

# Study on the Erythromycin Polylactic Acid Microspheres for Lung Targeting

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**ABSTRACT** **AIM** The purpose is to optimize the preparation of sustained release microspheres of erythromycin using the biodegradable materials-poly(lactic acid) (PDLLA) for lung targeting. **METHODS** The orthogonal test design was used to optimize the technology of preparation with good reproducibility. The surface morphology of the microspheres was observed by scanning electron microscope. The formation of the drug microspheres was confirmed with DSC. The mean diameter and the size distribution of microspheres, the drug loading, the incorporation efficiency, the reappearances of pharmaceutical technology, drug release *in vitro*, stability and tissue distribution after intravenous administration were examined. **RESULTS** Erythromycin poly(lactic acid) microspheres were regular in their morphology. Drug was enveloped in microspheres but not physically mixed with PDLLA. The average particle size was 11.65  $\mu\text{m}$  with over 94% of the microspheres being in the range of 520  $\mu\text{m}$ ; the drug loading and the encapsulated ratio were 18% and 60% respectively. The reappearance of pharmaceutical technology was good. The microspheres were stable for three months at 4  $^{\circ}\text{C}$  and room temperature. The *in vitro* release properties could be expressed by the Higuchi's equation:  $y = 28.067 + 3.8515t^{1/2}$  ( $r = 0.9834$ ). Compared with injective solution, the drug in microspheres was more concentrated in lung tissue. **CONCLUSION** The technology of preparation was successful and erythromycin poly(lactic acid) microspheres showed significant sustained release and lung targeting.

**KEY WORDS** Erythromycin; Poly(lactic acid); Microspheres; Lung targeting

## 中国化学制药工业的发展重点

据中国化学制药工业协会信息,今后我国化学制药工业发展重点与重点工作是:

### 生物技术药物

现代生物技术产业是全球重点发展的产业,目前生物技术应用首先在农业和医药领域。我国生物技术从 863 计划开始,药品生产已有一定基础,已有 15 种产品投产。许多科研单位、大专院校参与生物技术药品的研究工作,除国有企业外,也涌现出一批有实力的民营企业。不少省市把生物技术药品作为发展重点,因而此过程中要加强协调,提倡分工合作,防止重复科研和重复生产。

### 绿色药品

世界崇尚自然,崇尚天然药物。中药历史悠久,我国拥有使用天然药物的久远历史,有丰富的药用植物资源,有发展植物药的优势。

据资料报道,全世界药物市场上,由天然物质制成的药品已占 30%,国际植物药市场份额已达 270 亿美元。

国家提出中药现代化战略,同时大力开发植物新药,不仅供应国内需要,还可走向世界。加入 WTO,是中药和植物药走向世界的良好机遇。

### 蓝色药品

海洋资源利用已为世界所重视。海洋物种已鉴定为 20278 种,其中有的可利用或开发成海洋药物,中药中就有 100 多种海洋药物。

我国有 300 多万平方公里领海,有丰富的海洋药物资源。国内许多大专院校都从事海洋药物研究工作,已取得一些成果。从海洋湖泽资源开发药品、滋补营养品有良好的前景。

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# Inhibition of Puerarin on the H<sub>2</sub>O<sub>2</sub>-induced Apoptosis of Smooth Muscle Cells

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**ABSTRACT** **AIM** The purpose is to examine the inhibition of Puerarin on the H<sub>2</sub>O<sub>2</sub>-induced apoptosis of smooth muscle cells in the serum deprivation medium. **METHODA** The DNA content and percentage of apoptosis were measured by flow cytometry; the DNA fragmentation was analyzed by agarose gel electrophorsis; the viability percentage of cells was measured using MTT assay. **RESULTS** The apoptosis of VSMC occurs in serum-free medium (18 h) containing H<sub>2</sub>O<sub>2</sub>. When the VSMC had been treated with Puerarin, the percentage of VSMC apoptosis was markedly decreased, and the degraded fragments of DNA obviously decreased. Puerarin (10<sup>-5</sup>, 10<sup>-6</sup>, 10<sup>-7</sup> mol/L<sup>-1</sup>) could partly protect cells from necrosis induced by H<sub>2</sub>O<sub>2</sub>. **CONCLUSION** Puerarin could prevent VSMC from apoptosis and necrosis induced by H<sub>2</sub>O<sub>2</sub> in serum medium.

**KEY WORDS** Hydrogen peroxide; Puerarin; Thoracic aorta; Smooth muscle cell; Apoptosis; Flow cytometry; A-agarose gel electrophorsis

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提高合成药水平

化学药品属于精细化工, 合成药离不开中间体和化工原料。某些合成药技术水平的提高有赖于化工中间体水平的提高。如扑热息痛(对乙酰氨基酚)是年产近 3 万吨、年出口近 2 万吨的化学合成药, 其中间体对氨基酚由化工厂生产供应, 目前均以对硝基氯苯或苯酚为起始原料, 工艺落后, 污染严重, 成本高。如改为硝基苯氢化转位工艺, 就能降低成本、减少污染。所以与化学工业密切结合开发中间体大有可为, 可大大提高我国合成药的国际竞争力。

加强环境保护

环境与质量、安全均应放在突出位置。研究和推行清洁工艺, 推行清洁生产, 控制污染总量。重点企业和出口为主的企业力争尽早通过 ISO14000 系列认证; 重点产品和出口为主的产品力争迟早获得环境标志。这是国际贸易“绿色通行证”。

另外, 减少消耗高、污染严重、附加值低的原料药出口, 增加技术含量高、附加值高的原料药和制剂出口。

抓住加入 WTO 的机遇, 扩大出口。大宗原料药出口要创造条件, 变通由中间商出口为直接销售给用户, 以稳定市场和价格。争取到国外办厂或贸易公司。