

目的 建立4 h常规血液透析(血透)清除磷总量的简易计算公式。方法 选取华山医院血透中心维持性血透(MHD)患者165例,随机分成公式建立组和验证组。将患者每周第2次透析治疗期间的透前血磷、二氧化碳结合力(CO<sub>2</sub>CP)、甲状旁腺素(iPTH)、血钾、血细胞比容(Hct)、碱性磷酸酶(AKP)、尿素清除指数(Kt/V)、透后60 min透析废液中磷浓度以及透析器对磷的清除率、超滤量、血流量、干体质量、性别、年龄等作为公式的待筛选变量。绘制透析废液磷浓度随治疗时间的变化曲线,以曲线下面积估算总磷清除量。公式变量筛选采用逐步后退法,用Bland-Altman方法对公式预测值与实际测量值进行一致性检验。结果 通过后退法筛选得到的磷清除总量的计算公式:磷清除总量=88.6×透析废液磷浓度-0.03×年龄+1.07×性别+0.06×透析器对磷的清除率-4.59。验证结果显示预测值与真实值差值基本不超过4 mmol。结论 本公式适用于推算每次4 h常规血透的磷清除总量,为临床上调控尿毒症患者的磷代谢平衡提供帮助。

Objective To report a simple formula to estimate phosphate removal by standard four-hour hemodialysis in Chinese patients. Methods A total of 165 MHD patients in Huashan Hospital were enrolled. Effluent dialysate samples were collected during treatment to estimate the total amount of phosphate removal. Pre-dialysis levels of serum phosphate, potassium(K<sup>+</sup>), hematocrit(Hct), parathyroid hormone(iPTH), carbon dioxide combining power(CO<sub>2</sub>CP), alkaline phosphatase (AKP), Kt/V, and ultrafiltration volume, age, gender, dry body weight, blood flow, phosphate clearance of dialyser, phosphate concentration of dialysate at 60 min after the start of HD were obtained. 80% observations were randomly selected for formula building by backward stepwise and the remaining 20% observations were used to validate the formula. Results The formula was described as  $Tpo_4 = 88.6 \times C_{60} - 0.03 \times \text{Age} + 1.07 \times \text{Gender} + 0.06 \times \text{Clearance} - 4.59$ , where C<sub>60</sub> was phosphate concentration in dialysate measured 60 min into HD and Clearance was the phosphate clearance of dialyser. Formula validation further suggested good predictive ability. Conclusion This study derives an approach to quantify phosphate removal by a simple formula, which will be helpful for clinicians to treat patient individually.



中华肾脏病杂志®  
Chinese Journal of Nephrology

主管: 中国科学技术协会  
主办: 中华医学会  
编辑: 《中华肾脏病杂志》

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中华肾脏病杂志 » 2012, Vol. 28 » Issue (9): 673-678 DOI:

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## 单次透析治疗对维持性血液透析患者磷清除的估算

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DOI: 10.3760/cma.j.issn.1001-7097.2012.09.002 基金项目: 上海市人才发展基金(037) 作者单位: 200040上海, 复旦大学、郝传明、陈靖, 护理部(黄碧红、袁立); 复旦大学上海医学院统计学教研室(廖慧敏、余勇夫) 通信作者: 陈靖, Email: c

### A new formula of quantifying phosphate removal within one hemodialysis session

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摘要

图/表

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