

## Basic Research Overview

### High-Frequency Chest Compression: Mechanisms of Action/Physiological Effects

Mucus clearance-related changes in the physical properties of mucus gel simulants occurring during high frequency chest compression (HFCC) suggest that oscillating air flow may act as a physical "mucolytic", thus enhancing ciliary and cough clearability. This randomized controlled blinded crossover study of sputum viscosity in sputum samples collected from stable CF patients following either HFCC or chest physiotherapy (CPT) show significant reductions in the viscosity of mucus with HFCC but not CPT.

<b>Title</b>	Tomkiewicz R, Biviji A, Yaz A, King M. Effects of oscillating air flow on the rheological properties and clearability of mucus gel simulants. <i>Biorheology</i> 1994; 31 (5): 511-520.
<b>Objective</b>	To compare the viscosity of mucus cleared following HFCC compared with CPT.
<b>Method</b>	<ul style="list-style-type: none"> <li>• Rheological variables (spinnability and viscoelasticity) in mucus gel simulants expectorated following HFCC and CPT were measured             <ul style="list-style-type: none"> <li>○ Stable CF patients aged 6-18 were randomized to receive either normal saline (N.S.) or DNase nebulization, followed by either HFCC or CPT in a crossover design</li> <li>○ An investigator blinded to the treatments analyzed expectorated sputum viscosity (rigidity index, log G*)</li> <li>○ A change in log G* of 0.3 represents an approximate twofold reduction in sputum viscosity</li> </ul> </li> <li>• Two derivative parameters, mucociliary clearability index (MCI) and cough clearability index (CCI), were computed from the rheological variables, based on relationships established from model studies of clearance</li> </ul>
<b>Results</b>	<ul style="list-style-type: none"> <li>• Sputum viscosity using HFCC, compared to CPT, is significantly reduced in six of the seven paired samples analyzed</li> <li>• An average reduction in log G* is 0.55 (P&lt; 0.1)</li> <li>• This phenomenon may account, in part, for pulmonary function improvements seen in long – term users of HFCC</li> </ul>

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