

·非血管介入 Non vascular intervention·

¹²⁵I 粒子组织间植入治疗肺恶性肿瘤

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【摘要】 目的 评价 CT 导向下 ¹²⁵I 粒子植入治疗肺恶性肿瘤的临床价值。方法 32 例肺恶性肿瘤患者, 其中 18 例为肺癌, 共 20 个病灶; 14 例为肺转移瘤(原发病 9 例为肝癌, 4 例为肠癌, 1 例为乳腺癌), 共 28 个病灶。病灶平均直径为 5.5 cm。采用治疗计划系统(TPS)计算布源, 在 CT 导向下将 ¹²⁵I 粒子植入瘤灶内。结果 32 例共 48 个病灶, 完全缓解(CR)25 个; 部分缓解(PR) 15 个; 无变化(NC) 7 个; 进展(PD) 1 个, 总有效率 83.3 %。术中肺内有少量渗出; 2 例出现气胸, 肺压缩均在 30% 以内, 经保守治疗好转; 术后 1 周痰中带血 15 例; 术后 2 周 2 例出现轻度白细胞下降, 白细胞计数 $(3 \sim 4) \times 10^9/L$; 术后 2 个月的影像学检查发现肺内粒子游走 2 例; 未见其他严重并发症。结论 放射性粒子植入治疗肺恶性肿瘤, 近期效果好, 是治疗肺恶性肿瘤的简便、安全、有效的方法。

【关键词】 肺肿瘤; 碘; 放射性核素, 介入性; 临床研究

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CT guided radioactive ¹²⁵I seed implantation in treating lung malignant tumors JIAO De-chao, ZHANG Fu-jun, LU Li-gong, WU Yue-xia, LI Chuan-xing, DUAN Guang-feng. Department of Medical Imaging and Interventional Radiology, Cancer Center, Sun Yat-sen University, South China State Key Laboratory of Oncology, Guangzhou 510060, China

【Abstract】 **Objective** To evaluate the clinical application of CT-guided radioactive seed ¹²⁵I implantation in treating malignant lung tumors. **Methods** 32 patients (male 24, female 8, median age 56.0) with malignant lung tumors including 18 primary ones (20 foci) and 14 metastasis (24 foci of HCC 9 cases, intestinal carcinoma 4, breast carcinoma 1). CT guided radioactive seeds ¹²⁵I implantation were accepted according to TPS. **Results** Among 48 lesions in 32 cases, 25 obtained CR, 15 PR, 7 NC and 1 PD; with total response rate of 83.3%. The side effects occurred during the procedure including a few amount of effusion in all patients, pneumothorax in 2 cases with lung compression less than 30%, bloody sputum in 15 cases 1 week after the procedure and seeds migration in 2 cases during 2 months follow up. WBC decreased slightly in 2 cases, 2 weeks after the procedure, but WBC count was $3 - 4 \times 10^9/L$, without other severe complications. **Conclusions** CT-guided radioactive seed ¹²⁵I implantation is safe and well-tolerated in treating malignant lung tumors with few complications and short term efficacy. (J Intervent Radiol, 2008, 17; 190-193)

【Key words】 Iodine radioisotopes; Interventional Radiology; Lung neoplasms; Evaluation studies

在我国, 约 85% 肺癌患者在确诊时已进展到晚期^[1], 而肺转移瘤患者也失去了手术治疗原发病的机会。放射治疗、一线化疗就成为其主要的治疗方法, 但其不良反应太大。组织间内照射是一种新兴的恶性肿瘤治疗手段^[2-4]。我们对 32 例肺恶性肿瘤患者的 48 个病灶进行放射性粒子植入治疗, 就其

使用方法、安全性和短期疗效进行评价。

1 材料与方法

1.1 材料

1.1.1 临床资料 本组收集 2003 年 5 月至 2007 年 7 月接受 CT 导向下放射性粒子植入治疗的 32 例肺恶性肿瘤患者, 其中男 24 例, 女 8 例, 年龄 33 ~ 74 岁, 中位年龄 56 岁。原发肺癌 18 例, 肝癌肺转移 9 例, 肠癌肺转移 4 例, 乳腺癌肺转移 1 例。32 例患者病灶数 48 个, 所有病灶均与正常组织间有较清楚的边界, 最大径 4.5 ~ 7.5 cm, 平均 5.5 cm。全部

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病例均经病理证实。全部肺癌均为一线化疗后未控制病例,肺转移癌患者的原发灶均已得到良好控制,但肺部转移灶经多次全身化疗或支气管动脉灌注化疗后仍进展。放射性粒子植入前心、肝、肾及血液学指标检查基本正常,Karnofsky(KPS)评分^[4] > 70 分。患者均签署知情同意书。治疗前后肺部常规行薄层 CT 检查,按照世界卫生组织(WHO)肿瘤疗效评价标准评价放射性粒子植入的疗效。

1.1.2 仪器设备

1.1.2.1 使用 Picker CT-Twin Flash 扫描仪,肺脏扫描条件为 120 kV, 265 mAs, 层厚 3 mm。

1.1.2.2 计算机立体定位系统为和佳 HGGR-3000 型放射性粒子治疗计划系统。

1.1.2.3 粒子植入器械采用国产 18 G 粒子植入针和转盘式植入枪。

1.1.2.4 ¹²⁵I 放射性粒子外形为圆柱形钛合金封装体,长度为 4.5 mm,直径为 0.8 mm,内有 3.0 mm × 0.5 mm 银柱吸附 ¹²⁵I, 其外是壁厚 0.05 mm 的钛壳。¹²⁵I 粒子平均能量 27 ~ 35 keV,半衰期 59.6 d,半价层 0.025 mm 铅。组织穿透能力 1.7 cm,初始量率 7 cGy/h。临床使用 ¹²⁵I 粒子 [药监械临(2001)034 号] 6711/BT-¹²⁵I。单个粒子的放射性活度为 23.31 ~ 29.97 MBq。粒子出厂前经过检漏实验、活度测量后,合格者按 A 型包装邮寄到医院。

1.2 治疗方法

先行 CT 扫描获得肿瘤情况,勾画出肿瘤轮廓,相关数据输入计算机立体治疗计划系统(TPS)进行治疗计划设计。根据肿瘤靶体积 3 个互相垂直的直径,采用 TPS 计算出粒子数及剂量,在实际手术操作中,按间距 1.0 ~ 1.5 cm 布源;对残留厚度

≤ 1.0 cm 肿瘤平面植入;采用 18.5 ~ 29.6 MBq 活度的 ¹²⁵I 粒子相隔 1.0 ~ 1.5 cm 平面播植(¹²⁵I 在 1.7 cm 内具有肿瘤杀灭作用);计算出肿瘤匹配边缘剂量,即模拟实体肿瘤在处方剂量下的近似剂量分布,由此确定植入肿瘤的导针位置、方向(坐标)及植入粒子的数目。术前给予镇静剂和局部麻醉,术中监测生命体征,备好胸腔穿刺包。手术时根据布源需要确定进针点位置及数目后,在皮肤穿刺点作 1 mm 小切口若干个。通过粒子植入针在 CT 导向下按 TPS 将粒子源植入肿瘤体内。操作完成后拔出植入针,包扎、压迫。术后 3 d 常规使用抗生素预防感染^[5,7]。

1.3 疗效评价

对于放射性粒子植入的效果评价主要依靠影像学检查。在治疗前和治疗后 2 个月进行螺旋 CT 和 X 线检查,把治疗前后影像学上 2 个相互垂直的肿瘤最大直径的乘积进行比较。疗效评价标准为:①完全缓解(CR):肿瘤完全消失,影像学检查不能显示肿瘤或仅有索状影像。②部分缓解(PR):肿瘤缩小,乘积比治疗前减少 ≥ 50%。③无变化(NC):乘积比治疗前减少 < 50%或增大 < 25%。④进展(PD)乘积比治疗前增大 ≥ 25%或出现新病灶。

2 结果

2.1 临床疗效

所有患者均经 2 个月随访,32 例患者 48 个病灶中,CR 25 个,PR 15 个;NC 7 个;PD 1 个。总有效率为 83.3%(CR + PR)(图 1)。

2.2 并发症

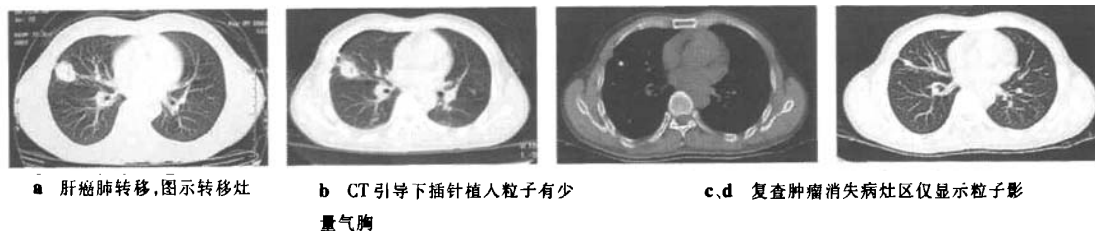


图 1 肺转移灶 ¹²⁵I 粒子植入治疗前后

32 例患者均顺利完成治疗,术中穿刺过程中肺内产生少量渗出,有 2 例出现气胸,肺压缩在 30% 以内,经保守治疗好转。术后 1 周内 15 例患者出现痰中带血,未经特殊处理自行缓解。术后 2 周 2 例患者出现轻度白细胞下降,白细胞计数 (3 ~ 4) × 10⁹/L,给予相应治疗后血象恢复正常。所有

病例未出现放射性肺炎等严重并发症。术后 2 个月的影像学检查发现肺内粒子游走 2 例。心肝肾功能术后未见明显异常。

3 讨论

3.1 放射性粒子植入的原理及应用

^{125}I 是低能量的放射性核素, 体内植入后穿透力极弱, 约 17 mm, 易于防护, 不易产生热点而损伤周围的重要脏器。其物理半衰期为 59.6 d, 发出的能量线为 27.4 ~ 31.5 keV 的 X 线和 γ 射线, 永久性种植治疗肿瘤具有以下优点: ①放射性粒子种植可以提高靶区局部与正常组织剂量分配比。②肿瘤的再增殖由于受到射线持续的照射而明显减少。③连续低剂量率照射抑制肿瘤细胞的有丝分裂, 引起肿瘤细胞集聚在 G2 期。④近距离治疗时, 乏氧细胞放射抗拒性降低, 同时在持续低剂量照射条件下乏氧细胞再氧合。这些特点致使肿瘤细胞因辐射效应遭到最大程度的毁灭性杀伤, 从而达到治愈的目的。目前粒子植入已被用于多种恶性肿瘤的治疗, 包括脑瘤、鼻咽癌、胰腺癌、直肠癌、肺癌及前列腺癌等, 并取得较好的临床效果^[8-12]。处方剂量 (prescription dose, PD) 是指肿瘤靶区设计剂量。肿瘤靶区 90% 的体积应达到 PD, 即 $V_{100} > 90\%$, 指 90% 以上体积得到 100% 的 PD。根据 TPS 计算布源或遵照 Halarism 的 ^{125}I 经验公式进行操作^[13], 所用 ^{125}I 的处方剂量为 60 Gy, 这样既能达到杀灭肿瘤的作用, 又避免了对周围正常组织的损伤。植入放射性粒子原则上应按 TPS 要求, 使剂量分布尽量均匀; 放射源应呈直线排列, 相互平行; 各放射源 (粒子) 之间应等距离。粒子植入发生位置误差的原因有: ①间隔不准确; ②导针偏斜。允许粒子移动的误差为 0.15 cm; 一般在设计的总活度基础上增加 15% ~ 20% 的剂量, 可增加疗效。

3.2 疗效分析

我们通过影像学检查进行随访, 以放射性粒子植入前后病灶大小变化作为判断疗效的标准。本组经治转移瘤近期有效率为 77.9%, 令人满意。此外还应该注意到本组 18 例转移瘤患者都是在经全身化疗或支气管灌注无效的情况下再行放射性粒子植入。由于瘤体细胞在多次和多种化疗药物作用下处于休眠或耐药状态, 对化疗不敏感, 而植入的粒子可在植入范围内大量杀伤肿瘤细胞, 并对未杀灭细胞产生损伤作用, 同时由于肿瘤负荷减少, 将可能增加这些细胞对化疗药物的敏感性, 有利于对肿瘤患者再作进一步综合治疗。另外, 值得注意的是放疗对肺转移瘤的疗效与原发灶是否对放射线敏感密切相关^[13]。 ^{125}I 作为放射治疗的一种手段, 也有其相应的适应证, 远期疗效需要更多的研究证实。

3.3 不良反应

32 例患者均能顺利完成治疗, 穿刺过程肺内可

见少量渗出, 有 15 例患者在术后 1 周内出现痰中带血, 较肺部穿刺活检发生率稍高。本组患者均未经特殊处理自行缓解。有 2 例出现气胸, 肺压缩在 30% 以内, 经保守治疗好转。术后 2 周 2 例患者出现轻度白细胞下降, 白细胞计数 $3 \sim 4 \times 10^9/\text{L}$, 给予口服药后血象恢复正常, 可能与患者经过多次放、化疗有关。所有病例未出现放射性肺炎, 本组病例虽然未设立外放疗对照组, 但放疗相关不良反应明显低于文献报道的肺外照射的发生率^[13]。术后 2 个月的影像学检查发现肺内粒子游走 2 例。心、肝、肾功能术后未见明显异常。

3.4 适应证及注意事项

放射性粒子植入是治疗肺部肿瘤的有效手段之一, 以下情况可考虑行肺粒子植入治疗: ①肺内孤立或转移病灶数目 ≤ 4 、预计生存期大于 6 个月; ②患者拒绝外放疗或化疗。对肿瘤体积较大, 需植入较多粒子的病灶, 可以和另一种新兴的介入治疗手段——射频消融相结合^[14]。为了避免放射性损伤, 对于重要脏器如心脏、大血管及食管等, 粒子植入间距最好不要 $< 10\text{ mm}$, 以免引起不良反应, 因为距离上述器官太近, 放射性剂量叠加过大会导致重要脏器放射性损伤, 如心肌的损伤导致心律失常。另外, 双肺存在转移病灶时, 宜先治疗一侧肺, 观察 1 ~ 2 d, 如无气胸情况下再考虑处理对侧肺病灶。经治疗的患者并发症少、症状轻, 一般情况好, 可在门诊实施治疗, 但对于靠近肺门、胸膜、膈肌、脊柱的肿瘤患者, 最好留院观察 3 ~ 7 d。

总之, 经皮 CT 导向下放射性粒子植入可直观地了解粒子植入针的位置, 保证粒子正确植入, 具有安全、微创、疗效确切、治疗时间短和可重复治疗等优点, 因而它是一种较好的局部治疗方法。在综合治疗的同时, 有望进一步提高治疗效果。

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·消 息·

第五届上海介入放射学学术大会征文通知

经研究决定第五届上海介入放射学学术大会现定于 2008 年 11 月 8 - 9 日在上海召开。会议征文通知如下:

一、征文范围:

全身各部位介入放射学以及临床护理学等。

二、征文内容:

1、头颈部的血管与非血管治疗;2、胸部的血管与非血管治疗;3、腹部、盆腔及后腹膜的血管与非血管治疗;4、四肢、脊柱的血管与非血管治疗等。以上有创新意义的实验研究,临床研究,综述,技术交流,经验介绍及临床病例报告,短篇,个案等。

三、征文要求:

1、论文全文(包括中英文摘要)3000 字以内,中文摘要 600 字以内;2、已在全国公开发行的刊物上发表的论文不采用;3、来稿采用软盘(或 E-mail)及打印稿各一份,发 E-mail 者可不提供软盘,文稿要求用 Word 排版,软盘文件名或 E-mail 的主题必须注明“2008 上海介入会+论文名”,来稿请在信封左下角注明“2008 上海介入会”;4、收稿地址:上海市延长中路 301 号 同济大学第十人民医院 李茂全 收,邮编:200072;电话:021-66313506 或 66300114 x 53506,52347,来稿 E-mail:cjr.limaquan@vip.163.com 或 5thshsir@163.com;5、来稿请自留底稿,概不退稿。

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125 I 粒子组织间植入治疗肺恶性肿瘤

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1. 期刊论文 [张俊](#), [石怡珍](#), [刘增礼](#), [申咏梅](#), [崔学军](#), [王爱东](#), [欧阳松应](#) hTERT启动子调控hNIS基因介导肺癌细胞摄取和131I治疗的实验研究 -[中华核医学杂志](#)2008, 28(2)

目的 构建含人端粒酶反转录酶(hTERT)核心启动子调控的人钠/碘同向转运体(hNIS)基因重组腺病毒,并靶向转染至肺癌A549细胞中特异性表达.探讨hTERT启动子调控的hNIS基因介导放射性碘治疗肿瘤的可能性.方法 应用AdEasy系统构建重组腺病毒Ad-hTERT-hNIS,同时构建巨细胞病毒(CMV)启动子调

控的hNIS重组腺病毒Ad-CMV. hNIS作为阴性对照, 不含hNIS的重组腺病毒Ad-CMV作为阴性对照. 应用反转录. 聚合酶链反应 (RT-PCR) 方法验证hTERT在转染肿瘤细胞中的转录活性, 摄碘实验检测表达的hNIS蛋白功能, 细胞克隆形成实验评价131I对转染肿瘤细胞的毒性作用. 结果 成功构建重组腺病毒Ad-hTERT-hNIS、Ad-CMV-hNIS及Ad-CMV, 并经PCR证实正确. RT-PCR证实hNIS cDNA能从Ad-hTERT-hNIS转染的细胞中扩增出来. Ad-hTERT-hNIS和Ad-CMV-hNIS转染的肺癌A549细胞摄碘能力比阴性对照组Ad-CMV转染的细胞分别提高了23和31倍, 且摄碘能力可以被NaClO4抑制. Ad-hTERT-hNIS和Ad-CMV-hNIS转染的肺癌A549细胞均可被131I杀死, 2组细胞成活率分别为(31.2±1.45)%和(23.6±4.08)%, 而阴性对照组和未转染病毒组分别为(89.0±2.99)%和(91.2±4.63)%. 结论 hTERT启动子调控的hNIS重组腺病毒转染肿瘤细胞后, 应用131I治疗有望成为一种新的基因靶向治疗手段.

2. 期刊论文 [金普乐, 王敏, 胡文霞 经环甲膜置入125碘粒子治疗中心性肺癌2例 - 临床荟萃2005, 20\(20\)](#)

内科采用经环甲膜穿刺、置管, 气道内悬挂125碘放射性微粒子(简称种子源)治疗中心性肺癌2例, 现将方法和疗效报道如下.

3. 期刊论文 [邵秋菊, 徐海峰, 袁梦辉, 周润锁, Shao Qiu-ju, Xu Hai-feng, Yuan Meng-hui, Zhou Run-suo 131碘标记](#)

[血管抑制素体内外生物活性的研究 - 中国临床康复2005, 9\(10\)](#)

背景: 血管抑制素(Angiostatin, AS)是重要的血管生成抑制因子, 能有效地抑制血管内皮细胞的增生和迁移, 抑制肿瘤血管生成. 目的: 观察AS及131I标记的AS(131I-Angiostatin, 131I-AS)和单纯131I对大鼠肺静脉内皮细胞ECV304增殖的影响及其对小鼠Lewis肺癌移植瘤质量及体积的抑制作用. 设计: 以大鼠肺静脉内皮细胞ECV304和荷Lewis肺癌的C57BL/6小鼠为研究对象, 随机对照、重复观察测量. 单位: 一所军医大学的放射医学实验室和医院核医学实验室. 材料: 荷Lewis肺癌的C57BL/6雌性小鼠28只, 体重质量(20±2)g, 5~7周龄. 方法: 用131I标记AS, 得到4种不同浓度的131I-AS: A(含131I 0.74 GBq/L, AS 0.5 mg/L), B(含131I 0.74 GBq/L, AS 16mg/L), C(含131I 1.48GBq/L, AS 0.5mg/L), D(含131I 1.48GBq/L, AS 16mg/L); 采用MTT法观察131I-AS、单纯AS、及单纯131I对大鼠肺静脉内皮细胞ECV304增殖的影响. 28只荷Lewis肺癌的C57BL/6小鼠(右前肢皮下移植瘤直径约1cm)随机分成4组, 分别腹腔注射131I-AS(含131I 1.1 MBq, AS 2.5 mg/kg), AS(2.5 mg/kg), 131I(1.1 MBq)和生理盐水各0.3 mL, 治疗2次, 间隔7 d, 观察肿瘤体积和质量的变化. 主要观察指标: ①MTT法观察细胞生长抑制率(%). ②动物肿瘤体积和质量的变化. 结果: ①单纯AS在(0.5~64)mg/L浓度下, 对ECV304细胞生长抑制率为(7.3±3.5)%~(41.9±4.3)% (与0浓度AS比较, P=0.003); A, B, C, D 4种浓度的131I-AS对ECV304细胞的抑制率分别为(23.9±2.8)%, (58.2±3.9)%, (39.1±4.1)%和(78.4±5.4)%, 与AS和131I相比, 抑制率明显提高(P=0.000 3). ②动物实验显示, AS, 131I, 131I-AS和生理盐水治疗14 d后, 各组小鼠Lewis肺癌移植瘤的平均体积分别为(3 943±236), (5 219±351), (1 963±126), (7 353±350)mm³, 与生理盐水组比较: AS, 131I, 131I-AS对小鼠Lewis肺癌移植瘤的抑瘤率分别为46.4%, 29.0%, 73.3%, (P=0.000 1). 结论: 131I-AS在体外能明显抑制内皮细胞的生长, 在体内能明显抑制小鼠Lewis肺癌移植瘤的生长, 其抑制作用强于单纯的等浓度的AS和131I.

4. 外文期刊 [Semnani ES, Wang K, Adelstein SJ, Kassiss AI 5-\(123I/125I\) iodo-2'-deoxyuridine in metastatic](#)

[lung cancer: radiopharmaceutical formulation affects targeting.](#)

This study assesses targeting of lung metastases in mice with the radioiodinated thymidine analog 5-[(123I)/(125I)I]iodo-2'-deoxyuridine ((123I)-I-UdR/(125I)-I-UdR), formulated with varying amounts of tributyltin precursor and injected intravenously. METHODS: Six- to 8-wk-old C57BL/6 mice were injected intravenously with B16F10 melanoma cells. Two weeks later, when lung tumors were established, the animals were injected intravenously with (125I)-I-UdR synthesized using 1, 35, 100, 150, 200, or 250 microg 5-tributylstannyl-2'-deoxyuridine (SnUdR) in the presence of an oxidant. Nontumor-bearing mice were also injected with these formulations and served as control animals. Twenty-four hours later, the animals were killed, and the radioactivity associated with the lungs and other tissues was measured in a gamma-counter. The percentage injected dose per gram tissue (%ID/g) and tumor-to-nontumor ratios (T/NT ratios) were calculated. Phosphor imaging was done on lungs from tumor-bearing and nontumor-bearing mice injected with (125I)-I-UdR formulated with each tin precursor concentration. Scintigraphy was also performed 3 and 24 h after intravenous injection of (123I)-I-UdR. RESULTS: The %ID/g (125I)-I-UdR was higher in lungs of tumor-bearing animals than in lungs of control animals. Although the increase in SnUdR present led to a small but statistically significant decrease in the radioactive content of normal lungs, a 3-fold increase was observed in the lungs of tumor-bearing animals with radiopharmaceutical formulated with 100 microg SnUdR (5 microg per mouse). This enhancement in radioactive uptake by the lungs led to approximately 14-fold increases in T/NT ratios. Phosphor imaging ((125I)-I-UdR) of lungs as well as scintigraphy ((123I)-I-UdR) of whole animals substantiated these findings. CONCLUSION: The formulation for the synthesis of radio-I-UdR that leads to the highest %ID/g in tumor and the best T/NT ratio has been identified. Further studies are required to determine the

5. 外文期刊 [Watanabe, N, Yokoyama, K, Shuke, N, Kinuya, S, Aburano, T, Tonami, N, Seto, H, Goodwin, DA Experimental](#)

[investigation of I-123 iodoamphetamine in the detection of lung cancer.](#)

Experimentally we investigated the detection of lung cancer with N-isopropyl-p-I-123-iodoamphetamine (I-123 IMP). Various tumors including Lewis lung cancer were used as tumor models. Serial images were obtained. Biodistribution of Lewis lung cancer was performed. In Lewis lung cancer good visualization as in B-16 melanoma and high tumor accumulation were found with IMP. In conclusion, due to its greater accumulation almost equivalent to that in melanotic melanoma, I-123 IMP may have a role in the detection of lung cancer.

6. 外文期刊 [Marten K, Seyfarth T, Auer F, Wiener E, Grillhosl A, Obenauer S, Rummeny EJ, Engelke C Computer-](#)

[assisted detection of pulmonary nodules: performance evaluation of an expert knowledge-based](#)

[detection system in consensus reading with experienced and inexperienced chest radiologists.](#)

To evaluate the performance of experienced versus inexperienced radiologists in comparison and in consensus with an interactive computer-aided detection (CAD) system for detection of pulmonary nodules. Eighteen consecutive patients (mean age: 62.2 years; range 29-83 years) prospectively underwent routine 16-row multislice computed tomography (MSCT). Four blinded radiologists (experienced: readers 1, 2; inexperienced: readers 3, 4) assessed image data against CAD for pulmonary nodules. Thereafter, consensus readings of readers 1+3, reader 1+CAD and reader 3+CAD were performed. Data were compared against an independent gold standard. Statistical tests used to calculate interobserver agreement, reader performance and nodule size were Kappa, ROC and Mann-Whitney U. CAD and experienced readers outperformed inexperienced readers (Az=0.72, 0.71, 0.73, 0.49 and 0.50 for CAD, readers 1-4, respectively; P<0.05). Performance of reader 1+CAD was superior to single reader and reader 1+3 performances (Az=0.93, 0.72 for reader 1+CAD and reader 1+3 consensus, respectively, P<0.05). Reader 3+CAD did not perform superiorly to experienced readers or CAD (Az=0.79 for reader 3+CAD; P<0.05). Consensus of reader 1+CAD significantly outperformed all other readings, demonstrating a benefit in using CAD as an inexperienced reader replacement. It is questionable whether inexperienced readers can be regarded as adequate for interpretation of pulmonary nodules in consensus with CAD, replacing an experienced radiologist.

7. 期刊论文 [杨卫东, 赵荣, 秦伟伟, 王涛, 陈锐, 汪静 hNIS基因介导碘摄取测量microRNA let-7在肺腺癌A549细胞中](#)

[的表达 - 中华核医学杂志2009, 29\(6\)](#)

目的 拟建立用放射性核素测量microRNA(即miRNA)在肿瘤细胞中表达的新方法, 探讨miRNA与肿瘤的关系. 方法 分别克隆人钠/碘同向转运体(hNIS)及可与let-7互补结合的ras 基因的3'非翻译区(3'-UTR), 即RU序列; 以hNIS作为报告基因, 将ras基因的3'-UTR与hNIS连接构建融合基因(hNIS-

RU),使Hnis的表达受let-7的调控;同时克隆前体let-7(pri-let-7)及前体mir143(pri-mir143),转入细胞后加工形成成熟的let-7及mir143.将hNIS及hNIS-Ru分别转染肺癌A549细胞,转染24 h后,于培养液中分别加入 $37\text{ kBq }^{125}\text{I}$,1h后收集细胞并测量 ^{125}I 计数;将hNIS-Ru分别与不同量的pri-let-7或pri-mir143共转染A549细胞,转染细胞24 h后分别测量其对 ^{125}I 的摄取.结果 转染hNIS的A549细胞 ^{125}I 摄取明显增高,是未转染A549细胞的12倍;转染hNIS-RU的A549细胞 ^{125}I 的摄取减低,为转染hNIS A549细胞的70%,是未转染A549细胞的8倍;hNIS-Ru及pri-let-7共转染A549细胞的放射性计数进一步降低,为转染hNIS A549细胞的50%;转染hNIS-Ru不变,增加pri-let-7的转染量, ^{125}I 的摄取随pri-let-7的增加而降低;转染hNIS-Ru不变,共转染不同浓度的pri-mir143,A549细胞对 ^{125}I 的摄取基本不变.结论 构建了hNIS-Ru融合基因,hNIS在细胞中的表达受let-7的调节,二者呈反比关系.初步建立了以hNIS为报告基因测量miRNA在细胞中表达的高灵敏度放射性核素新方法.

8. 外文期刊 [Kiessling F. Boese J. Corvinus C. Ederle JR. Zuna I. Schoenberg SO. Brix G. Schmahl A.](#)

[Tuengerthal S. Herth F. Kauczor HU. Essig M Perfusion CT in patients with advanced bronchial carcinomas: a novel chance for characterization and treatment monitoring?](#)

Advanced bronchial carcinomas by means of perfusion and peak enhancement using dynamic contrast-enhanced multislice CT are characterized. Twenty-four patients with advanced bronchial carcinoma were examined. During breathhold, after injection of a contrast-medium (CM), 25 scans were performed (1 scan/s) at a fixed table position. Density-time curves were evaluated from regions of interest of the whole tumor and high- and low-enhancing tumor areas. Perfusion and peak enhancement were calculated using the maximum-slope method of Miles and compared with size, localization (central or peripheral) and histology. Perfusion of large tumors ($\geq 50\text{ cm}^3$) averaged over both the whole tumor ($P = 0.001$) and the highest enhancing area ($P = 0.003$) was significantly lower than that of smaller ones. Independent of size, central carcinomas had a significantly ($P = 0.04$) lower perfusion (mean 27.9 ml/min/100 g) than peripheral ones (mean 66.5 ml/min/100 g). In contrast, peak enhancement of central and peripheral carcinomas was not significantly different. Between non-small-cell lung cancers and small-cell lung cancers, no significant differences were observed in both parameters. In seven tumors, density increase after CM administration started earlier than in the aorta, indicating considerable blood supply from pulmonary vessels. Tumor perfusion was dependent on tumor size and localization, but not on histology. Furthermore, perfusion CT disclosed blood supply from both pulmonary and/or bronchial vessels in some tumors.

9. 外文期刊 [Swensen SJ. Brown LR. Colby TV. Weaver AL Pulmonary nodules: CT evaluation of enhancement with iodinated contrast material.](#)

PURPOSE: To determine if the degree of enhancement of pulmonary nodules is directly related to the likelihood of malignancy and to the vascularity of the nodule. MATERIALS AND METHODS: Uncalcified 6-40-mm-diameter pulmonary nodules were studied in 163 patients with malignant neoplasm ($n = 111$), granuloma ($n = 43$), and benign neoplasm ($n = 9$). Serial thin-section computed tomography (CT) was performed before and after injection of 100 mL of nonionic contrast material at 2 mL/sec. The maximum level of enhancement was recorded. Eighteen histologic specimens were graded after vascular staining. RESULTS: Malignant neoplasms enhanced (median, 40.0 HU; range, 20-108 HU) significantly more than granulomas and benign neoplasms (median, 12.0 HU; range, -4 to 58 HU) ($P < .001$). With 20 HU as the threshold for a positive test, sensitivity was 100%; specificity, 76.9%; positive predictive value, 90.2%; negative predictive value, 100%; and accuracy, 92.6% (prevalence of malignancy, 68.1%). Degree of enhancement was significantly related to amount of central vascular staining ($P = .003$). CONCLUSION: Enhancement is an indicator of malignancy and vascularity.

10. 外文期刊 [Yi CA. Lee KS. Kim EA. Han J. Kim H. Kwon OJ. Jeong YJ. Kim S Solitary pulmonary nodules:](#)

[dynamic enhanced multi-detector row CT study and comparison with vascular endothelial growth factor and microvessel density.](#)

PURPOSE: To evaluate enhancement dynamics of solitary pulmonary nodules at multi-detector row computed tomography (CT) and to correlate results with extent of tumor angiogenesis in pathologic specimens. MATERIALS AND METHODS: One hundred thirty-one patients with solitary pulmonary nodules underwent unenhanced thin-section CT, followed by dynamic helical CT (throughout the nodule for 30 mm along the z-axis [13 images] and at 20-second intervals for 3 minutes [130 images total]) after intravenous injection of 120 mL of contrast medium. Diagnosis of malignancy or benignancy was assigned in 109 patients, and follow-up imaging suggested benignancy in the remaining 22. CT findings were analyzed for peak attenuation, net enhancement, and enhancement dynamics. In 54 patients with surgical diagnoses, Pearson correlation coefficient was used to correlate enhancement pattern with extent of microvessel density and vascular endothelial growth factor (VEGF) staining. RESULTS: With 30 HU or more of net enhancement as a cutoff value in differentiation of malignant and benign nodules, sensitivity for malignant nodules was 99% (69 of 70 malignant nodules), specificity was 54% (33 of 61 benign nodules), positive predictive value was 71% (69 of 97 malignant readings), negative predictive value was 97% (33 of 34 benign readings), and accuracy was 78% (102 of 131 nodules). Peak attenuation was correlated positively with extent of microvessel density ($r = 0.369$, $P = .006$) and VEGF staining ($r = 0.277$, $P = .042$). Malignant nodules showed significantly higher VEGF expression ($P = .009$) than that of benign nodules. CONCLUSION: Dynamic enhancement with multi-detector row CT shows high sensitivity and negative predictive values for diagnosis of malignant nodules but low specificity because of highly enhancing benign nodules. Extent of enhancement reflects underlying nodule angiogenesis.

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