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Vibration response imaging and pulmonary function; comparing non-smokers and smokers

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Introduction: The VRITM (Deep Breeze CO, Or-Akiva, Israel) is an imaging modality that records energy generated by the lungs vibration during the respiration cycle. Vibration energy can be displayed as the percentage contribution within each lung to the total vibration energy (Quantitative lung data, QLD). In this study, we investigate the correlation between regional QLD and spirometric findings in healthy male Japanese nonsmokers and smokers.

Methods: The VRI images of 50 normal healthy male subjects, including 25 nonsmokers (30.9±7.4 years) and 25 smokers (6 ex-smokers and 19 current smokers, 34.5±6.7 years) were recorded. Subjects were defined as healthy according to medical history, lung function test and physical exam. Predicted values of spirometric measurements were derived from guidelines for pulmonary function tests issued by the Japanese Respiratory Society.

Results: Slightly significant correlations were found for %VC and the upper lung QLD and positive correlations for %VC or %FVC and the lower QLD in all subjects. These correlations were accentuated in smokers. Subgroup analysis revealed that there were significant and moderate correlations in regional QLD, especially the lower lung QLD, and %VC ($r=0.54$, $p<0.01$), %FVC ($r=0.53$, $p<0.01$) or %FEV1 ($r=0.45$, $p<0.05$) in smokers. In nonsmokers, however, we couldn't find any correlations of regional QLD and spirometric findings.

Conclusion: Significant correlations of the regional QLD and pulmonary function parameters were observed in smokers only. Further studies are needed to elucidate the reasons why these correlations were not observed in nonsmokers.