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### The pharmacological effect of crocus extract in protecting adult meriones against lead neurotoxicity

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Lead (Pb) is a metal element released into the atmosphere and a major source of environmental contamination. The accumulation and concentration of this metal in a food web may lead to the intoxication of the body, more precisely, the nervous system (NS). In addition, Pb-exposure can cause structural and functional disruption of the NS. Studies have shown that Pb-exposure could be a risk factor in the development of Parkinson's disease (PD). The latter is related to dopaminergic deficiency that may be triggered by genetic and environmental factors such as Pb intoxication. Our study will focus on the negative effects of oxidative stress on the brain of meriones shawi, since it is the organ most exposed to the oxidation due to the high phospholipid content of neuronal membranes and the link existing with the development of neurodegenerative pathologies such as PD. Also, we have evaluated, in one hand, the neurotoxic effect of Pb (25 mg / kg B.W i.p) for three consecutive days on dopaminergic system and locomotor performance in Merione shawi. In the other hand, the possible antioxidant effect and restorative potential of *C. sativus* (CS) (50 mg / kg BW) by oral gavage. The immunohistochemical approach has revealed that Pb-intoxicated Meriones show a significant increase of Tyrosine Hydroxylase (TH) levels within the Substantia Nigra compacta (SNc), Ventral Tegmental Area (VTA), Locus Coeruleus (LC), Dorsal Striatum (DS) and Medial Forebrain Bundle (MFB), unlike the control meriones, a group intoxicated and treated with *Crocus sativus* hydroethanolic extract (CSHEE) and treated group by CSHEE. Treatment with CSHEE, has shown a real potential to prevent all Pb-induced damages. In fact, restores the TH levels by 92%, 90%, 88%, 90% and 93% in SNc, VTA, LC, DS and MFB respectively, similarly, locomotor activity dysfunction in Pb-intoxicated meriones was reinstated by 90%. In this study, we have revealed a new pharmacological potential of *Crocus sativus* that can be used as a neuroprotective product for neurodegenerative disorders, especially, which implying dopaminergic and noradrenergic injuries, like PD, triggered by heavy metals.

**Key words:** *crocus sativus*, dopamine and noradrenaline, lead neurotoxicity, locomotion, meriones shawi, midbrain, oxidative stress

### Locus coeruleus impairment induced by lead toxicity versus a treatment by crocus sativus in desert rodent meriones shawi

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**Key words:** *crocus sativus, locus coeruleus, noradrenaline, lead neurotoxicity, locomotion, meriones shawi*

### **Altered locus Coeruleus induced by lead neurotoxicity: A possible link with Parkinson's disease**

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**Key words:** *crocus sativus, locus coeruleus, noradrenaline, lead neurotoxicity, locomotion, meriones shawi, parkinson's disease*

### **Involvement of neuroinflammation in hepatic encephalopathy**

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Hepatic encephalopathy (HE) corresponds to all neurological and neuropsychiatric disorders caused by liver failure and/or shunts-porto systemic. The clinical presentation is polymorphic and nonspecific, ranging from subtle cognitive disorders detectable only by psychometric tests, for minimal EH, to asterixis and alterations in moderate consciousness to coma in the case of clinical EH. It occurs as a complication of acute hepatic insufficiency (type A), portosystemic shunt (type B), or as a complication of chronic liver disease, mainly cirrhosis (type C). Cerebral edema is one of the major complications of hepatic encephalopathy and is the result of net accumulation of water

and solutes in the intracellular and / or extracellular cerebral an increase in the volume of the brain mass. The pathophysiology of EH is complex and multifactorial, while the accumulation of ammonia at the cerebral level is one of the major etiological factors, recent studies reveal that neuroinflammation plays an important role in the pathogenesis of EH whether acute or chronic, through pro-inflammatory cytokines. These will activate the glial cells and subsequently a neuronal dysfunction is observed. EH is a major prognostic factor influencing survival and quality of life in cirrhotic patients.

**Key words:** *hepatic encephalopathy, neuroinflammation, edema, ammonia*

### **Effects of chronic aluminum exposure on neurotransmission in rat brain**

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Aluminum (Al) causes multiple impairments in several body systems including the central nervous system. In fact, Al exposure has been mostly associated with neurological dysfunctions that occur in some brain diseases. The effect of Al neurotoxicity on the dopaminergic system is well documented, but this effect on the serotonergic system is poorly studied. The aim of this work is to evaluate the effect of chronic Al intoxication (0.3% of aluminum chloride exposure from the intra-uterine age until 4 months of adult age) on dorsal raphe nucleus (DRN) which is the main source of serotonin, and also on the glycoprotein secretion of subcommissural organ (SCO), receiving important serotonergic innervation. This will be executed using immunohistochemistry procedure, with both the anti serotonin and the anti Reissner's fiber antibodies in the rat. Our results showed a significant increase of serotonin immunoreactivity in the DRN, accompanied by a noticeable decrease of RF immunoreactivity in the SCO ependymocytes. This study provides further evidence confirming the toxic effect of Al exposure on serotonin neurotransmission in the brain likely through increased synthesis or decreased release. Al exposure was also shown to decrease RF glycoprotein which is involved in the detoxification of cerebrospinal fluid.

**key words:** *aluminum, serotonergic system, immunoreactivity, dorsal raphe nucleus, subcommissural organ*

### **The neuroprotective effect of curcumin against aluminum intoxication in brain: Link with neurodegenerative diseases**

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Aluminum is the most abundant metal on the earth crust, it can access to the body via gastrointestinal and lung tissue, it crosses the blood-brain barrier and forms deposits in brain regions such as substantia nigra of patients affected by Parkinson's disease and in other cerebral areas of different neurodegenerative diseases, some previous studies demonstrated that aluminum induced changes in many neurotransmitter levels including dopaminergic system. Medicinal plants are very variable but some of them is used as spice such as curcumin which is extracted from the rhizome of the plant 'Curcuma longa'. Curcumin exhibit a variety of biological and pharmacological

activities such as namely antioxidant potential. The present study aims to evaluate the possible protective effect of curcumin on rats exposed to aluminum which is a major risk factor of parkinson's disease. Thus our Experiments were carried out on wistar rats exposed to aluminum chlorid(0,3%) in drinking water during 4months, the aluminum intoxicated group received concomitantly curcumin by oral gavage (30mg/kg B.W.) for the same duration as mentioned previously, we evaluated the locomotor activity of rats using 'open field test' and using the immunohistochemistry procedure, with tyrosine hydroxylase antibody (TH: the key enzyme of dopamine synthesis) we evaluated the TH immunoreactivity in the substantia nigra.

Our results showed, a significant decrease of TH immunoreactivity in the substantia nigra in chronic aluminum intoxicated rats, this decreased of TH immunolabelling was remedied with daily curcumin administration. Concerning the locomotor performance, aluminum induced a significant decrease of locomotor activity in aluminum intoxicated group. In the aluminum intoxicated-curcumin treated group, the locomotor activity increased significantly in comparison with aluminum intoxicated group.

In conclusion curcumin might have a neuroprotective effect against aluminum-induced alterations on dopamine neurotransmission and locomotor activity which are the major signs of Parkinson's disease, thus curcumin might be the preventive key of Parkinson's disease.

**Key words:** aluminum, curcumin, immunoreactivity, neurodegenerative diseases, parkinson's disease

## Origine biologique de l'autisme: Troubles neuroendocriniens et de neuroplasticité

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L'autisme est un trouble neuro-développemental qui se manifeste avant l'âge de 3 ans et affecte chez l'enfant les interactions sociales, la communication et le comportement à caractère restreint, répétitif et stéréotypé. L'identification des caractéristiques biologiques de ce trouble est primordiale à l'élaboration d'une prise en charge thérapeutique adaptée et à une prévention précoce. Bien que faisant l'objet de nombreuses recherches, les caractéristiques neurobiologiques de l'autisme restent obscures. une hypothèse récente attribue les causes biologiques de l'autisme à un dysfonctionnement de la glande pinéale et à une carence en mélatonine. Cette dernière a pour fonction principale de synchroniser les rythmes circadien et saisonnier, ainsi que de réguler le cycle veille-sommeil. Par conséquent, le dysfonctionnement pinéal

a été mis en évidence sur la base d'observations associant les faibles concentrations de mélatonine et les troubles du sommeil associés à l'autisme. Une autre hypothèse attribue les origines biologiques de l'autisme à des troubles de neuroplasticité, tel que la prolifération corticale anormale et la dysgénésie des épines dendritiques des neurons.

Au cours de cette conférence nous allons éclaircir que cette neuroplasticité anormale soit provoquée par l'hyperactivité et le métabolisme anormal de la N, N-diméthyltryptamine (DMT) endogène, substance synthétisée naturellement par la glande pinéale.

**Key words:** autisme, origine biologique, glande pinéale, mélatonine, troubles de neuroplasticité, DMT

## Use of psychoactive substances (pas) and factors associated with consumption in school adolescents of beni mellal's prouvince

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The objective of this work is to take stock of the current state of addiction at a psychoactive substance (PAS) in the region of Béni Mellal among adolescents enrolled at school. This study is the first of its kind in the Béni Mellal-Khénifra region. It should lead to a cartography drawing up the physiognomy of addictions and compare it to that drawn up at the national level, and draw any particularities from it.

A sample of 500 students distributed geographically at four randomly selected sites (rural, urban and suburban) concerned four levels of education, 9th grade Junior School pupils and High School pupils (Common Core, 1st year of baccalaureate, 2nd year of baccalaureate) belonging to seven different institutions in the province of Béni Mellal.

The results showed that the highest usage frequencies in our study related to males. The highest consumption for both genders concern tobacco and related products (13.2% for Tobacco, 11.6% Chicha, 9.2% Nefha and 7.9% for Kala, in second position, we found alcohol (8.1%) followed by inhalants (7.8%) and in last position cannabis with 6.9%.

Half of the students (48.2%) started using PAS are likely to be influenced by their peers, 15.9% because of family problems, 11.6% used the PAS to overcome school problems, 10.4% for dealing with personal issues, while 9.1% said them experienced use under the influence of a family member.

The values found are close to those found in the national studies with some nuances related to the particularities of the region studied.

**Key words:** prevalence, psychoactive substances, risk factors, adolescents-béni mellal