

Vibration Response Imaging:

A Promising Emerging Technology to Diagnose and Monitor Pulmonary Disease

By Daniel Layish, M.D.

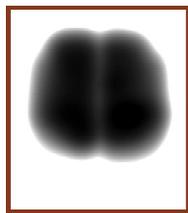


Vibration Response Imaging (VRI) was developed in 2001 by an Israeli Pediatrician, Dr. Igal Kushnir. Dr. Kushnir was interested in developing a method to monitor lung function that did not involve the radiation exposure which occurs with x-ray and CT scan technology. VRI is a functional imaging tool manufactured by Deep Breeze Ltd. The system is mobile and can be used at the point-of-care with limited patient effort.

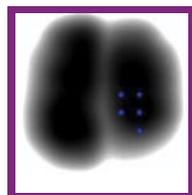


Over the past ten years, there has been refinement of the VRI technology and it is now poised to become a potentially useful modality in multiple clinical settings. VRI even has the potential to be used in patient's homes.

VRI uses the natural vibration energy generated by the body. Air flowing through the bronchial tree produces turbulent vibrations. The structural or functional changes in the lungs will produce a corresponding change in the vibration frequency which can be determined at various locations over the thoracic cage. The system uses an array of forty piezo-electric sensors. This data is then processed to produce functional images. Essentially, VRI takes the basic principles of the stethoscope and amplifies this into an objective, quantitative imaging tool for assessing pulmonary function.

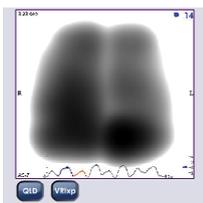


Healthy Image



Lower left lobe
Asthma Patient

Clinical studies have determined that the image appearance and quantitative data from VRI has characteristic features in normal patients versus patients with pulmonary pathology. Patients with consolidation will show increased vibration energy intensity, whereas patients with pleural effusion will have a decrease in vibrational energy. In asthma, there is an asynchrony at peak inspiration and expiration. Patients with COPD show diffuse dynamic disturbances throughout various lung regions. VRI has the potential not only to differentiate between various pulmonary conditions, but also assess regional lung function (for example, in monitoring the effect of inhaled medications, or mucus clearance techniques.) Vibration response imaging can be easily repeated to follow se-



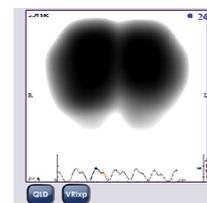
COPD Patient

quential changes in lung function and monitor a patient's condition.

In a Spanish study of 58 patients with lung cancer VRI was comparable to a nuclear medicine quantitative ventilation/perfusion lung scan in predicting postoperative pulmonary function. If this is validated in larger studies, it would provide a more rapid and cost effective way to assess postoperative pulmonary function. Other clinical studies have shown that VRI can be useful to assess secretion retention and the effectiveness of mucus clearance techniques in mechanically ventilated patients. VRI could potentially be used to monitor patients after lung transplantation in the home setting. By providing real-time visual feedback to patients, the VRI may also improve compliance with therapy in patients with conditions such as cystic fibrosis. Newer versions of the VRI are being adapted for home use (which may be ideal for monitoring chronic diseases to prevent repeat hospitalization.) In this setting, the VRI would be connected through a wireless transmitter to a remote server for analysis of trends by a clinician.

In summary, by expanding simple auscultation to an advanced, digital objective measure of regional lung function, it is hoped that VRI will provide an important diagnostic tool which can directly impact patient management.

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CHF Patient

