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Spermicidal Action of Styrene Maleic Anhydride Polyelectrolyte in Combination with Magnetic and Electrically Conductive Particles

Rakhi K. Jha, Pradeep K. Jha, Suresh V.S. Rana and Sujoy K. Guha

The aim of this study is to evaluate impact of a new polymeric contraceptive SMA-Fe₃O₄-Cu-DMSO called Smart RISUG (acronym for Smart Reversible Inhibition of Sperm under Guidance), a colloidal suspension of styrene maleic anhydride co-polymer (SMA), nano-micro iron oxide (Fe₃O₄) and copper powder (Cu) (one milligram) dissolved in dimethylsulphoxide (DMSO) (1:30); on Albino rat's sperm solution (one milliliter). Experiments to assess the morphology and viability of control as well as treated sperm cells were performed by using microscopic techniques like High Resolution Transmission Electron Microscopy (HRTEM), Field Emission Scanning Electron Microscopy (FESEM), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM)-X ray microanalysis, phase contrast microscopy and Fluorescent Activated Cell Sorting (FACS). Treated cells indicate uniform adhesion of Smart RISUG particles to the sperm cell membrane, topological alteration, decrease in the cell count, reduced cell motility and viability, increased sperm abnormality and complete cell inactivation in about 72 h. This study suggests use of smart RISUG as a potential non-invasively reversible male/female contraceptive in future. (*International Journal of Pharmacology* 5 (1): 1-12, 2009; *doi*: 10.3923/ijp.2009.1.12)

Anticancer and Biochemical Effects of Calcium Chloride on Ehrlich Carcinoma Cell-Bearing Swiss Albino Mice

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The anticancer activity of calcium chloride was evaluated from the total count and viability of Ehrlich Ascites Carcinoma (EAC) cells and their proteins, nucleic acid, malondialdehyde (MDA) and Nonprotein sulfhydryl (NP-SH) groups in addition to observations on survival and the body weight changes. The tumors at site of injection were investigated for histopathological changes. The treatment with calcium chloride (50, 100 and 200 mg/kg/day) caused cytotoxic activity. These data are substantiated by biochemical and histopathological changes and are attributed to calcium ions, which are known to disrupt calcium homeostasis, produce ROS, damage mitochondria and cause DNA breaks. Nevertheless, these data were not in agreement with the results on survival and body weight of the

same animals. Treatment at the higher doses of calcium chloride increased the body weight and restricted the life span much earlier than the lower dose of calcium chloride and ADM. The discrepancy between these results might be due to the difference in the time of observation. While the experiments on cytotoxic activity, biochemical investigation and histopathology were conducted 10 and 5 days after the implantation of EAC cells and treatment, respectively, the observations on body weight and mortality were continued until death of all the animals or up to a maximum of 50 days. Data obtained in the present study demonstrate that treatment of calcium chloride at the higher doses had no influence on body weight and cause mortality as a long term effect, which might be due to co-morbidity of several diseases, caused by hypercalcemia and impairment of mitochondria. Further experiments are warranted on the use of a sufficient number of lower doses of calcium chloride to determine a pharmacologically effective and non-toxic dose. (*International Journal of Pharmacology* 5 (1): 13-21, 2009; doi: 10.3923/ijp.2009.13.21)

Antidepressant-Like Effects of an Ethanolic Extract of *Sphenocentrum jollyanum* Pierre Roots in Mice

E. Woode, N. Amidu, W.K.B.A. Owiredu, E. Boakye-Gyasi, C. Ansah and M. Duwiejua

In the present study, the effect of an ethanolic extract of the roots of the plant in two animal models of depression the Forced Swimming Test (FST) and Tail Suspension Test (TST) has been reported. The extract (100-1000 mg kg⁻¹; p.o.), dose-dependently reduced the duration of immobility in both the FST (ED₅₀: 296.20±53.97 mg kg⁻¹) and TST (203.90±39.01 mg kg⁻¹). The effect of the extract was 20-50 times less potent than imipramine and fluoxetine which were used as standards. Pretreatment with α -methyldopa (400 mg kg⁻¹; 3 h; p.o.) attenuated the anti-immobility effects of imipramine but not SJE and fluoxetine. Similarly, pretreatment with reserpine (1 mg kg⁻¹; 24 h; s.c.) abolished the effect of imipramine and partially the effects of SJE but not fluoxetine. A concomitant treatment with α -methyldopa and reserpine attenuated the effects of all but fluoxetine. The extract, imipramine and fluoxetine did not modify motor performance on the rotarod test at all doses tested. Putting all together, present results suggest that SJE has antidepressant-like effects in the model employed and may possibly exert its effects by modifying monoamine transport and/or metabolism. (*International Journal of Pharmacology* 5 (1): 22-29, 2009; doi: 10.3923/ijp.2009.22.29)

Quantification of Acute Renal Denervation Diuresis and Natriuresis in Sprague Dawley and Spontaneously Hypertensive Rats

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The present study was undertaken to quantify the renal salt and water excretory functions in response to acute unilateral renal denervation in Sprague Dawley (SD) and spontaneously hypertensive (SHR) rats in an attempt to characterize the relative contribution of renal sympathetic nerve activity (RSNA) to renal functional excretory responses in normotensive and hypertensive conditions. Adult male SD and SHR rats were fasted overnight, anesthetized with pentobarbitone sodium (60 mg kg^{-1} i.p.), denervated by application of phenol to the left renal artery and maintained on an intravenous (i.v.) infusion of normal saline for 2 h. Throughout this period, six urine and plasma samples were collected at 20 min intervals to study kidney function parameters. The data showed that there was a significantly higher ($p < 0.05$) amount of sodium and water excretions in the urine of denervated SD and SHR rats as compared to their innervated counterparts. No significant difference in the renal salt and water excretions was seen between innervated SD and SHR rats; however, the difference was significant ($p < 0.05$) following removal of renal sympathetic input. No appreciable changes in the mean arterial blood pressure (MAP) and plasma sodium (P_{Na}) were observed in denervated SD and SHR rats as compared to the innervated ones; yet, MAP values were significantly higher ($p < 0.05$) in denervated and innervated SHR rats in comparison to the denervated and innervated SD rats. Moreover, P_{Na} in denervated SHR rats, which was significantly higher ($p < 0.05$) in SHR rats as compared to SD rats prior to renal denervation, tended to approximate the one in denervated SD rats. In conclusion, this study confirmed the significant role played by the renal nerves in the control of renal functions. Diuresis and natriuresis are typical responses to acute renal denervation (ARD) in SD and SHR rats. Enhanced salt and water excretion following ARD in SHR rats suggests high renal sympathetic nerve discharge in these animals and highlights the significant contribution of renal nerves to the genetic model of essential hypertension. (*International Journal of Pharmacology* 5 (1): 30-36, 2009; doi: 10.3923/ijp.2009.30.36)

***Torreya nucifera* Essential Oil Inhibits Skin Pathogen Growth and Lipopolysaccharide-Induced Inflammatory Effects**

W.J. Yoon, S.S. Kim, T.H. Oh, N.H. Lee and C.G. Hyun

In this study, the chemical composition of *Torreya nucifera* essential oil (TEO) and its biological activities were analyzed. TEO was obtained by steam distillation

from leaves collected from Jeju Island and analyzed using gas chromatography (GC)-flame ionization detection (FID) and GC-MS. dl-Limonene (30.1%), δ -3-carene (15.37%) and α -pinene (11.5%) were the major components in TEO. The antibacterial and anti-inflammatory activities of TEO against skin pathogens have not previously been reported. Thus, we assessed the antibacterial activities of TEO using the disk diffusion method. TEO showed excellent antibacterial activities against *Propionibacterium acnes*, *Propionibacterium granulosum*, *Malassezia furfur*, *Staphylococcus epidermidis* and *Candida albicans*. The minimum inhibitory concentration (MIC) of TEO against these skin pathogens ranged from 2.5 to 20.0 $\mu\text{L mL}^{-1}$. In addition, TEO reduced the LPS-induced secretion of interleukin-1 β (IL-1 β), IL-6, NO and PGE₂ in RAW 264.7 cells, indicating that it has anti-inflammatory effects. Therefore, we suggest that TEO may be an attractive candidate for promoting skin health. (*International Journal of Pharmacology* 5 (1): 37-43, 2009; doi: 10.3923/ijp.2009.37.43)

Vasorelaxant Properties of *Loranthus ferrugineus* Roxb. Methanolic Extract

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In the present study, *Loranthus ferrugineus* was evaluated for blood pressure lowering activity using *in vitro* and *in vivo* animal experimental approaches. The fresh aerial parts of the plant were dried, pulverized into powder and successively extracted with petroleum ether, chloroform, ethyl acetate, methanol and water using hot extraction methods. Each of the extracts was dried under reduced pressure using rotary evaporator and subsequently freeze-dried. The effects of three different concentrations (0.5, 1 and 2 mg mL⁻¹ of each extract were examined on isolated rat aortic ring preparations and responses to cumulative doses of noradrenaline (NA) were measured. It was found that the relatively polar methanol extract was the most potent to produce a significant ($p < 0.05$) dose-dependent inhibition in the maximum response and to shift the dose-response curve of NA to the right which suggests that *Loranthus ferrugineus* methanolic extract (LFME) contains compound(s) with non-competitive inhibitory activity. In another set of experiments, LFME was found to be the most active in blood pressure lowering activity in anaesthetized normotensive Sprague Dawley (SD) rat model. Moreover, LFME produced a dose-dependent blood pressure lowering effect. Chemical analysis of LFME showed the presence of significant amounts of polyphenolic and flavonoid constituents. The data suggests that LFME contains some biologically active substances that produce a significant dose-dependent blood pressure lowering effect and vasodilatation is one of the possible

mechanisms which may explain its use in the management of hypertension. Furthermore, LFME effects can possibly be attributed to the high polyphenolic contents of this plant. (*International Journal of Pharmacology* 5 (1): 44-50, 2009; doi: 10.3923/ijp.2009.44.50)

Evaluation of the Reproductive Toxicity of Chlorpyrifos Methyl, Diazinon and Profenofos Pesticides in Male Rats

Nour El-Hoda A. Zidan

The toxic effects of organophosphorus pesticides (i.e., chlorpyrifos methyl, diazinon and profenofos) on male reproductive system of rats were evaluated. Rats received pesticides mixed with powdered feed at concentrations of 5 and 50 ppm of each pesticide for 65 successive days. Sex organs weight, semen picture, concentrations of the hormones [i.e., testosterone, Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH)], activities of acetylcholinesterase (AChE) and histopathological changes in testes were the criteria used to evaluate the reproductive toxicity of the treated rats. Results showed that the effect of all tested pesticides on testes and seminal vesicles weights was dose-dependent since all tested pesticides at 50 ppm significantly decreased their weights. Serum AChE activity was inhibited with all tested pesticides. Both the concentrations of the tested pesticides decreased sperm count associated with increase in the number of morphologically abnormal spermatozoa of treated rats; however sperm motility was significantly decreased with the highest concentration of the tested pesticides. A decrease in the serum testosterone was observed in all treated groups; however LH and FSH levels were decreased with the highest concentration of the tested pesticides. Tissues of treated rat's testes showed slight alterations when histopathologically examined especially with the higher concentrations. (*International Journal of Pharmacology* 5 (1): 51-57, 2009; doi: 10.3923/ijp.2009.51.57)

Modulation of Restraint Induced Gastric Oxidative Changes in Rats by Tocotrienol and Tocopherol

M.F. Nur Azlina, K. Rubaizah, M. Siti Muliana and M.I. Nafeeza

The present study compares the effect of tocotrienol mixture and α -tocopherol on gastric malondialdehyde (MDA), glutathione peroxidase (GPx), superoxide dismutase (SOD), reduced and oxidized glutathione (GSH and GSSG) content and prostaglandin E₂ level in rats exposed to restraint stress. Twenty-four male *Sprague dawley* rats were randomly assigned into 4 equal sized groups; two

control groups and two treated groups which were supplemented with either tocotrienol (TT) or α -tocopherol (TF) orally at a dose of 60 mg kg⁻¹ body weight. After 28 days of treatment, one control group, the TT and TF groups were subjected to restraint stress, 2 h daily for 4 consecutive days. After the last exposure to stress, the stomach was excised for the evaluation of the parameters. Present findings showed that TT was better in preventing the formation of gastric lesion compared to TF while both TT and TF significantly reduces the gastric MDA content compared to stress control. We also found that both TT and TF have the ability to reduce prostaglandin E₂ loss which was apparent with stress exposure. The endogenous content of antioxidant enzyme GPx activity and GSH content was maintained towards the normal levels in rats receiving TT but not in the TF treated group. The SOD level however was not altered in stressed rats. As a conclusion, tocotrienol posses a better protective effect against stress-induced gastric lesions compared to α -tocopherol. The protective effect was associated with decreased lipid peroxidation, increased prostaglandin E₂ (PGE₂) and restoration of GPx activity and GSH content which was altered by stress. (*International Journal of Pharmacology* 5 (1): 58-64, 2009; *doi*: 10.3923/ijp.2009.58.64)

Antisickling Activity and Thermostability of Anthocyanins Extract from a Congolese Plant, *Hymenocardia acida* Tul. (Hymenocardiaceae)

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Antisickling activity of anthocyanins extract from a Congolese plant (*Hymenocardia acida* Tul.) was evaluated using Emmel test. Chromatographic separations using chloroform-benzene (2:1) provided three fractions A₁, A₂ and A₃ with the most polar [A₁ (TLC, R_f = 0.21)] exhibiting the highest activity. Thermal kinetic degradation of this fraction at 100 and 120°C produced a first order rate constants k = 2.64×10⁻⁴ and 4.08×10⁻⁴, respectively. Structural elucidation of isolated compounds is in progress. (*International Journal of Pharmacology* 5 (1): 65-70, 2009; *doi*: 10.3923/ijp.2009.65.70)

Biological Activities of *Pereskia bleo* Extracts

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The aim of this study is to screen the hexane, dichloromethane, ethyl acetate and methanol extracts of *Pereskia bleo* (PB) for their antibacterial, anti-oxidant and

anti-cancer properties using disc diffusion method, DPPH assay and MTT cytotoxicity test, respectively. It is found that hexane and methanol extracts showed highly and moderately, respectively, considerable antibacterial activity towards two Gram-negative bacteria, *P. aeruginosa* 60690 and *S. choleraesuis*. Ethyl acetate extract showed a weak narrow spectrum activity ($\approx 35\%$ of streptomycin activity). The highest antibacterial activity on MRSA is obtained by DCM extract. Hexane extract was the most effective DPPH radical scavenger (37.55%). Ethyl acetate and DCM extracts were less effective free radical scavenger (16.1%). None of the extracts were cytotoxic significantly towards MCF-7, HT-29 and CEM-SS cell lines after 72 h incubation time ($IC_{50} > 30 \mu\text{g mL}^{-1}$). It could be concluded that antibacterial activity of *P. bleo* is the most promising biological activity attributed to this plant. (*International Journal of Pharmacology* 5 (1): 71-75, 2009; doi: 10.3923/ijp.2009.71.75)

Effect of Xylazine Sedation on Some Haematological Indices after Chloramphenicol Pre-Treatment in Sokoto Red Goats

M. Gweba, K.I. Onifade and O.O. Faleke

The effect of a single dose pre-treatment with chloramphenicol at 50 mg kg^{-1} given intramuscularly on xylazine sedation was evaluated on 6 Sokoto Red goats weighing 11-14 kg. The duration of xylazine sedation after xylazine administration at 0.2 mg kg^{-1} IM alone was 83.16 ± 10.95 min (control), as against 129 ± 1.78 and 157.83 ± 4.99 min for the other two pre-treatments with chloramphenicol, respectively. There was a significant ($p < 0.05$) decrease in the haemoglobin concentration for all treatments while a significant increase in the white blood cells count was observed for all treatments. Irrespective of weight variation, the goats in all exhibited the same clinical signs. It can be deduced from this research that chloramphenicol pre-treatment may prolong the duration of action of xylazine sedation. (*International Journal of Pharmacology* 5 (1): 76-80, 2009; doi: 10.3923/ijp.2009.76.80)

Antibacterial, Antifungal and Toxicity of Rare Iranian Plants

K. Keymanesh, J. Hamedi, S. Moradi, F. Mohammadipanah and S. Sardari

As a part of our drug discovery program, an effort to introduce new effective medicinal plants, with antibacterial, antifungal and cytotoxic properties was made. The extracts of aerial part of 8 plants, collected in southeastern Iran, were investigated against standard strains of *Bacillus subtilis*, *Enterococcus faecalis*,

Pseudomonas aeruginosa, *Salmonella enterica* subsp. *enterica* ser. Typhi, *Escherichia coli*, meticillin resistant *Staphylococcus aureus* (isolated from patients), *Fusarium oxysporum*, *Aspergillus niger*, and *Aspergillus fumigatus*. We used brine shrimp (*Artemia salina*) cytotoxicity bioassay in order to provide a better base for introducing the extracts as the new therapeutic candidates. *Capparis deciduas* (Forsk.) Edjw. and *Cleome oxypetala* Boiss. (both from Capparidaceae family) were recognized as having the potential for development of new antibiotics. On the other hand, *Cistanche tubulosa* (Schrenk) R. Wight, could be worthy of attention for finding anticancer phytochemicals. (*International Journal of Pharmacology* 5 (1): 81-85, 2009; doi: 10.3923/ijp.2009.81.85)

Dual Effects of Interaction Between Meloxicam, Diclofenac Sodium or Tramadol and Nitrogen Species Radicals: *In vitro* Comparative Study

M.S.M. Al-Nimer and E.A. Ali

This study aimed to investigate the interaction between synthetic peroxy nitrite or sodium nitroprusside (nitric oxide donor) and meloxicam, diclofenac sodium or tramadol HCl. Meloxicam, diclofenac sodium or tramadol HCl (100-500 µg) were incubated in phosphate buffer saline in presence or absence of synthetic peroxy nitrite (180 µM) or sodium nitroprusside as nitric oxide donor (10 mM). The level of peroxy nitrite and nitric acid in solution were measured using UV-visible spectrophotometer. The results showed that meloxicam scavenged synthetic peroxy nitrite and involved in peroxy nitrite mediated phenol nitration when it incubated alone in phosphate buffer. All tested compounds, *in vitro*, behaved like sodium nitroprusside in releasing nitric oxide. Both meloxicam and diclofenac sodium reduced the activity of sodium nitroprusside-releasing nitric oxide. Tramadol HCl was not interacted with sodium nitroprusside at any concentration. We concluded that selective or non selective nonsteroidal anti-inflammatory drugs reduced the activity of nitric oxide donor while tramadol HCl is free from this effect. (*International Journal of Pharmacology* 5 (1): 86-89, 2009; doi: 10.3923/ijp.2009.86.89)

Solid Lipid Nanoparticles Preparation and Characterization

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The presents study aimed to prepare and characterize Solid Lipid Nanoparticles (SLNs) from palm oil materials. Hydrogenated palm oil and lecithin incorporated

with surfactant were mixed and formed by High Pressure Homogenization (HPH) at elevated temperature. Appropriate analytical methods are needed for the characterization of SLN. The use of several analytical techniques is a necessity such as particle size which determined using Photon Correlation Spectroscopy (PCS). The change of particle charge was studied by Zeta Potential (ZP) measurements, while the melting and recrystallization behavior characterized by Differential Scanning Calorimetry (DSC). Data showed physical stability of the formulation. In conclusion, the SLN presented here are well suited for several applications including drug delivery. (*International Journal of Pharmacology* 5 (1): 90-93, 2009; doi: 10.3923/ijp.2009.90.93)

Evaluation of the Proposed Inhibitory Effect of the Aqueous Stem-Bark Extract of *Ficus exasperata* on Uterine Preparations *in vitro*

E.E. Bafor, M. Nwiko, E.K.I. Omogbai, R.I. Ozolua and Z.A.M. Nworgu

The effect of the aqueous stem-bark extract of *Ficus exasperata* (ASE) was studied on oxytocin- and acetylcholine-induced uterine contractions in uterine preparations isolated from non-pregnant Sprague-Dawley rats in oestrus. Preliminary phytochemical analysis was also performed. There were no statistically significant increases in the concentrations of oxytocin and acetylcholine required to elicit 30 and 50% of maximum response (EC₃₀ and EC₅₀, respectively) in the presence of the extract. Salbutamol and atropine, however, significantly inhibited the effects of oxytocin and acetylcholine, respectively. Phytochemical analysis revealed the presence of alkaloids, tannins and saponin glycosides. These results indicate that ASE possesses no inhibitory effect on the non-pregnant rat uterus as claimed by traditional healers. (*International Journal of Pharmacology* 5 (1): 94-97, 2009; doi: 10.3923/ijp.2009.94.97)

Antimicrobial Activity of Essential Oil from *Nelumbo nucifera* Gaertn. Pollen

Chaiyasit Sittiwet

The *Nelumbo nucifera* Gaertn. pollen essential oil was extracted by using vapor distillation. Antimicrobial activity of *Nelumbo nucifera* Gaertn. pollen essential oil has been investigated using agar diffusion susceptibility test and broth macro-

dilution. The essential oil were tested against both gram positive (*S. aureus* ATCC 25923, *S. epidermidis* ATCC 12228, *M. luteus* ATCC 9341, *B. subtilis* ATCC 6633 and *L. plantarum* ATCC 14917) and gram negative (*E. coli* ATCC25922, *S. typhimurium* ATCC 14028, *K. pneumoniae* ATCC 10031, *P. vulgaris* ATCC 13315, *Ps. aeruginosa* ATCC 9721) bacteria using agar diffusion susceptibility test. Significant zone of inhibition were observed for *S. typhimurium* ATCC14028 and *E. coli* ATCC25922). The MICs and MBCs are 10-40 and 20-80 ml L⁻¹, respectively. *Nelumbo nucifera* pollen essential oil show inhibitory effect on growth of food born pathogen bacteria in low concentration which indicated the possibility of used as food preservation additive. (*International Journal of Pharmacology* 5 (1): 98-100, 2009; *doi*: 10.3923/ijp.2009.98.100)

Anti-Nociceptive Effects and the Mechanism of *Palisota hirsuta* K. Schum. Leaf Extract in Murine Models

E. Woode, E. Boakye-Gyasi, G.K. Ainooson, C. Ansah and M. Duwiejua

The anti-nociceptive effect of an ethanolic leaf extract of *Palisota hirsuta*, a plant used locally in Ghana for various painful conditions was assessed, using various pain models. *Palisota hirsuta* extract (PHE) together with morphine and diclofenac (positive controls), all showed significant dose-dependent anti-nociceptive activity in all the models used, that is the tail withdrawal test, the inflammatory-induced mechanical hyperalgesia test, the acetic acid induced writhing test and the formalin test. The anti-nociceptive effect exhibited by PHE in the formalin test was reversed by the systemic administration of the non-selective opioid antagonist, naloxone, the NO synthase inhibitor, N^o-nitro-arginine methyl ester (L-NAME) and the ATP-sensitive K⁺ channel inhibitor, glibenclamide. However, theophylline, a non-selective adenosine receptor antagonist did not reverse this effect. PHE, unlike morphine, did not induce tolerance to its anti-nociceptive effect in the formalin test after chronic administration and also morphine tolerance did not cross-generalize to PHE. Overall, the present results demonstrate that the anti-nociceptive effects of PHE might partially or wholly be due to the stimulation of peripheral opioid receptors through the activation of the nitric oxide-cyclic GMP-ATP-sensitive K⁺ (NO/cGMP/K⁺ATP)-channel pathway without tolerance induction after chronic administration. (*International Journal of Pharmacology* 5 (2): 101-113, 2009; *doi*: 10.3923/ijp.2009.101.113)

Safety Evaluation of Long Term Treatment of Methanol Sub-Fraction of Seeds of *Carica papaya* as a Male Contraceptive with Particular Emphasis on Carcinogenicity in Albino Rats

S. Goyal, B. Manivannan, A.S. Ansari and N.K. Lohiya

A preliminary study to evaluate if long term treatment of Methanol Sub-Fraction (MSF) of the seeds of *Carica papaya* as a male contraceptive would develop neoplastic lesions in vital organs was carried out in albino rats at 50, 250 and 500 mg kg⁻¹ b.wt. day⁻¹ for a period of 24 months, with a minimum dose being one therapeutic dose. Pre-terminal deaths, 45% in males and 48% in females, well within the acceptance limit, were reported to be age related and not treatment related, resulted due to general/respiratory/gastrointestinal/ urogenital disorders in both males and females of control and treated animals. Skin peeling, withering of fur leaving skin patches were observed in few of the animals after 18 months of treatment. Absence of spermatozoa in the cauda epididymis was evident in all the treated animals. No major structural changes compared to control were evident in the vital organs. Serum testosterone, serum electrolytes, tissue biochemical, hematology and clinical chemistry were comparable to those of control animals, suggesting no adverse effect of the test substance following long term treatment. The results provided evidence that the methanol sub-fraction of the seeds of *Carica papaya* does not lead any development of neoplastic lesion following life term treatment for 24 months in rats and is safe enough to be permitted for further trials as a male contraceptive. (*International Journal of Pharmacology* 5 (2): 114-125, 2009; doi: 10.3923/ijp.2009.114.125)

Selenomethionine Induced Changes on the Binding of Spermine with DNA: A Study by Fourier Transform Raman and Fourier Transform Infra Red Spectroscopy

N. Iyandurai and R. Sarojini

In this research, FT Raman and FTIR spectroscopy had been used to extend our knowledge about spermine-DNA and selenomethionine-spermine-DNA interaction at different volume ratios. The analysis of FT Raman and FTIR data supported the existence of structural specificities in the interaction. From the observed results, the effect of spermine on DNA is reversed when selenomethionine is added with spermine-DNA complexation. For example, band at 1511 cm⁻¹ is assigned to an adenine carbon-carbon stretching vibration. This

band shifts downward by 3 cm^{-1} in the spectra of spermine-DNA of all the complexes studied. Similarly this band shifts upward by 2 cm^{-1} in the spectra of selenomethionine-spermine-DNA of all the complexes studied. (*International Journal of Pharmacology* 5 (2): 126-136, 2009; doi: 10.3923/ijp.2009.126.136)

Effect of Green and Black Teas on Immobilization Induced Stress in Male Wistar Albino Rats

Salim S. Al-Rejaie

The present study was undertaken to investigate the potential of green and black teas to modulate restraint stress-induced oxidative changes in male Wistar albino rats. Repeated immobilization for 4 h daily for five consecutive days per week (for 2 and 4 weeks) was used as a test model. Repeated immobilization stress significantly decreased glutathione (GSH), RNA and total protein levels, while malondialdehyde (MDA) levels were elevated in brain and liver tissues. Daily drinking of green or black tea only attenuated the RNA decrease and the MDA increase in stressed groups in liver tissues. Green tea group attenuated the decrease in GSH and RNA and the increase in MDA induced by immobilization stress in brain tissues. However, black tea only attenuated the increase in brain MDA in stressed animals. The effect of green tea on restraint stress was higher in brain than liver. In conclusion, the present results revealed that the antioxidative effect of green tea during immobilization stress was higher, possibly attributed to the presence of relatively higher concentrations of flavonoids than in black tea. (*International Journal of Pharmacology* 5 (2): 137-145, 2009; doi: 10.3923/ijp.2009.137.145)

Inhibition of Ethanol-Induced Gastric Mucosal Damage by Carvedilol in Male Wistar Albino Rats: Possible Biochemical Changes

Salim S. Al-Rejaie

The effect of acute carvedilol (a third-generation nonselective β -blocker) pretreatment on gastric mucosal injury induced by 80% ethanol was investigated in male Wistar albino rats. The effects caused by pylorus ligation, accumulated gastric acid secretions and ethanol-induced changes in gastric mucus secretions, levels of proteins, nucleic acid, malondialdehyde (MDA) and non-protein

sulfhydryl groups (NP-SH) in the stomach wall were investigated. The gastric ulcers were induced by administration of 1 mL of 80% ethanol, as a necrotizing agent into the stomach. Carvedilol pretreatment at two oral doses of 30 and 60 mg kg⁻¹ body weight were found to protect against the ulcerogenic effects of ethanol. Same dose regimen of carvedilol offered significant protection against ethanol-induced damage on the parameters evaluated for histopathology. Furthermore, the pretreatment afforded a significant inhibition of pylorus ligated accumulation of gastric acid secretions and ethanol-induced depletion of stomach wall mucus, nucleic acids, proteins and NP-SH contents. Only higher dose of carvedilol provided inhibition of ethanol-induced increase in MDA concentration. The protective effects of carvedilol against gastric secretion or damage to the gastric-wall mucosa may be mediated through its effects on mucus production and NP-SH concentrations, possible free-radical scavenging ability and/or cytoprotective properties. (*International Journal of Pharmacology* 5 (2): 146-154, 2009; doi: 10.3923/ijp.2009.146.154)

A Preliminary Study of Dexamethasone Against Ischemia/Reperfusion Liver Injury in Rats

Amr A. Fouad, Mahmoud H. El-Bidawy, Arif Mohy Uddin and Mohamed T. Yacoubi

The hepatoprotective effect of dexamethasone was investigated in rats exposed to ischemia/ reperfusion liver injury. Ischemia was induced by clamping the pedicle of the left hepatic lobe for 1 h followed by 3 h of reperfusion. Dexamethasone was administered 24 h before the ischemic insult in two i.p., doses (10 mg kg⁻¹, each) with 12 h interval. Dexamethasone significantly attenuated the ischemia/reperfusion-induced elevations in serum aminotransferase and hepatic levels of tumor necrosis factor- α and nitric oxide. Dexamethasone also significantly compensated deficits in hepatic antioxidant defense mechanisms (reduced glutathione and catalase and superoxide dismutase activities) and suppressed lipid peroxidation observed with liver hypoxia-reoxygenation. This was associated with significant restoration of the ischemia/reperfusion-induced increase in hepatic caspase-3 activity. Neutrophil infiltration and hepatocellular necrosis and apoptosis detected by histopathological examination of liver tissue were markedly ameliorated by pre-ischemic dexamethasone treatment. In conclusion, dexamethasone can be considered a potential therapeutic agent to protect against the major clinical challenge of liver injury resulting from ischemia/reperfusion. (*International Journal of Pharmacology* 5 (2): 155-161, 2009; doi: 10.3923/ijp.2009.155.161)

Anti-Angiogenic and Anti Oxidant Properties of *Orthosiphon stamineus* Benth. Methanolic Leaves Extract

H.B. Sahib, A.F. Aisha, M.F. Yam, M.Z. Asmawi, Z. Ismail, S.M. Salhimi, N.H. Othman and A.M.S. Abdul Majid

Angiogenesis is a process by which new blood vessels are formed from the pre-existing blood vessel. *Orthosiphon stamineus* Benth. OS has been used as a medicinal herb for many centuries. Due to the presence of high level of anti-oxidants and phenolic content compounds in OS and the effect of anti-oxidants and phenolic compounds being anti-angiogenic, the perturbation of new blood vessels ability of OS was tested. Dry powdered leaves of the OS plant were extracted with Petroleum Ether (PE), chloroform (CE), methanol (ME) and water (WE) by using sequential cold maceration method. The ME of OS has the highest anti-angiogenic activity ($93.28 \pm 1.24\%$) in the rat aortic assay followed by CE ($85.55 \pm 1.64\%$), PE ($51.54 \pm 4.12\%$) and WE ($50.22 \pm 1.23\%$) in descending order of reactivity. The methanol extract was also found to have potent anti-oxidant activity in the 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity assay. The IC_{50} value was measured to be 0.286 mg mL^{-1} . The total phenolic content of 1 mg mL^{-1} of methanol extract was equal to 38.27%. (*International Journal of Pharmacology* 5 (2): 162-167, 2009; doi: 10.3923/ijp.2009.162.167)

The Decoction of Leaves of *Phyllanthus discoideus* Possesses Anticonvulsant and Sedative Properties in Mice

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The aim of this study is to scientifically look for sedative and anticonvulsant properties of the decoction of *Phyllanthus discoideus* Baill (*P. discoideus*) in mice. The *in vivo* models of epilepsy were used to evaluate the anticonvulsant properties of the plant. These models were maximal electroshock-, N-methyl-D-aspartate-, pentylenetetrazol-, isonicotinic hydrazide- acid and strychnine- induced convulsions or turning behavior in mice. The potentiation of sleep induced by diazepam in mice was used for the determination of the sedative properties. Four doses of the plant in the decoction were used: 17.1, 42.7, 85.5 and 171 mg kg^{-1} . The decoction of the leaves of *P. discoideus* strongly increased the total sleep time ($p < 0.001$) induced by diazepam and precipitated its onset ($p < 0.001$). The

decoction also protected mice against maximal electroshock- ($p < 0.001$), pentylenetetrazol- ($p < 0.001$), strychnine- ($p < 0.001$) and N-methyl-D-aspartate-induced seizures or turning behavior ($p < 0.001$). Finally, the decoction increased the latency to the onset of seizure in isonicotinic hydrazone acid test ($p < 0.001$). In conclusion the decoction of *P. discoideus* possesses anticonvulsant and sedative properties in mice. The presence of these properties could explain its use in traditional medicine in Cameroon in the treatment of insomnia and epilepsy. (*International Journal of Pharmacology* 5 (2): 168-172, 2009; **doi**: 10.3923/ijp.2009.168.172)

Effect of Protein Depletion on Host and Tumor Response to Paclitaxel in Experimental Animals

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The present study is aimed to examine the possible effects of Protein Malnutrition (PM) on the therapeutic activity and toxicity of paclitaxel in mice implanted with Ehrlich carcinoma cells. Mice that were fed either with standard or low protein diets were treated with a single dose of paclitaxel (10 mg kg^{-1} , i.p.). Paclitaxel administration increased the tumor growth delay of Ehrlich carcinoma from 2.8 days in protein deficient animals to 4.9 days in normal feeding mice and this represented about 43% increase in tumor growth delay. Furthermore, protein deficiency also interfered with the antitumor activity of paclitaxel. The percent survival of tumor-bearing mice after paclitaxel treatment were 56 and 19% in normal fed and protein deficient animals, respectively. Moreover, Paclitaxel administration increased the serum level of creatine phosphokinase isoenzyme (CPK-MB) in both groups, with maximum effect appeared after 48 h. Seventy two hours later, the levels were reduced to the normal values in normal fed animals while in protein malnourished mice, the activity was found to be high. In addition, paclitaxel administration significantly increased the plasma histamine concentration after 10 min and persisted for 120 min in animals on protein malnourished diet, however, in animals on a normal fed diet, histamine concentration reached the normal level after 120 min of paclitaxel administration. In conclusion, Paclitaxel administration exerts its toxic effects on both protein malnourished and normal feeding animals, however, its toxicity is enhanced and therapeutic activity is reduced in the protein deficient animals. (*International Journal of Pharmacology* 5 (2): 173-177, 2009; **doi**: 10.3923/ijp.2009.173.177)

The Effect of Oxamate on Fertilization Capacity of Mouse Sperm *in vitro*

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This study was conducted *in vitro* to show the effect of oxamate on motility and fertility of the mouse. The spermatozoa were extracted from the caudal part of epididymis. The study animals divided into four groups: (1) control group in TYH medium+5 mg mL⁻¹ BSA; (2) test groups in TYH medium in which contain 10 Mm oxamate; (3) test groups in TYH medium in which contain 20 Mm oxamate and (4) test groups in TYH medium in which contain 30 Mm oxamate. All four groups were incubated for 90 min to obtain capacitation. Further their motility was checked after incubation time. The mice were super ovulated with PMSG and HCG hormones to obtain oocytes. Total of 600 oocytes were collected and cultured in drops of KSOM medium+5 mg mL⁻¹ BSA, then for fertilization process received spermatozoa from different groups of mentioned above. After 24-26 h, the rate of fertilization was checked. The results of this research indicated that oxamate at the concentration of 20 and 30 Mm significantly reduce ($p < 0.05$) the progress of motility and fertility. Statistical analysis showed that percentage of the sperm progress motility in both concentration of 20 and 30 Mm was significantly differ ($p < 0.05$) in compare with control group and in concentration of 10 Mm, respectively. The same results were obtained in the case of fertility. These findings suggested that oxamate has an inhibitory role on motility and fertility of mouse sperm. (*International Journal of Pharmacology* 5 (2): 178-180, 2009; doi: 10.3923/ijp.2009.178.180)

Anti-Arthritic Effects of *Palisota hirsuta* K. Schum. Leaf Extract in Freund's Adjuvant-Induced Arthritis in Rats

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The anti-arthritic effect of an ethanolic leaf extract of *Palisota hirsuta*, a plant used locally in Ghana for various painful inflammatory conditions was assessed, using the Freund's adjuvant induced-arthritis model in rats. *Palisota hirsuta* Extract (PHE) as well as dexamethasone and methotrexate, used as positive controls, showed significant dose-dependent anti-arthritic properties prophylactically, curatively and also in combination therapy. PHE (30-300 mg kg⁻¹) significantly reduced the arthritic edema in the ipsilateral paw with the highest

dose used giving a maximum inhibition of $13.02 \pm 8.77\%$. PHE 300 mg kg^{-1} also significantly prevented the spread of the edema from the ipsilateral to the contralateral paw indicating inhibition of systemic spread. Dexamethasone ($0.3\text{-}3 \text{ mg kg}^{-1}$) and methotrexate ($0.1\text{-}1.0 \text{ mg kg}^{-1}$) significantly and in a dose dependent manner also inhibited polyarthritis edema as well as completely preventing the spread of the arthritis from the ipsilateral to the contralateral paws of the treated animals. PHE in combination with methotrexate did not show any significant effect, however, there was a significant inhibition of arthritis in both the acute and the polyarthritis phases when PHE was combined with dexamethasone. Dexamethasone in combination with methotrexate gave the greatest inhibition of both phases with an extreme level of significance as expected. Overall, the present results demonstrate that PHE has anti-arthritic effect which could be similar to that exhibited by methotrexate. (*International Journal of Pharmacology* 5 (3): 181-190, 2009; doi: 10.3923/ijp.2009.181.190)

Vascular Responsiveness to *Macrosolen cochinchinensis* Extracts in Isolated Rat Thoracic Aorta

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The aim of the current investigation was to examine the vascular responsiveness to different extracts obtained from *M. cochinchinensis* using isolated Sprague Dawley (SD) rat aortic rings preparations. The fresh aerial parts of the plant were dried, pulverized into powder and sequentially extracted with petroleum ether, chloroform, methanol and water using hot extraction method. The effects of three concentrations ($0.5, 1$ and 2 mg mL^{-1}) of each extract on rat thoracic aorta were tested using cumulative concentrations of noradrenaline (NA). The data showed that all the extracts had the ability to relax vascular smooth muscle; however, high concentrations of the methanol and water extracts caused the most significant ($p < 0.05$) reduction in NA-induced vasoconstriction as compared to petroleum ether and chloroform extracts. Polyphenolic content, HPLC profiling and IR spectra were indicative of the presence of diterpenoid constituents. The results collectively suggested the presence of some biologically active ingredients of possible diterpenoid nature that have the ability to modulate the action of naturally occurring vasoactive agents such as NA on vascular smooth muscle responses *in vitro*. (*International Journal of Pharmacology* 5 (3): 191-199, 2009; doi: 10.3923/ijp.2009.191.199)

Antihyperglycemic, Hypolipidemic and Antioxidant Enzymes Effect of *Strobilanthes crispus* Juice in Normal and Streptozotocin-Induced Diabetic Male and Female Rats

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The aim of the present study was to investigate the effect of *Strobilanthes crispus* juice on glucose, lipid profile, glutathione peroxidase and superoxide dismutase in normal and streptozotocin-induced diabetic male and female albino Sprague-Dawley rats. This study was conducted on normal and streptozotocin-induced diabetic male and female Sprague-Dawley rats fed with basal diet and *S. crispus* juice with different doses 1.0, 1.5 and 2.0 mL kg⁻¹ b.wt. for 30 days. The results showed that significant (p<0.05) decrease in serum glucose levels in male and female diabetic and normal rats with treated *S. crispus* juice (1.0, 1.5 and 2.0 mL kg⁻¹ b.wt.). Cholesterol and triglyceride level significantly (p<0.05) decreased in diabetic rats treated with 1.0, 1.5 and 2.0 mL kg⁻¹ b.wt. of *S. crispus* juice. Cholesterol, triglyceride and LDL-cholesterol level showed reduction in treated male and female normal rats. HDL-cholesterol showed the increasing but not significant (p<0.05) difference in treated diabetic and normal male and female rats. Glutathione peroxidase and superoxide dismutase activities significantly (p<0.05) increased in treated diabetic and normal male and female rats. In conclusion, *S. crispus* juice possesses antihyperglycemic, hypolipidemic and antioxidant effect in streptozotocin-induced diabetic rats. Thus, *S. crispus* juice could be the alternative treatment for lowering glucose, cholesterol and triglyceride for diabetic patients in the future. (*International Journal of Pharmacology* 5 (3): 200-207, 2009; doi: 10.3923/ijp.2009.200.207)

Efficacy and Safety of Folic Acid During Toxic Hepatitis Induced by Acute Overdose of Paracetamol

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Paracetamol, a major cause of acute liver failure represents a significant clinical problem. Intake of a large dose of paracetamol (APAP) may result in severe hepatic necrosis. Oxidative stress mediated by oxidative capacities of the APAP metabolite (N-acetyl-P-benzoquinon-imine (NAPQI)) is considered as the main cause of hepatotoxicity of APAP. This labor therefore seeks to induce liver damage in rats using single dose of APAP and to evaluate the possible protective effects of administration of folic acid on APAP induced liver damage in rats. Serum transaminases and lactic dehydrogenase levels were assessed as markers of hepatic damage. Also, bilirubin, total protein, albumin, globulin and A/G ratio

were analyzed. Equally, comparative effects of folic acid on the markers were also evaluated. Paracetamol caused liver damage as evident by statistically significant increased in the activities of alanine aminotransferase, aspartate aminotransferase and alkaline phosphates. There were general statistically significant losses in the activities of lactic dehydrogenase and an increase in total bilirubin and protein with significant decrease in A/G ratio in paracetamol treated group compared with the control group. Also, the histopathological examination of liver showed marked degeneration of hepatic cells and necrosis with congested portal vein and dilated hepatic sinusoid. However, folic acid was able to counteract the effect of APAP. The present results suggest that folic acid can act as hepatoprotective against paracetamol toxicity and that the mechanism by which they do this is by acting as antioxidants. (*International Journal of Pharmacology* 5 (3): 208-214, 2009; *doi*: 10.3923/ijp.2009.208.214)

Comparative Effect of Vitamins A and E on Gasoline Vapours-Induced Haematotoxicity and Weight-Loss in Male Rats

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Comparative effect of vitamins A and E on gasoline vapours haematotoxicity, growth-depression and weight-loss was assessed in male Wistar albino rats. The rats were exposed to gasoline vapours ($17.8 \pm 2.6 \text{ cm}^3/\text{h}/\text{m}^3/\text{day}$), 6 h/day, 6 days/week for 20 weeks. Vitamins A (retinol) and E (α -tocopherol) at prophylactic dosage (400 and 200 IU/kg/day, respectively) were orally administered to the rats separately, in the last 2 weeks of exposure. The levels of haemoglobin (Hb), haematocrit or Packed Cell Volume (PCV), Red Blood Cells (RBC), growth-rate and weight-gain in the rats exposed to the vapours were significantly lower ($p < 0.05$) compared, respectively to the levels obtained for control rats. On the other hand, the levels of White Blood Cells (WBC) in the test rats were significantly higher ($p < 0.05$) compared, respectively with the level obtained for male control rats. These observations indicate that exposure to gasoline vapours may cause haematotoxicity, growth-depression and weight-loss in male rats. However, administration of vitamins A and E was observed to produce a significant recovery ($p < 0.05$) in haematotoxicity, growth-depression and weight-loss observed to be associated with exposure to gasoline vapours, although, the rats administered with vitamin E were noted to respond more favourably than those administered with vitamin A. This suggests that although retinol and α -tocopherol may be used to reverse or prevent haematotoxicity, growth-depression and weight-loss in subjects exposed to gasoline vapours, the reversal potency of α -tocopherol is higher than that of retinol. (*International Journal of Pharmacology* 5 (3): 215-221, 2009; *doi*: 10.3923/ijp.2009.215.221)

Hepatoprotective Activity of *Coccinia grandis* Leaves Against Carbon Tetrachloride Induced Hepatic Injury in Rats

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Coccinia grandis Linn. (Cucurbitaceae) is a perennial branched handsome tendril climber, distributed through out India. It has been used in folk medicine for the treatment of jaundice. The aim of this work was to study the hepatoprotective effect of crude ethanolic and aqueous extracts from the leaves of *C. grandis* against liver damage induced by CCl_4 in rats. The ethanolic extract at an oral dose of 200 mg kg^{-1} exhibited a significant ($p < 0.05$) protective effect as shown by lowering serum levels of glutamic oxaloacetic transaminase, glutamic pyruvic transaminase, alkaline phosphatase, total bilirubin and total cholesterol and increasing levels of total protein and albumin levels as compared to silymarin, the positive control. These biochemical observations were supported by histopathological examination of liver sections. The activity may be due to the presence of flavonoid compounds. The extracts showed no signs of acute toxicity up to a dose level of 2000 mg kg^{-1} . Thus it could be concluded that ethanolic extract of *C. grandis* leaves possesses significant hepatoprotective activity. (*International Journal of Pharmacology* 5 (3): 222-227, 2009; doi: 10.3923/ijp.2009.222.227)

Evaluating the Antibacterial Activity and *in vivo* Assay of Methanolic Extract of *Stichopus badiionotus*

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This study investigated the antibacterial activity of the methanolic extract of the animal to justify its use in traditional medicine. Antimicrobial activity was assayed by disc diffusion method and broth macro dilution method. From the result it appeared that the methanolic extract of *Stichopus badiionotus* displayed antibacterial activities against *Staphylococcus aureus*, three non resistant strains and three multiple resistant strains. The Minimum Inhibitory Concentration (MIC) of the extract against non resistant strain values were 3.75 mg mL^{-1} and for resistant strain values 7.50 mg mL^{-1} . Further more, this extract tested on rats in wound infection model justified faster healing rates compared to antibiotics. These results indicate that the traditional use of these holothurians for the treatment of *S. aureus* infection mainly on resistant strains should be elucidate to bring out the potential antibacterial agent. (*International Journal of Pharmacology* 5 (3): 228-231, 2009; doi: 10.3923/ijp.2009.228.231)

Assessment of Inhaler Technique in Patients Attending a Chest Hospital in Riyadh City

M.I. Al-Hassan

The study population consisted of patients diagnosed with Chronic Obstructive Pulmonary Disease (COPD), who were maintained on MDIs. The data was collected through structured questionnaire on demographic data, patient information characteristics and possible factors that might affect proper MDI utilization and scoring system to assess the technique. The results obtained demonstrated defective use of MDIs, which warrants education of the society and public awareness. Health professionals, including pharmacists should be well prepared to train the patients for their correct use. The present study concludes that most patients use the inhalers incorrectly. Thus, education of the society is an important factor that may increase public awareness about medication and therefore improve patient compliance. More studies are needed to assess health professionals' knowledge about use of inhalers and role of pharmacists in teaching patients their proper use. (*International Journal of Pharmacology* 5 (3): 232-235, 2009; doi: 10.3923/ijp.2009.232.235)

Anti-Nociceptive Assets of Coral Associated Gastropod, *Drupa margariticola*

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The extract of gastropod, *Drupa margariticola* tested for their analgesic assets using chemical (acetic acid) induced and hot plate method on Swiss mice model showed promising results. One hundred percent column purified extracts of the *D. margariticola* (25 and 100 mg kg⁻¹ p.o.) exhibited significant (p<0.001) writhing inhibition of 65 and 78.57%, respectively against acetic acid induced abdominal constrictions. The result of hot plate study, in the difference between the mean reaction time and increased percentage of jump response of test animals in the treated groups, control and standard groups were statistically significant (p<0.001). At 30 min, the mean reaction time for extracts (50 mg kg⁻¹ p.o.) group was 6.67±1 sec, when compared to control group (2.67±0.52 sec) and pentazocine treated groups (11.5±1.22 sec) for 100 mg kg⁻¹ p.o. These facts suggest that the 100% acetone fraction of the *D. margariticola* was shown the strongest analgesic action. The important results obtained in present study were central and peripheral analgesic activities demonstrated by the inhibitory action on the acetic acid induced writhings and hot plate models. The hot plate method was

found to be suitable in the evaluation of centrally acting analgesic action but not for peripherally acting analgesic action. (*International Journal of Pharmacology* 5 (3): 236-239, 2009; **doi:** 10.3923/ijp.2009.236.239)

***In vitro* Antimicrobial Activity of *Schefflera leucantha*: The Potential of Respiratory Tract and Urinary Tract Infection Treatment**

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The antimicrobial activity testing to evaluate the possibility of *S. leucantha* for treatment of nosocomial infection such as respiratory tract and urinary tract infections. The aerial part of *S. leucantha* was extracted using aqueous system with yield of 0.7-1.3% of dried weight of dried plant's powder. The antibacterial activity of *S. leucantha* aqueous extract has been screened using agar diffusion method. The *S. leucantha* aqueous extract showed inhibitory effect on growth of *L. plantarum* ATCC 14917, *E. coli* ATCC 25922, *K. pneumoniae* ATCC 10031 and *P. vulgaris* ATCC 13315. The MICs of *S. leucantha* are in the range of 8-16 g L⁻¹ while MBCs are in the range of 16-32 g L⁻¹. In conclusion, the aqueous extract of *S. leucantha* showed inhibitory effect on growth of respiratory tract and urinary tract infection bacteria at low concentration. This result may give supporting data of used *S. leucantha* as nosocomial infection treatment. (*International Journal of Pharmacology* 5 (3): 240-243, 2009; **doi:** 10.3923/ijp.2009.240.243)

Fatty Acid Profile, α -Tocopherol Content and Total Antioxidant Activity of Oil Extracted from *Nigella sativa* Seeds

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Nigella sativa (*N. sativa*) is popularly known as the black seed, a herb that has traditionally been used for centuries in many parts of the world. It has gained popularity due to its potential health benefits. However, more scientific data is needed to support the various health claims. This study was carried out to determine the fatty acid profile, α -tocopherol content and to evaluate the antioxidant activity of seed oil samples from three different regions in Yemen namely Marib, Sadah and Taiz. *N. sativa* seeds oil was extracted using three different solvents (n-hexane, petroleum ether and chloroform: methanol 2:1 v/v) and the fatty acids composition was analyzed using gas chromatography, while the α -tocopherol was determined using HPLC. Ferric thiocyanate (FTC) and thiobarbituric acid (TBA) methods were used to evaluate the antioxidant activity

of the seeds oil. Results indicated that *N. sativa* seeds contain high amount of oil (30-48%) and the major unsaturated fatty acids were linoleic acid (57.96, 58.04 and 57.04%) followed by oleic acid (21.49, 20.87 and 20.60%), while the main saturated fatty acids were palmitic (11.56, 11.23 and 11.22%), followed by stearic and myristic acids in Marib, Taiz and Sadah samples respectively. Oil extracts exhibited strong antioxidant properties when compared to α -tocopherol with 78-82% inhibition in the FTC method and 70-80% in the TBA assays. The oil extracts were found to be rich in α -tocopherol content 290 ± 1.5 , 170 ± 0.40 and 120 ± 0.15 mg/100 g, in Marib, Sadah and Taiz samples, respectively. Present results suggest that *N. sativa* seeds contain high amount of antioxidants that are essential for health and preventing numerous diseases. (*International Journal of Pharmacology* 5 (4): 244-250, 2009; doi: 10.3923/ijp.2009.244.250)

Studies on the Anti-Inflammatory, Analgesic and Antipyretic Properties of *Andrographis echinoides* Nees

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The purpose of this investigation was to study the anti-inflammatory, analgesic and anti-pyretic properties of total extract and three fractions (ether, chloroform and ethyl acetate) from *Andrographis echinoides* (Acanthaceae) in rats and mice. The plant material was extracted with methanol. In order to estimate the polarity of the active compounds, the total extract was successively partitioned between ether, chloroform and ethyl acetate. Dose of 200 and 400 mg kg⁻¹ of each extracts were used in carrageenan-induced paw edema, cotton-pellet granuloma in rats, writhing nociception in mice and yeast induced hyperpyrexia in rats. All compounds reduced paw edema in comparison to the control group at 5 h post carrageenan injection. The total, ether and ethyl acetate extracts were similar to phenylbutazone ($p < 0.001$), while the chloroform extract was weaker than phenyl butazone in reduction of paw edema and cotton-pellet granuloma. All extracts as well as Paracetamol induced antinociception in writhing test in comparison to control. Positive results for flavanoids and phenolic compounds were investigated by phytochemical analysis of total extract. Phenolic compounds were found in three fractions. The higher antinociception effects of total and ether extracts among different extracts tested, might back to the presence of flavanoids and phenolic compounds. The total, ether, ethyl acetate extract produced a significant dose dependent inhibition of temperature elevation. These data suggest that different extracts of *A. echinoides* produce antinociceptive, anti-inflammatory and anti-pyretic activities that could be due to the effect of one or a combination of the bio active components in each extract. (*International Journal of Pharmacology* 5 (4): 251-256, 2009; doi: 10.3923/ijp.2009.251.256)

Preventive Effect of Grape Seed Hydroalcoholic Extract on Dementia Type of Alzheimer's Disease in Aged Male Rats

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Aim of this study was to investigate the effects of Grape Seed Extract (GSE), as a potent antioxidant on spatial memory in rats with Alzheimer's Disease (AD). Alzheimer's disease is a progressive neurodegenerative disease clinically characterized by dementia and neurobehavioral deterioration. Forty five aged male wistar rats were divided randomly into three equal number groups (n = 15). Control; AD and GSE+AD. The rat model of Alzheimer's disease was induced by local injection of Ibotenic acid (Ibo) into brain Nucleus Basalis Magnocellularis (NBM) or meynert bilaterally (Ibo, 6 $\mu\text{g } \mu\text{L}^{-1}$ each site) under stereotaxic surgery. The spatial memory performance was evaluated by Morris Water Maze task. The results show that injection of Ibo into NBM of rats could impair spatial memory capacity. The GSE supplementation (100 mg kg^{-1} , by gavages) for 30 days before NBM lesion could be alleviating pre-lesion memory impairment. Present results showed that GSE could be a useful agent to prevent neurodegenerative disorders such as AD. (*International Journal of Pharmacology* 5 (4): 257-262, 2009; doi: 10.3923/ijp.2009.257.262)

Antitumoral Effect of *L. inermis* in Mice with EAC

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In recent years, prophylactic usage of natural products and tendency to resort to alternative medicine has increased rapidly. Henna (*Lawsonia* sp.) has been used not only cosmetically but also medicinally in Turkish population. Among the studies of henna's antifungal, anti-microbial, tuberculostatic and antitumoral effects come on the science. In this study, we planned to research the effect of *Lawsonia inermis* that is an oxidant agent against development of cancer, by constituting peritonitis carcinomatous with Ehrlich ascites cells. The animals were divided to three groups and *Lawsonia inermis* extract and tap water were given to mice for 5 days. After 5 days, all of animals were decapitated by cervical dislocation and their liver tissues were sampled to measure reduced glutathione (GSH) level. Mean Survival Time (MST) and Average Survival Time (AST) were calculated; peritoneal liquid pH was measured; Ehrlich Ascites Carcinoma (EAC) cells were counted with hemocytometer. At the result, the longest life period was detected

on the group which was given 10 mg/kg/day *Lawsonia inermis*. In group 2 and 3 which were given *Lawsonia inermis* following to forming Ehrlich ascites carcinoma, total number of cancer cell decreased. The scaled pH levels belonging to group 2 and 3 changed into alkaline compared to that of group1 (pH = 6.2). Glutathione levels of liver tissue were determined to decrease in group 2 and 3 in comparison with group1. In conclusion, *Lawsonia inermis* may lead cells to apoptosis related to deficiency in detoxification of intracellular radicals. (*International Journal of Pharmacology* 5 (4): 263-267, 2009; doi: 10.3923/ijp.2009.263.267)

Hepatoprotective Effect of *Enicostemma littorale blume* and *Eclipta alba* During Ethanol Induced Oxidative Stress in Albino Rats

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The leaves of *Enicostemma littorale blume* (Ens) and *Eclipta alba* (Ecl) have been used for skin infection, antiviral and antibacterial activity in traditional medicine. The present study is aimed at to evaluate the hepato-protective effect of the aqueous leaf extracts of the above two plants during ethanol induced oxidative stress in albino rats. The aqueous leaf extracts of *Enicostemma littorale* and *Eclipta alba* combine (1:1) at dose level of 250 mg kg⁻¹ b.wt. were tested for hepato-protective and antioxidant effects during ethanol induced oxidative stress in liver tissue of wistar male albino rats. The degree of hepatoprotection was assessed by measuring the activity levels of the marker enzymes such as serum aspartate transaminase (AST), alanine transaminase (ALT) and alkaline phosphatase (ALP). Free radicals generated lipid peroxidation was assessed by measuring the tissue levels of thiobarbituric acid reacting substances (TBARS) and the activity levels of the tissue antioxidant enzymes such as catalase (CAT), superoxide dismutase (SOD). The ethanol supplemented rats recorded elevated activity levels of serum AST, ALT and ALP revealing ethanol induced hepatotoxicity. The increased levels of TBARS in liver and decreased activity levels of SOD and CAT in ethanol fed animal's revealed oxidative stress. The aqueous leaf extracts supplementation of Ens+Ecl in 1:1 produced significant hepatoprotection and antioxidative effect during ethanol induced hepatotoxicity. The study can be concluded that the therapeutic effect of aqueous leaf extracts of Ens+Ecl in 1:1 is not only hepatoprotective but also possess significant antioxidant property. (*International Journal of Pharmacology* 5 (4): 268-272, 2009; doi: 10.3923/ijp.2009.268.272)

***Orthosiphon stamineus* Benth. Methanolic Extract Enhances the Anti-Proliferative Effects of Tamoxifen on Human Hormone Dependent Breast Cancer**

H.B. Sahib, Z. Ismail, N.H. Othman and A.M.S. Abdul Majid

Estrogen Receptor (ER+) antagonist, Tamoxifen (TMX), is widely used in the treatment of the hormone responsive breast cancer. However, the common occurrence of resistance after prolonged treatment of TMX hampers its effectiveness. *Orthosiphon stamineus* Benth. (OS) is a common herb found in South East Asia and is used traditionally to treat various types of ailments. The aim of this study was to determine whether the methanolic extract of *Orthosiphon stamineus* Benth. (MEOS), that had been proven in previous study to act as anti-angiogenic agents, enhance the anticancer efficacy of ER+ antagonists. In this study methanolic extract of (MEOS) was treated to MCF-7 hormone sensitive breast cancer cell line with the addition of TMX. MEOS showed no significant cytotoxic effect towards MCF-7 when used alone, however when combined with TMX, the anti proliferative activity of the combination increased five fold higher when compared to the anti-proliferative activity of singly treated TMX. The result suggests that MEOS synergistically enhance the activity of TMX against hormone responsive breast cancer cells *in vitro* and may prove to be useful for the treatment of metastatic breast cancer. (*International Journal of Pharmacology* 5 (4): 273-276, 2009; doi: 10.3923/ijp.2009.273.276)

α -Glucosidase Inhibitor Activity of *Terminalia* Species

K. Anam, R.M. Widharna and D. Kusriani

Terminalia arjuna, *Terminalia ballerica*, *Terminalia chebula*, *Terminalia catappa*, *Terminalia kaerbachii* and *Terminalia microcarpa* leaves were tested for their α -glucosidase inhibitory activity *in vitro*. The α -glucosidase activity was determined by measuring the p-nitrophenol release from pNPG at 400 nm. *Terminalia kaerbachii* has the highest α -glucosidase inhibitor activity with IC₅₀ value of 0.27±0.17 $\mu\text{g mL}^{-1}$ and is a promising antidiabetic herbal medicine candidate. However, most of the *Terminalia* species are also potential as antidiabetic medicine candidates as the IC₅₀ values are approximately 5 $\mu\text{g mL}^{-1}$, which is near the IC₅₀ value of 1-deoxynojirimycin, the reference compound, except for *Terminalia microcarpa*, which has IC₅₀ value of 25.15±0.04 $\mu\text{g mL}^{-1}$ (above 21 $\mu\text{g mL}^{-1}$). From the phytochemical screening, *Terminalia kaerbachii*

contains alkaloids, flavonoids and catechic tannins, but does not contain saponin, quinon, steroid/terpenoids and gallic tannins. It is estimated that there is a correlation between α -glucosidase inhibitory activity and its phytochemical content. (*International Journal of Pharmacology* 5 (4): 277-280, 2009; **doi**: 10.3923/ijp.2009.277.280)

Anti-Microbial Properties of Clove (*Eugenia caryophyllum* Bullock and Harrison) Aqueous Extract Against Food-Borne Pathogen Bacteria

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Anti-microbial activity of *Eugenia caryophyllum* Bullock and Harrison aqueous extract has been tested against food-borne pathogen bacteria (*S. aureus* ATCC 25923, *S. typhimurium* ATCC 14028 and *E. coli* ATCC 25922), normal flora (*S. epidermidis* ATCC 12228 and *L. plantarum* ATCC 14917) and other pathogen bacteria (*P. vulgaris* ATCC 13315). The agar diffusion susceptibility test revealed inhibition zone of *Eugenia caryophyllum* Bullock and Harrison aqueous extract against *S. aureus* ATCC 25923, *S. typhimurium* ATCC 14028, *E. coli* ATCC 25922, *S. epidermidis* ATCC 12228, *L. plantarum* ATCC 14917 and *P. vulgaris* ATCC 13315. The Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) were determined by using agar dilution and broth macro-dilution methods. The MIC and MBC of clove against all tested bacteria were in the range of 1 to 4 g L⁻¹ and 2 to 8 g L⁻¹, respectively. In conclusion, the aqueous extract of *E. caryophyllum* showed good inhibitory effect on tested food-borne pathogen bacteria. (*International Journal of Pharmacology* 5 (4): 281-284, 2009; **doi**: 10.3923/ijp.2009.281.284)

Antioxidative and Antibacterial Activities of *Pangium edule* Seed Extracts

Fook Yee Chye and Kheng Yuen Sim

Phenolic and alkaloid extracts of *Pangium edule* Reinw (Flacourtiaceae) seed were investigated for their antioxidative activities using DPPH radical scavenging and β -carotene bleaching assays. The extracts were evaluated for antibacterial activity against *Salmonella typhimurium* and *Listeria monocytogenes*. The acetone extract with higher phenolic content (22.22 \pm 0.05 mg GAE g⁻¹) showed the most potent antioxidative activity in both DPPH radical scavenging and β -

carotene bleaching assays as compared to other extracts. The phenolic extract seems to have stronger inhibitory against *L. monocytogenes* than *S. typhimurium*. The free phenolic acid extract was found to have the highest Minimum Inhibition Concentration (MIC) among the seed extracts, indicates its weak antibacterial activity against both bacteria. Nevertheless, both tested pathogens were killed at the Minimum Bactericidal Concentration (MBC) of 30.3 and 55.5 mg mL⁻¹, respectively, for the phenolic extracts. Significant correlation ($p < 0.05$) was observed between the total phenolic content and its antioxidative activity ($r = 0.878$) as well as antibacterial ($r = 0.840$) activity suggesting that phenolics of the seed extract could be potential sources of natural antioxidant and antibacterial. (*International Journal of Pharmacology* 5 (5): 285-297, 2009; doi: 10.3923/ijp.2009.285.297)

***In vitro* Cytotoxic Activity of *Sargassum thunbergii* and *Dictyopteris divaricata* (Jeju Seaweeds) on the HL-60 Tumour Cell Line**

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The cytotoxic activity of a variety of Jeju coastal seaweeds against a panel of tumour cell lines was tested *in vitro* using a calorimetric 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. Twenty-three extracts were screened against HL-60 (human promyelocytic leukaemia cell line), HT-29 (human colon carcinoma cell line), B16F10 (murine melanoma cell line) and A549 (human lung cancer cell line). The ethyl acetate (EtOAc) extracts of *Sargassum thunbergii* and *Dictyopteris divaricata* showed excellent cytotoxic activity against the HL-60 cell line. Furthermore, the *S. thunbergii* extract also exhibited good cytotoxic activity against the HT-29 and B16F10 cell lines. To explore the mechanisms of cytotoxicity of *S. thunbergii* and *D. divaricata*, we used several measures of apoptosis to determine whether these processes were involved in EtOAc fraction-induced HL-60 cell death. We found that EtOAc fractions induced cell shrinkage, cell membrane blebbing and formation of apoptotic bodies. In addition, HPLC fingerprinting of the *S. thunbergii* extract revealed that fucosterol was a standard component of these fractions. These results suggest that *S. thunbergii* and *D. divaricata* have great potential value as food additives, medicinal supplements for patients with chronic diseases and preventive agents against cancer. (*International Journal of Pharmacology* 5 (5): 298-306, 2009; doi: 10.3923/ijp.2009.298.306)

Diffusion of Sulbactam and Ceftriaxone into Cerebrospinal Fluid of Meningitis Induced Rat Model

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The present study was to investigate the comparative efficacy of ceftriaxone and a fixed dose combination of ceftriaxone plus sulbactam along with VRP1034 (Sulbactam) in cerebrospinal fluid (CSF) of meningitis induced rat model. Eighteen rats were divided into three groups of six rats each. Meningitis were induced by MRSA strain ($\log 10^6$ cfu mL⁻¹). Group I was infected group; whereas group II and III were ceftriaxone and sulbactam treated groups. Drugs were analyzed in CSF by high performance liquid chromatography. Some biochemical parameters were studied in infected and treated groups. Present results showed that the mean level of ceftriaxone drug concentration was increased significantly in sulbactam treated group in comparison to ceftriaxone alone treated group. Glucose level was increased in sulbactam treated group as compared to ceftriaxone alone treated group. The levels of protein, calcium and phosphorus were significantly lowered in both treated group as compared to infected group. These biochemical parameters were decreased along with increased glucose level in sulbactam treated group in comparison to ceftriaxone alone treated group. Present findings concluded that sulbactam enhanced the penetration rate in CSF than ceftriaxone alone due to VRP1034. It plays a therapeutic role in crossing blood brain barrier and helps in prevention of bacterial meningitis infection. (*International Journal of Pharmacology* 5 (5): 307-312, 2009; doi: 10.3923/ijp.2009.307.312)

A Randomized Open-Label Comparison of Lamotrigine and Valproate in Patients with Juvenile Myoclonic Epilepsy

S.E.M. Nejad, M.R.A. Nikpour, F. Rahim, S.N. Naghibi and M.A. Bahrammi

The aim of this study was to evaluate the efficacy and tolerability of lamotrigine and valproate in patients with different types of generalized epilepsy characterized by myoclonic seizures as well as compare the efficacy of those two drugs. A pilot, randomized controlled trial analysis of 46 female patients (age 8-30 years) in a large university hospital. All patients underwent several interictal EEG including routine awake and sleep EEGs. Lamotrigine was started at the dose of 500 mg day⁻¹ and was progressively increased to a mean dose of 1500-2000 mg day⁻¹ in a time course of 8 weeks. The target maintenance dose for valproate was 800

mg day⁻¹ after starting valproate at the dose of 200 mg/12 h. The mean dose was reached within 4 weeks. Out of total 46 patients, 46 (100%) had juvenile myoclonic epilepsy; 43 (93.48%) had tonic-clonic; 5 (11%) had myoclonic absences. In the valproate and lamotrigine groups, there was significant reduction ($p < 0.001$, $p < 0.001$) in myoclonic seizure and tonic-clonic seizure frequencies. There was no clinically significant difference ($p > 0.05$) between the effect of those two drugs that means the lamotrigine and valproate have similar effect in reducing the myoclonic seizure and tonic-clonic seizure frequencies. There was statistically significant effect ($p < 0.05$) of those two drugs that means the lamotrigine and valproate also have significant effect in reducing the absences seizure frequency. The results suggest that lamotrigine monotherapy is a possible alternative for valproate among patients with juvenile myoclonic epilepsy who experienced unaccepted side effects or inadequate seizure control with valproate monotherapy. (*International Journal of Pharmacology* 5 (5): 313-318, 2009; doi: 10.3923/ijp.2009.313.318)

Evaluation of Preserving Efficacy for Different Cough Syrups Manufactured by Different Pharmaceutical Companies

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The aim of the current investigation is to assess the efficacy of different preservatives ingredients of different expectorant cough syrups manufactured by different pharmaceutical companies by comparing the growth of five microorganisms of known quanta of *S. aureus*, *E. coli*, *P. aeruginosa* and *C. albicans*. The microorganisms were inoculated into syrup A (glycerol and propylene glycol), syrup B (propylene glycol and glycerin), syrup C (glycerin, propylene glycol and butyl paraben), syrup D (methyl paraben and propylparaben) and normal saline as a control. All microorganisms were taken from standard stock cultures and incubated for 24 h. Growth of microorganisms into syrup was compared by counting the CFUs from a subculture of inoculated syrup at zero, 3, 6, 12, 24 and 48 h intervals. The data showed that all the combinations of the preservatives in the four studied cough syrups behaved similarly in term of antimicrobial efficiency. The findings suggested that the preservatives mixtures of propylene glycol with glycerol or with glycerin or with butyl paraben preservatives as well as methyl paraben with propylparaben are acceptable clinically and have considerably antimicrobial activity against infectious bacteria during the 48 h studied period. (*International Journal of Pharmacology* 5 (5): 319-322, 2009; doi: 10.3923/ijp.2009.319.322)

Hypoglycaemic and Hypolipidemic Activities of *Rauwolfia serpentina* in Alloxan-Induced Diabetic Rats

S.A. Qureshi, A. Nawaz, S.K. Udani and B. Azmi

The prevalence of diabetes is increasing worldwide. Changes in lipid metabolism are secondary to diabetes, which may become the cause of hypertension, atherosclerosis and other cardiovascular diseases. The present study was designed to investigate the effect of methanolic root extract of *Rauwolfia serpentina* (a known antihypertensive herb) on glucose, total cholesterol (TC), triglycerides (TG) and alanine aminotransferase (ALT). Alloxan-induced diabetic rats were divided into 3 groups viz., group I: diabetic control treated with 5% dimethyl sulfoxide (DMSO) in distilled water (1 mL kg^{-1}), group II (positive control): diabetic rats treated with known anti-diabetic drug chlorpropamide (20 mg kg^{-1}) and group III (diabetic test): treated with methanolic root extract (30 mg kg^{-1}). Glucose was estimated from each group at 0, 1, 2 and 4 h after intra-peritoneal injection of each treatment by using glucometer. Rats were decapitated at 4 h, blood was collected to separate the serum that used to analyze TC, TG and ALT. There was a significant decrease ($p < 0.0001$) found in glucose level from 0 to 4 h ($94\text{-}106 \text{ mg dL}^{-1}$) in test rats as compared to diabetic control. Similarly, TG ($p < 0.01$), TC and ALT ($p < 0.05$) were also significantly decrease in test group. The methanolic root extract of *R. serpentina* was found hypoglycaemic, hypolipidemic and hepato-protective in alloxan-induced diabetic rats. (*International Journal of Pharmacology* 5 (5): 323-326, 2009; doi: 10.3923/ijp.2009.323.326)

Dextromethorphan Attenuates Ethanol Withdrawal Induced Hyperalgesia in Rats

U.S. Rao Chakradhara and K.S. Karanth

Ethanol withdrawal increases sensitivity to painful stimuli. N-methyl-D-aspartate glutamate receptors may have a role in alcohol dependence and the development of withdrawal signs and symptoms. This study examined the effect of oral administration of dextromethorphan on the hyperalgesia induced by ethanol withdrawal, using hot plate assay and chemical induced writhing in rats. Wistar albino rats (250-300 g) were divided into three groups of six animals each. All the groups received 7.5% v/v alcohol and food *ad libitum*, for 10 days and were given saline (10 mL kg^{-1}) or dextromethorphan dissolved in saline (32 and 64 mg kg^{-1}) orally once daily for 10 days. Ethanol was withdrawn on day 10. The reaction times on the hot plate were measured on Day 0, at 6, 12 h after ethanol

withdrawal. The ethanol withdrawal signs were rated immediately before testing. Chemical assay using acetic acid (1% v/v) was done on day 0 and at 12 h after ethanol withdrawal. Chronic exposure to ethanol produced antinociception while withdrawal produced hyperalgesia. Repeated administration of dextromethorphan prevented ethanol withdrawal induced hyperalgesia and significantly reduced total ethanol withdrawal scores at both the doses tested. This study demonstrated that dextromethorphan can attenuate hyperalgesia during ethanol withdrawal and suggests the role of N-methyl-D-aspartate receptors in ethanol withdrawal induced hyperalgesia. (*International Journal of Pharmacology* 5 (5): 327-332, 2009; doi: 10.3923/ijp.2009.327.332)

Comparison of Efficacy of Turmeric and Commercial Curcumin in Immunological Functions and Gene Regulation

A.K. Chakravarty, S.N. Chatterjee, H. Yasmin and T. Mazumder

Curcumin, the active constituent of turmeric possesses anti-cancer, anti-inflammatory and other properties. Earlier we have shown ethanolic extract of turmeric rhizome (ETE) activates murine lymphocytes and induces apoptosis in tumor cells. The present investigation is intended to study comparative efficacy of ETE as used by us and others and commercially available curcumin. The efficacy of these two substances was tested for immunostimulatory, anti-inflammatory and anti-oxidant properties in murine model. The expression of a few genes such as perforin, IL-2, IL-6, TNF- α and iNOS related with these events have also been studied at transcriptional level in T-cells. The ETE promoted cell division and functions of murine lymphocytes like production of NO⁻, up regulation of perforin, IL-2 and IL-6 genes in course of functional differentiation much better than curcumin. The ETE acts better as anti-inflammatory agent in DTH reaction than curcumin. The better efficacy of ETE over curcumin could be due to presence of other compounds in the total extract than only diferuloylmethane as curcumin. The present study intends to recommend use of turmeric over curcumin whenever possible. (*International Journal of Pharmacology* 5 (6): 333-345, 2009; doi: 10.3923/ijp.2009.333.345)

A Study on the Effects of IL-10 in Anti-Thy 1-Induced Glomerulonephritis in Rats

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In the present study, we examined the effects of IL-10 after 24 h in a model of acute glomerulonephritis (GN). One hour after the anti-Thy 1 antibody

administration, a single i.v. dose of IL-10 was administered to rats. Normal rats, control nephritic rats and nephritic rats treated with IL-10, were sacrificed 24 h after administration of antibody. Samples of urine, blood and organs were subsequently collected. The effects of IL-10 were studied by quantification of various inflammatory parameters at the protein level after immunohistochemical staining and at the mRNA level by a quantitative real time PCR technique. Nitric oxide and protein content were determined in serum and in 24 h-excreted urine, respectively. The inflammatory parameters were reduced in the IL-10-treated group: in increment in glomerular CD14, ICAM-1 and MMP-13 staining induced by anti-Thy 1 injection was significantly attenuated by IL-10. In contrast, mRNA levels for CD14, IL-1 β , TNF- α and MCP-1 were not different between IL-10-treated and control GN groups. In conclusion, a single i.v. dose of IL-10 suppresses the expression of several inflammatory parameters, 24 h after inducing of acute GN but at this time point mRNA levels of all parameters examined were not affected. Although its therapeutic efficacy needs further evaluation, anti-inflammatory effects of this short-lived cytokine can be found one day after its administration. (*International Journal of Pharmacology* 5 (6): 346-353, 2009; *doi*: 10.3923/ijp.2009.346.353)

Antinociceptive Effects of an Ethanolic Extract of *Capparis erythrocarpos* Isert Roots in the Mice Formalin Test

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Antinociceptive effect of an ethanolic extract of *Capparis erythrocarpos* Isert roots (10-300 mg kg⁻¹; p.o.) was evaluated in the mouse formalin test. Morphine (1-10 mg kg⁻¹; i.p.) was used as positive control. The extract dose-dependently reduced pain scores in both phases of formalin-induced nociception with the 100 mg kg⁻¹ dose significantly reducing formalin-induced pain by 47.54 \pm 5.65 and 80.01 \pm 3.77% in the first and second phases, respectively. Naloxone (an opioid antagonist) did not block the antinociceptive effect of the extract in both the neurogenic phase and the inflammatory phase; however, theophylline (an adenosine antagonist) completely blocked the effect in the neurogenic phase and significantly inhibited the effect in the inflammatory phase. These findings demonstrate that the ethanolic extract of *C. erythrocarpos* roots has both central and peripheral antinociceptive effect with possible involvement of adenosinergic mechanism. (*International Journal of Pharmacology* 5 (6): 354-361, 2009; *doi*: 10.3923/ijp.2009.354.361)

Effects of *Piper sarmentosum* Water Extract on 11- β Hydroxysteroid Dehydrogenase Type 1 Bioactivity in Ovariectomy-Induced Obese Rats

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The 11 β -hydroxysteroid dehydrogenase type 1 (11 β -HSD1) convert inactive circulating 11-keto steroids into active glucocorticoids, amplifying local glucocorticoid action. It is elevated in adipose tissue in obese humans and rodents, suggesting that adipose tissue glucocorticoid excess may be the causative factor for obesity. This study was conducted to evaluate the effects of *Piper sarmentosum* (PS) water extract and glycyrrhizic acid (GCA) on 11 β -HSD1 bioactivity in ovariectomized induced obese rats. Forty-two female *Sprague-Dawley* rats were randomly divided into six groups; four treatments (PS, GCA, CTRL and SHM) and two basal (B-CTRL and B-SHM). All groups underwent ovariectomy excluding SHM and B-SHM which underwent sham operation. Basal groups were sacrificed on the first day of treatment, while ovariectomized groups were given PS extract (0.125 g kg⁻¹), GCA (0.120 g kg⁻¹) and water (CTRL), respectively, while SHM received only water. Blood pressure was measured monthly while body weight weekly. After five months, rats were sacrificed and liver, heart and visceral adipose tissues were taken for analysis. *Piper sarmentosum* (PS) and GCA group showed a significant reduction in enzyme activity but no difference in body weight compared to CTRL group. Meanwhile only the blood pressure in GCA group was significantly higher after three months of treatment as compared to CTRL group but no difference after five months. In conclusion, both PS water extract and GCA have the ability to reduce 11 β -HSD1 enzyme activity but only GCA cause an increased in blood pressure. (*International Journal of Pharmacology* 5 (6): 362-369, 2009; *doi*: 10.3923/ijp.2009.362.369)

Screening of Antiangiogenic Activity of Some Tropical Plants by Rat Aorta Ring Assay

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Angiogenesis is essential for the growth and metastasis of most solid malignancies. Accordingly, tumor angiogenesis is an important pharmacological target for cancer prevention and treatment. This study was conducted to study antiangiogenic activity of some tropical plants. Seven plants were extracted successively with n-hexane and methanol to prepare 18 extracts and antiangiogenic properties of the extracts were studied by rat aorta ring assay. Nine extracts showed more than

50% inhibition of the blood vessels outgrowth from the primary tissue explants. The MTT assay was used to study the cytotoxic activities of extracts with more than 50% inhibition. The Human Umbilical Vein Endothelial Cells was used as a test cell line versus two human colon cancer cell lines HCT-116 and HT-29, two human breast cancer cell lines MCF-7 and T47D and one hepatocarcinoma cell line HepG-2. The selectivity index on Human Umbilical Vein Endothelial Cells was calculated. The selectivity index results indicated antiangiogenic activities of three plants *Parkia speciosa*, *Syzygium campanulatum* and *Sandoricum koetjape*. The results presented in this research article make these plants good candidates for further studies to purify the active compounds and to study *in vivo* antiangiogenic activity. (*International Journal of Pharmacology* 5 (6): 370-376, 2009; doi: 10.3923/ijp.2009.370.376)

Evaluation of Free Radical Scavenging Activity of *Pandanus odoratissimus*

R. Londonkar and A. Kamble

Pandanus odoratissimus is used in traditional medicinal and it is also famous for its fragency. The present study was performed to evaluate the methanolic effect of *Pandanus odoratissimus* (MEPO) against free radical damage. The antioxidant activity of has MEPO been studied using its ability to scavenging DPPH, Nitric acid, superoxide radicals and hydroxyl radicals. The MEPO shows antioxidant activity by 87.52% reducing the DPPH and 73.55% inhibition of nitric acid. The result also indicates maximum inhibition of superoxide radical's inhibition 74.12 and 78.14% inhibition of hydroxyl radicals. The BHT was used as standard. (*International Journal of Pharmacology* 5 (6): 377-380, 2009; doi: 10.3923/ijp.2009.377.380)

Effect of Administration of Fungal Mycotoxin (Gliotoxin) on Clinical and Serobiochemical Parameters in Camels

M.S. Shathele

The main objective of this study was to determine the effect of administration of fungal mycotoxin (Gliotoxin) on clinical and serobiochemical parameters in camels. A bolus of 0.1 $\mu\text{g kg}^{-1}$ b.wt. of gliotoxin was administered intravenously to camels. The treated camels were lethargic and decreased their appetite from day 3 onwards. The toxin administration decreased the protein and glucose concentration of serum. The increased activity of aspartate amino transferase,

gamma glutamyl-transferase, sorbitol dehydrogenase and alkaline phosphatase due to mycotoxin administration was indicative of liver damage. High concentration of urea nitrogen and creatinine in treated animals was a characteristic of renal injury. In conclusion, the gliotoxin is acutely toxic to camels affecting liver and kidney function. (*International Journal of Pharmacology* 5 (6): 381-383, 2009; doi: 10.3923/ijp.2009.381.383)

Risk Factors for Breast Cancer in Iranian Women: A Case-Control Study

S. Abbasi, C. Azimi, F. Othman, N. Einollahi, N. Dashti, F. Nabatchian and P. Ismail

The objective of the present study was to investigate risk factors for breast cancer in Iranian women. A case-control study was conducted from April 2004 to May 2007 in Tehran, Iran. Demographical data and risk factor related information were collected using a short structured questionnaire. In all, 150 women with breast cancer and 147 control women were interviewed. In multivariate analysis, only body mass index or BMI age at menarche, age at marriage, race, ABO and Rh blood groups and family history of breast cancer were associated with significantly increased risk for breast cancer ($p < 0.05$). The findings of the present study suggest that family history and marital status may have an impact on the incidence of breast cancer in Iranian women. (*International Journal of Cancer Research* 5 (1): 1-11, 2009; doi: 10.3923/ijcr.2009.1.11)

Protective Effect of Green Algae Against 7, 12-Dimethylbenzanthracene (DMBA)-Induced Breast Cancer in Rats

Amr Amin

The present study investigated the chemopreventive effects of the water extract of chlorella on the development and growth of DMBA-induced mammary tumors. Female rats were daily administered vehicle control or chlorella either at 0.5 g or at 1.0 g kg⁻¹ body weight starting at age of 35 days and continued to the end of the experiment. At age of 50 days breast tumor was induced by administering DMBA at 25 mg kg⁻¹ body weight. Similar DMBA dose was administered to DMBA-alone group at age of 50 days. As a control for chlorella treatment one group (chlorella-alone) was administered chlorella at 1.0 g kg⁻¹ body weight starting at age of 35 days and continued to the end of the experiment. Animals

were then followed for 15 weeks. Effects of chlorella on the expression of proliferating cell nuclear antigen (PCNA), p53 and estrogen receptor (ER) were investigated in mammary tissues of control and experimental groups using immunohistochemistry. Present data demonstrated that chlorella treatment restored the normal expression levels of PCNA and ER. Chlorella also significantly increased cell death as assessed by the terminal deoxynucleotidyl transferase-mediated triphosphate nick-end labeling (TUNEL) analysis. In conclusion, the protective role of chlorella's water extract against carcinogen-induced breast cancer seems to be mediated through its anti-proliferative and pro-apoptotic properties. (*International Journal of Cancer Research* 5 (1): 12-24, 2009; **doi**: 10.3923/ijcr.2009.12.24)

A Comparison of Rice Bran, Corn Oil and Soybean Oil Against Azoxymethane Induced Colon Cancer in a Fisher 344 Rat Model

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The objective of this study was to compare the inhibitory effects of Rice bran oil (RBO), Corn oil (CO) and Soybean oil (SBO) at 7% (normal fat level) and 14% (high fat level) on Azoxymethane (AOM) induced Aberrant Crypt Foci (ACF). The long term effect (End Point Tumor (EPT) study) of dietary fat from the above sources on colon cancer in Fisher 344 male rats was determined. In the ACF study 2 groups of F344 rats (4 weeks old) (n = 6) received AIN-93G Control (C) diet containing 7 and 14% Soybean oil (SBO). The remaining groups were assigned treatment diets consisting of 7 and 14% RBO and CO. The rats remained on their respective diets for 13 weeks. Rats in the EPT study were fed a control (AIN-93G) diet with 7% SBO, while the treatment groups were fed diets containing 7% RBO and CO, respectively. At 20 week of age rats in the EPT study were switched to AIN-93 Maintenance (M) diets. All rats received 2 s/c injections of AOM at 7 and 8 week of age @ 16 mg kg⁻¹ body weight in saline. At 17 and 45 week of age all rats were killed by CO₂ asphyxiation. Total colonic ACF in the rats fed SBO, RBO and CO at 7 and 14% levels ranged from 101-189. In the EPT study, all the rats fed 7% SBO and CO developed tumors (100% tumor incidence) while tumor incidence in the groups fed RBO, was 54% while tumor size (mm) and tumor/Tumor Bearing Rat ratio (TBR) in the rats fed SBO, RBO and CO ranged from 1.3-6.86 and 1.83-5.86, respectively. Present results indicate that the type and constituents (such as n-3 PUFA, vitamin E, phytosterols) of dietary fat plays a significant role in the formation of AOM induced colonic ACF and tumors in Fisher 344 rats. (*International Journal of Cancer Research* 5 (1): 25-35, 2009; **doi**: 10.3923/ijcr.2009.25.35)

Histological and Immunohistochemical Studies for Evaluation of the Role of Microalgae *Spirulina* sp. Against Cancer in Experimental Animals

Mashaal Mohammed Bin-Meferij

The present study aims to study the possible effect of the cyanobacterium *Spirulina* sp. as a protective agent in rats given diethylnitrosamine (DEN) in drinking water. The investigation is supposed to be carried out through histopathological and immunohistochemical examinations for proliferation marker Ki67 in liver tissues. The hepatoprotective role of *Spirulina* shown by the histopathological examination of the liver where only little dilatation in the blood sinusoids, slight vacuolization in the cytoplasm and few pyknotic nuclei were observed. Immunohistochemical evaluation shown reduction of the number of malignant cells and its proliferation in treated group, but the Ki67 expression was high labeling index in DEN induced hepatocarcinoma group. Also, liver Ki67 labeling index (Ki67 LI) in tumor tissues or adjacent non-tumor tissues were higher than that in normal liver tissues, while in tumor tissues it was higher than that in adjacent non-tumor tissues. So, using *Spirulina* seems to have realistic results and rapid curative effect. The development of specific therapeutic strategies based on natural algal products should be considered as an attractive approach. Based on these fascinating possibilities, *Spirulina* offers a great promise for patients with liver injury and Ki67 expression could represent a valuable tool in the understanding of hepatocellular carcinoma. (*International Journal of Cancer Research* 5 (1): 36-43, 2009; **doi**: 10.3923/ijcr.2009.36.43)

Ethanollic Seed Extract of Grapefruit (*Citrus paradisi* Macfad) as an Effective Attenuator of Doxorubicin-Induced Oxidative Stress in the Rat Heart

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In the present study, we examined the ameliorating effect of the 100% ethanol extract of *Citrus paradisi* (grapefruit) seed (GSE) on survival of doxorubicin treated rats and on DOX- induced cardiomyopathy. Whereas only 20% of the rats treated with DOX(20 mg kg⁻¹ body weight intraperitoneally) survived at the end of 14 days, almost all the DOX-treated rats survived when GSE (20 mg kg⁻¹ body weight) was administered by gastric gavage. In the second experiment, GSE (20 mg kg⁻¹ body weight) was administered daily by gavage for 14 consecutive days before a cumulative single dose of DOX (20 mg kg⁻¹ body weight, intraperitoneally) was given. DOX induced marked biochemical alterations

characteristic of cardiac toxicity. There was enhanced lipid peroxidation measured as malondialdehyde (MDA). The anthracycline antibiotic drug reduced the cardiac enzymatic activities of superoxide dismutase (SOD), glutathione S transferase (GST) and catalase (CAT). Besides, it reduced significantly the reduced glutathione (GSH) level; prior administration of grapefruit seed extract ahead of doxorubicin challenge ameliorated all these biochemical markers. Taken together, one could conclude that grapefruit seed extract has a protective role in the abatement of doxorubicin-induced cardiac toxicity that resides, at least in part, on its anti-radical effects. (*International Journal of Cancer Research* 5 (2): 44-52, 2009; **doi**: 10.3923/ijcr.2009.44.52)

Pretreatment Serum Squamous Cell Carcinoma Antigen Levels in Esophageal Squamous Cell Carcinoma

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The present study tried to evaluate pretreatment SCCAg in esophageal squamous cell carcinoma patients in this region. Forty six patients with a biopsy-proven diagnosis of esophageal squamous cell carcinoma were recruited to this study. Tumors were located by endoscopy. The lesions were histologically graded and TNM staging was performed according to the radiologic, clinical and postoperative findings. Pretreatment serum SCCAg levels were measured by RIA and compared with clinicopathological aspects of tumor. The mean pre-treatment SCCAg level was 3.82 ng mL^{-1} while 21.7% of patients had elevated levels ($>3 \text{ ng mL}^{-1}$). Tumor size was the only studied clinicopathologic factor significantly associated with SCCAg. Positive patients had greater tumor size compared to negative ones ($p = 0.031$). Although, SCCAg marker was positive in minority of the patients, but considering its relation with tumor size and probability disease stage, it is suggested to carry out survival study on more cases to find out the relation between marker positivity and cancer recurrence. (*International Journal of Cancer Research*, 5 (2): 53-57, 2009; **doi**: 10.3923/ijcr.2009.53.57)

Mutations in XRCC1 Gene Alters the Genetic Risks of Head and Neck Cancer Patients

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The XRCC1 gene promotes the efficiency of the DNA repair process and a deletion or modification of this gene appears to result in lethal phenotypes, as we

have investigated this hypothesis in this study. It was found that Arg280His variant, was associated with increased risk of head and neck cancer [OR = 2.11, 95% CI, 1.28-3.46) in smokers as compared to nonsmokers. The frequency of Arg/Arg polymorphism was higher in the smokers (64.82%) and nonsmokers (69.03%) compared to the cancer patients (46.6%) suggesting that this particular mutation may not be adverse genotype, whereas the heterozygous variant (Arg/His) and homozygous variant His/His were more frequent in the patients than in the smokers and nonsmokers suggesting that these genotypes were high risk groups. The distribution of Arg/Arg, Arg/Gln and Gln/Gln genotypes at the Arg399Gln site for nonsmokers was 44.6, 43.22 and 6.45% and for smokers it was 47.5, 43.4 and 8.96%, respectively. Individual who smoked >15 years and carried the codon 280 Arg/His genotype had an OR = 2.30, 95% CI, 1.01-5.30 and who smoked less than 15 years had an OR = 1.64, 95% CI, 0.78-3.46, these results suggested that the codon Arg280His genotypes were associated with high risk of head and neck cancers in heavy smokers. (*International Journal of Cancer Research*, 5 (2): 58-68, 2009; **doi**: 10.3923/ijcr.2009.58.68)

A Review: Cancer Research of Natural Products in Asia

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With the increasing level of the carcinogenic and mutagenic substances in the environment, the research to explore new anticancer compounds has become crucial day after day. Although, many chemical anticancer agents are available, the wide spectrum side effects and emergence of chemotherapy resistant cancer cells among patients have made cancer research and discovery of new anticancer agents from natural products particularly medicinal plants pivotal. This review highlights the cancer research led to new natural anticancer agents discovered by Asian scientists in the period from 2000 to 2008. This review focuses also on the evidence based scientific research that proved the importance of dietary habits particularly the vegetarian diet as a potent factor in reducing the risk of carcinogenesis. Many components isolated from plants have been approved to be potent anticancer agents. The plant-derived polyphenolic compounds are promising nutraceuticals for control of various disorders and cancer. These compounds may be the future developing anticancer drugs with no side effect and low cost for people all around the world. The much lower risk of colon, prostate and breast cancers in Asians, who consume more vegetables, fruits and tea than populations in the western hemisphere, raises the role of flavonoid components as protective factors against carcinogenesis. (*International Journal of Cancer Research*, 5 (2): 69-82, 2009; **doi**: 10.3923/ijcr.2009.69.82)

Antioxidative and Antimutagenic Potentials of Phytochemicals from *Ipomoea batatas* (L.) Lam.

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The present study investigated the physiological functions of sweetpotato leaves and as a resource for products with these functions. The polyphenolic compositions and the potential chemo-preventative properties such as radical scavenging activity and antimutagenicity of leaf extracts were compared in six selected sweetpotato (*Ipomoea batatas* L.) genotypes. The total phenolic content ranged from 12.18 to 16.17 g/100 g Dry Weight (DW). The Radical Scavenging Activity (RSA) ranged from 1.09 to 1.85 $\mu\text{mol Trolox mg}^{-1}$. In the case of RSA, the cultivar V-5 showed highest activity (1.85 $\mu\text{mole Trolox equivalence mg}^{-1}$ DM) and V-3 was the lowest (1.09 $\mu\text{mol Trolox equivalence mg}^{-1}$ DM). The significant positive correlation between the radical scavenging activity and the level of total phenolic ($r = 0.62$; $n = 90$; $p < 0.01$) suggests that phenolic compounds are important antioxidant components of sweet potato leaves. The antimutagenicity of the six sweetpotato genotypes studied ranges from 77 to 96% inhibition. The polyphenolic compositions of sweetpotato leaves were identified by using the Reverse Phase-High Performance Liquid Chromatography (RP-HPLC). All the RP-HPLC profiles of the genotypes tested showed peaks at the same retention times but peak areas of individual phenolic compounds differed. Six caffeoylquinic acid derivatives of sweetpotato leaves were identified and quantified. They include: caffeic acid, chlorogenic acid, 4,5-di-O-caffeoylquinic acid, 3,5-di-O-caffeoylquinic acid, 3,4-di-O-caffeoylquinic acid and 3,4,5-tri-O-caffeoylquinic acid. The caffeoylquinic acid derivatives showed higher DPPH-radical scavenging activity (%) and antimutagenicity by effectively inhibiting the reverse mutation induced by Trp-P-1 on *Salmonella typhimurium* TA 98. Thus, these phenolic components have potential value as chemo-preventative materials for human health. (*International Journal of Cancer Research* 5 (3): 83-94, 2009; doi: 10.3923/ijcr.2009.83.94)

Clove (*Syzygium aromaticum*) Extract Potentiates Gemcitabine Cytotoxic Effect on Human Cervical Cancer Cell Line

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Cervical cancer is the second most common carcinoma in the world among women and is highly chemoresistant and radio resistant, often resulting in local

treatment failure. For locally advanced disease, radiation is combined with low-dose chemotherapy; however, this modality often leads to severe toxicity. Prevention of cancer through dietary intervention recently has received an increasing interest, and dietary agents have become not only important potential chemopreventive, but also therapeutic agents when combined with chemotherapy or radiotherapy. In this study, we observed that gemcitabine was highly cytotoxic to both cancer and normal cells while clove extract ($0.7\text{-}8\text{ mg mL}^{-1}$) was found to be comparatively more cytotoxic towards cancer cells. Notably, combination of low dose gemcitabine and ethanolic clove extract ($2\text{ and }3\text{ mg mL}^{-1}$) had more pronounced cytotoxic effect on cancer cells than single modalities. It is noteworthy that use of clove extract increased the efficacy of gemcitabine and importantly, it was found to be minimally toxic to normal cells. Together, these results suggest a novel mechanism may be involved in the synergistic effect of this combination. (*International Journal of Cancer Research* 5 (3): 95-104, 2009; doi: 10.3923/ijcr.2009.95.104)

Cytotoxic and Anti-Angiogenic Properties of the Stem Bark Extract of *Sandoricum koetjape*

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Cytotoxic and anti-angiogenic properties of n-hexane extract of *Sandoricum koetjape* stem bark were investigated *in vitro*. 2,3-bis-(2-methoxy-4-nitro-5-sulphophenyl)-2H-tetrazolium-5-carboxanilide (XTT) cell proliferation assay was used to study the cytotoxic properties on Human Umbilical Vein Endothelial Cell (HUVEC) and both colon cancer and normal cell lines; HCT-116, HT-29 and CCD-18CO. Rat aorta ring assay was used to study the anti-angiogenic properties of the extract. At $100\text{ }\mu\text{g mL}^{-1}$, the extract showed $94\pm 5.5\%$ inhibition of the outgrowth of the blood vessels from the rat aorta rings. The extract also showed a dose dependent growth inhibition of all tested cell lines, IC_{50} values against HCT-116, HUVEC, CCD-18CO and HT-29 were 14, 23, 50 and $52\text{ }\mu\text{g mL}^{-1}$, respectively. At $50\text{ }\mu\text{g mL}^{-1}$, the extract had potently induced apoptotic cell death of HCT-116 colon cancer cell line by inducing caspases 3 and 7 activity. These results showed that n-hexane extract of *S. koetjape* possess both anti-angiogenic and apoptotic properties on colon cancer cell lines making it a good candidate for further studies. (*International Journal of Cancer Research* 5 (3): 105-114, 2009; doi: 10.3923/ijcr.2009.105.114)

Cytotoxic Effect of *Cayratia carnosa* Leaves on Human Breast Cancer Cell Lines

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Leaves of *Cayratia carnosa* have been ethnomedically claimed to possess a wide array of biological activities including anticancer activity. To verify the folklore claim, this study was performed in a Human breast carcinoma cell lines, MCF-7 and MDA-MB-231. Methanol and aqueous extracts of the leaves of *C. carnosa* showed cytotoxic effect on MCF-7 and MDA-MB-231 cell line, as determined with 3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide (MTT) microculture tetrazolium viability assay. Subcellular alterations were evaluated by using normal inverted microscope. Cells treated with methanol extract showed degeneration of cytoplasmic organelles, profound shrinkage of cells and apoptotic characteristics. The results showed that the methanol extract possesses cytotoxic effect which was greater than aqueous extract when compared to that of the control. (*International Journal of Cancer Research* 5 (3): 115-122, 2009; doi: 10.3923/ijcr.2009.115.122)

***In vitro* Cytotoxic and Apoptotic Properties of the Stem Bark Extract of *Sandoricum koetjape* on Breast Cancer Cells**

A.F.A. Aisha, S.A. Arokayan, K.M. Abu-Salah, Y. Darwis and A.M.S. Abdul Majid

Both cytotoxic and apoptotic properties of the stem bark extract of *Sandoricum koetjape* were investigated *in vitro*. 2,3-bis-(2-methoxy-4-nitro-5-sulphophenyl)-2H-tetrazolium-5-carboxanilide (XTT) cell proliferation assay was used to study the cytotoxic properties on three breast cancer cell lines and one normal cell line; MCF-7, MDA-MB-231, T47D and MCF-10A, respectively. Caspase Glo 3/7 assay was used to study the apoptotic activity on MCF-7 as a model cell line. The n-hexane extract showed a dose dependent growth inhibition of all tested cell lines with IC₅₀ values between 44 and 48 µg mL⁻¹. At 100 µg mL⁻¹, the extract induced apoptotic cell death of MCF-7 by inducing activity of the effector caspases 3 and 7. These results indicated that n-hexane extract of *S. koetjape* has cytotoxic and apoptotic properties on breast cancer cell lines making it a good candidate for further studies. (*International Journal of Cancer Research* 5 (3): 123-129, 2009; doi: 10.3923/ijcr.2009.123.129)

Determination of Total Phenolics, Flavonoids and Antioxidant and Chemopreventive Potential of Basil (*Ocimum basilicum* L. and *Ocimum tenuiflorum* L.)

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Basil (*Ocimum basilicum* L. and *Ocimum tenuiflorum* L.) contains important phytochemicals that have been reported to afford protection against several chronic diseases due to their anti-inflammatory and antioxidant activities. The purpose of this study was to determine the effects of three accessions of *Ocimum tenuiflorum* (Holy Basil) Denmark (HBD), Cuba (HBC), India (HBI) and one accession of *Ocimum basilicum* (Culinary Basil) (CB) at 1 and 2% levels on azoxymethane (AOM) induced Aberrant Crypt Foci (ACF) in Fisher 344 male rats and to determine the effect of oven drying on total phenolics, flavonoids and anthocyanins of Basil and antioxidative activity. Fifty four rats were divided into 9 groups (n = 6) after a 1 week period of acclimatization. Group 1 was fed a control (C) diet (AIN-93 G) and remaining groups were fed C+1 or 2% CB, HBD, HBC and HBI. All rats received s/c injections of AOM in saline at 16 mg kg⁻¹ b.wt. at 7 and 8 week of age. Rats were killed by CO₂ asphyxiation at 17 week of age. The ACF in rats fed C (158.1) was higher than in rats fed C+1% CB, HBD, HBC, HBI (77, 86, 76, 73) and C+2% CB, HBD, HBC, HBI (65, 78, 61, 67). The GST and CAT activities (µmol mg⁻¹) in rats fed C+1 and 2% CB, HBD, HBC and HBI were significantly (p<0.05) higher compared to C. Results showed that feeding culinary and Holy Basil leaves reduced the number of AOM-induced ACF and therefore may have implications in the food industry as a potential chemopreventive agent. (*International Journal of Cancer Research* 5 (4): 130-143, 2009; doi: 10.3923/ijcr.2009.130.143)

The Influence of Olive Oil on Sprague Dawley Rats DMBA-Induced Mammary Tumors

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The aim of the present study was to evaluate the possible protective role of olive oil on mammary carcinogenesis. Experimental studies can support epidemiologic data on the influence of some nutrients that can affect risk and prognosis of neoplastic lesions. In the present study, seventy two Sprague-dawley female rats 42 days old were equally divided in three groups, being group C supplemented with

olive oil (5%) and submitted to chemical carcinogenesis induction with 20 mg kg⁻¹ of 7, 12-dimethylbenzanthracene (group B and C). At 150 days, all the animals were sacrificed and necropsy process was conducted. Animals from group A did not developed neoplastic lesions and group C showed significant differences on the number and volume of the neoplastic lesions when compared to animals from the group that was not supplemented with olive oil, it was also verified the absence of metastases in this group. The present data suggests a possible protective role of olive oil, due to its content of oleic acid and phenolic compounds, on growth and differentiation of mammary neoplastic lesions that should be confirmed on further investigation projects. (*International Journal of Cancer Research* 5 (4): 144-152, 2009; doi: 10.3923/ijcr.2009.144.152)

Protective Effects of Rice Bran on Chemically Induced Colon Tumorigenesis may be Due to Synergistic/Additive Properties of Bioactive Components

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In this study we examined the preventive properties of Rice Bran (RB) and germ on the incidence of azoxymethane induced colon tumorigenesis in Fisher 344 male rats. We also examined the cytotoxic and apoptotic properties of RB using an *in vivo* model. Tumor incidence (%) in C and RB 5% and RB 10% were 100, 55 and 64, respectively. Tumors/tumor Bearing Rats (TBR) were 3.8, 2 and 1.56 for C, RB 5% and RB 10%, respectively. Tumor size (mm) was larger in control (6.50) than in rats fed RB 5% and RB 10% (1.33 and 0.64). After 12, 24 and 48 h of incubation with RB extracts, LDH (%) release ranged from 2.25-46.79. Present results suggest that feeding RB at 5 and 10% levels significantly ($p < 0.05$) reduced the incidence of AOM induced colon tumors in Fisher 344 male rats. We conclude that the protective effects of RB against colon tumorigenesis may possibly be attributed to the synergistic/additive actions of phytochemicals contained in RB. (*International Journal of Cancer Research* 5 (4): 153-166, 2009; doi: 10.3923/ijcr.2009.153.166)

Preventive Potential of Sorrel (*Hibiscus sabdariffa*) Calyx on the Formation of Azoxymethane Induced Aberrant Crypt Foci in Colon of Rats

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The objective of this study was to determine the effects of dietary administration of sorrel calyx and sorrel juice on the induction and development of azoxymethane

(AOM) induced Aberrant Crypt Foci (ACF) in Fisher 344 rats. Thirty male F344 rats were randomly divided into 5 groups and fed AIN 93-G diet as control, AIN 93-G+sorrel meal (5 and 10%) or juice (2.5 and 5%). Rats were given subcutaneous injections of AOM (16 mg kg⁻¹ b.wt.) once a week for 2 weeks and were killed after administering sorrel for 13 weeks. The effect of sorrel on detoxification (phase I and II) and antioxidant enzymes (catalase (CAT) and superoxide dismutase (SOD)) was also determined. Treatment with dietary sorrel meal and juice significantly (p<0.05) decreased total number of ACF and the total number of aberrant crypts compared to the control fed rats. Feeding sorrel meal at 10% level significantly (p<0.05) reduced the percentage of ACF by 70% compared to the control. Administration of sorrel to rats significantly (p<0.05) increased hepatic Glutathione-S-Transferase (GST), CAT and SOD activities by 3.3-6.5 fold compared to the control fed rats. However, no effect on CYP2E1 activity was observed among the treatment groups. Present results demonstrate the chemopreventive potential of sorrel either as meal or juice on AOM induced ACF as well as its ability to modulate detoxification and antioxidant enzymes. (*International Journal of Cancer Research* 5 (4): 167-175, 2009; **doi:** 10.3923/ijcr.2009.167.175)