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中药复方多成分体系群体药动力学: 总量统计矩数学模型及参数计算研究

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中文摘要:目的: 分析单成分群体药动力学参数的计算方法, 建立中药复方多成分体系的群体药动力学: 总量统计矩参数测算方法。方法: 针对单成分群体药动力学分析原理, 运用统计矩原理阐明并建立中药复方多成分体系药动力学总量统计矩参数群体模型及参数计算方法。结果: 建立了包括总量零阶矩(AUC_T)、一阶矩(MRT_T)、二阶矩(VCR_T)、总清除率(CL_T)、总表观体积(V_T)、总95%成分代谢时间区间、总95%成分累积代谢时间区间等中药复方群体药动力学参数数学模型, 并关联了单个成分群体药动力学参数。结论: 中药复方多成分体系的群体药动力学数学模型及参数体系可在单成分群体药动力学数学模型及参数体系基础上按总量统计矩原理建立; 在群体典型值处依泰勒展开可获得总量统计矩参数群体典型、固定效应、生物间变异及实验误差。

中文关键词: 中药复方; 多成分体系; 群体药动力学; 总量统计矩; 数学模型; 参数分析

Study of population pharmacokinetic model and parameter analyses for multiple components in Chinese materia medica formula

Abstract: Objective: To elucidate and establish a new population pharmacokinetic mathematical models and parameter calculation for the multiple components in the Chinese Materia Medica Formula(CMMF) through analyses of population pharmacokinetic parameter calculation for single compounds. Method: The model was been set up by statistic moment principle to form a new population pharmacokinetics for the multiple components in CMMF according to the single compound population pharmacokinetic parameter calculation principle. Result: It have been established the mathematical model for the population pharmacokinetic model for CMMF that consisted of a series of parameters: ①total quantum zero moment as AUC_T, ②first moment as MRT_T, mean residence time of metabolism, ③second moment as VRT_T, variance of mean residence time of metabolism, ④total body clearance CL_T, ⑤total apparent volum V_T, ⑥95% of total ingredient metabolic time interval Pa^{0.95}, ⑦95% of total ingredient accumulation metabolic time interval Pa^{0.95}, etc that were correlated with single population pharmacokinetic parameters. Conclusion: The population pharmacokinetic model and parameter calculation for CMMF can be established on the bases of single compound population pharmacokinetics by way of total quantum statistic moment principle to be expanded taylor expression at point of population parameter typical values to divide population pharmacokinetic total quantum statistical moment parameters into the four term of typical value, fixed effect, biologic variation and experiment error.

keywords: Chinese materia medica formulae; multiple component system; population pharmacokinetics for CMMF; total quantum statistical moment; mathematical model; parameter analyses

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