Cystic Fibrosis

The articles and abstracts in this listing were selected for inclusion based on their relevance to the title topic.

The Cystic Fibrosis listing contains information on the safety and efficacy of high-frequency chest wall oscillation (HFCWO) as it specifically applies to the treatment of cystic fibrosis. Comparisons with other airway clearance modalities, treatment efficacy and adherence, and cost-analysis studies for this patient population are included.

Aerosol Deposition, Effects on


The effects of high-frequency chest compression (HFCC) on aerosol delivery to the lung was studied in ten normal subjects who inhaled 99m Technetium-labeled Human Serum Albumin (HSA) aerosol alternately with and without HFCC. The study suggests that HFCC does not impair aerosol delivery in normal subjects and that it improves delivery to the lower respiratory tract to a degree just short of significance.

Perry GV, Stites SW, Peddicord T, Cox G, McMillian C. Effect of high frequency chest wall oscillation on the central and peripheral distribution of aerosolized DTPA as compared to standard chest physiotherapy in cystic fibrosis. *Am J Respir Care Med* 1999;159(suppl 3):A686.

This crossover evaluation compares deposition of aerosolized DTPA administered simultaneously with high-frequency chest wall oscillation (HFCWO) versus DTPA aerosolized after standard chest physiotherapy in patients with cystic fibrosis. Combined HFCWO and aerosol therapies displayed a non-significant trend toward more central deposition of aerosolized medications.

Cystic Fibrosis, Use in


This retrospective study of 54 patients with cystic fibrosis who had received The Vest™ shows that FEV₁ improved an average of 8% when comparing the best pulmonary function test (PFT) results from the time interval 0?6 months prior to Vest initiation to the best PFT results from the time interval 0?6 months following it. Improvement for those patients who had received CPT prior to receiving The Vest averaged 7%; for those who did not receive CPT prior to Vest initiation, improvement averaged 11%.


This retrospective study evaluated Vest therapy compliance for 82 patients who used The Vest™ for more than six months. Compliance tracked by a meter on the device appears constant over the first several months of therapy and may be higher than compliance ranges for patients receiving conventional chest physiotherapy.

Anbar RD. Use of ThAIRapy Vest does not affect liver function of patients with cystic fibrosis. *Am J Respir Crit Care Med* 1999;159(3), A687.

This retrospective analysis of 77 patients indicates that short-term use of the high-frequency chest wall oscillation does not affect liver function as measured by liver enzyme levels.

A study of 50 cystic fibrosis (CF) patients hospitalized for acute pulmonary exacerbation who were randomized to receive either conventional chest physiotherapy or high-frequency chest compression (HFCC) reveals significant improvements in pulmonary function and clinical status in both groups and no significant differences between the two. The authors speculate that HFCC may provide an adequate alternative in management of patients with CF in a hospital setting.


A study of three different chest physiotherapy regimens-postural drainage, positive expiratory pressure, and high-frequency chest compression-administered to 16 cystic fibrosis patients hospitalized for acute pulmonary exacerbation of their disease shows no significant differences in short-term efficacy among the three regimens.


A controlled comparison of conventional chest physiotherapy and The Vest™ treatments in ten adult cystic fibrosis patients hospitalized for infectious exacerbations resulted in comparable spirometry measurement results and oxygen saturation effects, but expectorated secretions were greater following Vest treatments. The authors speculate that the advantage of The Vest™ may be due to its simultaneous treatment of numerous affected sites and/or to a beneficial effect of high-frequency chest compression on peripheral mucus clearance.


This article presents a case study of one patient with cystic fibrosis who used The Vest™ with positive results, including enhanced mucociliary clearance and stabilized pulmonary function.


This prospective study compares manual chest physiotherapy (mCPT), intrapulmonary percussive ventilation (IPV), and high-frequency chest wall oscillation (HFCWO) via The Vest™ in patients with CF. Wet and dry weights of collected sputum were evaluated, with no significant difference found among the dry weights of sputum collected by the three methods. The authors suggest that HFCWO and IPV are as effective as vigorous professionally-delivered mCPT and might be reasonable substitutes for mCPT during pulmonary exacerbations of CF.


This retrospective study evaluates the change in lung function before and after initiation of Vest therapy in 40 children with cystic fibrosis. Adherence to Vest therapy is reported at 68.1% over a 22-month period. Although there was no significant change in FEV₁ after initiation of Vest therapy, declining trends in FEV₁ tended to revert to positive trends after one year.


This abstract reports on The Vest™ use by 27 patients in one cystic fibrosis clinic who were prescribed The Vest™ Model 102. Fifty-eight percent of those patients were using their Vests one hour or less per week. During the first three months, the majority of patients' average use per day was very stable, suggesting that early use habits are a strong predictor of future compliance.

This is a preliminary report on a project designed to use objective data gathered from the usage monitor on The Vest™ to monitor adherence and improve patient education. Patients also completed subjective ratings of health status and satisfaction with method of chest therapy. Researchers are using the data to work with patients to overcome barriers to therapy and find ways of increasing therapy adherence.


In the study of 41 cystic fibrosis (CF) patients using either manual chest physiotherapy (CPT) or high-frequency chest wall oscillation (HFCWO), changes in weight and number of hospital days were measured retrospectively over a 3-year period. The study demonstrated no appreciable difference in pulmonary function or number of hospital days between the two groups, but a significant (p=0.0001) improvement in weight gain in the group using HFCWO.


A 32-year old male hospitalized with end-stage cystic fibrosis was placed on The Vest™ after showing no improvement in sputum mobilization after receiving manual CPT for 26 days. Results of Vest initiation included copious sputum production, improved pulmonary function test results, and a subjective sense of feeling better. The patient was able to be discharged on day 30.


A comparative study of standard chest physiotherapy and high-frequency chest wall oscillation (HFCWO) in a group of stable cystic fibrosis (CF) patients resulted in significantly more sputum expectorated, determined by both wet and dry weights, as a result of HFCWO. This study suggests that HFCWO is at least as effective as manual CPT in clearing secretions from the airways in patients with CF.


This prospective study evaluates Vest adherence and quality of life in patients (ages 7-23) with mild to moderate cystic fibrosis. All subjects were enrolled in the standard Outcomes Monitoring Program offered by Advanced Respiratory. Adherence to Vest therapy was 48±28% for study participants and 49±30% for a group of age-comparable patients who received the standard Outcomes Monitoring program by the company but were not enrolled in the study. Since no significant difference in percent adherence was seen between the study group and the control group, researchers suggest that study participation does not affect therapy adherence behavior.


This prospective study evaluates adherence to Vest therapy and adherence predictors in 28 subjects (ages 7-23) with cystic fibrosis. Adherence was measured using the hour meter on the device. Six-month adherence in this population was 43±27%. Increased age as well as poorer nutrition, pulmonary function status, and perceived quality of life were associated with poor adherence to airway clearance therapy.

Oermann CM, Accurso F, Castile R, Sockrider MM. Evaluation of the safety, efficacy and impact on quality of life of the ThAIRapy Vest and Flutter® compared to conventional chest physical

This multicenter, randomized, cross-over study of 24 cystic fibrosis patients was designed to compare the efficacy, safety and patient acceptance of manual chest physiotherapy (CPT), The Vest, and the Flutter® valve. Results indicate that the three therapy modalities are comparably efficacious with no significant differences emerging in PFT scores. NIH scores, which evaluate disease severity and predict prognosis, improved from baseline with the use of The Vest™. Given a choice among modalities, 50% of patients chose the ABI Vest, 37% chose the Flutter®, and 13% chose manual CPT.


This large, cross-sectional study evaluates results of a chest physiotherapy satisfaction questionnaire distributed among patients using postural drainage, percussion, and vibration (PDPV), the Flutter®, and the ABI Vest. Four domains were evaluated: efficacy, convenience, comfort, and general satisfaction. Results suggest that the CPT satisfaction questionnaire is reliable and valid. Disease severity positively correlated with CPT compliance. Significant differences in patient satisfaction were shown among therapies.


A study of the effects on pulmonary function of high-frequency chest wall oscillation delivered by The Vest™ during a three-month period shows no significant improvement or deterioration of lung function while using The Vest, but that the device did increase feelings of independence, enhanced breathing techniques and allowed patients to increase therapy by themselves.


A study comparing the effects of high-frequency oral airway oscillation, high-frequency chest wall oscillation, and conventional chest physical therapy finds no significant differences among the modalities with respect to weight of expectorated sputum, effect on pulmonary function, or effect on oxygen saturation. All therapies were tolerated well. Researchers suggest that the two self-administered modalities (high-frequency oscillation of the oral airway and of the chest wall) have cost advantages.


A retrospective year-long study of the efficacy of high-frequency chest wall oscillation (HFCWO) vs. manual chest physical therapy (CPT) in a large group of cystic fibrosis (CF) patients yielded no statistically significant difference between the groups in terms of measured pulmonary function values (FVC, FEV₁, PEF, FEF, sGAW, and RV/TLC). There was a statistically significant improvement (p=0.0049) in the Brasfield chest X-ray score in the group using HFCWO. Investigators concluded that HFCWO is an acceptable long-term alternative to CPT for airway clearance in individuals with CF.


In an effort to evaluate the efficacy of and overall patient satisfaction with three airway clearance modalities, investigators designed a randomized, cross-over study of 24 cystic fibrosis (CF) patients hospitalized with acute exacerbations. The modalities evaluated were postural drainage and
percussion (PD&P), intrapulmonary percussive ventilation (IPV), and high-frequency chest compression (HFCC). Efficacy of the modalities was determined by wet and dry sputum weights. Patient satisfaction was determined by the results of a questionnaire. Investigators concluded that HFCC and IPV were at least as effective as PD&P for mucus clearance in hospitalized CF patients and that there was no significant difference in patient preference between the three modalities. Based on their findings, the investigators suggest that patients be allowed to experience each modality and choose based on individual preference.


In this retrospective analysis of the pulmonary function of 16 patients with cystic fibrosis, the authors evaluate the regression line slopes for percent predicted forced vital capacity (FVC) and forced expiratory volume in one second (FEV$_1$). Ninety-four percent of the patients' regression line slopes became more positive during self-administered high-frequency chest compression (HFCC) therapy as compared to slopes before HFCC therapy, when manual chest physical therapy was used.


A study of the long-term effects of high-frequency chest compression (HFCC) on cystic fibrosis patients over a thirty-month period shows that, in those exposed to HFCC, as a group there was less decline in FEF25-75%, and, in males, there was an improvement in FEV$_1$ and FEF25-75%.

**Mechanism of Action for Mucus Clearance**


This study evaluates the effects of high-frequency oscillations on the breakdown of high-molecular-weight DNA in cystic fibrosis (CF) sputum samples. Results suggest that high-frequency oscillations are capable of breaking down DNA to levels comparable to those obtained through rhDNAse treatment. Authors estimate reduction in intact DNA to be approximately 15% after 30 minutes of treatment.

**Respiratory System Mechanics, Effects on**

Fink JB, Fahey PJ. A comparison of common bronchial hygiene devices and their effects on esophageal pressure. *Chest* 1998;114(4):293S.

This study evaluates the effect of various bronchial hygiene techniques (Flutter, Vest, Hayek, EPAP, PEP) on airway and esophageal pressures in normal subjects. Each device generated considerably different flow and pressure fluctuations in both frequency and magnitude at the airway. Significant differences in esophageal patterns were also demonstrated. These differences in the mechanical effects were evident inside and outside the same general functional category of the device.


A comparative, blinded and randomized physiological study of ten normal volunteers and 11 clinically stable cystic fibrosis (CF) patients, designed to measure the short-term effects of high-frequency chest compression (HFCC) in both populations, shows that CF patients with moderate or severe airway obstruction may gain maximal benefit from HFCC therapy when low vest pressure is used at an oscillation frequency of 10-15 Hz. The lowest Vest pressure minimized the decrease in end-expiratory lung volume and a frequency of 10-15 Hz maximized oscillating flow.