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双源CT双能量肺动脉成像的单能量图像质量评价

Evaluation of the quality of monochromatic energy image in dual-source dual-energy pulmonary angiography

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中文摘要:

目的 定量评价双源CT双能量肺动脉成像的单能量图像质量。方法 对31例患者行双源CT双能量肺动脉成像,获得低能量(100 kV)、混合能量及各水平单能量图像。测量肺动脉CT值和噪声标准差(SD),计算SNR、CNR,获得SNR和CNR高峰时单能量范围,比较不同水平单能量图像与低能量图像、混合能量图像间肺动脉CT值、SD、SNR及CNR的差异。结果 40~190单能量keV图像中,70~80 keV单能量图像SNR和CNR较高,74 keV图像中二者达峰值。比较70 keV、80 keV和74 keV单能量图像与低能量及混合能量图像差异,70 keV图像与低能量图像肺动脉CT值高于其他各图像,但差异无统计学意义($P>0.05$);低能量图像SD值最高,其次为70 keV图像,80 keV图像SD值最低;各图像CNR值差异无统计学意义($P>0.05$);74 keV和80 keV图像SNR值均高于低能量图像($P<0.05$)。结论 双源CT双能量肺动脉成像中,70~80 keV单能量图像质量与低能及混合能量图像相当,74 keV为本研究条件下的最佳单能量水平。

英文摘要:

Objective To quantitatively evaluate the quality of monochromatic energy image in dual-source CT dual-energy pulmonary angiography. **Methods** Totally 31 patients underwent dual-source CT dual-energy pulmonary angiography, and low energy (100 kV), mixing energy as well as different monochromatic images were obtained. CT value and noise standard deviation (SD) of pulmonary arteries were measured, then SNR and CNR were calculated. The ranges of monochromatic energy when SNR and CNR reached the peak were obtained. CT, SD, SNR and CNR of pulmonary arteries in different monochromatic energy images, low energy and mixing energy image were compared. **Results** In images of 40—190 keV, SNR and CNR values were higher from 70—80 keV and reached the peak at 74 keV, therefore 70 keV, 80 keV and 74 keV monochromatic energy images were selected to be compared with low energy and mixing energy image. It was shown that CT values of pulmonary arteries in 70 keV monochromatic energy and low energy image were higher than those in the other images, though no statistical significance was found (both $P>0.05$). SD value was the highest in low energy image, secondly for 70 keV monochromatic energy image, and SD value was the lowest in 80 keV monochromatic energy image. There was no difference of CNR among each image (all $P>0.05$), and SNR in 74 and 80 keV monochromatic energy images were higher than that in low energy image (both $P<0.05$). **Conclusion** Quality of 70—80 keV monochromatic energy images are equivalent with low energy and mixing-energy image. Under the given conditions of this study, 74 keV is the optimum monochromatic energy for pulmonary angiography.

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