生物物理学报 2011, 27(4) 365-372 DOI: 10.3724/SP.J.1260.2011.00365 ISSN: 1000-6737 CN: 11-1992/Q

研究论文

抗人精子蛋白17磁性纳米探针靶向的卵巢癌体内外磁共振成像

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摘要:

用MRI（magnetic resonance imaging）技术探索连接抗人精子蛋白17单克隆抗体（anti-Sp17 mAb）的磁性纳米探针对体外培养及动物体内Sp17+卵巢癌的靶向性。将anti-Sp17 mAb连接到表面包覆壳聚糖的超顺磁性氧化铁纳米颗粒上，制成磁性纳米探针anti-Sp17-MNP，用作MRI阴性对比剂。将磁性纳米探针与Sp17+和Sp17−培养的肿瘤细胞共育，进行一系列体外磁共振成像实验。荷瘤小鼠尾静脉注射磁性纳米颗粒，用7T磁共振仪在体成像，观察肿瘤部位的信号变化，并用普鲁士蓝染色肿瘤组织切片，观察有无铁粒子聚集。体外MRI数据显示，anti-Sp17-MNP与细胞靶向结合，并与细胞共育2 h后，Sp17+HO-8910的T_2*信号强度比Sp17-HepG2低2倍；anti-Sp17-MNP对肿瘤细胞的靶向作用可被重组人Sp17阻断。7T磁共振仪对动物在体肿瘤成像结果显示，感兴趣区因磁性纳米探针靶向聚集而导致信号降低，并经组织切片普鲁士蓝染色证实。本研究结果表明，用anti-Sp17 抗体和新的合成路线制备的纳米探针具有用作MR对比剂进行分子成像的潜能。

关键词: 磁性纳米探针 磁共振成像 精子蛋白17 卵巢癌

In Vitro and *in Vivo* Targeting Magnetic Resonance Imaging for Ovaran Cancer by Anti-Human Sperm Protein 17 Mediated Magnetic Nanoprobes

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Abstract:

The aim of this study is to develop a targeting molecular nanoprobe with anti-human sperm protein 17 (anti-Sp17) mediated magnetic nanoparticle for prospectively tumor magnetic resonance (MR) imaging *in vitro* and *in vivo*. The nanoprobes with anti-Sp17-MNP were prepared by linking anti-human Sp17 monoclonal antibodies on the surface of chitosan coated magnetic nanoparticles (MNPs). A set of *in vitro* magnetic resonance imaging experiments were performed after incubated the immunomagnetic nanoparticles with human sperm protein 17 expressing ovarian cancer cells. The nanoprobes were injected into tail vein of nude mice and monitored the implanted tumor with 7T MR image system. Histologic sections were stained with the mixture of 10% potassium ferrocyanide. Statistical analyses were performed by using repeated- measures analysis of variance. The data obtained from *in vitro* MRI showed that anti-Sp17-MNPs were targeted successfully to the Sp17+ cancer cells. When anti-Sp17-MNPs were incubated with cells for 2 h, Sp17+HO-8910 were found to have reduced SI by 2-folds over that of Sp17-HepG2 and this targeting effect could be blocked by recombinant human sperm protein 17. There was clearly detectable accumulation of the nanoprobes in subcutaneous tumor on T_2-weighted images after the injection of nanoprobes for 2 h while the insignificant effects after the injection of antibody free MNPs. Histological analyses confirmed the presence of the nanoprobes in the tumor. The results of this research showed that the nanoprobes prepared by the novel synthetic route could potentially be used as MR contrast agents for molecular imaging.

Keywords: Magnetic nanoprobe MRI Sperm protein 17 Ovarian cancer

收稿日期 2011-01-30 **修回日期** 2011-03-12 **网络版发布日期**

DOI: 10.3724/SP.J.1260.2011.00365

基金项目:

国家自然科学基金项目(30670599)，南京军区医学科技“十一五”研究计划重点项目(06Z43)

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