

Testing Respiratory Function and Mechanics

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ASSOCIATION BETWEEN FEATURES OF VIBRATION RESPONSE IMAGING (VRI) OF THE LUNGS AND THE RESULTS OF METHACHOLINE INHALATION CHALLENGE TESTING

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PURPOSE: **Vibration Response Imaging (VRI)** is a novel non-invasive technology that creates images of the lungs by recording **vibrations** from the chest wall during the respiratory cycle. It was hypothesized that some features of VRI images at baseline might predict results of a subsequently performed methacholine inhalation challenge (MIC) test.

METHODS: 14 patients underwent baseline VRI **imaging** immediately prior to a MIC test performed for evaluation of respiratory symptoms. Two readers that were blind to the MIC results independently scored these baseline VRI images, on a scale of 0-3, at different points of the respiratory cycle for shape and intensity, right-left symmetry, and maximum **vibration** energy detected. Regression analysis was used to test the association between the 16 subcomponent scores describing the VRI image and MIC test results.

RESULTS: VRI images were satisfactory for analysis in 13 patients and MIC test results were positive in 6. There was a correlation between the total VRI scores by the two readers ($r=0.62$, $p=0.03$). Average of the total scores by the two readers had a poor association with MIC results (odds ratio=0.90, $p=0.21$). However, 3 subcomponent scores for specific image features (early inspiratory expansion, the direction of expansion during inspiration, and maximum **vibration** energy) showed, in aggregate, a predictive trend (odds ratio=3.0, $p=0.07$). The 3 patients with the lowest subcomponent scores had a positive MIC and the 2 patients with the highest scores had a negative MIC.

CONCLUSION: Features of VRI images can be scored with interobserver correlation. Early inspiratory expansion, direction of image expansion during inspiration, and maximum **vibration** energy showed a trend for predicting MIC test results. A larger, prospective clinical evaluation of a scoring system based on these image features needs to be performed.

CLINICAL IMPLICATIONS: A semi-quantitative scoring system based on specific features of the baseline VRI image may be useful for the diagnosis of asthma. If such a scoring system can be validated prospectively, VRI would be a new and potentially sensitive method for evaluating asthma.

DISCLOSURE: Payam Aghassi, Grant monies (from industry related sources) Supported by Deep Breeze, Ltd.; Product/procedure/technique that is considered research and is NOT yet approved for any purpose.

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