研究论文

多模态分子影像对肝癌进展和血管生成的研究

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摘要：

通过对HCCLM3-fLuc-GFP肝癌的进展和血管生成的多模态成像分析，对肝癌细胞在体内生长的适应过程和级数生长特性，分别进行了生物自发荧光成像 (bioluminescent imaging，BLI)研究、激发荧光成像(fluorescent imaging, FMI)研究和小动物计算机断层成像 (micro-computed tomography，Micro-CT) 研究，对采集的成像数据进行定性定量分析，并与肿瘤的体积测量数据进行了相关性分析。结果表明，肿瘤细胞在接种后第4天细胞数量基本为原接种数量的一半，第7天体内的细胞基本与接种数量相等，7天内细胞基本完成了体内的适应过程，之后肝癌细胞进入了快速增殖期。BLI成像、FMI成像均与肿瘤体积的测量结果高度相关 (R^2=0.9263，R^2=0.9068)。通过计算机断层成像 (Micro-CT)，对肿瘤的新生血管进行分析，并用可视化的手段对肿瘤的血管新生特性进行三维显示，Micro-CT成像结果验证了BLI、FMI成像揭示的肿瘤生长后期的非指数生长特性。

关键词： 生物自发荧光成像 激发荧光成像 计算机断层成像 肝癌进展 血管生成

Research on Liver Tumor Proliferation and Angiogenesis Based on Multi-Modality Molecular Imaging

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Abstract:

To detect the HCC-LM3-fLuc-GFP tumor adaptive and exponential process of tumor progression, bioluminescent imaging (BLI) and fluorescent imaging (FMI) were used to calculate the bioluminescent intensity and fluorescent intensity. The results showed that in the first four days, tumor cells became fewer because of the phagocytosis and decomposition of the macrophage and the trypsins. At about the seventh day, the tumor cells were equal with the number of the cells on the first day. This adaptive process cost about one week. In the following days, the tumor began to mount up exponentially. A good linear correlation was found between the tumor sizes measured by caliper and the BLI signals (FMI signals) determined by the optical imaging (R^2 (tumor sizes and BLI signals)=0.9263; R^2 (tumor sizes and FMI signals)=0.9068; R^2 (BLI signals and FMI signals)=0.9961). In addition, to study the tumor angiogenesis, Micro-CT was used to visualize the tumor blood vessels. The figures clearly displayed the connection between the tumor blood vessel and heart, liver or lung blood vessels.

Keywords: Bioluminescent imaging   Fluorescent imaging   Micro-computed tomography   Liver tumor proliferation   Tumor angiogenesis

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