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The deterioration seen in myelin related morphophysiology in vanadium exposed rats is partially protected by concurrent iron deficiency

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Oligodendrocyte development and myelination occurs vigorously during the early post natal period which coincides with the period of peak mobilization of iron. Oligodendrocyte progenitor cells (OPCs) are easily disturbed by any agent that affects iron homeostasis and its assimilation into these cells. Environmental exposure to vanadium can disrupt this iron homeostasis. We investigated the interaction of iron deficiency and vanadium exposure on myelination infrastructure and neurocellular profiles in developing rat brains. Three groups of rats were used. Control group 1 (C) dams were fed normal diet and pups injected with Dulbecco's phosphate buffered saline. Group 2 (V) dams were fed normal diet and pups injected with 3mg/kg body weight (b.w.) of sodium metavanadate (NaVO₃) daily from postnatal day (PND) 1-21. Group 3 (I+V) dams were fed iron deficient diet after delivery and pups injected with 3 mg/kg b.w. NaVO₃ from PND1-21. Primary cultures of glia cells were raised from newborn rat and treated with different concentrations of NaVO₃ with or without the iron chelator, desferrioxamine for 48hours. Untreated cells served as control. Cells viability was determined using 3-(4,5-Dimethylthiazol-2-yl)-2,5-Diphenyltetrazolium Bromide (MTT) assay. Immunohistochemical staining showed more astrogliosis and microgliosis indicative of neuroinflammation in I+V, but intense OPCs depletion and hypomyelination were seen in V, and this was partially protected in I+V. In *in vitro* studies, vanadium induced glial cells toxicity was partially protected only at LD₅₀ dose with desferrioxamine. The data indicate that vanadium promotes myelin damage and iron deficiency in combination with vanadium partially protects these neurotoxicological effects of vanadium.

Key words: Vanadium, iron-deficiency, hypomyelination, neurotoxicity

Cadmium in tobacco increases the sensitivity of female adolescence mice to nicotine-related behavioural deficits

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Exposure to tobacco through tobacco products has been implicated in the cause and/or progression of several neurodegenerative disorders. Although the behavioural change in nicotine abuse has been studied extensively, it is unclear how cadmium affects the brain circuits to give the observed susceptibility observed in adolescence females. This study investigated spatial and non – spatial working memory, anxiety related behaviour and motor activities in cadmium and/or nicotine exposed female adolescent mice. Female adolescent mice were divided into four groups of five mice each. A set of mice (Nic) received subcutaneous nicotine (2.0 mg/kg) while a separate set (Cd) was treated with 2.0 mg/kg cadmium (s.c). For the combined treatments of cadmium and nicotine, we administered 2.0 mg/kg Nicotine (s.c.) and 2.0 mg/kg of Cd (s.c). Subsequently, a separate group of n=5 animals (control) received normal saline. The total duration of treatment for all groups was 28 days. At the end of treatment the animals were tested using batteries of behavioural assays for anxiety (Elevated plus maze), motor function (Rotarod) and memory consolidation (Novel object recognition and Y – maze). The test responses were captured using a digital video recorder and analyzed in Any – Maze software. The combined nicotine-cadmium treatment induced a decline in weight of the animals versus the control. Also, nicotine administration increased the motor function, while cadmium and nicotine-cadmium treatment caused a decline in motor activity. Both nicotine and cadmium induced a reduction in memory index; however, nicotine-cadmium treatment induced the most significant decrease in non – spatial working memory. We concluded that weight reduction effect of tobacco smoke is not an exclusive function of nicotine but nicotine and cadmium synergy.

Key words: Nicotine, cadmium, motor function, memory, anxiety

Evaluation of the anti-inflammatory effect of aqueous and ethanolic extracts of *Anacardium occidentale* L. leaf in histamine-induced paw oedema

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Histamine is both an inflammatory mediator and a potent activator of nociceptors. In response to histamine-induced paw oedema in rats, a vicious cycle of histamine release is activated which is responsible for the accompanying swelling and pain of inflammation. This study was aimed at evaluating the anti-inflammatory property of crude aqueous and ethanolic extracts of *Anacardium occidentale* L. leaf (AOAL) and (AOEL) respectively. *In-vivo* study was done by subcutaneous injection of 0.1 ml of 1% histamine dissolved in saline into the experimental rat model to induce oedema, and the diameter of oedema was monitored over time *vis-à-vis* a standard anti-inflammatory drug (indomethacine). Phytochemical screening was carried out using standard methods. The results show an inhibition ($p < 0.05$) of paw oedema by AOAL and AOEL extracts with the AOEL extract giving the best inhibition even at the lowest dose. Phytochemical screening of AOAL revealed the presence of tannins, saponin, phlobotannins, flavonoids and terpenoids while that of AOEL revealed the presence of cardenolides in addition to the secondary metabolites found in AOAL. These results not only indicate the presence of anti-inflammatory principles in aqueous and ethanolic extracts of *Anacardium occidentale* L, but also suggest anti-nociceptive effect because pain constitutes one of the key components of inflammation. These reinforce the plant's potential use against anti-inflammatory diseases.

Key words: anti-inflammation, *Anacardium occidentale*, oedema, histamine, aqueous, ethanolic, indomethacine

Pleurotus tuber regium: a study of its effect on the cerebella histology and neurobehaviour in rats

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Pleurotus tuber regium is an edible fungus common to the southern part of Nigeria. The aim of this study was to assess possible toxic effects of this edible fungus on the histology of the cerebellum, anxiety and locomotor/exploratory activities in rats. Twenty one albino Wistar rats were used for the study. After the acclimatization period, these were divided into three groups of seven rats each: designated as control, low and high dose groups. The control group received distilled water, while the two experimental groups were administered with 25mg and 50mg of the ethanolic extract of *Pleurotus tuber regium* extract per kilogram body weight of the rats. Administration was done orally using an orogastric tube for a period of four weeks. The locomotor/exploratory neurobehavioural tests were carried out for four days while administration was on. A day after the 28th day, the animals were anaesthetized with chloroform and sacrificed. The cerebellum was preserved in buffered formalin and later processed for Haematoxylin and eosin staining method. Results showed normal histological features of the rats' cerebellum on section from both control and the two experimental groups, increased anxiety and decreased locomotor/exploratory activities. The observed results are attributed to its bioactive constituents. In conclusion, ethanolic extract of *Pleurotus tuber regium* at the administered dose had no pathological effect on the histology of the cerebellum but increased anxiety and decreased locomotor/excitatory activity in Wistar rats.

Key words: *Pleurotus tuber regium*, cerebellar histology, Neurobehaviour, Wistar rats

MRI signs of Wernicke-Korsakoff syndrome in HIV patients

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Magnetic resonance imaging (MRI) is the most effective radiological diagnostic method of brain lesions in HIV - infection, which allows you to identify the affected areas and the prevalence of the process, conduct a differential diagnosis between the lesion (lymphoma in HIV), inflammatory (opportunistic infections) and vascular characteristics of the process, as well as against the background of the disease, identify affected areas of brain matter typical of Wernicke-Korsakoff syndrome. MRI study was performed on magnetic resonance imaging «Panorama» 0.23 T, Phillips (Holland). The study was conducted in the axial, sagittal and coronal projections modes T1, T2, T2 * weighted image and FAST FLAIR, as well as T1 – weighted image with intravenous contrast enhancement agents (Omniscan - 20 ml, Tomovist - 20 ml and Gadovist 7.5 ml). A complex clinical, laboratory and instrumental examination of 193 patients, females - 91 (47.15%), males - 102 (52.85 %) with human immunodeficiency virus (HIV) – infection was carried out. The ages of patients ranged from 23 to 47 years. According to the MRI data, Wernicke-Korsakoff syndrome showed areas of typical symmetrical lesions of the brain matter in the mamillary bodies, thalamus and periventricular areas. In combination with the typical signs, there may be the possibility of the presence of atypical lesions located in other areas of the brain. The results of the study showed that magnetic resonance imaging (MRI) is the “gold standard” method in the diagnosis of Wernicke-Korsakoff syndrome in patients with HIV – infection.

Key words: HIV-infection, Magnetic resonance imaging, Opportunistic infections, Wernicke-Korsakoff syndrome.

Sub-chronic vanadium exposure results in microglia activation and expression of tumour necrosis factor (TNF)-alpha and interleukin (IL)-1 beta in different brain regions in mice

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Environmental exposure to vanadium is on the increase particularly in areas with persistent burning of fossil fuels. Vanadium induces oxidative stress, but information on brain damage and histopathological correlates of neurotoxicity of this metal is still limited. Using BALB/c mice, we investigated body weight changes, behavioural deficits, myelination, glia cell activation and pro-inflammatory cytokine expression after chronic vanadium exposure. The dams were administered sodium metavanadate contiguously from post natal day (PND)-1 through 89, while matched controls were administered sterile water. Body weight measurements, open field and hanging wire tests were done prior to sacrifice. On PND90, the brains were processed for myelin histochemistry, and immunophenotyping of astrocytes, microglia, and expression of TNF- α and IL-1 β , with single and multiple immunolabeling. Results showed a vanadium induced reduction in body weight gain and behavioural deficits. Marked demyelination, and astrocyte and microglia activation were observed with striking induction of TNF- α expression found especially in the hippocampus, where the cytokine was expressed in astrocytes. IL-1 β induction prevailed instead in diencephalic regions. The findings point to widespread vanadium-induced brain damage, represented by demyelination and a marked neuroinflammatory response, with a regional distribution that could account for diverse functional effects.

Key words: sub-chronic vanadium exposure, microglia activation, pro-inflammation cytokines

Anticonvulsant properties of *n*-butanol fraction of ariel parts of *Cassia siamea* Lam in mice and chicks

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Epilepsy is one of the most common afflictions of human beings. Antiepileptic drugs (AEDs) are effective only in 50 % of all epileptic patients. Natural products from folk medicines have contributed significantly in the discovery of modern drugs. *Cassia siamea* was extracted with methanol and subsequently partitioned to obtain *n*-butanol fraction. This was screened for anticonvulsant effects in chicks and mice using maximal electroshock (MES) and pentylenetetrazole (PTZ) induced test models respectively. In MES test shock was administered with Ugo Basile Electroconvulsive Machine. Acute toxicity test was conducted in mice and chicks intraperitoneally using Lorke's method. Ethical approval was obtained from departmental committee for handling and use of animals for research (DAC/IW-OT/1-13). The percent yield of *n*-butanol fraction is 10.6% w/w while the median lethal dose in mice and chicks was found to be > 5000 mg/kg. There was no significant ($p > 0.05$, ANOVA) reduction in mean recovery time of chicks (7.75 ± 1.03 , 11.00 ± 2.08 and 5.63 ± 0.75) subjected to MES in all doses tested (1000, 500 and 250 mg/kg respectively) compared to control (6.30 ± 0.54) while a 10% protection from seizure was observed at 500 and 1000 mg/kg of the extract. Similarly, no significant ($p > 0.05$, ANOVA) increase in onset of seizure (7.67 ± 1.62 , 4.00 ± 0.52 and 4.83 ± 1.01) compared to control (4.5 ± 0.43) was observed with the extract (1000, 500 and 250 mg/kg respectively) in the PTZ test. No protection against seizure was observed as well. The *n*-butanol fraction from *Cassia siamea* whole plant extract possesses an insignificant anticonvulsant property.

Key words: *n*-butanol fraction, maximal electroshock, pentylenetetrazole, mice, chicks

A comparative study on the effects of ethanolic extracts of *Cymbopogon citratus* (lemon grass) and *Mangifera indica* (mango) bark on the nissl substance in the cerebellum

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Cymbopogon citratus (Lemon grass) and *Mangifera indica* (Mango) bark, are two common plant materials used in Nigeria for the treatment of several ailments including malaria and stomach problems. A comparison of the potential effect of the ethanolic extracts of *Cymbopogon citratus* and *Mangifera indica* bark on Nissl substance of the cerebellum of adult Wister rats was investigated in this study. Twenty adult Wister rats weighing 160-200g were divided equally into four groups. Group A was control, Groups B and C received 2000 mg/kg b.w. of lemon grass and mango bark, Group D received 1000 mg/kg b.w of lemon grass and mango bark respectively for 14 days and on the 15th day the rats were sacrificed by chloroform inhalation and the cerebellum was excised for neurohistological studies using Cresyl fast violet method. Result showed deeply stained intensity of the Nissl substance in group B when compared with the control. Group C and D showed reduced intensity of Nissl substance, when compared to the control and group B animals that received 2000mg/kg of the ethanolic extract of *Cymbopogon citratus*. The reduction in staining intensity was more pronounced in animals in Group C. From the result, it can be concluded that the components found in mango bark has a potential of affecting protein synthesis and causing neuronal degeneration in the cerebellum as indicated by the reduction in staining intensity when compared to other experimental groups.

Key words: lemon grass, mango bark, Nissl, cerebellum, ethanolic extracts, Wistar rats