



## GC/MS-Based Metabolomic Analysis of Serum and Urine in Rats after Dichlorvos Poisoning

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**SUMMARY.** Dichlorvos (DDVP) is one of the most widely used organophosphorus pesticides which has become a serious risk for environment, as well as the health of human and animals. The aim of this study was to conduct a gas chromatography-mass spectrometry (GC-MS) based metabolomic method for evaluating the toxic effect of acute exposure of DDVP to rats. Twenty Sprague-Dawley rats were randomly divided into control group and DDVP group. The rats of DDVP group were given a single dose of DDVP (25 mg/kg) by intragastric administration in this work. The serum and urine samples were collected at different time-points to measure the metabolic profiles. No significant changes were observed in serum metabolites after DDVP poisoning. While in the urine, creatinine, D-arabinonic acid and pantothenic acid were increased, and D-galactose, benzenoacetic acid, myo-inositol, pentaric acid, benzenepropanoic acid, galactonic acid, tetradecanoic acid, glucaric acid, tartaric acid, arachidonic acid, ribitol, octadecanoic acid and uridine were decreased after DDVP poisoning. The results indicated that the acute exposure of DDVP could affect amino acid metabolism, lipid metabolism and urea cycle perturbations in rats. This research also demonstrated that metabolomics was a reliable tool in unveiling the mechanisms of DDVP.

**RESUMEN.** Dichlorvos (DDVP) es uno de los plaguicidas organofosforados más utilizados, que se ha convertido en un grave riesgo para el medio ambiente, así como para la salud de humanos y animales. El objetivo de este estudio fue realizar un método metabolómico basado en cromatografía de gases y espectrometría de masas (GC-MS) para evaluar el efecto tóxico de la exposición aguda de DDVP a ratas. Veinte ratas Sprague-Dawley fueron divididas aleatoriamente en el grupo control y el grupo DDVP. En este trabajo las ratas del grupo DDVP recibieron una dosis única de DDVP (25 mg/kg) por administración intragástrica. Las muestras de suero y orina se recogieron en diferentes puntos de tiempo para medir los perfiles metabólicos. No se observaron cambios significativos en los metabolitos séricos después del envenenamiento con DDVP, mientras que en orina se incrementaron la creatinina, el ácido D-arabinónico y el ácido pantoténico. D-galactosa, ácido benzenoacético, mio-inositol, ácido pentálico, ácido benzenopropanoico, ácido galactónico, ácido tetradecanoico, ácido glutárico, ácido tartárico, ácido araquidónico, ribitol, ácido octadecanoico y uridina disminuyeron después del envenenamiento con DDVP. Los resultados indicaron que la exposición aguda de DDVP podría afectar el metabolismo de los aminoácidos y el de los lípidos y las perturbaciones del ciclo de la urea en ratas. Esta investigación también demostró que la metabolómica es una herramienta confiable para descubrir los mecanismos del DDVP.

**KEY WORDS:** dichlorvos, GC-MS, metabolomics, PLS-DA, serum, urine.

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