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Amitraz alteration of 5-HT levels mediated through disruption of estradiol content in CNS of male rats

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Amitraz is a formamidine insecticide/acaricide that alters different neurotransmitters levels, among other neurotoxic effects. Oral amitraz exposure (20, 50 and 80 mg/kg bw, 5 days) has been reported to increase serotonin (5-HT) content and to decrease its metabolite and turnover rate in the male rat brain, particularly in the striatum, prefrontal cortex, and hippocampus. However, the mechanisms by which these alterations are produced are not completely understood. Amitraz alters estradiol concentrations in the brain that regulate the enzymes responsible for this neurotransmitter synthesis and metabolism. Thus, alterations in estradiol levels in the brain could mediate the observed effects. To test these hypothesis regarding possible mechanisms, we treated male rats with 20, 50 and 80 mg/kg bw for 5 days with or without tamoxifen (TMX, 1 mg/kg bw), a selective estrogen receptor antagonist, and then isolated tissue from striatum, prefrontal cortex, and hippocampus. We then measured tissue levels of 5-HT neurotransmitter. Amitraz produced a dose-dependent increase of the 5-HT levels in all brain regions studied compared to the control group. The increase of 5-HT ranged from highest to lowest in prefrontal cortex, striatum and hippocampus. Moreover, amitraz induced a dose-dependent decrease of 5-HIAA metabolite content and its turnover rate (5-HIAA/5-HT) in all brain regions studied compared to the control group. 5-HIAA and turnover rate decrease ranged from highest to lowest in prefrontal cortex, hippocampus and striatum. TMX co-treatment with amitraz partially reversed the change in 5-HT neurotransmitter and its metabolite levels as well as the turnover rate induced by amitraz alone in all brain regions studied. Our present results provide new understanding of the mechanisms contributing to the harmful effects of amitraz.

Biography

Paula Moyano received his JD degree at the University Complutense University of Madrid in 2013. She has a Masters in Pedagogical Sciences 2017. She specialized in neurotoxicology and legal sciences and received his PhD in Toxicology and legal medicine in 2016.

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