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Sciences de Tétouan

Devant le jury :

Pr. MAOUNI Abdelfettah	Ecole Normale Supérieur de Tétouan, UAE	Président
Pr. LOUAJRI Adnane	Faculté des Sciences de Tétouan, UAE	Membre
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RESUME

Parkinson's disease (PD) and Hepatic encephalopathy (HE) are classified as neurological disorders with various symptoms. PD is a neurodegenerative disease characterized by the degeneration of dopaminergic neurons. Reserpine administration to animals was used to develop a PD model with motor and non-motor symptoms. HE is another neurological disorder associated with acute or chronic liver injuries. Motor coordination is classified as a symptom in patients with HE. These diseases could be induced by exposure to high levels of heavy metals such as lead (Pb). Bioactive molecules could be used for their neuroprotective effect against PD, HE, and Pb exposure. Our research directions are focused on three sections. **The first section** is devoted to the treatment of PD by administration of low concentrations of graphene oxide nanoparticles (GONPs). In this section, we investigated the neuroprotective and antioxidant effects of GONPs in a mouse model of PD by evaluating neurobehavioral test alterations and neuronal biomarkers of antioxidant and oxidative stress. The second part of this first section is devoted to characterizing chemically induced HE with neurobehavioral tests in rats with acute HE. **In the second section**, we evaluated cannabis graphene quantum dots (C-GQDs) and *Cannabis saliva* essential oil (CSEO) for their antibacterial and accelerative effect on the healing process in a mouse incisional wound model. **The third section** is dedicated to the valorization of curcumin-III as a neuroprotective bioactive molecule against acute (three days) and subchronic (six weeks) Pb-exposure in *Meriones shawi*. The study evaluates the possible neurochemical alterations in the subcommissural organ (SCO) and the neuroprotective effect of curcumin-III. Interesting results were obtained in the three research sections. **Firstly**, GONPs showed a clear neuroprotective effect and reversed the neuronal alterations induced by reserpine. These findings suggested that GONPs could be used as an antioxidant agent and protect against neurodegenerative processes in the PD animal model. **Secondly**, the C-GQDs and CSEO confirmed the *in vitro* study and showed an apparent anti-inflammatory effect with a decrease of neutrophil levels in blood and skin tissue. In addition to the accelerative effect on re-epithelization, C-GQDs restored neurobehavioral alteration induced by incisional wounds by reducing oxidative stress and cortisol levels, increasing the anxiolytic-like effect and vertical locomotor activity. **Thirdly**, co-treatment with curcumin-III at a dose of 30 mg/kg bw significantly ameliorated SCO secretory activity and decreased the neurotoxic effect of lead with restoration of Reissner's fiber (RF) levels in the SCO.

Keywords : Parkinson's disease, Hepatic encephalopathy, Graphene oxide, Oxidative stress, Wound healing, Graphene quantum dots, *Cannabis Sativa Essential Oil*, Pb-exposure, *Meriones shawi*, Mouse.