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## <sup>99m</sup>Tc-HL91乏氧显像监测放疗后荷H<sub>22</sub>肝癌KM小鼠肿瘤再氧合状态

### <sup>99m</sup>Tc-HL91 hypoxia imaging to monitor reoxygenation states of H<sub>22</sub> liver tumor-bearing KM mice after radiation therapy

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中文摘要:

目的 探讨<sup>99m</sup>Tc-HL91乏氧显像监测肿瘤再氧合状态情况,同时检测肿瘤乏氧诱导因子-1a(HIF-1a)表达,分析两种检查方法的相关性。方法 荷H<sub>22</sub>肝癌KM小鼠随机分为对照组和实验组,实验组又根据放疗后时间1 d、3 d、5 d进行实验。对照组不进行<sup>60</sup>Co放疗,实验组接受单次15 Gy的<sup>60</sup>Co放疗。各组小鼠注射<sup>99m</sup>Tc-HL91显像剂2 h后进行SPECT平面显像。各组小鼠图像通过ROI技术,计算T/NT比值。图像采集结束后立即处死小鼠,完整剥离肿瘤,称重并计算放射性计数,计算肿瘤微分摄取率(DUR)。之后迅速将肿瘤组织常规制成蜡块,用免疫组化技术测定HIF-1a的表达。最后将DUR、T/NT数值分别与HIF-1a的表达进行等级相关性分析。结果 与对照组相比,随着放疗时间的延长,DUR及T/NT比值呈现先减少后增加的趋势,HIF-1a阳性细胞数量也呈现先减少后增加的表达。结果显示DUR及T/NT比值分别与HIF-1a的表达呈正相关( $r$ 值分别为0.75和0.86, $P<0.05$ ,双侧)。结论 <sup>99m</sup>Tc-HL91乏氧显像与HIF-1a的表达可用于监测肿瘤放疗后的再氧合状态,二者呈正相关。

英文摘要:

**Objective** To investigate whether <sup>99m</sup>Tc-HL91 hypoxia imaging could be used to monitor reoxygenation of tumor after radiation therapy, and to analyze the relationship between <sup>99m</sup>Tc-HL91 hypoxia imaging and the expression of HIF-1a (hypoxia induce factor-1a). **Methods** H<sub>22</sub> tumor-bearing mice were randomly divided into control group and experimental group, and the latter was further divided into 1 d, 3 d, 5 d subgroups according to the different time after radiotherapy. The experimental group accepted <sup>60</sup>Co radiotherapy at a single dose of 15 Gy. All groups underwent SPECT plane imaging two hours after injected <sup>99m</sup>Tc-HL91 hypoxia imaging agent. ROIs were drawn around the tumor and contralateral muscles in planar images to calculate the T/NT of imaging in all mice. The mice were killed immediately after image acquisition, then the tumors were excised, weighted. Radioactivity was measured, and DUR (differential uptake ratio) was computed for quantitation of the tracer uptake. Immunohistochemical analyses of HIF-1a expression were also performed in excised tumor. Finally the relationship between T/NT (T: tumor; NT: non tumor), DUR values in different time groups and HIF-1a expression was analyzed. **Results** Compared with the control group, DUR and T/NT values decreased first and then decreased with the time of radiotherapy, and the quantities of HIF-1a positive cells also showed similar expression that decreased at first and then decreased. Significant positive correlation was found between DUR, T/NT values in different time groups respectively and HIF-1a expression ( $r=0.75, 0.86$ , both  $P<0.05$ ). **Conclusion** <sup>99m</sup>Tc-HL91 hypoxia imaging and HIF-1a expression can be used to determine reoxygenation of tumor after radiation therapy, and positive correlation exists between them.

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