

研究论文

草酸钾诱导的LB膜缺陷及对草酸钙堆积图形的影响

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收稿日期 2006-7-25 修回日期 网络版发布日期 2007-2-1 接受日期

摘要 采用扫描电子显微镜(SEM)和原子力显微镜(AFM)研究了经不同浓度草酸钾($K_2C_2O_4$)处理后二棕榈酰磷酸酯胆碱(DPPC)的缺陷LB膜及其对一水草酸钙(COM)成核和生长的影响. $K_2C_2O_4$ 的处理可进一步破坏LB膜中圆形畴区内的分子列阵, 尤其是使处在液态扩张相(LE)/液态凝集相(LC)边界的分子列阵无序程度增加, 从而促进了COM晶体在此处的成核和生长, 最终诱导圆形堆积的COM晶体图形出现. 随着损伤LB膜的 $K_2C_2O_4$ 浓度 c ($K_2C_2O_4$)从0.3 mmol/L增加到5.0 mmol/L, 其对LB膜畴区有序结构的破坏作用逐渐增强, 圈状堆积的晶体图形数量增多. 当 $c(K_2C_2O_4)$ 为0.3 mmol/L时, 主要诱导实心的圆形堆积的COM晶体图形, 而当 $c(K_2C_2O_4)$ 增加至5.0 mmol/L时, 生成圈状COM晶体图形, 且图形的半径减小. 这一研究结果将有助于从分子和超分子水平上了解肾小管上皮细胞膜损伤后的微结构变化及其与肾结石形成的关系.

关键词 [缺陷](#) [AFM](#) [草酸钙](#) [二棕榈酰磷酸酯胆碱](#) [LB膜](#) [肾结石](#)

分类号 [O614.23](#) [O782+.9](#)

DOI:

Defective LB Films Induced by Potassium Oxalate and Its Effect on Deposited Patterns of Calcium Oxalate

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Received 2006-7-25 Revised Online 2007-2-1 Accepted

Abstract The defective Langmuir-Blodgett(LB) film of 1,2-dipalmitoyl-sn-glycero-3-phosphocholine(DPPC) induced by potassium oxalate($K_2C_2O_4$) and its effect on nucleation and growth of calcium oxalate monohydrate(COM) were investigated with the aid of atomic force microscopy(AFM) and scanning electron microscopy(SEM). $K_2C_2O_4$ can destruct the molecules arrangement in the circular domains in LB film especially at the boundaries of liquid condensed(LC) and liquid expanded(LE) phases, which provides much more nucleating sites for COM crystals and promotes the nucleation and growth of COM crystals. It results in the formation of circular COM crystals patterns. As the concentration of potassium oxalate increases from 0.3 mmol/L to 5.0 mmol/L, the patterns of the COM crystals change from a solid circle to a ring-shape, the number of patterns increases and the average diameter of the patterns decreases. The results would shed light on the molecular mechanism of structure change in renal epithelial membrane injured by oxalate at the molecular and supramolecular level, and on the relationship between urolithiasis and the injury of renal epithelial membrane.

Key words [Defect](#); [AFM](#); [Calcium oxalate](#); [DPPC](#); [Langmuir-Blodgett film](#); [Nephrolith](#)

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