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**Title:** Is cough with high frequency chest wall oscillation (HFCWO) effective on the differences of mucus rheological property, driving pressure?

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**Body:** Background:HFCWO is commonly used for airway clearance, and effective for moving airway secretions from peripheral airway. We already reported that effects of mucus clearance on the differences of rheological property, driving pressure and frequency during HFCWO in ERS Congress 2011. However the effect of cough mucus clearance on the rheological property, driving pressure during HFCWO is not clear. The purpose of this study is to clarify differences of airway clearance efficacy in mechanically assisted cough by HFCWO. Method: 20 normal subjects participated in this study. Mucus stimulants (MS) were prepared using thickener 1, 2, 3 and 4% and the pressure controls of SmartVest™ were driven 30, 40, 50 and 60 on the frequency 13Hz synchronized with cough. MS rheological studied were measured frequency-dependency and stress-dependency using rheometer. They were coughed into the internal diameter of 10mm, 1-meter-long tube through a mask during SmartVest™. We measured migration length of each MS, Peak Couth Flow (PCF), PEmax and effortless breathing. Results: The higher setting pressure controls droved, the more PCF and PEmax increased except of 60 (p<0.05). In the rheology of MS, the lower viscoelasticity of 1% MS had, the longer migration length moved (p<0.05). However, the migration length did not increase in the higher viscoelasticity of MS in spite of high driving pressure. The driving pressure 40 and 50 were most increased by comparison with 30 and 60(p<0.05). The subjects were not tolerable on 60. Conclusions The cough synchronized with driving pressure 40 and 50 using HFCWO (SmartVest™) is effective for mucus clearance.