

Use of thoracic impedance sensors to screen for sleep-disordered breathing in patients with cardiovascular disease.

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Abstract

Screening patients for the possibility of sleep apnoea, one of the most common forms of sleep-disordered breathing, requires measurement of respiration. We propose a simple method to estimate the amplitude modulation of a respiratory tidal volume, using a semi-quantitative measure of respiration based on thoracic impedance (TI). Because respiratory volume changes may be accommodated by varying displacements of the rib cage (RC) and abdomen (AB), the latter produced by outward motion of the diaphragm, it is necessary for any useful measure of respiration to be closely related to both RC and AB displacements. Because the relative contributions of RC and AB displacements to respiratory tidal volume vary in different body positions, the present measurements were recorded from subjects in supine, and right and left lateral decubitus postures. We observed a clear linear relationship between TI and both RC and AB signals in all three body positions. There were no statistically significant differences between observed relationships between TI and AB and between TI and RC, and these relationships were independent of the body position. TI sensors appear to be a useful candidate for a simple method of screening for sleep apnoea, especially in a cardiology clinical setting. Further investigation is warranted for the refinement of algorithms to detect changes in amplitude modulation occurring with apnoeas and to remove artefacts due to gross body movements.