

论著

大鼠口服龙胆水煎剂后尿液代谢谱的变化

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摘要 目的 观察大鼠灌胃给予龙胆水煎剂 (RGD) 后其尿液代谢谱的变化及其与龙胆寒性作用的相关性。方法 10只雌性Wistar大鼠分为对照组 (ig生理盐水) 和RGD组 (ig RGD 40 g·kg⁻¹·d⁻¹, 共 9 d)。从给药前3 d开始每3 d检测1次体重、体温、食量和饮水量。于d 5收集大鼠尿样, 测定核磁共振氢谱 ([¹H] NMR)。给药结束d 2称体重, 测定血浆中环磷酸腺苷 (cAMP) 和环磷酸鸟苷 (cGMP) 含量, 取肝、肾、脾和胸腺等脏器称重并计算脏器指数。结果 与对照组比较, 从给药d 3开始RGD组大鼠毛脏且色泽差, 腹泻, 体温降低, 活动减少, 受激排便增多, 但食量和饮水量无明显变化。RGD组大鼠肝、肾、脾和胸腺等脏器指数及血浆cAMP / cGMP比值无明显变化。

尿样 [¹H] NMR数据分析表明, RGD组与对照组在主成分分析得分图中呈聚类型分布, 两组间未见重叠, RGD组尿样中葡萄糖、氨基酸、2-羧基戊二酸、柠檬酸盐和琥珀酸盐明显增加, 牛磺酸、氮氧三甲胺、肌酸酐和十二烷酸酯类等明显减少。结论 长时间给予较大剂量RGD可使大鼠出现虚寒证体征, 给药后尿液 [¹H] NMR谱变化与龙胆寒性作用相关, 主要表现为三羧酸循环能量代谢、脂肪酸代谢以及能量保存和利用功能明显降低。

关键词 [龙胆](#) [代谢组学](#) [磁共振波谱学](#) [模式识别](#)

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Changes of metabonomic profiles of rat urine after oral administration of Radix Gentianae decoction

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Abstract

AIM To study the metabonomic profile of rat urine after oral intake of Radix Gentianae decoction (RGD) and to observe the correlation between the metabonomic changes and the cold-property action of Radix Gentianae. **METHODS** Ten female Wistar rats were divided into control (ig normal saline) and RGD (ig RGD 40 g·kg⁻¹·d⁻¹, for 9 d) groups. The physical parameters, such as body weight and temperature, food and water intake, were measured every 3 d from d 3 before RGD administration. At d 5, the urinary sample of each rat was collected individually and the [¹H] nuclear magnetic resonance ([¹H] NMR) spectra of the urinary samples were measured. At d 2 after the end of RGD administration, the plasma concentrations of cyclic adenosine monophosphate (cAMP) and cyclic guanosine monophosphate (cGMP) were determined, and organ indexes were calculated after weighting the liver, kidneys, spleen, thymus, adrenals and ovaries of the rats. **RESULTS** From d 3 of RGD administration, compared with the control, the rats of RGD group showed poor physical appearance, obvious diarrhea, lower body temperature, and more stool under stimulus, but no marked changes on diet and water intake. The plasma cAMP/cGMP ratio and organ indexes had not shown statistically significant differences between the two groups. Analysis of the [¹H] NMR data of the urinary samples showed that the RGD group and the control group were distributed in 2 clusters in the principal components analysis diagram without overlap. Escalated glucose, amino acid, 2-O glutarate, citrate and succinate levels, and reduced taurine, creatinine and dodecanoate levels were observed in urinary samples of RGD group. **CONCLUSION** Long term treatment with high dose of RGD causes a cold syndrome of the insufficiency type in the test rats. The variation of the [¹H] NMR data appeared closely associates with the cold-property of RGD, which indicates the obvious down regulation of RGD at energy metabolic progress in tricarboxylic acid cycle, fatty acid metabolism and energy conservation and utilization.

Key words [Radix Gentianae](#) [metabonomics](#) [magnetic resonance spectroscopy](#) [pattern recognition](#)

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