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The Impact of a Holding Compartment on Aerosol Delivery from Nebulizer Systems

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Submicronic nebulizer systems require 5 minutes or longer of breathing from a 20/mCi/mL reservoir to obtain the necessary counts to perform a pre-perfusion aerosol study. The purpose of the current study was to evaluate the potential use of a holding compartment in order to improve aerosol delivery efficiency without sacrificing image quality.

Methods: 105 patients (pts) who were referred for evaluation of pulmonary emboli were evaluated using a pre-perfusion aerosol technique. Quality of images were determined by 2 blinded observers on 42 patients using a standard nebulizer (SN) and 43 pts using the same nebulizer with a holding compartment (HC) appropriately located to capture DTPA particles during patient expiration, and made available for re-breathing.

Quality of Aerosol was determined semi-quantitatively using a 1-4 scale for central deposition, peripheral penetration and overall scan quality.

Results: Quality analysis is shown in the following table. (Mean +/- SD)

Nebulizer	Central Deposition	Peripheral Penetration	Overall Quality
Reader A SN	3.11 +/- .73	3.42 +/- .63	3.02 +/- .63
Reader A HC	3.31 +/- .71	3.55 +/- .63	3.40 +/- .63
Reader B SN	3.09 +/- .81	3.37 +/- .69	3.35 +/- .65
Reader B HC	3.33 +/- .79	3.70 +/- .56	3.70 +/- .52

Breathing time analysis of 20 subjects demonstrated over 100% improvement in efficiency using the holding compartment system when compared to the nebulizer alone allowing studies to be done with breathing times of 120 sec.

Conclusion: We conclude that a strategically placed holding compartment within the aerosol/nebulizer system will dramatically reduce the required breathing time and significantly improve overall image quality.

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