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不同测量方法评估气道体模CT图像测量的准确性

Accuracy of evaluation on airway phantom measurement on CT images with different methods

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英文关键词:Tomography, X-ray computed Reconstruction kernel Field of view Airway phantom

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中文摘要:

目的 研究不同测量方法及图像获取条件对胸腔气道测量的准确性。方法 将亚克力圆管插入泡沫中制成气道模型，应用Siemens 64排螺旋CT 进行扫描，然后用不同重建内核对不同下获得的数据进行重建，得到气道模型CT图像；分别用半高宽法（FWHM）、二阶零交点方法（ZC）和相位一致方法（PC）对气道模型CT图像进行测量，比较测量误差。结果 对约为1.5~2.0 mm的管道，当重建内核从B30f变化到B60f时，FWHM和ZC的测量误差从正值变为逐渐增大的负值，并在B45f时达到最小（<11%），PC的测量误差相对稳定。对于壁厚约mm的管道，FWHM和ZC的测量误差在B30f时最大（>35%），随着重建内核变得锐利，测量误差近似呈线性递减关系，分别在B60f和B50f达到最小（<5%），PC的测量误差范围为6.14.47%。结论 测量壁厚约为1~2 mm的气道体模时，FWHM和ZC方法在B50f时误差最小；而PC方法受重建内核影响小，测量结果稳定。

英文摘要:

Objective To assess the accuracy of thoracic airway measurement with different methods on CT images obtained under different conditions. **Methods** The airway phantom, which was made from poly-acryl tubes and foam, was scanned with Siemens 64-multi-detector row CT scanner. Data obtained with different FOV were reconstructed into CT images with different reconstruction kernels. CT images of airway phantom were measured by using full width at half maximum (FWHM), zero crossing (ZC) and phase congruency (PC), and the measurement errors were compared. **Results** For tubes with the thickness of about 1.5—2.0 mm, when reconstruction kernels were varied from B30f to B60f, the measurement errors by FWHM and ZC were varied from positive to increased negativ reached the minimum at B45f (<11%), and those by PC were relatively steady. For tubes with thickness of about 1 mm, the measurement errors by FWHM and ZC reached maximum (>35%) at B30 dropped near linearly with the reconstruction kernel becoming sharper, and reached the minimum at B60f and B50f (<5%). The range of measurement errors by PC was 6.93%—14.47%. **Conclusion** measure airway phantoms with thickness of 1—2 mm, the total error by FWHM and PC is minimum at B50f, while PC is less affected by reconstruction kernels and remains steady.

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