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论文

雷公藤内酯醇新型固体脂质纳米粒微观结构研究

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摘要:

选择固体脂质山榆酸甘油酯(Compritol ATO 888)和液态油三辛酸甘油酯制备雷公藤内酯醇新型固体脂质纳米粒(SLN)载体系统，运用常温、低温差示量热分析(DSC)、X射线衍射(XRD)、小角X射线衍射(SAXS)和核磁共振(NMR)等多种分析测试手段对新型SLN性能和微观结构进行研究。结果显示，新型SLN纳米体系熔点从70.8 ℃降低到61.4 ℃，纳米化后熔融焓大大降低，于-17.7 ℃发生油相熔融吸热行为；无论是否载药，制备的纳米分散体系(新型SLN和传统SLN)都是由α相和少量β′相组成，所载药物雷公藤内酯醇对载体结晶性能基本无影响；新型SLN中分子运动自由度介于Compritol ATO 888基材和其制备的传统SLN二者之间，其长程结构相对于传统SLN和基材的结构只偏移0.1 nm，表明中链甘油酯液态油分子不可能插入片间和2个或3个链长结构间。两种物理状态不同的甘油酯在新型SLN中仍以两种状态存在：液态油和固态脂质，因其有各自的熔融性状(低温和常温DSC研究)和分子运动状态(NMR检测)，推测本实验室制备新型SLN的微观结构应是液态油分子，没有插入到固体脂质层状结构之间，而是形成了更加微细的纳米油室，周围包被着固体脂质，整个球形颗粒还处于纳米尺度。

关键词： 固体脂质纳米粒 雷公藤内酯醇 微观结构 常温低温DSC XRD SAXS NMR

Microstructure of novel solid lipid nanoparticle loaded triptolide

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Abstract:

Novel solid lipid nanoparticle (SLN) system is prepared with Compritol ATO 888 and tricaprylic glyceride. DSC, XRD, SAXS and NMR are employed to study the novel carrier property and microstructure. When the peak melting point decreased from 70.8 ℃ to 61.4 ℃, the enthalpy sharply decreased. It could be concluded that the regular crystal lattices in the novel carriers are broken out for the oil joined in them. Melting behavior is occurred at -17.7 ℃ while novel SLN is composed of oil and solid lipid mixture from the DSC measurement. Most *α* phase and least *β′*phase are in the nano carrier system weather drug loading or not from the XRD investigation. There is only 0.1 nm change of long space among the novel SLN made of mixture and the lipid matrix and traditional SLN; therefore, it is impossible of the oil molecular insert into the solid glyceride structure. Since the different melting behavior (DSC measurements) and molecular move state (NMR investigations), two lipid matrix are still in two state of liquid and solid lipid in the novel SLN carrier. Presume the microstructure of the novel SLN prepared by our experiment would be that liquid oil has formed superfine nano accommodation encapsulated with solid lipid, but the whole particle is still in nano size range.

Keywords: triptolide microstructure DSC XRD SAXS NMR solid lipid nanoparticle

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