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Cardioprotective effect of newly synthesized acyl amino substituted propanolamine derivatives, DPJ 955 and DPJ 890 against isoprenaline induced myocardial necrosis

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Abstract

Two newly synthesized β blockers, DPJ 955 and DPJ 890 were studied for cardioprotective action against isoprenaline induced myocardial necrosis and anti lipid peroxidation potential against ferric chloride induced lipid peroxidation. Administration of isoprenaline (300 mg/kg, s.c.) for 3 days at an interval of 24 hours significantly increased LDH, CK, AST and ALT levels as compared to normal animals. Treatment with DPJ 955 (10 mg/kg) and DPJ 890 (3 mg/kg) for 4 days followed by administration of isoprenaline (300mg/kg, s.c.) for a period of 3 days significantly reduced the concentration of marker enzymes in serum. Histological examination of hearts revealed that DPJ 890 (3 mg/kg, i.p.) reduced the severity of infarction produced by isoprenaline. The mortality was found to be very high (50%) with isoprenaline alone treated group. Pretreatment with DPJ 955 (10 mg/kg), DPJ 890 (3 mg/kg) reduced the mortality rate as compared to isoprenaline treated group. The cardioprotective effect produced by DPJ 890 was superior to propranolol. DPJ 955, DPJ 890, propranolol and carvedilol produced concentration dependent reduction in lipid peroxidation induced by ferric chloride. The rank order potency of anti lipid peroxidation activity was found to be carvedilol > DPJ 955 > propranolol = DPJ 890. These results suggest that prevention of myocardial damage produced by isoprenaline in rats pretreated with DPJ 955, DPJ 890 and propranolol may be mainly due to the β blocking activity as these compounds lacked lipid peroxidation activity.

Key words: Acyl amino substituted propanolamine, isoprenaline, myocardial necrosis, lipid peroxidation, β blockers, propranolol.

Toxicol. Int. Vol. 12, No. 2, 2005 pp 67-73

Effect of RPR-V (Phosphorothionate) on acid and alkaline phosphatase activities in tissues of male and female rats

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Abstract

The aim of this study was to investigate the effect of RPR-V, a novel phosphorothionate on Acid (AcP) and Alkaline (AkP) phosphatases in serum, liver, kidney and lung tissues of male and female albino Wistar rats. Three sub-chronic doses of 0.033 (low), 0.066 (medium) and 0.099 (high) mg kg⁻¹ body weight were administered orally for 45 or 90 days. The long-term and repeated administration of this compound caused significant increase in AcP and AkP activities in serum and kidney (AcP), whereas these enzymes were decreased significantly in liver, kidney (AkP) and lung tissues of both male and female rats after 45 and 90 days of treatment. Two way ANOVA revealed that the alterations were mostly significant in both columns and rows indicating that the changes were dose and time dependent. Sexual

dimorphism was not recorded when the activities of male rats were compared with female rats. After 28 days post-treatment recovery was near to control. There was a high degree of negative correlation between results for serum as compared to those for liver, kidney (AkP) and lung. However, there was a high degree positive correlation between AcP results for serum as compared with those of kidney. The changes in these enzymes indicated that liver was the most susceptible followed by lung and kidney. AcP and AkP are membrane-bound enzymes and their increase in serum with simultaneous decrease in liver, kidney (AkP) and lung might be due to the necrosis of these cellular tissues. However, the increase in kidney (AcP) might be due to the increased permeability of plasma membrane showing stress condition of the treated rats. These biochemical enzymes can be detected rapidly and hence may be used for the prediction and diagnosis of pesticide insult.

Key Words: RPR-V; phosphorothionate; acid; alkaline phosphatase; rat

Toxicol. Int.Vol. 12, No. 2, 2005 pp 75-81

Hepatoprotective effect of a propriety herbal formulation (PHF) on experimental liver damage in rats

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Abstract

Administration of carbon tetrachloride (0.2 ml/kg) intraperitoneally to normal rats caused significant decrease in Hb, RBC and WBC Counts, and considerable increase in the level of transaminases, blood sugar and the activity of serum alkaline phosphatase. A marked increase in the serum protein was also observed. Significant decrease was observed in glycogen content of liver, on the contrary, a marked increase was seen in kidney. Carbon tetrachloride provided significant rise in protein content and activity of acid phosphatase of liver and kidney both. Activity of alkaline phosphatase showed marked depletion in both the organs. Significant elevation in hepatic lipid peroxidation level and a sharp depletion in glutathione level were also seen. Conjoint treatment with PHF (250 mg/kg, orally) for 12 weeks caused significant recoupment in liver and kidney in most of the parameters studied.

Keywords: Propriety herbal formulation (PHF), Carbon tetrachloride, Hepatotoxicity, Lipid peroxidation.

Toxicol. Int.Vol. 12, No. 2, 2005 pp 83-86

Synthetic pyrethroid residues in foods of animal origin in Kumaon

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Abstract

Synthetic pyrethroid residues in samples of cow milk, poultry egg and meat, collected from Tarai (foot hills) and hilly regions of Kumaon were estimated with the help of High Performance Liquid Chromatography (HPLC). The mean values of deltamethrin residue of the positive samples in the whole Kumaon region were 0.0688, 0.0448 and 0.0356 mg/l or mg/kg, respectively. The values for fenvalerate residue were 0.1498, 0.1627 and 0.0164 mg/l or mg/kg, respectively. The results confirm the use of synthetic pyrethroid pesticides in Kumaon regions of Uttaranchal. However, none of the samples showed residual concentration above the 'maximum residue limit' as per the guidelines of the FAO/WHO.

Key words: Deltamethrin, fenvalerate, residue, egg, milk, meat

Toxicol. Int.Vol. 12, No. 2, 2005 pp 87-92

Destructive effects of dyeing effluent on haemopoietic system of albino rats

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Abstract

Blood is a connective tissue which is highly sensitive to environmental toxicants as evident in the following study. In albino rats, exposed to 5% concentrated solution of textile wastewater for 30, 45 and 60 days, stomatocytes, schistocytes, poikilocytes, anulocytes, acanthocytes and Heinz bodies were found. Large number of basophilic inclusions in the cytoplasm of erythrocytes were observed. Erythrocytes also showed higher degree of hypochromia. The structural deformities found in erythrocytes revealed disruption of cell membrane in erythrocytes which leads to haemolytic anaemia. Haemolytic anaemia is a condition in which the average life span of the red blood cell is greatly reduced due to the destruction of blood cells. The degree of anaemia is found directly related to the exposure time to wastewater. In leucocytes, hyper-segmentation in neutrophils and granulation in lymphocytes were found in treated rats. Besides this the nuclei of most of the leucocytes showed disorganization. Marked increase in the average diameter and significant ($P<0.01$) reduction in the counts of both types of blood cells was observed. Response of DLC in effluent treated rats exhibited eosinophilia and neutropenia.

Key words: Textile wastewater, erythrocytes, leucocytes and albino rats.

Toxicol. Int.Vol. 12, No. 2, 2005 pp 93-96

Effect of oral ingestion of monosodium glutamate (MSG) on certain lipid fractions and carbohydrate metabolizing enzymes in the intestinal tissue of male mice

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Abstract

Oral administration of monosodium glutamate (MSG), to normal adult male mice, for six consecutive days at dose level of 4 mg and 8 mg per gram body weight induced lipogenesis as the level of total lipids, triglycerides and phospholipids was significantly increased whereas the level of digestive enzymes, such as sucrase, maltase, lactase, trehalase and that of lactate dehydrogenase was significantly decreased in the intestinal tissue. These observations suggested that altered specific activity of above studied digestive enzymes (upon ingestion of MSG at dose level of 4 mg and 8 mg per gram body weight) may be due to the action of glutamate for glucose as the substrate for the production of energy in the intestinal tissue.

Key Words : Monosodium L-glutamate (MSG), Hyperlipidemia, Sucrase, Maltase, Lactase, Trehalase, Lactate dehydrogenase (LDH)

Toxicol. Int.Vol. 12, No. 2, 2005 pp 97-100

Effect of acrylamide and chlorpromazine hydrochloride on functional observation battery (FOB) in Wistar rats

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ABSTRACT

The effects of acrylamide at three different doses of 12.5, 25 and 50 mg/kg body weight and chlorpromazine hydrochloride at two concentrations of 2.5 and 5 mg/kg body weight were investigated on functional observations in Wistar rats. The functional observation battery was carried out before start of treatment and after the treatment at different intervals. Acrylamide caused a marked reduction in motor activity on post treatment day 1 and day 3 at 25 and 50 mg/kg body weight groups. Chlorpromazine hydrochloride at 2.5 mg/kg body weight decreased the motor activity and increased the fore limb grip strength when compared to control group.

Key words: FOB, Acrylamide and Chlorpromazine hydrochloride

Toxicol. Int.Vol. 12, No. 2, 2005 pp 101-107

Toxicity studies of metoprolol succinate after repeated oral exposure in albino rats

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Abstract

The toxic effect of metoprolol succinate, a selective β_1 antagonist, was studied in rats after oral exposure to it for 28 days. The study was conducted on 50 Wistar rats divided into five equal groups. Groups A, B, C, D received oral doses (mg/kg) of metoprolol succinate @ 1000, 750, 500 and 300, respectively, in two divided doses daily for 28 days, whereas group E was untreated control. On the basis of clinical picture, pathological changes, cardiometric parameters, hematological and biochemical changes, it was found that metoprolol succinate caused mild CNS depression and adverse effects on body weights at 1000 mg/kg. The mortality was observed at the doses above 500 mg/kg in all the groups. The post mortem lesions and histopathological findings suggested that apart from lesions on liver, kidney and intestine, heart was major organ affected. Besides, rounding of heart and increase in heart weight indicated cardiotoxicity of metoprolol succinate. 300 mg/kg was found to be the dose causing repeated dose oral toxicity of metoprolol succinate in rats.

Key words : Metoprolol succinate, cardiotoxicity, rats.

Toxicol. Int.Vol. 12, No. 2, 2005 pp 109-118

Physico-chemical characterisation of pulp and paper mill effluent and toxicity assessment by a tubificid worm, *Tubifex tubifex*

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Abstract

After physico-chemical analysis of pulp and paper mill effluent, its toxic effect was studied on fresh water tubificid worm, *Tubifex tubifex* at different concentrations (10, 20, 40, 60 and 80% v/v), which revealed that toxic ingredient of effluent induced high mortality at 10 to 60% (v/v) concentration after 96 hours exposure. Further, in higher concentrations (>60% v/v) effluent exposed *T. tubifex*, morphological alteration due to the presence of pentachlorophenol was observed. Relative toxicity of effluent in term of lethal concentration, LC50 value was 29.0% after 96 hours exposure. Dissolve oxygen (DO) content was found lower at all elevated concentration during bioassay. The reduction in DO content was 65.12% at 80% effluent concentration (v/v) after 96 hours exposure. Pulp and paper mill effluent was brown-coloured having color units (CU) 11727 Pt-Co with higher levels of COD (16766 mg/l), BOD₅ (6033 mg/l), T.S (1115 mg/l), lignin (413 mg/l), heavy metals (Ni 0.122, Cu 0.216, Fe 0.182 and Cd 0.135 mg/l) and pH 7.5-8.0. The effluent was also found to contain significant amount of chlorinated phenols such as 2,4-dichlorophenol (8.65 mg/l), 2,3,5-trichlorophenol (0.73 mg/l) and pentachlorophenol (50.31mg/l).

Key Words: Pulp paper effluent, Physico-chemical, DO, Mortality, *T. tubifex*

Toxicol. Int.Vol. 12, No. 2, 2005 pp 119-124

Ameliorative potential of turmeric (*Curcuma longa*) against cadmium induced hepatotoxicity in mice

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Abstract

A single dose of cadmium (CdCl₂, 1.8 mg /kg, i.p.) in mice caused liver damage as evidenced by serum transaminases and morphology of the hepatic tissue. An elevation of hepatic lipid peroxides, cadmium, zinc and calcium, and lowering of glutathione levels was also observed .However, pretreatment with turmeric at two doses (25 and 100 mg / kg,orally) for 7 days, showed significant reduction in the oxidative stress markers and serum transaminases. The gross toxicopathological changes were also markedly arrested. These results suggest cytoprotective including antioxidative potential of turmeric in acute Cd toxicity.

Keywords : Turmeric , cadmium, biochemical , histopathology , mice

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Behavioural and pathological studies on laboratory rats fed with crude extract of bracken fern

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Abstract

The objective of present work was to study the neurotoxic effects of bracken fern in laboratory rats. In this study, 24 young male albino rats were divided into four groups as crude extract (Gr-I), crude extract with uracil (Gr-II). Grs I and II were fed with 0.5ml of aqueous crude extracts of bracken fern for period of 6 months. Uracil (0.5%) was administered to Grs II and III for one month. The treatment was discontinued after 6 months of post feeding (MPF) and experiment was terminated at 8 MPF. At the end of 6 MPF, all rats were subjected to test spontaneous and motor activities. Spontaneous motor activity of rats revealed significantly reduced number of ambulations (horizontal activity) in BFCE+UGr (431.00±45.38) and rearing (vertical activity) in same group (66.70±4.20) as compared to other groups,

when tested at pre-determined time of 4 minutes in activity cage. Both the crude extracts drenched groups exhibited signs of sleepiness and reduced movements in activity cage. In forced motor activity on rota-rod apparatus, rats of both crude extracts fed group remained relatively shorter period (33.03 ± 2.76 and 29.53 ± 2.50 min) as compared to UGr (76.18 ± 7.79 min) and CGr (112.89 ± 7.69 min). Thus, both crude extracts fed groups lost their balance on rota-rod and showed the signs of tremors in their hindlimbs. Moreover, the rats of these groups had dullness, off-feed, opisthotonus and occasional spastic paralysis of hindlimbs during various periods of experiment. In fern extract drenched groups appreciable decrease in body weight and increased relative weight of brain was observed. Histopathological lesions of engorged blood vessels with thickened vessel wall, haemorrhages in meninges and stroma and occasional glial cell proliferation in brain along with above clinical observations were suggestive of neurotoxic effects of bracken fern. It was concluded that neurotoxic effects in both crude extract drenched groups of rats might be due to presence of thiaminase enzyme in bracken fern.

Key words: Behavioural studies, rats, bracken fern, uracil.

Toxicol. Int. Vol. 12, No. 2, 2005 pp 129-131

A chromogenic paper technique for single step detection of organo chlorine pesticide residues in vegetables

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Abstract

The major share of the pesticides still used in India are organo chlorinated compounds, despite the environmental threats posed by these compounds, due to economic factors. The persistent nature of organo chlorinated pesticides endows them with presence in almost all the food products tested. In view of the hazardous nature of these pesticides to various non target species including human beings, it is necessary to routinely monitor residues in consumer food. In the present study an effective, quick, specific, simple and sensitive single step method has been developed for the detection of different pesticide residues in various vegetables. The appearance of intense Prussian blue spots on the o-tolidine impregnated chromogenic paper following sunlight exposure indicated the presence of organochlorinated pesticide residues in the vegetables tested.

Keywords: Organo chlorinated pesticides, vegetables, chromogenic technique, Prussian blue, coloured spots.

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Toxicol. Int.Vol. 13, No. 1, 2006 pp 1-17

Potential health risks related to tire fire smoke

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Abstract

A tire fire at a retreading location in Blair Township near Interlochen, Michigan was reported at 9:30 a.m. on December 29, 1995. The company had stored over 700,000 petroleum based tires at this location. It took 22 days for 15 fire departments to quell the fire. Inside the tire piles, the temperature reached up to 2400°F. Tire fire smoke usually includes inorganic and organic particulates, ash, arsenic, benzene, carbon monoxide, formaldehyde, lead, oxides of nitrogen, polycyclic aromatic hydrocarbons, phenol, sulfur dioxide, zinc, etc. Most of the above mentioned environmental contaminants in low concentrations were found at or near the tire fire location in outdoor air, groundwater, snow and soil. No contaminants were detected in indoor environments (residential areas) about one mile

away from the tire fire location. Cancer risk assessments were conducted for carcinogens using U.S. EPA guidelines and assumptions. These cancer risk estimates were very low as compared to the acceptable excess risk level of 1×10^{-6} . Reported concentrations and potential health risks of the released contaminants are briefly discussed. The tire fire smoke is an irritant to eyes, nose, and the respiratory tract, therefore, exposure to this source of air pollution should be regulated and minimized.

Key words: Tire fire smoke, environmental contaminants, cancer risk estimates, potential health risks, air pollution regulations

Toxicol. Int. Vol. 13, No. 1, 2006 pp 19-22

Immunopathological effects of quinalphos on cell mediated immune response in chickens

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Abstract

To study the effect of quinalphos on cell mediated immune response in chickens, one week old 80 chicks procured from Poultry Research Centre of the University were randomly divided into two equal groups. The chicks were immunized with Ranikhet disease vaccine at day 4 and IBD vaccine at day 15. Group I was kept as control while group II birds were given quinalphos daily orally at dose rate of 8 ppm for 8 weeks in feed. Cellular immune response in chickens was measured by Lymphocyte Stimulation Test (LST), Total Leucocyte Count (TLC), Absolute Lymphocyte Count (ALC) and Delayed Typed Hypersensitivity Reaction (DTH). The results showed significant decrease in Lymphocyte Stimulation Index, Total Leucocyte Count, Absolute Lymphocyte Count leading to suppression in cell mediated immune response in quinalphos fed birds in comparison to control. Similarly, a mild DTH reaction was observed in pesticide fed birds than the control birds.

Key words: Cell mediated immune response, chickens, quinalphos, immunosuppression.

Toxicol. Int. Vol. 13, No. 1, 2006 pp 23-28

Ameliorating potential of *Withania somnifera* in chlorpyrifos intoxicated cockerels

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Abstract

This study was carried out to evaluate the protective potential of *Withania somnifera* in chlorpyrifos-induced changes in clinico-haematological parameters and hepatic microsomal enzyme activities after long term exposure of the insecticide in cockerels. Twenty four, eight week old male WLH cockerels were divided equally and randomly into four groups viz. I, II, III and IV. They were administered with powdered dried roots of *W. somnifera* (100 ppm) in group II, chlorpyrifos (25 ppm) in group III and both in group IV birds in feed for 24 weeks. Group I served as control. There was significant ($P < 0.05$) decrease in body weight, TEC, TLC, percent leucocytes, PCV and Hb concentrations and activities of aniline hydroxylase, aminopyrine-N-demethylase and glutathione-S-transferase enzymes in group III cockerels. Significant ($P < 0.05$) increase in the levels of cytochrome P_{450} and b_5 were also recorded in group III. Group IV birds did not show any significant alteration in clinico-haematological profiles in comparison to control. It may be concluded that chlorpyrifos altered the clinico-haematological parameters and activities of hepatic microsomal enzymes in cockerels. Simultaneous medication of *W. somnifera* reduced the severity of chlorpyrifos toxicity in cockerels.

Keywords: *W. somnifera*, chlorpyrifos, haematology, hepatic microsomal enzymes, cockerels

Toxicol. Int. Vol. 13, No. 1, 2006 pp 29-31

Cadmium chloride induced hepato-renal toxicity in the adult albino rats

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Abstract

Effect of cadmium chloride (CdCl₂) at three different dose levels: 0.5, 1.0 and 2.0 mg/kg of body weight, given intraperitoneally (i.p), daily for 15 days was studied in the liver and kidney tissues of male and female wistar strain adult albino rats. There is an increase (1.4 and 1.2 fold) of GOT in the kidney tissues of both male and female rats. Whereas in the liver tissue GOT decreased by 18% to 28% in the male and female rats. GPT level decreased by 54% and 73% in the liver tissue of female and male rats respectively, but in kidney tissue the increase was in the ratio of 1: 2 and 1:1.7 respectively. In the liver tissue, in males ALP increased at 1:1.6 and 1:2.2 ratio in the female respectively but in the kidney tissue the change was insignificant. Among the lipids, there is a decrease in TG level by 15%, 35% and 43% (low, medium and high) in the liver of male and 2 fold increase in female rats. 62% to 40% reduction occurs in the kidney tissue of male and female rats. However TC level was increased significantly by 2 to 4 fold in liver and a slight increase in the kidney of male and female rats respectively.

Key words : Cadmium, hepato-renal toxicity, albino rats, enzymes.

Toxicol. Int. Vol. 13, No. 1, 2006 pp 33-38

Alterations in the protein catabolism and transamination pattern in the rat liver on repeated hexachlorophene treatment

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Abstract

Effect of Hexachlorophene (HCP) on protein profiles, protease activity, free amino acid content, and transamination pattern in rat liver were studied during the sublethal (18 mg/kg⁻¹/day⁻¹) and paralytic (60 mg/kg⁻¹/day) dose of HCP. The effect of HCP was assessed on the basis of biochemical profile of proteins (total, sucrose soluble and insoluble), protease activity (acid, alkaline and neutral), free amino acids (FAA) and aspartate (AAT), alanine (ALAT), leucine (LAT), isoleucine (ILAT) and valine(VAT) aminotransferases. Exposure to hexachlorophene by gavage (oral administration) for 7 days showed degradation in the protein profiles due to elevation in the activity levels of proteases, and subsequent elevation in the free amino acid content, and activity of aminotransferases.

Key words: Hexachlorophene, liver, protein profiles, proteases, free amino acids and aminotransferases.

Toxicol. Int. Vol. 13, No. 1, 2006 pp 39-42

Experimental study on acute toxic effects of *N*-nitrosodiethylamine in rats

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Abstract

N-Nitrosodiethylamine is amongst the important group of carcinogens frequently present in human environment. The mechanism of toxicity of nitroso-compounds at cellular level is not clear, at least when the exposure is for short period. Therefore, the effect of varying doses of NDEA (50,100 and 200 mg/kg body weight) was studied in albino rats. Intraperitoneal administration of NDEA resulted in heart and spleen enlargement and decrease in liver weight. Hepatotoxicity was evident by a steady increase in enzyme levels of liver function test in a dose dependent manner. A significant increase in creatinine level at higher doses indicated it to be nephrotoxic as well. NDEA increased lipid peroxidation of blood and tissues in a dose dependent manner. These results were further supported by histopathological changes seen at higher doses.

Key words: N-Nitrosodiethylamine, lipid peroxidation, aminotransferases, creatinine and alkaline phosphatase.

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Toxic effects of subacute oral exposure of imidacloprid on biochemical parameters in crossbred cow calves

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Abstract

Imidacloprid, a neonicotinoid insecticide, after repeated oral administration at dose rate of 1 mg/kg/day for 21 consecutive days in cow calves produced very mild toxic symptoms of nasal discharge and occasional regurgitation of ruminal contents. Imidacloprid significantly elevated plasma alanine aminotransferase (22.3%), alkaline phosphatase (19.0%) and had no significant effects on plasma aspartate aminotransferase, acid phosphatase and cholinesterase enzymes. Daily oral administration of imidacloprid failed to induce any significant changes in the levels of total serum proteins, blood urea nitrogen, plasma creatinine, blood glucose and plasma cholesterol. The repeated oral toxicity study on imidacloprid in present investigation suggested that it is a low-risk insecticide.

Key words: Cow calves, Biochemical, Imidacloprid, Insecticide, Toxicity

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Investigation of endosulfan toxicity in cattle at an organized dairy farm

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Abstract

The present report describes outbreak of malicious endosulfan toxicity at an organized cattle farm. The clinical symptoms viz. excitement, restlessness, frothy salivation, high fever, circling movements, facial tremors and convulsions led to provisional diagnosis. The sick animals responded well to treatment of activated charcoal, diazepam, calcium borogluconate and normal saline at recommended dosages. Endosulfan residues were detected as α -endosulfan with

mean level of 22.6 mg/kg, β -endosulfan 10.5 mg/kg and endosulfan sulphate 1.5 mg/kg in green fodder. No insecticide was detected in feed samples.

Keywords: Endosulfan, poisoning, cattle

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Chronic toxicity of diethyl phthalate and polychlorinated biphenyls in rats - A sex related biochemical interaction study

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Abstract

A study was undertaken to evaluate the chronic interactive toxicity of DEP and PCBs in young male and female Wistar rats. Healthy young male and female albino rats of Wistar strain weighing 80-100 g (7-8 weeks old) were randomly assigned to five groups of six each. five groups for male and another five for female. Group I male and female rats were provided normal diet and water *ad libitum*. Group II male and female rats were maintained on normal diet mixed with corn oil at 16.5 mg/ kg of the diet / day (approx. 0.94mg/ kg body weight/ day) as oil control. Group III and IV male and female rats were given PCB and DEP dissolved in corn oil mixed with the diet at 50 mg/ kg of the diet /day, which is approximately equal to 2.85 mg/ kg body wt/ day, individually to each group. Group V female rats received a mixture of DEP and PCB, each dissolved in corn oil mixed with the diet at 50 mg/kg of the diet /day, which is approximately equal to 2.85 mg/ kg body wt/ day. Treatment was carried out for 150 days and after the completion of treatment, biochemical parameters in the serum and liver were assessed. Liver and serum cholesterol level was significantly increased in both the sexes of DEP-treated rats compared to controls, PCB and PCB + DEP-treated rats, and serum cholesterol level in DEP-treated female rats was significantly higher than males of the same group. Similarly, in the PCB-treated group, serum level of cholesterol was significantly higher in female rats compared to males of the same group. Triglyceride levels showed significant increase in liver and serum of both the sexes of PCB, PCB + DEP-treated and only in the serum of DEP-treated female rats compared to control rats, of which, level in the livers of male rats of PCB and PCB + DEP-treated groups was significantly higher than the females and opposite results in the serum of same group was observed. Liver glycogen level was significantly increased in both sexes of PCB and PCB + DEP-treated rats compared to controls and DEP-treated rats, of which levels in the female rats of PCB + DEP-treated group were significantly higher than male rats of the same group while levels in the male rats of DEP treated group was significantly higher than females of the same group. Serum glucose levels were significantly increased in both sexes of PCB and DEP-treated groups compared to control rats and PCB + DEP-treated rats, of which levels were significantly higher in both sexes of PCB-treated rats compared to both sexes of DEP-treated rats. Lipid peroxidation was significantly increased in the liver of both sexes of PCB, DEP and PCB + DEP treated rats compared to controls. These results indicate that PCB and DEP independently impair lipid metabolism and in combination, these agents severely affect carbohydrate metabolism in both sexes. In addition, there is significant gender based differences in response to both the xenobiotics individually as well as in combined form. The results of lipid peroxidation in liver also implicate that DEP is a strong peroxidant, of which male rats showed higher levels of peroxidation than female rats.

Key words : Diethyl phthalate (DEP), polychlorinated biphenyls (PCBs), liver, serum, cholesterol, triglycerides, glycogen, glucose.

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Cadmium chloride induced histopathological and biochemical changes in the testes of adult albino rats

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Abstract

Effect of Cadmium chloride administered intraperitoneally at 0.5(low-dose), 1.0 (medium-dose) and 2 (high-dose) mg/kg, body weight dose levels for 15 days was observed on the testes of adult albino rats. Cadmium chloride increased the activity of total protein by 6.5 fold; 3 and 4 fold increase occurs in the TC and TG levels. There is a significant increase occurs in the Ca⁺⁺ATP-ases and 59% and 32% reduction occurs in the Mg⁺⁺ATPase and Inorganic phosphatases. Histologically testes showed dose dependent seminiferous epithelial necrosis, degeneration and loss of spermatozoa. The changes were dose-dependent. These altered structural and biochemical changes associated with cadmium chloride intoxication along with altered membrane permeability may be responsible for the observed metabolic changes.

Key Words : Cadmium chloride, biochemical changes, testis, albino rat, histopathology.

BOOK REVIEWS

Essentials of Veterinary Pharmacology and Therapeutics authored by Harpal Singh Sandhu and Satyavan Rampal (PAU, Ludhiana) and published by Kalyani Publishers, Ludhiana/New Delhi (B-1/1292 Rajinder Nagar, Ludhiana-141 008) e mail: kalyanibook@yahoo.co.in, pages 1529, price Rs 575/-. ISBN 81-271-2642-4

The textbook on "Essentials of Veterinary Pharmacology and Therapeutics" authored by Harpal Singh Sandhu and Satyavan Rampal is a unique first edition of text material for veterinary students. The book provides an insight of molecular basis of drug action and its usage in therapeutics including many basic principles of Biochemistry, Physiology, Enzymology and the physical and chemical principles that govern body systems. The authors have integrated in one text, the essential elements of these disciplines in a practical manner. Furthermore the authors have concised these principles, theories and concepts in a very befitting manner and are easy to understand for the beginner who is interested in specializing in the discipline of Pharmacology.

The textbook has 1529 pages, divided into 13 sections consisting of 78 chapters. Each chapter has been written with some relevant background information on the physiology, pathology and clinical aspects which are required for better understanding of pharmacological and therapeutic principles in veterinary practice. For easy comprehension, schematic diagrams and tables have been so nicely concised so as to avoid confusion with other important features dealing with concepts of various drugs.

To start with the authors have covered in few pages abbreviations and symbols used in the book. Section 1 deals with general pharmacology, principles of pharmacokinetics, pharmacodynamics, development of new drugs and assaying methods of drugs. The general principles have been concised in 10 chapters and good amount of information has been tabulated nicely so as to give readers a clear understanding of the subject matter. Section 2 is entirely devoted to drugs acting on peripheral nervous system covering general considerations and neurotransmission, adrenergic agonists, antiadrenergic drugs, cholinergic agonists, anticholinergic drugs, drugs acting on autonomic ganglia and skeletal muscle relaxants. These topics have been covered in seven chapters with schematic diagrams that will help the students to understand the subject more clearly.

Section 3 covers wide topics related to central nervous system ranging from anesthetics, sedatives, anticonvulsants and stimulants. Due to "drug explosion" and availability of thousands of drugs, the main discussion has been restricted to the prototype or important substances in the group.

Section 4 is entirely devoted to autocoids and various types of anti-inflammatory, anti-pyretic and analgesic drugs used in veterinary practice. A number of drugs acting by different mechanisms to decrease intensity of inflammation and to alleviate pain have been concisely reviewed and well written.

Section 5 deals with drugs acting on the cardiovascular system. The authors have covered current material on myocardial stimulants, antiarrhythmics, vasodilators, antihypertensive drugs, drugs affecting hematopoietic system and general considerations which are helpful to students to understand the subject matter easily.

The sixth section covers renal function and fluid-electrolyte balance in four chapters. Emphasis has been given on diuretics, drugs acting on fluid, electrolyte and acid-base balance including tubular transport along with an insight into different mechanisms involved in maintenance of acid base balance with changing urinary pH. Drugs affecting gastrointestinal secretions, GIT motility and the drugs used to control the various functions have been dealt in section seven, whereas, drugs acting on the respiratory system have been nicely reviewed in section eight.

The contents of section 9 have been divided in 6 chapters. This section deals with endocrine system that includes pituitary, thyroid, parathyroid, adrenal, gonadal and pancreatic hormones. The first chapter of this section starts with general considerations of neuroendocrine system. The other chapters give clear understanding to the readers because not only the glands but also sites in the central nervous system with which these systems interact have been nicely integrated. Vitamins, both fat and water soluble and drugs acting on the immune system are part of sections 10 and 11 respectively.

The section 12 extensively covers details of chemotherapy which is an extremely important part of therapy used in veterinary practice. The authors have included the latest developments in antibiotics, drugs used in cancer and parasitic infections. The major emphasis is on sulphonamides, beta-lactam antibiotics, aminoglycosides, tetracyclines and amphenicols, macrolides and lincosamides, quinolones, urinary antiseptics, antifungal, antiviral, anthelmintics, antiprotozoal, drugs used against ectoparasites, antiseptics and antidisinfectants and antineoplastic drugs.

Finally in section 13 of the book, the authors have included several other chapters dealing with drugs acting on skin and mucous membranes, growth promoters and various drugs used in the treatment of poisonings. In addition, references have been included that will be useful to the readers to get additional information, if they, so desire. In the end, to facilitate calculation of dosage for dogs and cats a conversion table from body weight to surface area has been added.

In brief, the book gives excellent coverage of the subject matter with proper schematic diagrams and tables wherever necessary. The information has been very well compiled that will be extremely useful to students, teachers, scientists, academicians and every individual interested in the field of pharmacology. This book will be a valuable addition to the libraries of veterinary, drug industry, universities and other institutions. The book will also be useful to all those who would like to get the basic knowledge in learning and teaching because good textbooks are always pre-requisite to good teaching at the graduate and undergraduate level.

Authors have made an excellent effort in writing such a huge and useful volume for the veterinary students and they need to be congratulated for their untiring and inspiring contribution to this noble profession.

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Toxicology of Organophosphate & Carbamate Compounds edited by Ramesh C. Gupta, Murray State University, Breathitt Veterinary Center, Hopkinsville, Kentucky (first edition, 2006). Published by Elsevier Science, 1180 Westline Drive, St. Louis, MO 63146, USA.
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The book on "Toxicology of Organophosphate & Carbamate Compounds" edited by Ramesh C. Gupta is a unique reference book. This text/reference book provides the most comprehensive coverage of anticholinesterase compounds (Organophosphates and Carbamates), which constitute the largest number of chemicals that are primarily used as insecticides in agriculture, industry, and around the home/garden. Some OPs (nerve agents) have been used in chemical warfare and terrorist attacks, while some OPs and CMs have been recommended as therapeutic agents in human medicine as well as in veterinary medicine. Many chemicals of both classes are extremely toxic and lack selectivity, thus their inadvertent/accidental use continues to pose a threat to human and animal health, aquatic systems and wildlife. These anticholinesterase agents produce a variety of toxicological effects in target and non-target organs.

In light of this complexity, this multi-authored book is written by the well known scientists from many countries. The book covers 763 pages and is organized into nine sections, with a total of 49 chapters, to provide in-depth knowledge on various aspects of OP and CM compounds, including their use, classification, mechanism-based toxicity, and prophylactic and therapeutic measurements. Several chapters are written with special emphasis to cover timely topics, such as chemical warfare agents, physiologically based pharmacokinetic modeling, structure and function of cholinesterases, paraoxonase, carboxylesterases; developmental neurotoxicity, the intermediate syndrome, oxidative stress, endocrine disruption, and DNA damage/gene expression and carcinogenesis.

Section I deals with therapeutic uses, community preparedness and epidemiology whereas, section II is devoted to general principles of pharmacologically based pharmacokinetic modeling, kinetics and metabolism including interspecies variations of toxicity due to OP and CM compounds. Section III covers esterases and receptors with a major emphasis on non-cholinesterase mechanisms of central and peripheral neurotoxicity, paraoxonase polymorphism and development of tolerance to toxicity of cholinesterase inhibitors. The main body of the book (sections IV) discusses organ toxicity including *in vitro* testing, reproduction, placental toxicity, endocrinology and effects on the immune system. In section V, special areas of interest such as

oxidative stress, DNA damage and gene expression, and occupational toxicology and hygiene are covered. Section VI with 5 chapters is specifically devoted to risk assessment, safety and regulatory guidelines for pesticides. These issues are crucial to ensure that the research conducted on the toxicology of OP and CMs has actually an impact on human health and society at large. Issues related to ecotoxicology in the context of human toxicology have been reviewed in section VII. A novel topic dealing with biomarkers has been introduced and summarized in section VIII. The topic has direct reference both to human exposure and to effective assessment and, therefore, it holds major potential for prevention of risks induced by OPs. The another important aspect of veterinary importance is the treatment of poisoning cases. This issue has been excellently covered in section IX.

The efforts of both editor and authors are highly praiseworthy because the text of the volume has been well organized giving appropriate tables, figures in depth and comprehensive manner, covering important and novel issues. Thus the volume provides a thorough knowledge in the field of OP and CMs and will be immensely useful not only to scientists and teachers but also an excellent addition to the libraries and research professionals in government, industry, regulators, decision makers and students who want to specialize in this field of specialization.

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