

•非血管介入 Non vascular intervention•

¹²⁵I 放射性粒子植入联合吉西他滨顺铂方案治疗老年非小细胞肺癌

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【摘要】 目的 评价 ¹²⁵I 放射性粒子植入联合 GP 方案治疗老年非小细胞肺癌(NSCLC)的可行性、安全性及疗效。方法 40 例老年 NSCLC 中,初治 24 例,复治 16 例,均行 CT 引导下瘤体内 ¹²⁵I 粒子植入后 3~5 d 予 GP 方案:GEM 1 000 mg/m²,静脉滴注 30 min,第 1、8、15 天;DDP 30 mg/m²,静脉滴注,第 1~3 d,28 d 为 1 个周期,化疗 2~4 个周期。粒子植入后 2 个月(即化疗 2 周期后)进行近期疗效及不良反应评价。结果 ¹²⁵I 放射性粒子植入 2 个月后,40 例患者全部可评价疗效。全组 CR 9 例,PR 23 例,SD 5 例,PD 3 例,总有效率 80.0%。初治组 24 例中,CR 6 例,PR 14 例,SD 3 例,PD 1 例,有效率 83.3%;复治组 16 例中,CR 3 例,PR 9 例,SD 2 例,PD 2 例,有效率 75.0%,两组差异无统计学意义($P > 0.05$)。结论 ¹²⁵I 放射性粒子植入联合 GP 方案化疗对不能手术的老年 NSCLC 患者是一种安全、可行、有效的治疗方法。

【关键词】 肺癌;碘放射性同位素;介入放射学;近距离放疗;综合治疗

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【Abstract】 Objective To evaluate the feasibility, safety and curative effect of radioactive particle ¹²⁵I combined with GP in treating NSCLC. **Methods** Among 40 NSCLC cases, we did primary treatment in 24 cases, and secondary treatment in 16 cases. During the process, all the patients were embedded ¹²⁵I particles into tumors under the guidance of CT, then treated with GP 3-5 days later(GP: GEM 1 000 mg/m², intravenous dripping in 30 minutes, on the 1st, 8th, 15th day; DDP 30 mg/m², intravenous dripping, on the 1st, 2nd, 3rd day; with 28 days as one cycle, altogether 2-4 cycles). Two months after embedding the particle ¹²⁵I into the tumors(i.e. after 2 chemotherapeutics cycles), the evaluation of short term efficacy and adverse effects were carried out. **Results** Two months after embedding the particle ¹²⁵I into the tumors, all the 40 cases showed curative effects including CR in 9 cases, PR in 23, SD in 5 and PD in 3 with total effective rate of 80.0%. In the primary treatment group, there were CR in 6 cases, PR in 14, SD in 3 and PD in 1 with effective rate of 83.3%. In the secondary treatment group, there were CR in 3 cases, PR in 9, SD in 2, PD in 2 with effective rate of 75.0%; showing no remarkable difference between the two groups ($P > 0.05$). **Conclusions** The chemotherapeutic embedding radioactive particle ¹²⁵I combined with GP is safe, feasible, and effective to the therapy of senile-inoperable NSCLC.(J Intervent Radiol, 2008, 17: 197-199)

【Key words】 Lung neoplasms;Iodine radioisotopes;Interventional radiology;Brachytherapy;Combined therapy

临床上 50%以上肺癌患者在确诊时年龄已超过 65 岁,就诊时多数已属中晚期,80%病理类型为非小细胞肺癌(NSCLC)。因老年患者脏器储备功能

与修复能力下降,且并发症多,治疗上受到限制,放、化疗综合治疗已经成为不能手术的 NSCLC 治疗的标准模式。为了探索如何联合放、化疗,以提高疗效和减轻不良反应,我们于 2004 年 10 月-2006 年 9 月采用 ¹²⁵I 放射性粒子植入联合 GP 方案(吉西他滨+顺铂),治疗老年 NSCLC 40 例,取得了较

好的疗效,现报道如下。

1 材料与方法

1.1 临床资料

①老年 NSCLC 患者 40 例,年龄 60 ~ 75 岁,平均 61 岁;②Karnofsky 评分 ≥ 60 分;③经病理学或细胞学证实为 NSCLC,具有可测量和可评价的肿瘤病灶;④复治患者既往未放疗(包括外放疗或内放疗),末次化疗距本次治疗时间大于 4 周;⑤临床分期采用 1998 年 UICC 分期。详细临床资料见表 1。

表 1 本组患者临床资料

临床资料	例数	性别		组织学类型			临床分期		
		男	女	鳞癌	腺癌	鳞腺癌	Ⅱ期	ⅢA	ⅢB
初治	24	19	5	14	8	2	7	10	7
复治	16	13	3	9	7	0	4	6	6

1.2 治疗方法

1.2.1 粒子植入

1.2.1.1 术前准备:查血常规、凝血四项、心电图、肝肾功能,签手术知情协议书等。治疗计划系统(TPS)治疗计划:将 3 mm 薄层平扫肺部 CT 及强化 CT 图像输入 TPS 治疗计划系统,计算出粒子数及总剂量,或利用 Halarism 的 ^{125}I 经验计算公式得出粒子数及总剂量^[1]。通常采用 18.5 ~ 28.75 MBq 活度的 ^{125}I 粒子,粒子间距一般在 1.0 cm 左右;采用 28 ~ 37 MBq 活度的 ^{125}I 粒子,粒子间距一般在 1.0 ~ 1.5 cm 之间。

1.2.1.2 手术方法:CT 引导下穿刺。根据靶病灶位置结合患者的具体情况及实际操作的需要,固定体位、定位穿刺点、消毒、局部麻醉,采用分步法进针直达靶点,分步植入一定数目的 ^{125}I 粒子。植入粒子结束后,嘱咐患者屏气后拔出穿刺针,压迫穿刺点止血,创可贴等包扎。

1.2.2 术后处理 粒子植入后立即扫描定位像及 3 mm 薄层 CT 图像,观察粒子整体分布情况,排除气胸、液气胸或肺出血等并发症,密切监测生命体征,术后常规肌肉注射或静脉注射止血药物和地塞米松,使用抗生素预防感染;肺出血、气胸者给予相应的处理;检查手术环境有无脱落丢失粒子,做好粒子使用记录。

1.2.3 化疗方法 全组均在粒子植入后 3 ~ 5 d 给予 GP 方案:吉西他滨 1 000 mg/m²,静脉滴注 30 min,第 1、8、15 天;顺铂 30 mg/m²,静脉滴注,第 1 ~ 3 d,28 d 为 1 个周期,化疗 2 ~ 4 个周期。

1.3 观察指标

每周期化疗前后检查血常规、肝肾功能、心电图等,治疗期间详细记录 Karnofsky 评分、体重、症状改善情况。粒子植入后 2 个月(即化疗 2 周期后)进行近期疗效及不良反应评价,根据治疗前后肺部 CT 的改变,评价肿瘤病灶退缩情况,必要时行头颅、腹部等部位的影像学检查,了解有无新病灶出现。

1.4 评定标准

按照 WHO 统一评价标准,分为完全缓解(CR)、部分缓解(PR)、稳定(SD)和进展(PD),总缓解率 CR + PR。化疗不良反应按 WHO 标准分为 0 ~ IV 度。

2 结果

2.1 临床疗效

^{125}I 放射性粒子植入 2 个月后(化疗 2 周期),40 例患者全部可评价疗效。共植入粒子 55 处病灶,每个病灶植入粒子数为 5 ~ 60 粒。全组 CR 9 例,PR 23 例,SD 5 例,PD 3 例,总有效率 80.0%。初治组 24 例中,CR 6 例,PR 14 例,SD 3 例,PD 1 例,有效率 83.3%;复治组 16 例中,CR 3 例,PR 9 例,SD 2 例,PD 2 例,有效率 75.0%,两组差异无统计学意义($P > 0.05$)。

2.2 不良反应

全组主要不良反应为骨髓抑制和消化系统反应。骨髓抑制表现为白细胞和血小板减少、血红蛋白降低,其中 III ~ IV 度血小板减少均出现在化疗 4 个周期后(14/40,35.0%),III ~ IV 度白细胞下降 32.5%(13/40),消化系统反应主要表现为恶心、呕吐。未发现严重的肝脏毒性和肾脏毒性(表 2)。

表 2 全组放化疗反应(例%)

不良反应	I 度	II 度	III 度	IV 度
白细胞下降	3(7.5)	4(10.0)	7(17.5)	6(15.0)
血小板下降	3(7.5)	3(7.5)	8(20.0)	6(15.0)
血红蛋白下降	4(10.0)	3(7.5)	3(7.5)	3(7.5)
恶心呕吐	8(20.0)	7(17.5)	2(5.0)	2(5.0)

2.3 手术并发症

本组 40 例 55 个病灶均顺利完成粒子植入。术中 5 例出现气胸,其中 4 例肺组织压缩在 30% 以下,未行抽气等特殊处理;1 例肺组织压缩 50%,给予术中抽气,观察病情稳定后继续治疗;6 例术后出现痰中带血,未行特殊处理,24 ~ 48 h 后自行消失。2 个月随访时未出现粒子移位。

2.4 随访情况

全组随访率 100%。生存时间 3.5 ~ 29 个月,中

位生存期 14 个月。其中随访满 1 年者 27 例,1 年生存率 85.2%(23/27)。

3 讨论

肺癌放疗和化疗组成的综合治疗有交替、序贯、同步疗法等。在众多报道中以同步疗法效果最好^[2]。其不利之处在于不良反应也相应增加^[3]。外照射与化疗相伴治疗最大的不利之处是治疗不良反应明显增加,如骨髓抑制、放射性肺炎、放射性食管炎等,尤其对于老年患者更难以实施。而内放疗具有其独特的优越性。

吉西他滨是美国 FDA 批准治疗 NSCLC 的一线用药,是目前新一代治疗 NSCLC 有效药物之一,其单药有效率在 19% ~ 27%^[4]。该药的最大特点是患者耐受性较好,延长了疾病进展时间,提高了患者的生存率^[5,6]。吉西他滨与顺铂联合治疗 NSCLC 的有效率能达到 28% ~ 54%^[7]。

放射性粒子近距离治疗是近 20 年发展起来的新技术。¹²⁵I 粒子近距离治疗肿瘤是指将微型放射源植入肿瘤内或受肿瘤浸润的组织中,持续低能量的 γ 射线,使肿瘤组织遭受最大程度的毁灭性杀伤,使肿瘤得到高剂量的持续照射,由于其低能量及射程仅 1.7 cm,穿透力弱,而肿瘤组织之外正常组织所受辐射剂量锐减,辐射损伤更小,加之周围组织细胞的增殖速度较肿瘤细胞明显低,对射线敏感性低,从而提高放射治疗增益比,减少放射损伤的发生。¹²⁵I 粒子半衰期 59.6 d,可提供约 200 d 左右的持续照射(3 个半衰期),有类似于超分割放疗的生物学特性,通过连续释放低能量 γ 射线,能够对进入不同分裂周期的肿瘤细胞进行不间断的照射,增加了肿瘤细胞的自我增敏,同时,低剂量照射可降低氧增强比值,增加肿瘤内乏氧细胞的敏感性,从而增强对肿瘤细胞的杀灭作用^[8]。

由于 ¹²⁵I 粒子这种保护正常组织的特点和吉西他滨、顺铂方案的高效低毒的优势,使得具有一些基础疾病的老年 NSCLC 患者能够在使用放化疗同时用 ¹²⁵I 治疗方案而达到最佳疗效。但同时应看到放射性粒子由于治疗靶区外剂量的很快下降和设计不严密带来的剂量“冷点”,可能导致肿瘤复发。本研究采用 ¹²⁵I 粒子内放疗并同步联合 GP 方

案化疗治疗老年 NSCLC,总有效率达 80.0%,其中初治组及复治组的有效率分别为 83.5%和 75.0%。全组随访率 100%,生存时间 3.5 ~ 29 个月,中位生存期 14 个月。其中随访满 1 年者 27 例,1 年生存率 85.2%(23/27)。表明该方案对初治及复治的老年 NSCLC 患者均有较好的疗效。全组主要不良作用为骨髓毒性和消化系统不良反应。骨髓毒性表现为白细胞和血小板减少、血红蛋白降低,消化系统不良反应主要表现为恶心、呕吐,未发现严重的肝脏毒性和肾脏毒性。出现Ⅲ度以上白细胞减少及血小板下降的患者,给予 G-CSF 等细胞因子治疗后,都很快恢复正常,无一例延迟给药,无一例出现放射性肺炎及放射性食管炎等。本研究结果表明:¹²⁵I 粒子植入近距离放射治疗联合 GP 方案化疗对不能手术的老年 NSCLC 患者是一种安全、可行、有效的治疗方法,值得临床推广应用。

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胞肺癌

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相似文献(10条)

1. 外文期刊 Huang M. Batra RK. Kogai T. Lin YQ. Hershman JM. Lichtenstein A. Sharma S. Zhu LX. Brent GA. Dubinett SM Ectopic expression of the thyroperoxidase gene augments radioiodide uptake and retention mediated by the sodium iodide symporter in non-small cell lung cancer.

Radioiodide is an effective therapy for thyroid cancer. This treatment modality exploits the thyroid-specific expression of the sodium iodide symporter (NIS) gene, which allows rapid internalization of iodide into thyroid cells. To test whether a similar treatment strategy could be exploited in nonthyroid malignancies, we transfected non-small cell lung cancer (NSCLC) cell lines with the NIS gene. Although the expression of NIS allowed significant radioiodide uptake in the transfected NSCLC cell lines, rapid radioiodide efflux limited tumor cell killing. Because thyroperoxidase (TPO) catalyzes iodination of proteins and subsequently causes iodide retention within thyroid cells, we hypothesized that coexpression of both NIS and TPO genes would overcome this deficiency. Our results show that transfection of NSCLC cells with both human NIS and TPO genes resulted in an increase in radioiodide uptake and retention and enhanced tumor cell apoptosis. These findings suggest that single gene therapy with only the NIS gene may have limited efficacy because of rapid efflux of radioiodide. In contrast, the combination of NIS and TPO gene transfer, with resulting TPO-mediated organification and intracellular retention of radioiodide, may lead to more effective tumor cell death. Thus, TPO could be used as a therapeutic strategy to enhance the NIS-based radioiodide concentrator gene therapy for locally advanced lung cancer.

2. 外文期刊 Suga. K. Kume. N. Shimizu. K. Nishigauchi. K. Hara. A. Motoyama. K. Matsunaga. N Potential of iodine-123 metaiodobenzylguanidine single-photon emission tomography to detect abnormal functional status of the pulmonary neuroadrenergic system in irradiated lung.

The potential of iodine-123 metaiodobenzylguanidine (MIBG) to detect functional abnormalities of the pulmonary neuroadrenergic system (PNS) in irradiated lung areas (ILAS) was preliminarily explored using single-photon emission tomography (SPET). The subjects included five healthy subjects and a total of 31 patients with peripheral-type lung cancer treated by radiation: 15 patients (group A) had received a dose of less than 36 Gy (mean \pm SD: 28.2 \pm 6.2 Gy), and 16 patients (group B) had received a higher dose (mean \pm SD: 51.2 \pm 3.5 Gy) at the time of examination. MIBG SPET scans acquired 15 min and 3 h after injection were used to measure the MIBG uptake ratio (count ratio of the ILA to the contralateral non-ILA) and the clearance rate [percentage of (early counts - delayed counts)/early counts] from the ILAS without noticeable abnormal opacities on chest computed tomography scan. Lung perfusion changes

were also assessed by technetium-99m macroaggregated albumin SPET. By contrast to the homogeneous MIBG uptake in the lungs of the healthy subjects, MIBG uptake was focally decreased in correspondence with the ILAs in all patients, including 11 patients (73.3%) of group A with relatively preserved lung perfusion. The reduction MIBG uptake was significant ($P \leq 0.0001$), and the MIBG clearance rate from the ILAs was also significantly faster than the clearance rates from the normal lungs and contralateral non-ILAs (both $P \leq 0.01$). Group B patients showed significantly lower MIBG uptake and faster clearance from the ILAs than group A patients ($P \leq 0.001$ and $P \leq 0.05$, respectively), although there was no significant difference in the clearance from the non-ILAs. Overall, MIBG uptake/clearance from the ILAs correlated significantly with the radiation dose in the 31 patients ($r = -0.656$; $P \leq 0.0001$ and $r = 0.387$; $P \leq 0.05$, respectively). Perfusion changes were inversely correlated with the clearance from the ILAs ($r = -0.432$, $P \leq 0.05$), but did not correlate

3. 外文期刊 [Yu L. Ju DW. Chen W. Li T. Xu Z. Jiang C. Chen S. Tao Q. Ye D. Hu P. Khawli LA. Taylor CR. Epstein AL](#) [131I-chTNT radioimmunotherapy of 43 patients with advanced lung cancer.](#)

The treatment of advanced lung cancer remains a major challenge in clinical medicine, justifying an urgent need for new therapeutic approaches. In a rather unique international collaboration, 43 patients with advanced lung cancer were treated using iodine-131-labeled tumor necrosis therapy chimeric antibody (131I-chTNT). METHODS: Patients were treated either with intravenous (i.v.) infusion ($n = 22$), intratumoral injection using a computer tomography (CT)-guided catheter ($n = 16$), or combination i.v. and intratumoral infusion ($n = 5$). All patients, regardless of route of administration, received 2 doses of 131I-chTNT on days 1 and 14. RESULTS: The results showed that of those patients receiving i.v. injection alone, 2 achieved partial response (PR) (9%), 16 had stable disease (73%), and 4 progressed (18%). Of those patients receiving intratumoral injection only, 1 had a complete response (CR) (6%), 8 achieved PR (50%), 7 had stable disease (44%), and none (0%) progressed. Finally, of those patients receiving both i.v. and intratumoral administration, 1 had a CR (20%), 1 achieved PR (20%), 2 had stable disease (40%), and 1 (20%) showed progression. CONCLUSIONS: These promising results demonstrate that sufficient doses of radiolabeled antibody can be safely delivered to tumors to cause significant therapeutic effects in advanced lung cancer.

4. 外文期刊 [Ho. Y. Hicks. R](#) [Hiatus hernia: a potential cause of false-positive iodine-131 scan in thyroid carcinoma.](#)

5. 外文期刊 [Bakheet. SM. Hammami. MM. Powe. J](#) [Radioiodine uptake in rheumatoid arthritis-associated lung disease mimicking thyroid cancer metastases.](#)

6. 外文期刊 [La-Perle-KristaM. D. Shen. Daniel. Buckwalter-TaraL. F. Williams. Bonnie. Haynam. Aaron. Hinkle.](#)

[George. Pozderac. Rodney. Capen. CharlesC. Jhiang. SissyM](#) [In vivo expression and function of the sodium iodide symporter following gene transfer in the MATLyLu rat model of metastatic prostate cancer.](#)

BACKGROUND: The sodium iodide symporter (NIS) mediates iodide uptake in thyroid follicular cells and provides a mechanism for effective radioiodide treatment of residual, recurrent, and metastatic thyroid cancers. This study investigated the clinical applications of NIS gene transfer for prostate cancer using the MATLyLu metastatic rat model. METHODS: MATLyLu cells expressing NIS were injected subcutaneously in Copenhagen rats, which developed metastases in lymph nodes and lungs. NIS protein expression was evaluated by Western blot and immunohistochemistry, and function was measured by tissue gamma counts and whole-body imaging following radionuclide administration. RESULTS: In vitro radioiodide-concentrating activity was increased up to 72-fold in a mixed population of MATLyLu-hNIS cells. NIS protein expression was confirmed in subcutaneous MATLyLu-hNIS tumors by immunohistochemistry and Western blot. Gamma counts of subcutaneous MATLyLu-hNIS tumors were 23-fold higher than parental MATLyLu tumors and radionuclide uptake in subcutaneous MATLyLu-hNIS tumors and lymph node metastases was visualized by whole-body image analysis. CONCLUSIONS: NIS expression by a proportion of cells in a population was sufficient to confer radionuclide-concentrating function in subcutaneous and metastatic MATLyLu tumors. Ablation of residual normal and neoplastic prostate tissues by radioiodide after prostate-restricted NIS gene transfer might be a novel adjuvant therapy to prostatectomy for the treatment of advanced prostate cancer. Copyright 2002 Wiley-Liss, Inc.

7. 期刊论文 [时沛](#) [125I粒子植入联合NP方案化疗治疗晚期非小细胞肺癌的临床研究 -中国误诊学杂志2010, 10\(1\)](#)

目的:探讨125I粒子植入联合NP方案化疗治疗晚期非小细胞肺癌的临床价值。方法:36例晚期非小细胞肺癌分为两组,治疗组(A)采用CT引导下125I粒子植入,后行NP方案化疗,对照组(B)单纯行NP方案化疗,两组均为4个周期。结果:两组治疗后总有效率A组为79%,B组为50%,1、2 a生存率A组分别为66%和43%,B组分别为39%和21%,中位生存期A组18个月,B组11个月,二者有统计学差异($P < 0.05$)。结论:125I粒子植入联合NP方案化疗是治疗晚期非小细胞肺癌安全有效的治疗方法,值得临床进一步研究。

8. 外文期刊 [Pisch. J. Wang. L. Wang. J](#) [Regarding Chen et al. IJROBP 1999;44\(5\):1057-1063 \(letter\)](#)

9. 外文期刊 [Filesi. M. Signore. A. Ventroni. G. Melacrinis. FF. Ronga. G](#) [Role of initial iodine-131 whole-body scan and serum thyroglobulin in differentiated thyroid carcinoma metastases.](#)

We evaluated the role of first (131)I-whole-body scan and of first serum thyroglobulin (Tg) measurement after surgery in the early diagnosis of metastases from differentiated thyroid carcinoma (DTC). METHODS: In 269 patients with metastases from DTC, we retrospectively evaluated the results of first whole-body scan (performed 40 days after surgery with diagnostic or therapeutic (131)I dose) and in 69 of them we also evaluated the result of first Tg measurement (performed the day before the first whole-body scan) in relation to the presence, localization and type of metastases. RESULTS: In all patients, the first whole-body scan was positive for the thyroid remnant, and in 54.3% of patients it was also positive for metastases. In the remaining 45.7% of patients, metastases were detected during the follow-up. First Tg levels were ≥ 60 ng/ml in 66.7% of patients with metastases. First whole-body scan detected metastases in 47.8% of patients with Tg values ≤ 60 ng/ml, while Tg values were ≥ 60 ng/ml in 61.3% of patients with first whole-body scan negative for metastases. The combined results of both first whole-body scan and first Tg measurement allowed the early detection of metastases in 82.6% of patients. Whole-body scan detected distant metastases more frequently than local lymph node metastases ($p \leq 0.01$). CONCLUSION: In more than 80% of patients, metastases were suspected or diagnosed as early as 40 days after surgery in the presence of residual thyroid tissue by combined evaluation of results of first whole-body scan and Tg measurement.

10. 外文期刊 [Samuel. AM. Rajashekharrar. B. Shah. DH](#) [Pulmonary metastases in children and adolescents with well-differentiated thyroid cancer.](#)

In this study, 27 patients less than 18 yr old with pulmonary metastases from well-differentiated thyroid carcinoma were evaluated to determine their response to (131)I therapy. METHODS: Of 121 children and adolescents treated with (131)I between 1963 and 1996, 27 patients had pulmonary metastases associated with nodal disease. Treatment response from (131)I was measured by three parameters: chest radiograph, scintigraphic images and serum thyroglobulin levels. Total activity of (131)I administered ranged from 4.6 GBq (125 mCi) to 38.7 GBq (1.05 Ci). Four patients were given one treatment, 8 were given two treatments, 4 were given three treatments and 11 were given more than three treatments. Radiation doses to the lungs were estimated in 14 patients using the MIRD methodology. The minimum duration of follow-up was 6 mo. RESULTS: At the time of initial presentation, diagnostic (131)I studies revealed bilateral radioiodine uptake in the lungs in 19 (70.4%) patients, whereas 12 (44.4%) patients had abnormal chest radiographs. One patient was lost to follow-up and was excluded from the study. Of the 26 patients studied, complete ablation of pulmonary metastases was observed in 8 (30.8%), partial ablation in 17 (65.4%) and there was no response to treatment in 1 (3.8%). Dosimetric parameters such as radioiodine uptake as a percentage of therapeutic activity, effective half-life and radiation dose delivered to the lungs were evaluated with each therapy. There was a progressive decline in each of these parameters with successive therapies. No correlation was observed between the radiation dose delivered and the response of pulmonary metastases to therapy. The number of therapies and amount of radioiodine administered had no influence on the ablation response. Of the 26 patients, 13 had a follow-up duration of less than 5 yr, 7 had 5-10 yr and 6 had more than 10 yr. One patient developed new metastases after 7 yr of diagnosis and treatment. One patient died of the disease

引证文献(1条)

1. [孟庆贺](#), [杨万菊](#), [张柏秋](#) CT引导下125I粒子植入治疗晚期非小细胞肺癌围手术期的护理[期刊论文]-[当代医学](#) 2009(17)

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