrodes, along-with simultaneous behavioural observations.

Administration of 6-hydroxydopamine causes the degeneration of catecholaminergic nerve terminals. An increase in the quiet waking period and a decrease in the deep sleep period was observed after 6-hydroxydopamine injection (8 ug in 1 ul) in the medial preoptic area. These findings are apparently contrary to what was observed after norepinephrine injection. The significance of our observations will be discussed.

4.13
SELECTIVE ROLE OF CA3 REGION OF HIPPOCAMPUS IN UNPLEASANT MEMORY COMPONENT: A SINGLE UNIT STUDY IN UNANAESTHETIZED MOBILE RABBITS

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Hippocampus plays a key role in memory processes. However, in different types of memory the role of hippocampus is quite controversial. The role of hippocampus in pleasant and unpleasant memory component were studied in adult unanaesthetized rabbits both at a cellular level by single unit activities study from the CA3 region and simultaneously studying and behavioural pattern of animals. The animals were conditioned with a tone of 600 Hz for 6 seconds (CS) then followed by food. The CA3 unit activities were studied before, during and after conditioning. In the same animals following the CS, when at random a subcutaneous electrical stimulation (5V) duration 300 usec and frequency 250 per sec for one second was applied instead of food, the animals showed an apprehensive behaviour with dilated pupils and retreated to the corner of the cage. The animals now behaved in a confused manner even when food was presented to them following CS. The single unit activities from CA3 region now could be compared with the preconditioned state of the animals. The same animals were studied after major deafferentation by bilateral electrocoagulation of dentate region. These animals now behaved more positively towards food following CS and showed less apprehension.

The CA3 unit activities also showed post conditioned pattern. So it seems that CA3 region plays an important role in the unpleasant memory component of behaviour.
Out of the 28 successful grafts obtained by transplanting 18 day embryonic hippocampus (archicortex) into the motor cortex region (neocortex) of 18 day old pups, 2 animals were perfused with 2% glyoxylic acid + 0.5% paraformaldehyde solution and the graft with surrounding host region was processed for studying the catecholaminergic neuronal axons by modified method of Bloom and Battenberg (1976). 20-30 μ thick sections were cut on the vibratome, thoroughly dried and slides were heated in closed coplin jars at 100°C temperature for the condensation of catecholamines with glyoxylic acid vapours making the fibres fluorescent. The slides were viewed under fluorescence microscope with Leitz filter block ‘D’ having excitation wavelength range of 355-425nm. Camera lucida tracings of these fibres along with their varicosities were digitised on the graphic tablet with the help of a spark stylus attached to the computer, and intervaricosity distances were measured. The same brain sections were also later on stained with cresyl violet (Nissl stain) to confirm whether the graft had viable neurons. The study revealed catecholaminergic axons in the graft hippocampus. The density of varicosities in the graft was found to be significantly higher compared to that of the native (normal) hippocampus, and was about the same if compared with normal neocortex. As the catecholaminergic neurons are located only in brainstem, the graft hippocampus when separated for transplantation would have undergone denervation of these axons, and the presently detected fibres would have to be newly regenerated fibres extending from surrounding host neocortex into the graft.

Thus, the data provided evidence that the grafts were reinnervated from the surrounding host neocortex.
The results showed that in both the 21 days and 45 days of age there was a significant reduction in the total number of synapses in the calorie undernourished animals when compared with the age matched controls. The study thus shows that the calorie undernutrition has affected the developing cortical synaptogenesis of molecular layer of the cingulate cortex.

90 day old undernourished Wistar rats born to undernourished parents and control normal rats were subjected to metrazole induced seizure test. The mean body weight of the control and undernourished groups were $255.5 \pm 24.5$ g (n 10) and $102.4 \pm 6.7$ g (n 8) respectively. Metrazole was administered subcutaneously at a dose of 70 mg/kg body weight. The undernourished rats differed significantly from the normal group in having early onset of myoclonic jerks and seizure episode in addition to having a shorter seizure episode. The onset time for the episode was $1.651 \pm .535$ for the undernourished group in contrast to $7.721 \pm 1.288$ min for the normal group. The duration of the episode was $0.321 \pm 0.192$ min in the undernourished, whereas it was $1.002 \pm .254$ min for the control, i.e., the undernourished had a significantly shorter seizure. 5 of the 10 normal group and 3 of the 8 undernourished group also developed a second episode of seizure. In a repeat study on another batch of 5 undernourished and 5 control rats similar results were obtained with respect to early onset of myoclonic jerks and seizure episode, but not in the duration of the seizure which was longer in the undernourished. In this undernourished group 2 of the 5 died during the seizure, the other three developed a second seizure during which one more died. The above results indicate that chronic calorie undernourished rats are more susceptible to the seizure inducing agent, although the seizure duration may or may not be longer than normal.

**DIFFERENCES IN SUBCUTANEOUS PENYLENE TETRAZOLE (METRAZOLE) INDUCED SEIZURES IN CHRONIC CALORIE UNDERNOURISHED AND NORMAL RATS**

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Wistar rats (F2 generation) born to undernourished parents, whose body weights were only about half of normals and were continued on reduced amount of diet (about 50% of normals) after weaning were used for the present study.

The cingulate cortices of 21 days and 45 days old normal and calorie undernourished rat brains were processed and stained with E-PTA for electronmicroscopy. Ultrathin sections of the molecular layer were then viewed under the electronmicroscope and the number of Synapses (per field of $x7,200$) in 20 fields per animal were counted. 3 undernourished and 3 control animals brains for each age group have been examined.

The results showed that in both the 21 days and 45 days of age there was a significant reduction in the total number of synapses in the calorie undernourished animals when compared with the age matched controls. The study thus shows that the calorie undernutrition has affected the developing cortical synaptogenesis of molecular layer of the cingulate cortex.

**NUMERICAL DENSITY CHANGES OF SYNAAPSES OF MOLECULAR LAYER OF CINGULATE CORTEX DUE TO CHRONIC CALORIE UNDER NUTRITION IN RAT BRAIN**

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EPTA stained electronmicroscopic study of molecular layer of both visual and motor cortices was made at 15, 21 and 45 days of age in normal controls and in calorie undernourished rats. The results showed that in both the cortical areas of undernourished, the number of synapses (per field of X8000) was significantly reduced at 21 and 45 days of age, but not at 15 days of age. The reduction was about 52% in motor cortex, and about 47% at 21 days of age and 20% at 45 days of age in visual cortex. In both the cortices the positive type of synapses were less at 45 days of age in the undernourished than in the controls. The negative type and the flat type of synapse were deficient significantly at this age in the motor cortex only. Thus undernutrition affected the developing cortical synaptogenesis, and the effect was relatively more pronounced in motor cortex than in visual cortex.

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4.21 EFFECT OF LATE POST-NATAL UNDERNUTRITION ON EEG DEVELOPMENT IN BONNET MONKEY (MACACCA RADIATA)


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There is little data on effect of undernutrition on brain development in monkey in whom brain growth-spurt is considered to be primarily prenatal, unlike in rat wherein it is mostly postnatal. In a developing bonnet monkey subjected to undernutrition by providing only about 60% of amount of feed given to a control normal, commencing from 1 year after birth onwards, EEG recordings were made between 3rd and 4th years of age. Control recordings were parallelly made in a normally nourished baby in comparable age range. With the undernutrition, the body weight attained only 69.5% of its control, at the time of the recordings. Computerised EEG recordings were made through chronically implanted epicrani electrodes. 6 recordings in normal monkey and 5 in undernourished monkey were made. The recordings were made while they were seated in primate chair in a closed, ventilated chamber fitted with a dim light and one-way viewing window for the observer to note changes in behaviora states. The EEG data was subjected to computerised power spectral analysis on-line. The data was separately analysed for eyes closed and eyes open states. The results of undernourished revealed that the power values of alpha and beta bands were significantly increased in both frontal regions. In the occipital regions also, the trend of increase was present but not so often statistically significant. There were also a few examples of reduction in dominant frequency values of delta and theta bands. Postnatal brain weights data of normal bonnet babies showed that there is only a marginal growth after first year. Considering this, the undernutrition imposed after 1st year of age appears to cause only few significant alterations in the brain organisation.

Wistar rats were fed with lead acetate 183.07 ug (lead 100 ug/g body weight per day by gastric intubation from 2nd day after birth (day of delivery was taken as day zero) upto 60 days of age , and maintained after wards without the leadt reatment for a period of 100 days. These animals along with their controls were sacrificed in batches at 20, 60 or 160 days of age and GAD activity was estimated by the method of Sytinsky et al (1975) and Sadasivudu (1978) in the following regions: olfactory bulb, motor cortex, hippocampus, striatum – accumbens, hypothalamus, cerebellum, brainstem and spinal cord. Around 150 animals were used in these estimations. At 20 and 60 days of age GAD activity was found to be significantly decreased in cerebellum in Pb treated animals, and this recovered to normal after rehabilitation by 160 days of age. Brainstem showed significantly increased activity at both 20 days and 60 days and this recovered to normal after rehabilitation. Hypothalamus showed a trend of increase of GAD activity at 20 days, though not statistically validated. Other regions showed no consistent changes.

These results indicate that lead intoxication can lead to different types of changes in different brain regions in GAD activity which is involved in the synthesis of GABA.
4.21

EFFECT OF LATE POST-NATAL UNDERNUTRITION ON EEG DEVELOPMENT IN BONNET MONKEY (MACACCA RADIATA)


Department of Neurophysiology, NIMHANS, Bangalore 29

There is little data on effect of undernutrition on brain development in monkey in whom brain growth-spurt is considered to be primarily prenatal, unlike in rat wherein it is mostly post-natal. In a developing bonnet monkey subjected to undernutrition by providing only about 60% of amount of feed given to a control normal commencing from 1 year after birth onwards, EEG recordings were made between 3½ and 4½ years of age. Control recordings were parallely made in a normally nourished baby in comparable age range. With the undernutrition, the body weight attained only 69.5% of its control, at the time of the recordings. Computerised EEG recordings were made through chronically implanted ekoioelectrodes. 6 recordings in normal monkey and 5 in undernourished monkey were made. The recordings were made while they were seated in primate chair in a closed, ventilated chamber fitted with a dim light and one-way viewing window for the observer to note changes in behavioral states. The EEG data was subjected to computerised power spectral analysis on-line. The data was separately analysed for eyes closed and eyes open states. The results of undernourished revealed that the power values of alpha and beta bands were significantly increased in both frontal regions. In the occipital regions also, the trend of increase was present but not so often statistically significant. There were also a few examples of reduction in dominant frequency values of delta and theta bands. Postnatal brain weights data of normal bonnet babies showed that there is only a marginal growth after first year. Considering this, the undernutrition imposed after 1st year of age appears to cause only few significant alterations in the brain organisation.
Wistar rats (N=60, mostly males) were implanted chronically with a cannula-cum-electrode and a bipolar electrode, in medial forebrain bundle at the level of lateral hypothalamus (MFB-LH) and in substantia nigra-ventral tegmental area (SN-VTA) respectively in some rats, and also conversely in others. After the subjects demonstrated reproducible and stable rates of self-stimulation (SS) pedal pressing responses from the respective sites with continuous reinforcement and fixed intensity of stimulating current, intracerebral microinjections of clonidine (L2-agonist), yohimbine (L2-antagonist), carbachol (ACh-M agonist) or atropine (ACh-antagonist) were made through the cannula electrode, and SS responses of the same and of other site were recorded. Effects of systemic injections also were studied. Systemic administration of clonidine (0.1 and 0.25 mg/kg i.p.) caused attenuation of SS in MFB-LH and SN-VTA, by 85% and 45% respectively with the higher dose. In contrast, 100 ng and 250 ng intracerebral microinjection could not alter the SS in SN-VTA, while both the doses were effective in reducing the SS in MFB-LH by 40–90%. Yohimbine administered intracerebrally in MFB-LH caused dose-dependent decrease of its SS, while
The present quantitative evaluations revealed for the first time, highly significant deviations in the differentiation of neurons and development of dendritic arborisation of grafts compared to the native normal neurons.

Another important observation in the grafts was, the presence of several neurons which did not resemble either the pyramidal or the granule cell type. These non-classifiable neurons had even better dendritic development than the pyramidal or granule cells.

The dendritic profiles of neurons of the grafts and of the native normal hippocampal neurons were quantitatively studied in Golgi material and compared for differences in dendritic intersections and branching orders at 40u and 80u radii away from somas. It was commonly observed that the dendritic intersections and branching orders values of the apical dendrites of the graft pyramidal neurons were more than those of native hippocampus, while the values of the basal dendrites of the graft neurons were less than those of the native hippocampal neurons. The granule cells of grafts also had lower values than normals.

Another important observation in the grafts was, the presence of several neurons which did not resemble either the pyramidal or the granule cell type. These non-classifiable neurons had even better dendritic development than the pyramidal or granule cells.

The present quantitative evaluations revealed for the first time, highly significant deviations in the differentiation of neurons and development of dendritic arborisation of grafts compared to the native normal neurons.
12 female albino rats were isolated from their mothers at the age of one month when they weighed about 50 grams approximately. 6 of them were housed in separate cages and the rest were housed in two cages in groups of three. After they grew into adults, their oestrus cycles were studied for 3 weeks by vaginal smear technique. Vaginal smears were taken once daily between 9.00 am and 10.00 am and identified. The duration of the oestrus cycle was determined by the length of the...
interval between the first appearance of proestrus to the last appearance of diestrus. The frequency of a stage was calculated as the percentage of appearance of that stage in vaginal smears taken over 3 weeks. The cycle regularity was assessed from the frequency of contiguous pairs of cycles with the same length. It was observed that the proportion of proestrus-oestrus smears were 35.2% in the isolated and 43.7% in the grouped rats. Cycle length was 5.50 ± 1.38 days in the isolated and 3.95 ± 1.20 days in grouped rats. The cycle regularity was 16.7% and 38.1% respectively. It is possible that social interactions following grouping may be responsible for the shorter but more regular cycles; the effect could be mediated by pheromones.

5.4

COMPARATIVE EFFECT OF MERCURIC CHLORIDE AND METHYLMERCURY CHLORIDE ON TESTICULAR STEROIDOGENESIS IN RATS

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The action of mercury compounds on male reproductive system are still to be studied in detail. Our recent studies showed severe degenerative changes after 90 days of mercuric chloride (MC) or methylmercury chloride (MMC) treatment to rats. Adequate levels of testosterone and essential for the initiation and maintenance of spermatogenesis. Therefore, present investigations were carried out to study the steroidogenic status of testicular tissues after mercury administration. 50 and 100 µg MC/kg and 5 and 10 µg MMC/kg were intraperitoneally administered, daily to male rats (age 30 ± 2 days) for 90 days.

Histological observations indicated sluggish appearance and atrophy of Leydig cells, nuclear pyknosis and significant reduction of nuclear diameter in all the treated groups. Nuclear structure was distorted in 10µg MMC treated group. The Leydig cell population was significantly decreased in both the MC and MMC treated groups. Both, MC and MMC inhibited the activity of 3β-hydroxy-Δ5- steroid dehydrogenase, a key enzyme of testosterone biosynthesis. Moreover, depletion of serum testosterone levels in all the treated groups confirmed abated steroidogenesis in testicular tissues. Possibly, inhibition of spermatogenesis degeneration of testicular tissues may be the consequences of unavailability of testosterone after mercurial treatment.

Accumulation of mercury in Leydig cells, in experimental groups, revealed a direct action of mercury on these cells. However, an effect through hypothalamo-hypophyseal axis may not be excluded.

5.5

AGE DEPENDENT RESPONSE OF LATERAL PROSTATE TO PROLACTIN

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In order to determine the age dependent response to prolactin, studies were carried out in adult and young male rats. Pituitaries from adult female rats were transplanted under renal capsule of castrated male rats. Control castrated and control grafted rats received testosterone Propionate.
Effect of Testosterone in doses of 0.25, 0.5, & 0.8 mg/kg body wt was studied in normal and castrated male albino rats. Inflammation was induced by Brodies hind paw oedema and Cotton pellet granuloma methods. The effects were observed 2, 24 and 76 hrs, 5th and 7th day after the induction of inflammation and compared with control and castrated rats.

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The thermogenic responses on acute cold exposure are inefficient in undernourished mammals. The present studies were conducted to evaluate the role of thyroid hormone in cold induced thermogenesis (CIT) in the undernourished newborn (UN) rats. Experiments were conducted on UN rats of day 21 and were compared with well fed (WF) pups of same age. The UN and WF pups were exposed to cold temperature of 15°C and 10°C for 60 minutes. The alterations in rectal temperature (TRec) and oxygen consumption (VO2) were recorded at every 15 minute interval during and after exposure. The serum T3 and T4 levels were also determined after cold exposure. The data indicates that UN rat pups showed a greater degree of hypothermia (i.e. 6°C and 10°C) and prolonged recovery on exposure to 15°C and 10°C as compared to hypothermia of 5°C in WF pups on exposure to corresponding cold temperatures. The VO2 increase during exposure in UN pups was comparatively less and in recovery phase, it started falling whereas in WF pups, the VO2 increase persisted in recovery phase. The serum T3 and T4 levels were raised after cold exposure irrespective of nutritional status of the animals. Thus these findings suggest a significant correlation between nutritional status and degree of hypothermia. But there appears to be no correlation between thyroid activity and VO2 in UN animals. This suggests that thyroid has no direct action on thermogenesis in UN during acute cold exposure.

Effect of Testosterone on Inflammation

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"Effect of Testosterone in doses of 0.25 0.5 & 1mg/kg body wt was studied in normal and castrated male albino rats. Inflammation was induced by Brodies hind paw oedema and Cotton pellet granuloma methods. The effects were observed 2, 24 and 76 hrs, 5th and 7th day after the induction of inflammation and compared with control and castrated rats."
Female rats weighing 150 grams (approx.) were divided into three groups. One of these groups was injected a synthetic glucocorticoid, dexamethasone sodium phosphate (5mg/kg/day, 1M in forelimb) for ten days. Another group was subjected to semistarvation induced undernutrition to match the reduced body weight (77% of the initial value) of glucocorticoid treated rats. The third group was injected 0.9% sodium chloride.

On the eleventh day, rats were anaesthetised and in-situ isometric contractions were recorded from extensor digitorum longus (EDL) and soleus (SOL) muscles of left hindlimb by stimulation of their innervating nerves with train (250 msec duration) of pulses (0.2 msec width and 100 Hz) at the rate of 60/min. After 25, 50, 75 and 100 seconds of stimulation EDL in glucocorticoid treated rats showed an increased fatiguability as compared to that in undernourished rats. SOL was stimulated for 10, 20 and 30 minutes. After 20 minutes of stimulation, fatigue was hastened in glucocorticoid treated rats. Muscles were stimulated after two minutes of rest to assess recovery.

5.8

AUTO REGULATION OF PROGESTERONE BY RAT LUTEAL CELLS
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Ovaries of pseudopregnant immature rats were treated with collagenase and DNAase to obtain a free cell suspension in the medium 199 (TCM). Cells equivalent to 200 ug protein were incubated in a final volume of 0.55 ml TCM without and with various test substances for 3 h. Progesterone accumulated in the TCM was measured by radioimmunoassay. One way analysis of variance was applied to test the statistical significance. Progesterone accumulation was stimulated by hCG and blocked epinephrine. Cycloheximide, an inhibitor of protein synthesis blocked the basal as well as hCG – and epinephrine – stimulated accumulation of progesterone. This inhibition of progesterone synthesis by cyclohexamidine was followed by disappearance of progesterone from the TCM. Exogenous progesterone when added to the cells too disappeared from the incubation medium in a dose dependent manner. The disappearance of progesterone was unaffected by HCG, epinephrine and Cycloheximide at a lower dose of added progesterone (233 ng). However, when 532 ng of progesterone was added, hCG but not epinephrine or-cycloheximide, inhibited the disappearance of progesterone from the TCM. It could be inferred that the high level of progesterone induced its own metabolic conversion.

5.9

CONTRIBUTION OF UNDERNUTRITION INCREASED FATIGUABILITY OF RAT HINDLIMB MUSCLES FOLLOWING EXCESSIVE GLUCOCORTICOID TREATMENT
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Female rats weighing 150 grams (approx.) were divided into three groups. One of these groups was injected a synthetic glucocorticoid, dexamethasone sodium phosphate (5mg/kg/day, 1M in forelimb) for ten days. Another group was subjected to semistarvation induced undernutrition to match the reduced body weight (77% of the initial value) of glucocorticoid treated rats. The third group was injected 0.9% sodium chloride.

On the eleventh day, rats were anaesthetised and in-situ isometric contractions were recorded from extensor digitorum longus (EDL) and soleus (SOL) muscles of left hindlimb by stimulation of their innervating nerves with train (250 msec duration) of pulses (0.2 msec width and 100 Hz) at the rate of 60/min. After 25, 50, 75 and 100 seconds of stimulation EDL in glucocorticoid treated rats showed an increased fatiguability as compared to that in undernourished rats. SOL was stimulated for 10, 20 and 30 minutes. After 20 minutes of stimulation, fatigue was hastened in glucocorticoid treated rats. Muscles were stimulated after two minutes of rest to assess recovery.
Recovery was better in undernourished rats in both EDL (86%) and SOL (98%) muscles as compared to the glucocorticoid treated rats which was 67% and 88% respectively. Observations suggested that increased fatiguability following glucocorticoid treatment could not be accounted for the per se action of glucocorticoid only but also contributed largely by undernourishment which accompanied the excessive glucocorticoid treatment.

5.10
METHODS FOR DELINEATION OF THE FERTILE PERIOD IN THE HUMAN FEMALE, BASED ON OVULATION PREDICTION – A Review

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Development of methods which accurately delineate the limits of the fertile period during the menstrual cycle of a human female are of great value in controlling births and in helping subfertile couples.

The fertile period in the human female is related on either side of the time of ovulation which is thus the crucial event in a menstrual cycle. Till date methods used to detect or predict the time of ovulation are presumptive. Direct visualization at laparotomy and laparoscopy obviously have limitations. A number of indirect methods have been developed and others are under development to predict ovulation and define the start and finish of the fertile period. Symptothermal methods like the calendar method, basal body temperature and cervical mucus studies can be used as home tests.

Radiommuoassays of oestradiol, LH, FSH and progesterone are claimed to be fairly accurate in ovulation prediction but need special laboratory facilities. Pelvic and transvaginal ultrasonography can fairly accurately predict the time of ovulation by following the follicular growth.

Differential breast skin temperature recording is being evaluated. Estimation of cervical mucus enzymes, urinary metabolites of oestradiol and progesterone and levels of these hormones in saliva are amongst the other methods being studied for their ovulation predictive value.

5.11
EFFECT OF PGF2α ON BOVINE LUTEAL CELL STEROIDOGENESIS

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PGF2α is known as a luteolysin in cow. It inhibits LH-stimulated progesterone production at a post-cAMP site in the bovine luteal cells, cultured over a period of 24 h. However we observed a stimulatory effect of PGF2α on the bovine luteal steroidogenesis in 3 h incubation of the cells. The report is presented and discussed here. Mid-luteal phase corpora lutea were pooled from nine animals and were treated with collagenase and DNase to prepare a free cell suspension. 200 μg of protein equivalent of the cells were incubated in a final volume of 550 μl of TCM 199 in quadruplica-
The objective of the present study was to determine the skin disorders during premenstrual syndrome in the normal population. Premenstrual syndrome is no longer a taboo in Western Countries in which a lot of publicity, self help books and specialized clinics highlight the importance of premenstrual syndrome. In our country people still don’t know much about this organic disease and that they should seek medical service for their skin problems, instead they use all sorts of remedies and spoil their face till it becomes a problem.
Morphological proliferation of adrenal cells was noted in low dose groups. Intense reaction activity of 3P-OHD and diffuse sudanophilic staining in cortical region along with low level of ascorbic acid and cholesterol indicated the stimulatory action of lead on adrenal steroidogenesis. Moreover, increased catecholamines content, urinary 17-K.S. excretion and deprivation in medullary ATPase and AMPase activity revealed the enhancement of medullary function with low dose lead treatment. In high dose groups increased cholesterol and ascorbic acid content, decreased catecholamines and urinary 17-K.S. along with reduced 3P-OHD activity suggested the inhibited steroidogenesis. Further, degeneration of cortical and medullary cells and intense reaction activity of ATPase and AMPase showed the toxic manifestation of lead treatment on adrenal. Thus, it can be stated that at low dose, lead activated the adrenal gland whereas degeneration and inhibited activity were observed at high dose. Therefore, biphasic action of lead on adrenals were recorded in this attempt.

Histological and histometrical analysis were performed to note the cellular growth pattern. Biochemical estimation of adrenal ascorbic acid, cholesterol, catecholamines and urinary 17-keto-steroids (17-K.S.) were undertaken in this study. Moreover, localization of 3β-hydroxy Δ5 steroid dehydrogenase (3β-OHD), adenosine triphosphatase (ATPase), adenosine monophosphatase (AMPase) and sudanophilic materials were considered to note functional activity of adrenals along with biochemical observations.

Morphological proliferation of adrenal cells was noted in low dose groups. Intense reaction activity of 3β-OHD and diffuse sudanophilic staining in cortical region along with low level of ascorbic acid and cholesterol indicated the stimulatory action of lead on adrenal steroidogenesis. Moreover, increased catecholamines content, urinary 17-K.S. excretion and deprivation in medullary ATPase and AMPase activity revealed the enhancement of medullary function with low dose lead treatment. In high dose groups increased cholesterol and ascorbic acid content, decreased catecholamines and urinary 17-K.S. along with reduced 3β-OHD activity suggested the inhibited steroidogenesis. Further, degeneration of cortical and medullary cells and intense reaction activity of ATPase and AMPase showed the toxic manifestation of lead treatment on adrenal. Thus, it can be stated that at low dose, lead activated the adrenal gland whereas degeneration and inhibited activity were observed at high dose. Therefore, biphasic action of lead on adrenals were recorded in this attempt.
A study has been made of the effects of hyperthermia and hypothermia on whole blood coagulation time, prothrombin time and plasma fibrinogen content.

The animals were divided into two groups of ten each. One group was subjected to hyperthermia and the other to hypothermia. The hyperthermia was induced by keeping the animals in an incubator at 45°C in a metal wire cage, which produced a rise of 1°-1.5°C in the rectal temperature of animals. The blood was withdrawn directly from the heart by a plastic syringe.

Hypothermia was induced by surface cooling by keeping the animal in a metallic ice box. Very light ether anaesthesia was administered when the animal became restless or shrivelled.

The whole blood clotting time was done by Lee and white method, prothrombin time by Quick’s one stage method, and plasma fibrinogen by Biuret method.
In hyperthermia a decrease in blood Coagulation time by 44.8% and in prothrombin time by 23.5% was observed. While in hypothermia an increase in whole blood Coagulation time by 69.8% and an increase in prothrombin time by 28.2% was observed. The fibrinogen level was not altered significantly in hyperthermia whereas a definite decrease by 20.3% was observed in hypothermia.

The present study was undertaken because of it’s applied significance. Man may be subjected to accidental or environmental change in temperature. Similarly induced or deliberate hyperthermia is being resorted to under different therapeutic or surgical procedures, and as such the above blood coagulation parameters may prove to be useful.

6.3

INDIVIDUAL VARIATIONS IN PLASMA VOLUME

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Plasma Volume is predicted to be about 4.5% of the body weight or 45 ml/kg (Actually it varies from 3.5 to 5.5% of the body weight or 35 to 55 ml/kg – the females having lower plasma volumes than the males).

When estimations are done in a large number of individuals, the means computed for the series usually fall within this range. However, there is considerable variation in the plasma volume of an individual when done at different times and even more variation between different individuals. In the present series 242 estimations of plasma volume were done by dye dilution method in 121 young adults (68 males and 53 females) and expressed as ml/kg body weight. The range both in the males and females is 62 – 24 ml/kg, though the means are 45.0 ml and 42.5 ml for the males and females respectively.

The individual variations from the mean probably reflect at least a transient inadequacy of the control mechanisms involved in maintaining the ‘ideal’ plasma volume.

7.1

DEGLUTITON REFLEX ELICTED BY PHENYLDIGUANIDE

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The earlier reports of co-occurrence of end-expiratory apnoea, laryngeal contraction and gastric relaxation in response to intra-atrial injection of phenyldiguanide, makes one wonder if these visceral responses are some of the sequential components of complex reflex deglutition. This possibility was investigated by recording EMG of mylohyoid muscle and intra-luminal pressure changes in pharynx, oesophagus and stomach. In 5 albino rats (charles foster-strain) the EMG activity of mylohyoid muscle increased within 0.6 to 1.2 sec. following intra-atrial injection of phenyldiguanide, which proceeds the sequential changes in intraluminal pressure. The intraluminal pressure changes in pharynx, oesophagus and stomach suggest that reflex deglutition is elicited following intra-atrial injection of phenyldiguanide. Bilateral vagotomy and atropinization could not abolish the pharyngeal phase of swallowing. It is concluded that phenyldiguanide can elicit reflex deglutition.
7.2
EVIDENCE FOR NUTRIENT-SENSITIVE CHEMORECEPTORS IN THE AMPHIBIAN LIVER

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Russek (1963), based on behavioural studies, postulated the presence of nutrient-sensitive chemoreceptors in the liver. Glucoreceptors have been identified in the mammalian liver (Niijima; 1969, 1984). However, presence of amino acid sensitive hepatic receptors have not been reported.

8.1
IS VAGUS INVOLVED IN CALORIE METERING OF ADLIB RATS?

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Adult male wistar rats adapted to gastric intubation of test solutions (isocaloric sucrose 9%; starch 9% and calorically-inert saccharin 0.2%; quinine 0.002% and water) followed by stock diet intake were divided into two groups. One group (n=6) had bilateral gastric vagotomy and the other (n=6) was intact. After one week post-operative rest and care, both groups of rats were intubated with 10 ml of any one test solution per day interposing rest day between two test days. Calorie intake/100 g body weight, in the first 1 h following solution intubation was measured and is compared to intake of group on rest day. Intact rats oral intake was decreased after gastric intubation of calorically-rich sucrose (1.5 ± 0.3 cal) and starch (1.7 ± 0.6 cal) while intake after calorically-inert saccharin (4.2 ± 0.5 cal), quinine (3.5 ± 0.6 cal) and water (3.8 ± 0.6 cal) was similar to rest day intake (3.7 ± 0.5 cal). In contrast vagotomised rats showed no change in intake after sucrose (3.1 ± 0.5 cal) or starch (3.0 ± 0.4 cal) and evidenced slight decrease after quinine (1.5 ± 0.3 cal) and increase after saccharin (5.1 ± 0.7 cal), thus indicating involvement of vagus in rapid gastric metering of calories.

8.2
EVIDENCE FOR NUTRIENT-SENSITIVE CHEMORECEPTORS IN THE AMPHIBIAN LIVER

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To assess the influence of adrenocorticoids on gastric mucosal barrier, betamethasone 0.4 mg was injected (im) daily for 14 days in three groups of albino rats. On 15th day gastric mucosal epithelial neutral glycoprotein was identified by periodic acid Schiff’s (PAS) technique and quantitatively assessed by considering the ratio of total mucosal thickness to that of the depth of PAS stained portion in it. Gastric adherent mucus was estimated by Alcian blue binding technique. Measurement of turbidity and estimation of the components of nondialysable mucosubstances of gastric secretion were made following standard methods.

The results when compared with saline treated control groups, 14 days betamethasone administration was found to cause complete depletion of gastric mucosal PAS positive material, denudation of surface epithelium and formation of ulcers associated with significant reduction of adherent mucus in both oxyntic and pyloric gland areas. The disruption of the gastric mucosal barrier was also evident from reduction in turbidity and in the concentration of nondialysable mucosubstances of gastric secretion. Alteration in the ratios between the carbohydrate components in the dissolved mucus was also observed. Our results support the view that weakening of the mucosal barrier is an important cause of steroid ulcerogenesis.
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Physical performance tests for muscle power, endurance, agility and flexibility were done in school and college girls attending Basketball coaching during various phases of menstrual cycle. Skilled performance tests in the game of Basketball were also done. There was no significant change in the performance of young women in different phases of ovarian cycle.

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Measurements of physiological parameters namely anthropometric, and cardiovascular, respiratory, hematological, nutritional, basal body temperature, muscular strength, Krausweber test scores for physical fitness were carried out in 25 female medical student volunteers between ages 17-21 yrs. in four phases of menstrual cycle. (The phases are named according to events happening in ovary, uterus and level of hormones in the blood). A comparison of results revealed that there was no statistically significant differences between observations in different phases except in mean corpuscular hemoglobin and bleeding time. Both were moderately increased in phase II but they do not contribute to change in fitness status of a person and no significant change has been found in the fitness in the different phases of the cycle. However, 50% had subjective symptoms of premenstrual tension and 25% dysmenorrhoea which indicates that any difference between phases that might have been conjectured are subjective. The moderate increase in phase II of MCH may be due to the reparative work with relatively low level of female sex hormones and increase in appetite leading to more optimal conditions for haematopoesis and hence better hemoglobin content. Increase in bleeding time in phase II could be due to prostaglandins originating from the endometrium just prior to and during menstruation is a process somewhat similar to tissue injury leading to an ulcerated surface within the uterus. Thrombin may be responsible. Increased bleeding time due to thrombin and Salicylates taken during menstrual phase may still be present or their effects still there, leading to inhibition of thrombin formation, a highly potent platelet aggregating agent and possibly changing the character of the platelets due to some toxic substances released from the shedding and shed endometrium and its subsequent absorption into the general circulation. Such substances may be responsible for the so-called subjective symptoms related to menstruation. Sports women should be well informed about these scientific facts and encouraged to fully participate in sports activity in different phases of their ovarian cycle.

9.2

SPORTS PERFORMANCE DURING MENSTRUAL CYCLE

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Physical performance tests for muscle power, endurance, agility and flexibility were done in school and college girls attending Basketball coaching during various phases of menstrual cycle. Skilled performance tests in the game of Basketball were also done. There was no significant change...
in physical performance but skilled performance was reduced in menstrual phase. This decrease in skilled performance is partly physiological and partly psychological. However, there is marked individual variation.

Exercises and participation in events should be continued irrespective of phases of menstrual cycle with full psychological support by coach and doctor, unless the woman experiences any symptoms or deviation from performance.

9.3

MAXIMAL EXPIRATORY FLOW RATES IN SOUTH INDIAN SPORTSMEN

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The maximal Expiratory Flow Volume (MEFV) loop is superior to peak expiratory Flow Rate (PFR) and Forced Expiratory Volume in one second (FEV₁) in that it describes total information during Forced Vital Capacity (FVC) test. MEFV loop was utilised to identify ventilatory adaptation in lungs of sportsmen. Twenty non-smoking sportsmen who were active participants in athletics at inter-university and interstate level were selected for the study. After a thorough clinical examination MEFV loop was recorded in the sitting posture using a computerised (P. K. Morgan (U.K.) pulmonary function test equipment and x-y recorder. When the results were analysed, it was found that mean PFR was 7.89 ± 0.29 L/S and flow rates of air at 25% (Vmax 25%) 50% (Vmax 50%) and 75% of FVC were 7.12 ± 0.29 L/S, 5.18 ± 0.27 L/S and 2.87 ± 0.24 L/S respectively. Mean Forced Mid Flow (FMF) was 5.09 ± 0.24 L/S. When compared to the predicted values of our laboratory, the mean percentage predicted values of these parameters were as follows: PFR=102.5%, vmax 25%=107.0%, vmax 50%=110.7%, vmax 75%=134.2% and FMF 114.2%. It is evident from these results that sportsmen have increasingly higher flow rates at terminal part of FVC curve. Mean Flow Volume Loop drawn for the sportsman falls on the right side of the predicted normal curve, indicating thereby that the airways are patent even at very low lung volumes to let the air flow out at faster rate. This may be due to adaptation to habitual ventilatory training on the air ways, especially small airways, in sportsmen.

9.4

EFFECT OF EXERCISE IN ALBINO RATS

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10 male albino rats were grouped into experimental and controls. The body weights girths of extremities chest girth and heart rate (with the help of ECG) were measured in both groups Experimental group was given training in swimming 20 min/day for one month. All the measurements were repeated. Hb%, RBC and WBC count was done in heart blood. Both groups were sacrificed. Wet weight of heart adrenals and gastrocnemius were taken and these organs and lungs were subjected to histology. Significant changes in girths, hematological observations and wet weights were seen. Histology findings show hypertrophy suggesting hyperfunctions of the organs.
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Low power Lasers used in clinical medicine is known to cause very little unfavourable effects on the biological systems, but in-depth study on the effects of Laser on many of the biological systems are still lacking. Hence this invitro study was undertaken to elucidate the effects of low power Laser irradiation on certain haematological and immunological parameters.

A He-Ne Laser with a maximum power output of 7mw/cm² at 630 nm was used for this study. Fresh blood samples were collected from healthy human donors and volunteers. Each sample was divided into two parts; one part served as control and the other part was exposed to Laser irradiation for a period of one hour at 25°C. The following parameters were studied in the control and irradiated samples. 1. Electrophoretic mobility of Haemoglobin, 2. Serum Immunoglobulin levels by single radial immunodiffusion, 3. Quantification of soluble immune complexes, 4. Blood grouping and Rh typing, 5. Candida phagocytosis by neutrophils.
Analysis of the data obtained show that there are no significant changes in the above parameters after Laser irradiation for one hour. However there was definite evidence of haemolysis in all the blood samples exposed to Laser irradiation.

10.2

IMMUNOGLOBULINS PATTERNS IN ABO BLOOD GROUPS

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The present investigations were undertaken to study the relationship between blood groups and immunoglobulins. 45 healthy adult male subjects were volunteered for this study. Estimation of IgG, IgM and IgA was done by using Tripartigen Immuno diffusion plates by standard method. Serum IgM and IgA levels were maximum in blood group A and IgG were maximum in blood group AB. Lowest values of IgM and IgA were seen in blood group B. In blood group 0 there were not much changes in IgM, IgG and IgA levels. Thus the study indicates the relationship between Immunoglobulins and blood groups.

11.1

AN EXPERIMENTAL STUDY OF KEROSENE AND DIESEL SMOKE EXPOSURE ON HAEMOGRAMS IN RABBITS

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Male healthy rabbits of 3–3.5 kg. weight were used for the study. The animals were maintained on a standard diet all through the study period. The animals were divided into three groups. Group-I served as control, Group –II animals were exposed to kerosene and Group – III to Diesel smoke. The exposure was given daily for 15 minutes in a closed chamber for a period of 4 weeks. Haemograms were studied biweekly in all the three groups of animals. Group II animals showed a decrease in the RBC count from 3.1 mm/µl to 1.32 mm/µl at the end of 4 weeks with an increase in MCV from 103 u1 to 149 u1 and MCH from 40 pg. to 52.6 pg. Group III animals also showed a decrease in RBC count from 3.9 mm/µl to 2.9 mm/µl, a mild leucocytosis and slight increase in the eosinophil count from the basal level. Other haematological parameters did not show any significant changes. Hence both kerosene as well as diesel smoke exposure cause changes in the haemograms.

11.2

COMPARATIVE STUDY OF RESPIRATORY PROBLEMS CAUSED BY DIESEL AND KEROSENE SMOKE IN RABBITS

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The present study was carried out on healthy male rabbits of 3–3.5 Kg. weight with standard diet. Animals were divided in three groups (A) Control (B) Kerosene fumes exposure group (C) Diesel fumes exposure group. The experimental groups were exposed to fumes of Kerosene/
Various autonomic function tests (skin temperature, postural pressor response, resting heart rate, resting respiratory rate, Valsalva ratio and cold pressor response) were carried out in healthy male medical students in summer month at hot (37.45 ± 0.5°C) and artificially created cold (32.54 ± 0.65°C) temperature. Significant decrease of average skin temperature was observed at hot temperature as compared to that at cold temperature. Postural pressor response showed significantly lower S.L. ratio at hot temperature. There was significant decrease in respiratory rate and insignificant increase in heart rate at hot temperature. Increase in Valsalva Ratio was statistically significant at hot temperature as compared to that at cold temperature. Both systolic and diastolic blood pressure during cold pressor test showed a significantly higher increase at hot temperature as compared to that at cold temperature. Thus the increased Valsalva ratio and higher increase of both systolic and diastolic blood pressure during cold pressor test with the decrease of skin temperature, respiratory rate and lowering of S.L. ratio indicated an increased sympathetic and a decreased parasympathetic activity at hot environmental temperature. Reserve happened at cold environmental temperature.

11.3 EFFECT OF BIDI SMOKE ON LUNG SURFACTANT IN ALBINO RATS

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In an earlier study we have reported that the use of ordinary cigarette filters (M/s. Periera Eqpt. Manufacturing Company, Bombay) prevents the decrease in lung surfactant. In continuation, the present study was planned to evaluate the effect of bidi smoke with and without filter on lung surfactant in albin rats using the bidi filters from the same company. Fifty albino rats were divided into five groups of ten rats each. Group I and II were exposed to cigarette smoke without filter and with filter respectively for 15 minutes twice daily for sixty days. Group III and IV were similarly exposed to bidi smoke without filter and with filter respectively for the same duration. Group V rats served as control. At the end of the experiments lung surfactant activity and phospholipid content were estimated in all the rats. As compared to the control, Group I and III rats showed significant decrease in both whereas Group II and IV showed near normal values. It is therefore suggested that the use of bidi filters were as effective as cigarette filters in preventing the decrease in lung surfactant and its associated complications.

11.4 CORRELATION OF ENVIRONMENTAL TEMPERATURE CHANGES WITH AUTONOMIC BALANCE

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Various autonomic function tests (skin temperature, postural pressor response, resting heart rate, resting respiratory rate, Valsalva ratio and cold pressor response) were carried out in healthy male medical students in summer month at hot (37.45 ± 0.5°C) and artificially created cold (32.54 ± 0.65°C) temperature. Significant decrease of average skin temperature was observed at hot temperature as compared to that at cold temperature. Postural pressor response showed significantly lower S.L. ratio at hot temperature. There was significant decrease in respiratory rate and insignificant increase in heart rate at hot temperature. Increase in Valsalva Ratio was statistically significant at hot temperature as compared to that at cold temperature. Both systolic and diastolic blood pressure during cold pressor test showed a significantly higher increase at hot temperature as compared to that at cold temperature. Thus the increased Valsalva ratio and higher increase of both systolic and diastolic blood pressure during cold pressor test with the decrease of skin temperature, respiratory rate and lowering of S.L. ratio indicated an increased sympathetic and a decreased parasympathetic activity at hot environmental temperature. Reserve happened at cold environmental temperature.
EFFECT OF EXPOSURE TO ELECTROMAGNETIC FIELD ON GUSTATORY RESPONSE IN DEVELOPING RATS

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Recently, there has been an increasing concern about potential effects of exposure to electromagnetic field of extremely low frequency (0–100 Hz), particularly from power transmission and electrical gadgets at home and work places. Chronic exposure in animals are reported to have behavioral, endocrinological and fetal abnormalities. Such an environmental pollution is a greater hazard for the developing organism wherein the regulatory mechanisms are in the process of maturation.  
The rat pups at birth were exposed to 50 Hz (30 KV/m) electromagnetic field for 7 weeks, 23 h each day. The gustatory responses were investigated after weaning in groups of d 31–35, 36–41 and 42–47 by 1 hr single-bottle test using 3% sucrose, 0.9% sodium chloride, 0.16% citric acid, 0.001% quinine sulphate and tap water as test solutions. Except 1 h test period they had access to food and and water adlibitum. The exposed rats ingested significantly less tap water, saline and sucrose solutions. They weighed 64.00 ± 5.5 g whereas, the controls weighed 99.66 ± 4.02 on d 47. Although, their food and water intakes were significantly suppressed their gustatory response is not probably secondary to it, since the citric acid intake was equal in both groups. Alteration in taste may be contributing towards lower food intake and body weight in electromagnetic field exposed developing rats.

EFFECT OF PRANAYAMA ON PULMONARY FUNCTION TESTS

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and Indore School of Yoga

It has been claimed by certain workers that yoga postures like Shalabhasana, Mayurasana and Pranayam caused improvement in breathing patterns in certain respiratory disorders. The present work was taken up to study the influence of the yogic postures on the efficiency of respiratory system in both static and dynamic lung functions in normal individuals. 

Twenty young volunteers were selected for the study. Before yoga practice the mean values of the respiratory function tests were RR = 18 ± 2/mt., RMV = 8.1 ± 2.2 L/mt., Tidal volume = 450 ± 106.75 ml, ERV = 773.4 ± 312.0 ml, I.C. = 2287.95 ± 367.1 ml, vital capacity = 3060.95 ± 491 ml, MVV = 131 ± 32.63 L/mt, FEV1 = 84 ± 4.5%, breath holding time = 54 ± 3 sec. 

The same subjects were given yoga training by an expert. Pulmonary function tests were done after 3 months of yoga practice. The mean values were RR = 15 ± 2/mt., RMV = 8.4 ± 1.71 L/mt., Tidal volume = 560 ± 50.06 ml, ERV = 1057.75 ± 212.7 ml, I.C. = 2479 ± 527.6 ml, Vital capacity = 3483.65 ± 491.78 ml, MVV = 128.15 ± 30.16 L/mt, FEV1 = 96 ± 3.4%, breath holding time = 106 ± 11 sec.
Several workers have suggested that exercise and yoga practices are beneficial in certain psychosomatic and metabolic disorders like diabetes-mellitus, atherosclerosis, hypertension, and coronary heart diseases. They have found lowering of blood levels of glucose, cholesterol and triglycerides by these practices.

12.2

EFFECT OF YOGIC PRACTICE ON CARDIAC EFFICIENCY

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25 male adults performing combined practice of several yogasanas for ten weeks were compared with 15 healthy controls. The experimental group was performing different yogic exercises and yogasana regularly for 10 weeks. The examination included heart rate, blood pressure and Fitness-Index. Subjects were examined twice, first when they joined the yoga centre and then after ten weeks of regular yogic practices.

Statistically significant improvement in cardiac efficiency was recorded in experimental group. Heart rate was decreased from 81/mt. ± 7.80 to 69/mt. ± 4.09, blood pressure both systolic and diastolic fell down from 126 mmHg ± 16.84 to 108 mm. Hg. ± 10.86 and 80 mm. Hg ± 8.44 to 73.52 mm. Hg. ± 5.86 respectively. While Fitness Index as assessed by Harvard step-up test increased remarkably from 116 ± 12.71 to 129 ± 14.35, suggesting improved cardiac efficiency.

12.3

EFFECT OF PRANAYAMA TYPE BREATHING ON THE ELECTROCARDIOGRAM OF HEALTHY SUBJECTS

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Yogic type of exercises bring about physiological changes in different organs of the body. Pranayama type breathing is one of the yogic techniques which has effects on various body functions especially on the respiratory and cardiovascular systems.

In the present study healthy medical students aged 17–20 years were taught the technique of pranayama type of breathing which consists of four phases i.e. Purak (inspiration), Kumbhak (holding in the breath), Rechak (expiration) and Shunyak (holding out the breath). The electrocardiogram of these subjects was recorded during (1) quiet breathing – eupnoea and (2) During pranayama type breathing. The results are discussed.

12.4

COMPARATIVE STUDY OF EFFECT OF YOGA AND EXERCISE ON CERTAIN BIOCHEMICAL PARAMETERS

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Several workers have suggested that exercise and yoga practices are beneficial in certain psychosomatic and metabolic disorders like diabetes-mellitus, atherosclerosis, hypertension, and coronary heart diseases. They have found lowering of blood levels of glucose, cholesterol and triglycerides by these practices.
Present study was taken up to compare the effects of yoga and exercise on these biochemical parameters. Sixty six healthy individuals were taken for the study and were put into control, exercise and yoga groups. Subjects of yoga and exercise were asked to practice for six months. After that fasting blood samples were collected and blood glucose, cholesterol and triglycerides estimations were done.

Mean blood glucose values of control, exercise and yoga groups were 79.44 mg%, 74.82 mg% and 69.81 mg% respectively. Yoga group showed significantly lower level than exercise group (P < 0.01). Mean values of serum cholesterol and serum Triglycerides were found lower in exercise group (174.39 mg%, and 88.36 mg% respectively) in comparison to mean values in yoga group (183.34 mg%, and 95.22 mg% respectively) but the difference in the lipid levels of these two groups was not of much significance (P > 0.05 and P > 0.05 respectively). Results were discussed.

12.5 A COMPARATIVE STUDY OF EFFECTS OF TRANSCENDENTAL MEDITATION (TM) AND PHYSICAL EXERCISES ON MAXIMUM AEROBIC POWER

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Maximum Aerobic power (Vo$_2$ Max) is an assessment of the functional status of respiratory, circulatory and metabolic systems of the body. TM and physical exercises are known to have effects on heart rate, blood pressure, respiratory rate, vital capacity and maximum voluntary ventilation. Since these parameters are indicative of cardio-pulmonary efficiency, so they are also likely to affect the Maximum Aerobic Power. An effort has been made to compare these two methods, to establish the relationship, if any, of the changes in above parameters with Vo$_2$ max. Thirty male medical students who offered voluntarily were divided into three groups of ten each. First group was kept as control and they sat quietly with eyes closed for 20 minutes twice a day. Second group practiced TM for the same period while the third group performed physical exercises as planned from the charts of Canadian Airforce. Vo$_2$ max was calculated in all the subjects before starting and after completion of eight weeks by using Astrand-Rhyming Nomogram after recording reclining pulse rate following Masters' step test.

The result revealed that exercise group showed significant (P > 0.05) in mean Vo$_2$ Max (31.0-34.5 ml per min./kg.). However, in TM group there was a tendency towards increase in mean Vo$_2$ Max (32.8-35.7 ml/min./kg.) as compared to control (32.0-32.8 ml/min./). It indicates that physical exercises are more beneficial than TM, in improving cardiorespiratory fitness. However, TM might also increase it significantly if the practice is continued for the longer period.

12.6 YOGIC TREATMENT FOR DIABETES

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Yogic practices are supposed to bring proper mental relaxation and balance through its asanas, pranayamas and kriyas. This principle was considered and emphasised while treating 9 diabetes patients at yogic hospital, Kaivalyadhama, Lonavla, as diabetes mellitus is considered as one of the psychosomatic disease.
It has been reported that there is disturbed lipid metabolism in uncontrolled diabetics. To study the effect of Yogic Practices on serum cholesterol levels, 15 diabetics and 30 medical students were given a 3 month training of Yogic practices, by a yoga expert. It was observed that with Yogic Practice serum cholesterol levels decreased significantly in subsequent months in diabetics (299.85 ± 7.89 mg%, 210.3 ± 8.02 mg%, 180.92 ± 7.5 mg%). The P value being less than .001.

Similar changes were observed in healthy subjects though of lesser magnitude (168 ± 8.2 mg%, 140 ± 11.4 mg), P value being less than .02.
A total of 10 volunteers participated in a study in which their left hand and forearm were exposed to ice-cold water (3.4°C) while their EEG, branchial artery pressure, heart and respiratory rates were being monitored. Most subjects reported pain within 8-10 seconds and could not keep their limbs in cold water for a period of more than 35-40 seconds. There was an immediate increase in pulse and respiratory rates, an increase in both systolic and diastolic pressure, accompanied by marked EEG desynchronization.

All individuals were then given a set of autosuggestion-phrases and asked to consciously think on those phrases as well as silently repeat them. The phrases aimed at relaxing their minds and conditioning them not to pay attention to pain. The autosuggestion period usually lasted for 20-30 minutes which was followed by a retest. On the average, each subject underwent 6-8 sessions of autosuggestion and retest to pain exposure. It was observed that all of them were able to increase the pain threshold (100-200 seconds), pain tolerance up to a maximum of 10 minutes, a marked decrease in the cold pressor response and least changes in respiratory and pulse rates. The EEG desynchronization was delayed and occurred only when the hand was taken out of cold water. In addition, there was a continued prominence of alpha waves in the EEG. Frequency analysis indicated marked peak between 8-10 Hz band.

The study indicates the possibility of using this technique for pain control in clinical situations.
It is well known that Pavanamuktasana, a yogic asana, promotes defecation. Hence it is used to cure constipation. The asana offers pressure to the ascending colon, the descending colon and the whole of abdomen (specially the lowermost of the alimentary canal) in a successive order. It seems logical to presume that such mechanical stimulus guides the passage of the excreta in the proper direction.

In addition, experiments on 7 subjects (6 non-smokers, 1 smoker, 2 non-smokers practise the asana regularly) on 50 occasions reveal that the asana activates both nostrils of a subject, indicating thereby that both adrenergic and cholinergic divisions of the adreno-cholinergic control system (ACS) are stimulated (Sinha, A; Science and Culture, Dec 1976, p. 602; Sinha, A; Chronobiologia 6, 158, 1979). The result supports my hypothesis (Proceed. Internat. Un. Physiol. Sci. 15, 42, 1983) that the adrenergic and the cholinergic divisions of ACS jointly control human defecation.

Evidence is also presented that the carotid body mechanism plays some role in activating both nostrils during the asana. It is possible that pressure-stimulation to a carotid body activates the contralateral and inhibits the ipsilateral nostril, as does such stimulation to other pressure-sensitive areas of the body.
EEG’s of 20 subjects were studied during Sahaj yoga practice. The subjects were divided into two groups. Group I comprised of 10 subjects who were laboratory staff of the department of Physiology. They were trained in Sahaj yoga which they practised for 20 minutes on all working days for 3 months. EEG’s were recorded before training and after 3 months of practice and further the recordings were made while they actually practised Sahaj yoga. The group II comprised of 10 subjects who were trained Sahaj yogi’s and had been practising Sahaj yoga for 2-3-years. The EEG’s were recorded before and during Sahaj yoga practice and even after 5 minutes after stoppage.

In Group I subjects there was an increase in amplitude and in alpha index in EEG’s recorded after 3 months of Sahaj yoga practice. Alpha activity from frontal recordings before training of Sahaj yoga with eyes closed was between 0–1.8% and after 3 months initial mean level increased to 4.25%. It further increased during the practice of Sahaj yoga to 15.87% and this was statistically significant (p < 0.05) In occipital recordings initial alpha index before training was 3.5% and after 3 months increased to 25.75% and during Sahaj yoga reached 40.12% which was statistically significant (p < 0.01). In some cases theta rhythm appeared during Sahaj yoga. Opening of the eyes during Sahaj yoga produced only partial blockage of alpha rhythm.

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EFFECT OF SAHAJ YOGA PRACTICE ON EEG

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EEG’s of 20 subjects were studied during Sahaj yoga practice. The subjects were divided into two groups. Group I comprised of 10 subjects who were laboratory staff of the department of Physiology. They were trained in Sahaj yoga which they practised for 20 minutes on all working days for 3 months. EEG’s were recorded before training and after 3 months of practice and further the recordings were made while they actually practised Sahaj yoga. The group II comprised of 10 subjects who were trained Sahaj yogi’s and had been practising Sahaj yoga for 2–3-years. The EEG’s were recorded before and during Sahaj yoga practice and even after 5 minutes after stoppage.

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In summary, post meditational effects appear to arise when there is a change of condition (eyes opening/closure) and after a 5 min delay following the meditation states. These effects were mainly observed in the 100–200 msec latency range and the direction of change differed among individuals.
Estimations of urine 5-hydroxyindoleacetic acid (5-HIAA), vanilmandelic acid (VMA), 3-methoxy-4-hydroxyphenylethylene glycol (MHPG), homovanilllic acid (HVA), and 17-ketosteroids (17kt), and blood lactate (La) and cortisol (Co) concentrations were made in senior practitioners of Brahmakumaris Raja Yoga (BK) and of Transcendental Meditation (TM), and in control subjects. Glucose, urea and cholesterol were also estimated in the same blood samples.

The values of samples obtained before and again after about 90 min with an intervening yoga session were compared. Repeat sessions were made on each of the subjects. In addition, control sessions were also conducted in identical design but sitting without meditation (non-yoga sessions) in both control and yoga subjects, to compare the changes occurring in these types of sessions with the changes occurring in the yoga sessions. The samples of control sessions showed that HVA values increased significantly. Their VMA, MHPG, 5-HIAA and the other parameters either remained unchanged or increased but not statistically significantly. In the meditators there was no such significant increase of HVA and in most of the sessions there was a consistent trend of reduction in the values of HVA, MHPG, VMA, 5-HIAA, La and Co. Although the magnitudes of these reductions were often more than the normal variation range of methodology of the parameters, they were not significant statistically because of considerable session-to-session variation in the magnitude of effect. Comparing the trends of changes of control subjects with those of the yoga subjects observed in yoga and non-yoga sessions, it appears that there is a tendency of reduction of the values of the above cited parameters, following a session of yoga practice.

M. Sukumaran, B.G. Nagaraja, B.V. Suresh, B.H. Hanumanthaiah, G. Narasimhalu and T. Desiraju
Department of Neurophysiology, National Institute of Mental Health and Neuro Sciences, Bangalore 560 029.

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Department of Neurophysiology, National Institute of Mental Health and Neuro Sciences, Bangalore 560 029.
According to physiological concept of yoga, cervical spondylosis is not a disease but it is a sort of degeneration process. The pain of cervical spondylosis spreads over to both sides of shoulders and hands. The pain is associated with swelling, stiffness of neck, lower back and creates trouble while walking. The study was conducted on 55 patients of spondylosis of lower and upper back. Diagnosis of spondylosis was made on the basis of radiological evidence.

Yoga works like magic and does not take long time to cure the spinal spondylosis problems. Certain poses were selected for the common age group patients (25 to 55) which are Brahmu-mudra, Mayurasana, Bakasana, Bhujangasana, Shalabhasana, Satubandhasana, Pawanmuktasana and Naditanasana. After six months of yoga therapy patients stopped the use of medicines and pain killers. There was no instrument used externally nor any belt and pain-killer. It has been noticed that patients stopped limping and dragging. Pressure on all vertebra of spine was reduced by regular and selected yoga practices.

Yoga Cure for Spondylosis of Total Spine

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Indore School of Yoga and M.G.M. Medical College, Indore - 452 001

According to physiological concept of yoga, cervical spondylosis is not a disease but it is a sort of degeneration process. The pain of cervical spondylosis of back spreads over to both sides of shoulders, and hands. The pain is associated with swelling, stiffness of neck, lower back and creates trouble while walking. The study was conducted on 55 patients of spondylosis of lower and upper back. Diagnosis of spondylosis was made on the basis of radiological evidence.

Yoga works like magic and does not take long time to cure the spinal spondylosis problems. Certain poses were selected for the common age group patients (25 to 55) which are Brahmu-mudra, Mayurasana, Bakasana, Bhujangasana, Shalabhasana, Satubandhasana, Pawanmuktasana and Naditanasana. After six months of yoga therapy patients stopped the use of medicines and pain killers. There was no instrument used externally nor any belt and pain-killer. It has been noticed that patients stopped limping and dragging. Pressure on all vertebrae of spine was reduced by regular and selected yoga practices.
The patients were trained to perform yoga practices regularly in the morning for 15-20 minutes under the guidance and supervision. These patients learnt them and then carried out themselves at their residences. They were asked to report after every one month and it was noticed that there was a remarkable improvement and they left taking all medicines. Skiagrams were repeated after a period of six months and they showed improvement. It is also noticed that all the patients were able to perform their normal routine duties. Yoga practices become their routine way of life.

13.1
FUNCTIONAL SIGNIFICANCE OF DIETARY FRACTIONS IN THE OCCURRENCE OF ISCHAEMIC HEART DISEASE

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The present study is designed to evaluate the functional significance of dietary components in the occurrence of ischaemic heart disease by estimating serum total cholesterol, H.D.L. (High density lipoprotein) and Triglyceride from patients having ischaemic heart disease and from normal individual as control. Age, Blood pressure and dietary habits were recorded from the patients and the normal individuals.

Parallel animal studies were performed on weanling rats. They were divided into five groups of 12 animals each and caged accordingly. Isocaloric diet specific for each of the five groups were prepared and designate as follows – (a) Control or basal diet, (b) Pure carbohydrate, (c) Dalda, (d) Butter and (e) Protein diet (casein). After six weeks the rats were sacrificed by light anaesthesia. Blood was collected from hepatic vein and serum was collected.

It was observed that total cholesterol and triglyceride levels were highest in rats fed with butter rich diet whereas the levels were lowest in rats fed with pure carbohydrate while that of dalda fed occupied a position between them. Protein treated group showed slightly higher level of serum total cholesterol and triglyceride than the control group and those kept on pure carbohydrate diet H.D.L. (High density lipoprotein) level was high in rats treated with pure carbohydrate and low in those treated with butter rich diet.

The same trend of result we observe in human beings who consume fatty diets. It may be presumed that only cholesterol rich diet is atherogenic.

13.2
EFFECTS ON VITAMIN ‘C’ ADMINISTRATION ON BLOOD CHOLESTEROL LEVEL IN HEALTHY MAN

R.S. Sharma, M.K. Sharma and A. Kaul
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The hypercholesterolemia is a major risk factor for ischemic heart disease. The relationship between cholesterol and ascorbic acid (Vitamin ‘C’) has recently attracted considerable attention. Some authors (Spittle, Ginter) have reported cholesterol lowering effect of Vitamin ‘C’ while others (Anderson) have refuted this. In view of these controversial results, we investigated the effect of Vitamin ‘C’ on serum cholesterol level in all age groups and in special risk groups viz. smokers and non-vegetarians.
The study was carried out in the 80 healthy subjects which were divided into two groups Control (40) and Test (40). Both groups were further sub-divided according to age (1 to 5), dietary and smoking habits. Control group were given placebo; while test group received Vitamin ‘C’ 1 gm. daily for 30 days. During this period the subjects did not take any medicine. The identity of subjects were kept secret by one of the authors; while all estimations were done by other author unbiased by the identity of the samples. Blood was collected after an overnight fast. Serum ascorbic acid was estimated colorimetrically using 2, 4 dinitrophenol hydrazine. Serum cholesterol was estimated by single step method. The tests were performed before starting Vitamin ‘C’ and at the end of the 30 days treatment. The control group were simultaneously tested.

The result shows that there is significant lowering of serum cholesterol in test group as compared to control. This was observed in all age groups, more in nonvegetarians as compared to vegetarians, though the latter also registered fall in serum level of cholesterol. Finally both smokers and non-smokers showed fall in serum cholesterol level after Vitamin ‘C’ administration, though it was more marked in the latter.

13.3 A COMPARATIVE STUDY OF SERUM CHOLESTEROL AND TRIGLYCERIDES IN ACTIVE AND SEDENTARY WORKERS AND TO OBSERVE THE EFFECT OF GARLIC ON THE TWO SERUM VALUES

H Jaseja, H.C. Gupta and S.P. Saxena
Department of Physiology, G.R. Medical College, Gwalior

Physical activity has been found to be associated with comparatively lower levels of serum cholesterol and triglycerides. A comparative study of these two levels was made in 28 active workers and 22 sedentary workers. Garlic was then administered for 30 days to all the subjects to study its effect on serum cholesterol and triglycerides. The dietary and medicinal use of Garlic has been mentioned in ancient Indian, Egyptian and Chinese civilisations.

The results were discussed and it was found that the base-line levels of serum cholesterol and triglycerides were statistically significantly lower in active group than the corresponding levels in sedentary group (P < 0.05). It was also observed that Garlic produced a statistically significant decrease (P < 0.05) in serum cholesterol and triglycerides in both the groups. The decrease in both levels in active group was more than that in sedentary group probably because of additive effect of activity and Garlic.

13.4 MEASUREMENT OF WHOLE BODY VOLUME IN HUMAN SUBJECTS

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ICMR Nutrition Research Centre, Department of Physiology, St. John’s Medical College, Bangalore – 560 034.

The Body Volume of 8 normal young male volunteers with mean body weight 57.26 ± 4.5 kg and age group 17-21 yrs, was measured by water displacement in a whole body volumeter. Measured body volume was corrected for residual volume (1.2L) and gastrointestinal gases (200ml). Corrected body volume was used to calculate body density, and percent body fat. Body density was also estimated from skinfold measurement using Durnin and Womersley’s equation (D = C - mlog skinfold). Mean body density using the volumetric method was 1.068 ± .008 whereas it was
The Effect of chronic intake of high doses of fluoride on long bones of young rabbits were investigated. Weanling Belgian rabbits were supplied with 500 ppm fluoride (as aqueous sodium chloride solution) for a period of 8–12 weeks, 16–18 weeks and 24 weeks. At the end of each experimental period, the degree of severity of skeletal fluorosis was confirmed by radiological and morphological features of long bones which were then subjected to chemical analysis.

In fluoride treated rabbits, the bones were soft and brittle, had higher fresh and dry weights and higher water content. Fluoride increased the accretion of minerals in bones tremendously leading to a considerable increase in the size of total calcium and phosphorus pool in experimental animals but the concentration of these minerals per unit weight of bone or bone ash and Ca/P ratio became less than normal after an experimental period of 24 weeks.

The higher water content of the bones can be correlated with the defective maturation of the organic phase of bone which may contribute to the alteration of mineral content and brittleness of fluoride afflicted bone.

13.5

URINARY ELIMINATION OF ASCORBIC ACID AFTER LARGE DOSES

J.D. Pathak and S.V. Joshi

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Uptakes of ascorbic acid in urine on usual diet and after its large doses (1000 mg. to 8000 mg.) orally for several days were studied in 131 healthy men. The estimations in urine were carried out by 2, 6, dichlorophenol indophenol method. About 30% of the large doses could be recovered in urine. The outputs exponentially increased with dose, but plasma levels of ascorbic acid did not do so nor did they exceed 1.8 mg% in all cases. Discontinuing the oral administration, the output fell to its basal values within 24 hrs; suggesting some controlling mechanism regarding absorption, distribution storage, utilisation and elimination.

13.6

THE EFFECT OF FLUORIDE ON THE MINERAL PROFILE OF RABBIT BONE

S. Ghosh and J. Nagchaudhuri

Department of Physiology, Kasturba Medical College, Mangalore (Karnataka)

The Effect of chronic intake of high doses of fluoride on long bones of young rabbits were investigated. Weanling Belgian rabbits were supplied with 500 ppm fluoride (as aqueous sodium chloride solution) for a period of 8–12 weeks, 16–18 weeks and 24 weeks. At the end of each experimental period, the degree of severity of skeletal fluorosis was confirmed by radiological and morphological features of long bones which were then subjected to chemical analysis.

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D. P. Thombre and S.G. Surange
Department of Physiology, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry-605006

Evaluation must be relevant to the present and future needs of the student. A medical student is always confronted with situations where he is expected to solve problems and take effective decisions. In order to test such abilities, written examination can be modified by designing the question paper by which students abilities of recall, interpretation and application can be judged. A design of such question paper tried by the Department of Physiology, JIPMER, Pondicherry, will be presented and discussed.

15.1

DESIGN OF A QUESTION PAPER IN PHYSIOLOGY TO ASSESS THE COGNITIVE ABILITIES OF A STUDENT

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Opioid substances have a well known role in the regulation of food intake. In addition it has been suggested that they may mediate circadian functions also. In this study the role of naloxone, an opiate receptor antagonist, on the circadian rhythm of food intake was investigated by injecting it into the bilateral suprachiasmatic nuclei (SCN) of rats through chronically implanted cannulae. Injection of naloxone during the beginning of light and dark phase produced differential effects although in both cases it produced disruption of the circadian rhythm of food intake. Control studies involving saline injection into the SCN and naloxone injection into the nearby SCN area failed to disrupt the circadian rhythm of food intake. The possible mechanism for the disruption of the circadian rhythm of food intake is the modification of the activity of the circadian pacemaker, SCN, by naloxone.

14.2

CIRCADIAN VARIATIONS IN BLOOD SUGAR AND TISSUE GLYCOGEN IN ALBINO RABBITS

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Experiments have been carried out on adult albino rabbits to study the blood sugar levels (BSL) at four hourly intervals during 24 hour period. The overall 24 hour mean blood sugar level (BSL) was found and tissue (Muscle and Liver) glycogen level was also estimated.

Mean blood sugar values at different hours of day showed circadian fluctuations. The highest value (125.0±3.33) was obtained at 12.00 noon whereas the lowest 111.9±2.91 was observed at 24.00 hour. The blood sugar estimation was done by “Reflomat Reflectance Photometer.” The corresponding value of glycogen (in mg/gm. of tissue) at 12.00 noon was found to be 12.31±0.99 and 1.73±0.116 in liver and muscle respectively whereas it was 15.25±0 in liver and 3.74±0.41 in muscle at 24.00 hour. The estimation was done photometrically after sacrificing the animals.

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15.2
THE CURRENT STATE OF MEDICAL EDUCATION IN INDIA AND SOME OF ITS PROBLEMS AND REMEDY

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The current problems facing Medical education in India can be accounted for largely due to defective Medical education policy, and mismanagement on the part of educational administrative authorities. The causes are complex, but the most important factors include; boring didactic lectures by untrained teachers and centralised multiple choice examinations which make the students orient their learning memorizing facts rather than acquiring medical skills; to little clinical experience, scarcity of training opportunities (tremendous rise in the number of medical students in various colleges of India); too few clinical patients and insufficiently experienced teachers. These drawbacks have to be improved to make the present medical education useful and purposeful, for which various factors have been discussed and our suggestions have been put forward.

15.3
TEACHING OF NEUROPHYSIOLOGY AS A MEANS TO UNDERSTAND OUR CULTURAL HERITAGE A conceptual analysis.

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Well developed neural apparatus in healthy awake adult human body is most suitable for storage and elaboration of linguistic concepts. Such elaboration adds new linguistic concepts to the surroundings and also helps to clarify the meaning of existing ones when Neural axis is active a limited spectrum of information is projected on it by the sense organs attached to it. Consciousness manifesting through active neural axis has the ability to objectively analyse the creative utility of any of these objects including the human body through which it manifests. Objective analysis of the creative utility of the body gradually brings objectivity in all bodily activities and a stage comes when subjective attachment to the body falls from the consciousness. Sages all over the world irrespective of time and place of their bodily existence have experienced it. Techniques described by them, though appear different, the difference is only apparent. Knowledge of neurophysiology can help us to understand it. Cultural unity is the need of time and teaching of neurophysiology is a means to achieve it.

16.1
THE DIAGNOSTIC VALUE OF SERUM COPPER AND CERULOPLASMIN IN ISCHEMIC HEART DISEASE

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Our aim of present study is to find out the diagnostic value of serum copper and ceruloplasmin levels and its correlation, if any, with severity and site of myocardial infarction. In the present study, serum copper and ceruloplasmin alongwith SGOT levels were determined.
On the basis of biochemical studies, many workers have reported certain changes in the levels of serum enzymes in cancer patients. They have claimed that these estimations are very helpful in the diagnosis, treatment, and prognosis of the patients. A similar type of study has been undertaken to estimate SGOT, SGPT, alkaline phosphatase, and acid phosphatase in different types of malignancies in patients of either sex at M.Y. Hospital, Indore.

The results indicate that the serum copper and ceruloplasmin levels were significantly raised in test group as compared to control group. As is well known, SGOT was also raised significantly in test group. However, the rise in serum copper and ceruloplasmin could not be correlated with the various types and extent of infarction. Also, no correlation could be found between the levels of serum Cu and ceruloplasmin and age, sex, and diet of the patient having infarction.

In 6 of the cases of infarction, which were followed up to 4 weeks, the values of serum Cu and ceruloplasmin and SGOT which were significantly very high during the 1st week, showed significant fall to almost normal range during the 4th week. This rise in values during the 1st week as well as the fall during the 4th week were found to be statistically highly significant thereby suggesting a definite correlation between serum Cu, ceruloplasmin, and SGOT levels. Thus the estimation of serum Cu and ceruloplasmin may be used as a diagnostic test as well as for predicting the prognosis in cases of acute myocardial infarction, either singly or in combination with the various other enzyme tests.

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Since lead acts on target organs like liver, blood, brain, and kidney passing across the barrier systems, in this report, oral sub-lethal lead (0.2 and 0.5 mg/ml/day in drinking water) effects were investigated in two sets of experimental and matched controls of 3–5 months old of both sexes of inbred Charles Foster albino (weighing 174±9.7 g) rats. These rats (n = 15/set) were fed with staple diet and lead acetate in drinking water (except placebos) and maintained under uniform environmental conditions for 90 days. Such a chronic exposure to lead resulted significantly in a dose-dependent depression (P < 0.01) of haemoglobin, calcium, and (P < 0.05) total proteins. The delta-aminolevulinic acid levels in urine of the lead exposed rats significantly increased by 60.57% (P < 0.05) and 323.24% (P < 0.01) when compared to control group in respect of 0.2 and 0.5 mg/ml/day doses after 90 days exposure.

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On the basis of biochemical studies, many workers have reported certain changes in the levels of serum enzymes in cancer patients. They have claimed that these estimations are very helpful in the diagnosis, treatment, and prognosis of the patients. A similar type of study has been undertaken to estimate SGOT, SGPT, alkaline phosphatase, and acid phosphatase in different types of malignancies in patients of either sex at M.Y. Hospital, Indore.
The blood samples of seventy patients of different types of malignancies (Histopathologically proved) were biochemically studied and compared with twenty normal subjects. It was observed that in all types of cancers these enzymatic levels were significantly increased, though the extent of rise was different in different types and their different stages. Raised transaminase and alkaline phosphatase levels were observed in 80 to 84% of patients, whereas acid phosphatase levels were towards the upper limit of normality, except in bone carcinoma, where its rise was significant. The highest values for SGOT, SGPT and alkaline phosphatase were found in the patients of cancer-cervix. The values were statistically analysed and the results are presented accordingly.

16.4

A STUDY OF BLOOD SUGAR LEVELS IN CANCER PATIENTS

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There have been a number of studies describing the abnormal carbohydrate metabolism in cancer patients, because of the increased turnover rate of glucose, increased rate of gluconeogenesis and recycling of glucose. According to them, the cancer patients show either hypoglycemic tendency because of the increased requirement of energy of Tumor Cells.

On the basis of these studies the present work was undertaken to study the etiology of abnormal blood sugar levels in different types of cancer patients of either sex in M.Y. Hospital, Indore.

The fasting blood samples of 171 non-diabetic cancer patients of different types of malignancies which were histopathologically proved were biochemically studied for blood sugar levels and compared with 20 normal subjects.

It was observed that in all types of cancer patients the blood sugar levels were found elevated showing hyperglycemic tendency. This rise was very significant with the advanced stage of disease. The results were statistically analysed and found highly significant, the P value being less than .001.

16.5

AGE RELATED CHANGES IN SOME RENAL FUNCTION TESTS

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Renal performance was examined in two groups of healthy men (a) young (10) 26.0 ± 3.6 yrs. (b) elderly (40) 70.9 ± 5.4 yrs. 24 hours urinary outputs and their composition were almost similar; the blood urea and creatinine values were a bit higher in elderly but were within accepted physiological norms. The creatinine clearance in elderly was however lower. This test therefore appears to be better indicative of decline in renal function due to aging, than other usual tests, significance of which is discussed
Histopathologically
was observed increased, though
malignant, whereas acid
acne was found in.

The existing literature on the role of zinc in acne vulgaris is very scanty with various opinions and
conflicting conclusions. The present study was carried out to investigate the serum zinc levels in
acne vulgaris and to observe the effect of oral zinc on the clinical picture of acne lesions.

Role of zinc in various dermatological conditions has been suggested for a long time. The
existing literature on the role of zinc in acne vulgaris is very scanty with various opinions and
conflicting conclusions. The present study was carried out to investigate the serum zinc levels in
acne vulgaris and to observe the effect of oral zinc on the clinical picture of acne lesions.

The subjects for the study comprised of 105 cases of acne vulgaris and 25 healthy controls
attending Outpatient Department of Skin and V.D., J.N. Medical College, Aligarh. Initially,
Since uric acid is the end product of ribonucleic and deoxyribonucleic acid metabolism a higher turn over is expected in case of various types of neoplastic diseases. The authors of present study felt interested to find out if uric acid estimation could be of help in diagnosis and prognosis of the various types of malignancy.

A STUDY OF INTENSITY OF FINGER PRINT PATTERN AMONG THE COMPLEMENTARY FINGER PARTS.

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A study of complementary finger pairs, in 188 males and 58 females, for the finger print pattern (F.P.P.), was carried out to find out the influence of F.P.P.s. of one hand, over the intensity of F.P.P.s. of other hand. The fingers of right hands were taken as reference fingers in which, types of pattern were noted, where as the left hands fingers were considered as experimental fingers in which the types as well as the intensity of patterns were studied. Finger ridge count (F.R.C.) was used to evaluate the intensity of F.P.P.F.R.C., done in the fingers of left hand in all the males and females were tabulated separately, under the 5 possible associations, formed with the complementary fingers of right hand, namely.

<table>
<thead>
<tr>
<th>Complementary finger pairs</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference (Right hand fingers)</td>
<td>Whorl</td>
<td>Whorl</td>
<td>Loop</td>
<td>Loop</td>
<td>Arch</td>
</tr>
<tr>
<td>Exptl. (Left hand fingers)</td>
<td>Whorl</td>
<td>Loop</td>
<td>Loop</td>
<td>Whorl</td>
<td>Loop</td>
</tr>
</tbody>
</table>

Statistical analysis shows that the finger print pattern of one hand can influence, the type and the intensity of the complementary finger print patterns of other hand. The finding in the light of foetal differentiation of various finger print patterns will be discussed.

SERUM URIC ACID LEVELS IN MALIGANNCY

F. Roohi, S. Bose, P. Sarkar and H.C. Gupta
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M.G.M. Medical College, Indore.

Since uric acid is the end product of ribonucleic and deoxyribonucleic acid metabolism a higher turn over is expected in case of various types of neoplastic diseases. The authors of present study felt interested to find out if uric acid estimation could be of help in diagnosis and prognosis of the various types of malignancy.
Biostimulators have been shown to stimulate the protein synthesis and utilization in goats. As silver plays an important role in protein and lipid metabolism, an attempt was made to study the effect of biostimulator feeding on certain chemical constituents of liver in Barbari and Black Bengal goats. The experiment was conducted in 4 months old male kids and biostimulator was prepared of slaughter house byproduct. After 20 weeks feeding of this dry powdery preparation, at two nutritional plans, the kids were slaughtered and liver isolated for the estimation of total proteins, lipid and phospholipid contents.

The average total protein contents of liver were observed as 29.03 ± 0.93, 29.25 ± 1.54, 31.47 ± 1.62 and 28.78 ± 2.11 mg/g of liver in control and experimental kids at low and high plans of nutrition respectively. Total phospholipid were observed as 41.89 ± 3.74, 44.09 ± 4.57, 37.19 ± 5.03 and 41.27 ± 4.11 mg/g in group I, II, III and IV respectively. Whereas the total phospholipid contents were compared in cases with and without metastasis.

C.S.F. AND SERUM GAMMAAMINOBUTYRIC ACID LEVELS AND ITS RATIO IN TUBERCULOUS MENINGITIS AND PYOGENIC MENINGITIS

K. N. Dave, B. N. Dave and F. R. Billimoria
Biochemistry Department

Cerebrospinal fluid (CSF) and serum Gammaaminobutyric acid (GABA) was estimated by Spectrofluorimetric assay in 60 cases of tuberculous meningitis (TBM), 64 cases of Pyogenic meningitis (PM) and 39 control samples. The values of Mean ± S. E. in CSF were 142.39 ± 8.16 (Control), 185.96 ± 11.63 (TBM), and 167.30 ± 6.4 (PM) respectively, and those in serum were 242.70 ± 12.58 (Control), 319.34 ± 6.06 (TBM), and 298.4 ± 11.4 (PM) respectively. Thus, the CSF and serum GABA levels in patients of TBM were higher compared to those in PM. CSF an serum GABA levels in patients of TBM were significantly higher (p < 0.001) when compared with control. CSF, GABA levels in patients with PM were significantly higher (p <0.01) whereas serum GABA levels were significantly (p <0.05) when compared with control. Increase in permeability of blood brain barrier due to meningeal inflammation could be the cause of altered values of GABA in CSF and serum in these conditions. The CSF/serum ratios in TBM and PM were 0.579 and 0.561 when compared with controls. The values are unaltered in both the diseased states. This shown that the ratio alone can not help in differential diagnosis.

EFFECT OF BIOSTIMULATOR FEEDING ON LIVER COMPOSITION OF GOATS

D. C. Shukla and B. B. Mahapatro
Division of Physiology & Climatology

Biostimulators have been shown to stimulate the protein synthesis and utilization in goats. As liver plays an important role in protein and lipid metabolism, an attempt was made to study the effect of biostimulator feeding on certain chemical constituents of liver in Barbari and Black Bengal goats. The experiment was conducted in 4 months old male kids and biostimulator was prepared of slaughter house byproduct. After 20 weeks feeding of this dry powdery preparation, at two nutritional plans, the kids were slaughtered and liver isolated for the estimation of total proteins, lipid and phospholipid contents.

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In HPLC systems, fluorescence detectors have an advantage over electrochemical and UV detectors in that they give better selectivity and sensitivity. We describe here a relatively simple HPCC method of determining urinary vanillylmandelic acid (VMA), homovanillic acid (HVA), 5-Hydroxyindole acetic acid (5-HIAA) and 3-methoxy-4-hydroxyphenyl glycol (MHPG) based on measuring their native fluorescence in a single isocratic mobile phase. VMA and HVA could be determined in one sample; initial stages of sample processing was done according to Dziedzic et al. (Anal. Biochem., 47, 592, 1972), wherein the metabolites are extracted in ethyl acetate and evaporated to dryness in nitrogen atmosphere. The samples were reconstituted in 0.05% ascorbic acid, instead of methanol before injecting in HPLC system. Hence, the possible change in concentration of methanol extracts due to evaporation could be avoided. 5-HIAA was extracted in salt saturated urine with diethyl ether, and evaporated and further processed as above. For MHPG, hydrolysis of conjugated MHPG and initial steps in extraction of free MHPG were carried out as described by Dekirrmenjian and Mass (Anal. Biochem., 35, 113, 1970) in ethyl acetate, and evaporated and reconstituted as cited above for injection in HPLC. In all the cases in the HPLC sodium acetate buffer (pH: 4.55) mixed with methanol (87 mL) was used as mobile phase (eliminating dissolved gases and air bubbles with a degasser) and C18 reversed phase columns (octadecylsilane, particle size: 3μm). The spectrofluorometer excitation and emission wavelengths were set at 285 nm and 325 nm respectively. Under these conditions the retention time for VMA, MHPG, 5-HIAA and HVA were 1 min, 2.5 min, 6.8 min, 8.5 min respectively. The method was highly reproducible: peak height variation was less than 3%. This simple method of not involving the derivatisation of fluorophores has
A scheme of 'specimen physiology' is proposed based on the fact that the learning is facilitated by formation of proper associations. As CVS/RS/CNS/Excretory systems are taught, it is essential to see the specimen of Heart/Lungs/Brain & spinal cord/kidneys. The specimen along with a short test can be displayed at a suitable place, during the system, course teaching. The text may contain brief description diagram with label/summary of functions or relevant physiological data. It will create interest, form associations of organ and function, help better understanding, better memory engrams and better future application of basics to clinical situations. Discussion of scheme along with some 'specimen physiology' exhibits photographs are presented in the paper.

Human Physiology is the study of functions of human body. As a preclinical subject it is taught to the medical students, along with Anatomy and Biochemistry. Despite of criticism and attempts of integration, the teachings in physiology and Anatomy have continued to be divorced, due to differences in timings, approach etc.

A scheme of 'specimen physiology' is proposed based on the fact that the learning is facilitated by formation of proper associations. As CVS/RS/CNS/Excretory systems are taught, it is essential to see the specimen of Heart/Lungs/Brain & spinal cord/kidneys. The specimen along with a short test can be displayed at a suitable place, during the system, course teaching. The text may contain brief description diagram with label/summary of functions or relevant physiological data. It will create interest, form associations of organ and function, help better understanding, better memory engrams and better future application of basics to clinical situations. Discussion of scheme along with some 'specimen physiology' exhibits photographs are presented in the paper.