

OBJECTIVE MEASUREMENT OF WHEEZES AND CRACKLES IN CONGESTIVE HEART FAILURE AND BRONCHIAL ASTHMA

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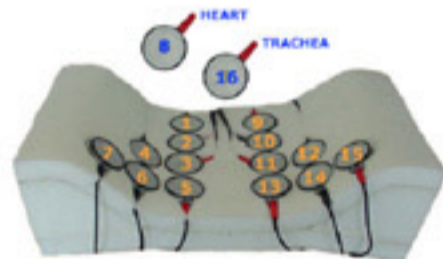
OBJECTIVE

To determine whether the frequency characteristics of wheezing differed in congestive heart failure (CHF) as compared to bronchial asthma (BA).

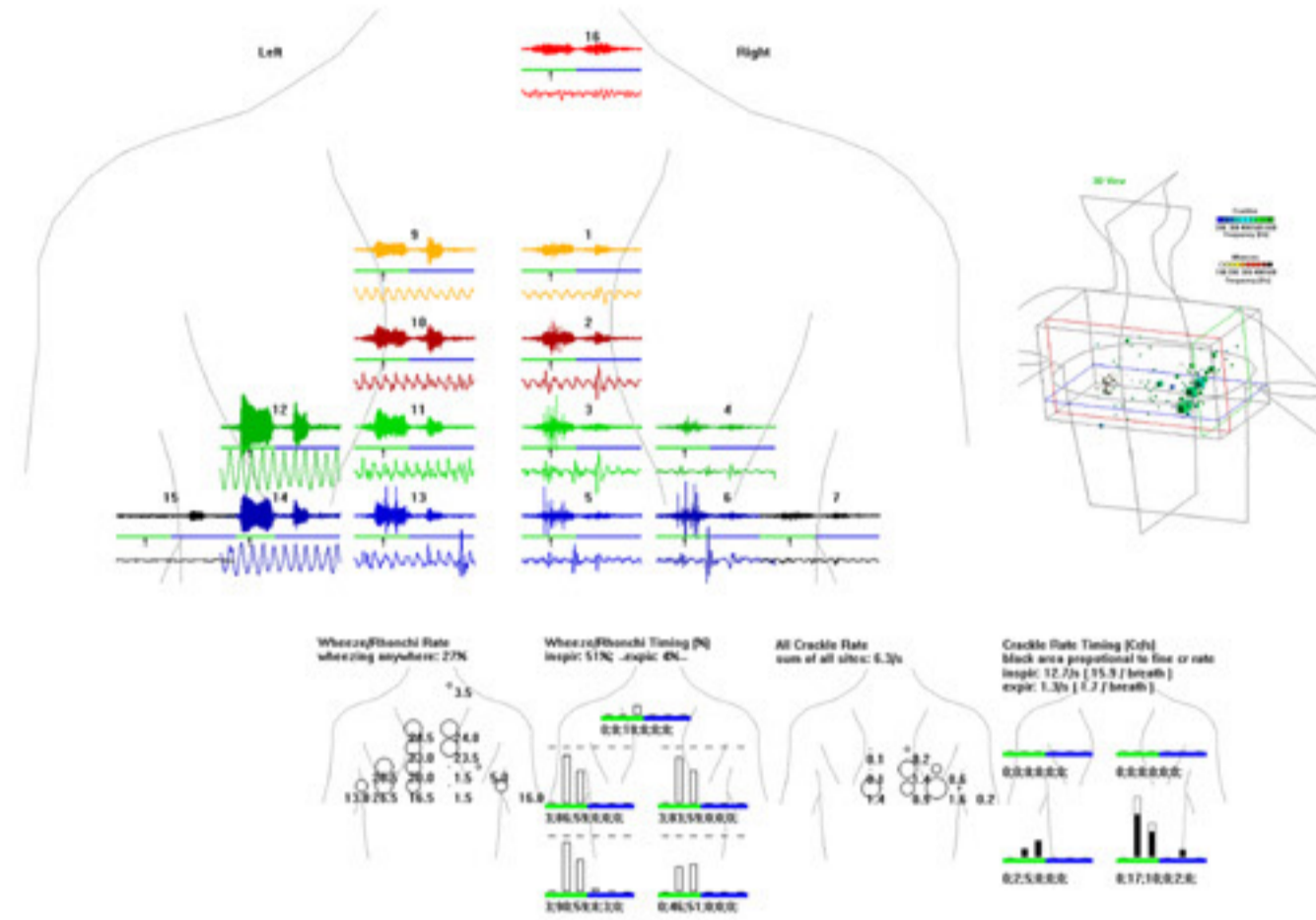
METHODS

We used a 16 channel lung sound analyzer (Stethographics Model 1602) to provide automated wheeze and crackle quantification.

Patients with clinical diagnoses of congestive heart failure (CHF) and bronchial asthma (BA) were identified from inpatients and outpatients at a community teaching hospital.

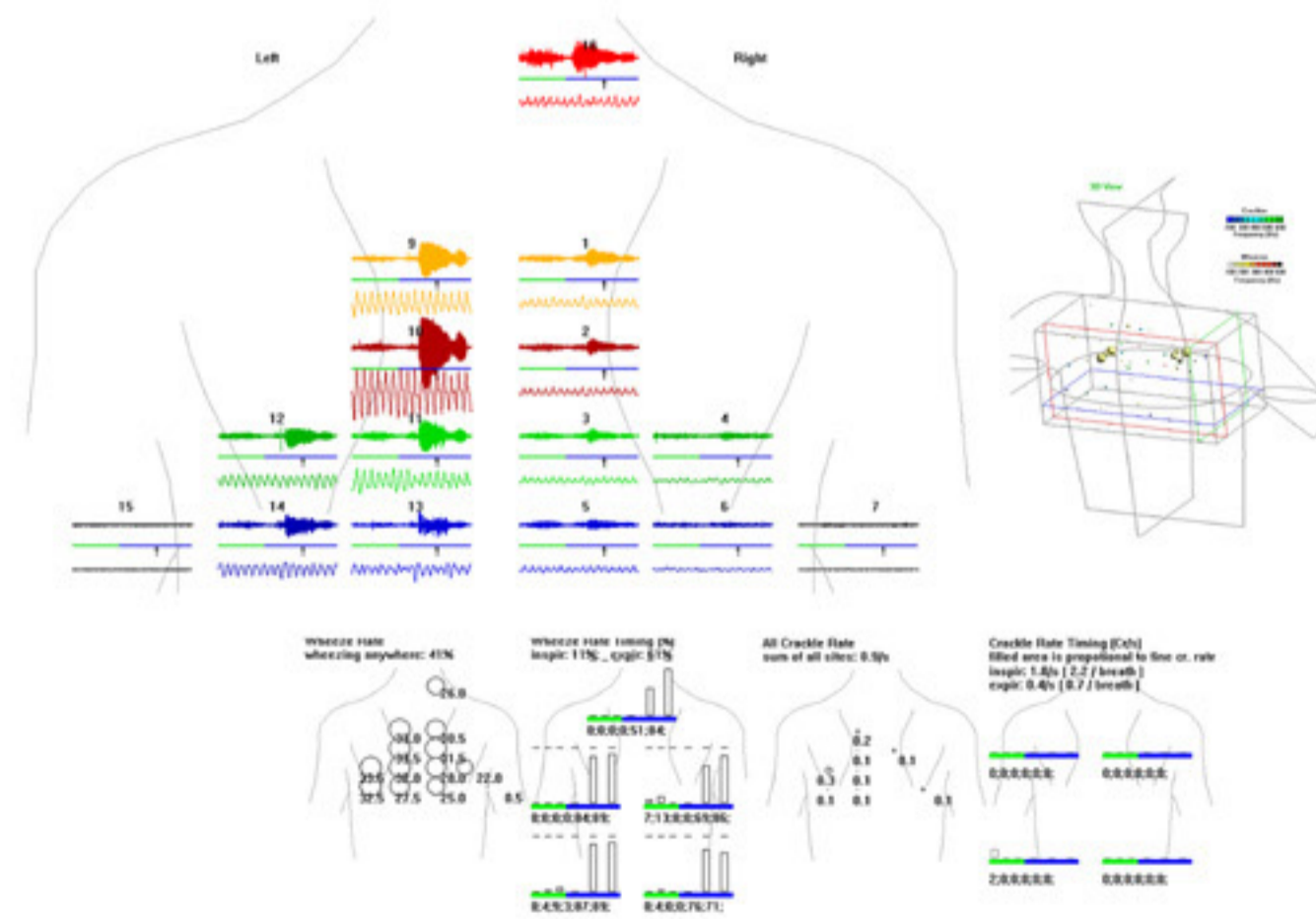


CHF



In this patient with CHF inspiratory crackles are present at both bases. They are a mixture of fine (black bar) and coarse (white bar) in character. Inspiratory wheezing is detected on the left.

BRONCHIAL ASTHMA



As seen in this figure wheezing is rather diffuse over the chest. The circles are proportional to the wheeze rate. Wheeze rate is defined as the proportion of breath cycle occupied by a wheeze. The bar graph shows the relative wheeze rate in each 1/3 of inspiration (green horizontal bar) and expiration (blue horizontal bar).

RESULTS

- > Wheezing was present in 14 of 40 CHF patients and in 30 of 40 asthma patients.
- > There were no significant differences in the mean frequencies and wheeze rates in the 14 CHF patients and the 30 asthmatics.

WHEEZING AND RHONCHI INSPIRATION

	CHF (n=14)	Asthma (n=30)
Rate (%)	35 ± 22	32 ± 18
Frequency (Hz)	232 ± 155	303 ± 140

WHEEZING AND RHONCHI EXPIRATION

	CHF (n=14)	Asthma (n=30)
Rate (%)	35 ± 31	47 ± 29
Frequency (Hz)	176 ± 86	234 ± 76

CRACKLES PRE BREATH

	INSPIRATION	EXPIRATION
CHF	8 ± 5	7 ± 3
BA	3 ± 3	4 ± 2

- > There was a tendency for inspiratory crackles to be more common in CHF.
- > Seven of the 14 CHF patients with wheezing had an inspiratory crackle rate of 5 or more crackles per breath.
- > None of the 30 asthmatic patients had 5 or more inspiratory crackles per breath.

CONCLUSIONS

- > Although there were no differences in mean wheeze frequency or rate, the presence of inspiratory crackles suggest CHF rather than BA.
- > A larger series of patients needs to be studied to confirm these results.

COMMENT

- > The lack of acoustical measurement differences between CHF and BA wheezing is consistent with the common clinical experience that this wheezing is difficult to distinguish.
- > Crackles can be measured easily at multiple sites even in very ill patients.
- > This offers the promise of differentiating the two conditions noninvasively.