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## 大鼠肠黏膜靶向磁共振对比剂Gd-DTPA-CPs成像

### Gd-DTPA-chitosan particles as a magnetic resonance contrast agent for rat's intestinal mucosa targeted imaging

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中文摘要:

目的 制备肠黏膜靶向磁共振对比剂Gd-DTPA-CPs,探讨其用于大鼠活体肠黏膜MR成像的可行性。方法 采用改良的乳化微滴融合法制备Gd-DTPA-CPs,经过结构表征和细胞毒性试验后对正常大鼠进行MRI。对大鼠行灌肠前MR扫描,之后将其分为两组,分别经直肠灌注Gd-DTPA-CPs溶液(实验组)和Gd-DTPA溶液(对照组)后于不同时间点行MR扫描,测量各时间点肠壁和盆壁肌肉信号强度,计算肠壁的相对信号值和强化率。扫描完成后取相应肠段进行病理学检查。结果 Gd-DTPA-CPs直径约420 nm,药物包封率为74.41%,分散度较好,体外细胞毒性小。实验组灌肠前、后各时间点肠壁相对信号值差异有统计学意义( $F=23.77, P<0.05$ ),保留灌肠20 min时出现最大差异,最大强化率达35%。经电镜证实实验组大鼠Gd-DTPA-CPs聚集于结肠黏膜上皮细胞内;对照组灌肠前后各扫描时间点相对信号值差异无统计学意义( $F=0.15, P>0.05$ ),结肠上皮细胞内无Gd-DTPA聚集。结论 本实验制备的Gd-DTPA-CPs能与正常肠黏膜结合,提示可通过直肠给药途径进行活体大鼠肠黏膜MRI。

英文摘要:

**Objective** To synthesize Gd-DTPA-chitosan particles, and to explore its feasibility and potential application as an intestinal mucosa targeted MR contrast agent by enteroclysis. **Methods** Gd-DTPA-CPs was synthesized by modified emulsion coalescence method, then the physical and chemical properties were identified. Gd-DTPA-CPs (Gd-DTPA-CPs group) and Gd-DTPA (Gd-DTPA group) was administrated to healthy rats with enteroclysis. MR scans were performed before enteroclysis and after clysis reservation at different time point. The signal intensity of intestinal wall and muscles of the pelvis were measured and the relative signal intensity values were calculated. Immediately after MR scanning, the rats were killed and intestinal segments were separated for pathological study. **Results** The prepared Gd-DTPA-CPs was 420 nm in diameter with a 74.41% Gd-DTPA content. The degree of dispersion was good and the cytotoxicity in vitro was low. The relative signal intensity value of intestinal wall at any time point after infusion in Gd-DTPA-CPs group was statistically higher than that observed before enteroclysis ( $F=23.77, P<0.05$ ). The signal intensity of the colon mucosa was highest at 20 min. No significantly difference was found before and after infusion in Gd-DTPA group ( $F=0.15, P>0.05$ ). Transmission electron microscopy images showed that Gd-DTPA-CPs localized inside the mucosal cells or intercellular space, while positive particles were not observed in intestinal mucosa of Gd-DTPA group. **Conclusion** Gd-DTPA-CPs were successfully prepared, which could be adhered and absorbed by intestinal mucosa, suggesting that it can be used as a potential intestinal mucosa targeted MR contrast agent by enteroclysis.

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