研究论文

魔角旋转核磁共振代谢组学方法对镧、铈急性生物效应的比较研究

廖沛球, 吴惠丰, 张晓宇, 李晓晶, 李中峰, 李伟生, 吴亦洁, 裴奉奎

中国科学院长春应用化学研究所, 长春　130022

摘要　　利用高分辨魔角旋转核磁共振(MAS ^{1}H NMR)技术对腹腔注射不同剂量[2, 10, 50 mg/kg(体重)]的硝酸镧[La(NO$_3$)$_3$]和硝酸铈[Ce(NO$_3$)$_3$] 的雄性Wistar大鼠肝、肾组织的MAS ^{1}H NMR谱进行比较分析, 研究了La(NO$_3$)$_3$和Ce(NO$_3$)$_3$的急性生物效应, 并结合模式识别技术对不同剂量La(NO$_3$)$_3$和Ce(NO$_3$)$_3$的急性生物效应进行了分类. 研究结果表明, La(NO$_3$)$_3$对大鼠的急性毒性主要表现为肝毒, Ce(NO$_3$)$_3$对大鼠肝、肾同时造成损伤. 该方法可用于其它稀土及金属化合物的毒性预测和毒理学研究.

关键词　　魔角旋转核磁共振　代谢组学　组织　稀土　生物效应

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Comparative Investigation on Acute Biological Effect of Lanthanum and Cerium by MAS ^{1}H NMR-based Metabonomic Approach

LIAO Pei-Qiu, WU Hui-Feng, ZHANG Xiao-Yu, LI Xiao-Jing, LI Zhong-Feng, LI Wei-Sheng, WU Yi-Jie, PEI Feng-Kui

Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, China

Abstract High-resolution magic-angle-spinning(MAS) ^{1}H NMR spectroscopic and pattern recognition(PR) based methods were applied to compare the different acute biochemical effects between La(NO$_3$)$_3$- and Ce(NO$_3$)$_3$-treated rats. Male Wistar rats were treated with various doses (2, 10, 50 mg/kg body weight) of La(NO$_3$)$_3$ and Ce(NO$_3$)$_3$, and MAS ^{1}H NMR spectra of the intact liver and kidney tissues were analyzed by using principal components analysis to extract metabolic information. The target lesion of La(NO$_3$)$_3$ to liver and Ce(NO$_3$)$_3$ to both liver and kidney were found by MAS ^{1}H NMR-PR methods. This work illustrated that the combination of NMR and pattern recognition technique is a powerful method to study the biochemical effects induced by xenobiotics.

Key words　Magic-angle spinning NMR　Metabonomics　Tissue　Rare earths　Biological effects

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通 讯 作 者　裴奉奎 peifk@ciac.jl.cn

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