化学学报 2003 61 (10): 1597-1602 ISSN: 0567-7351 CN: 31-1320/06

脂质体中不同种类羧酸钾对草酸钙晶体生长的调控作用

欧阳健明,段荔,何建华

暨南大学生物矿化与结石病防治研究所暨南大学化学系

收稿日期 修回日期 网络版发布日期 接受日期

摘要 首次研究了狼磷脂-水脂质体中不同种类羧酯钾对草酸钙晶体生长的调控作用。加入一元DAc只诱导一水草酸钙（COM）生成。二元K_2tart在其浓度大于1. 0mmol/L时可以诱导三水草酸钙（COT）生成。而加入三元的K_3cit和四元的 K_2edta后， 在不同的浓度下，可以分别诱导COM，二水草酸钙（COD）和COT的生 成。在低浓度（—3.3-17mmol/L）范围，， COD含量达到100%；而在较高浓度(＞17mmol/L)时，COD减少，COT含量增加。在不同的浓度区间，无论是COM含量减少， 还是COT含量增加，或者是COD含量的先增加后减少，均与该羧酸钾浓度的对数呈线
性关系。不同羧酯钾抑制COM生长并诱导COD形成的能力顺序为：K_3cit＞K_2edta ＞＞K_2tart-KAC,
诱导COT生长的能力顺序为：K_2tart＞＞K_3cit＞K_2edta＞＞ KAc.
由此推测抑制草酸钙结石形成的潜在效率依次为：K_3cit＞K_2edta＞＞ K_2tart＞＞KAc.

关键词 草酸钙 脂质体 羧酸钾 生物矿石 尿结石 晶体生长

分类号 0621

Effects of Different Kinds of Potassium Carboxylates on the Growth of Calcium Oxalate Crystals in Lecithin-Water Liposomes

Ouyang Jianming,Duan Li,He Jianhua

Institute of Biomineralization and Lithiasis Research, Department of Chemistry, Jinan University

Abstract The effects of different kinds of potassium carboxylates on the phase compositions of calcium oxalate (CaOxa) crystals grown in lecithin-water liposomes were first reported. The investigated potassium carboxylates included: monocarboxylate potassium acetate (KAc), dicarboxylate potassium tartrate (K_2tart) , tricarboxylate potassium citrate (K_3cit), and tetracarboxylate dipotassium of ethylenediaminetetraacetic acid (K_2edta). KAc only induces calcium oxalate monohydrate (COM) . Calcium oxalate trihydrate (COT) was induced when concentrations of K_2tart > 1.0 mmol/L. K_3cit and K_2edta can induce COM, calcium oxalate dihydrate (COD) and COT crystals depending on their concentrations. In a lower concentration range (1.0 ~ 17 mmol/L) , the COM content decreased and the COD content increased with increasing concentration of the K_3cit or K_2edta in logarithmic fashion. In a medium concentration range (3.3 to 17 mmol/L), only COD was grown. In a higher concentration range (> 17 mmol/L) , COT was nucleated. The ability to induce COD follows the order: K_3cit > K_2edta > > K_2tart ~ KAc, and the ability to induce COT follows: K_2tart > > K3_cit > K_2edta > > KAc. Since the affinity of calcium oxalate hydrates to the membranes of renal tubule cells follows: COM > COT > COD, that is, COD is easily expelled from human body along with urine. So the inhibitory efficiency of potassium carboxylates on CaOxa stones can be deduced as K_3cit > K_2edta > > K_2tart > > KAc.

Key words calcium oxalate liposome potassium carboxylate biomineralization urinary stone CRYSTAL GROWTH

DOI:

通讯作者