

SUMMARY OF STUDIES PUBLISHED FEATURING THE LIFE PULSE HIGH-FREQUENCY VENTILATOR

Use of High-Frequency Jet Ventilation in Neonates with Hypoxemia Refractory to High-Frequency Oscillatory Ventilation

**Friedlich P, Subramanian N, Sebald M, Noori S, and Seri I.
J Matern Fetal Neonatal Med 2003; 13(6):398-402**

"High-frequency jet ventilation improves hypoxemic respiratory failure unresponsive to high-frequency oscillatory ventilation in infants. These findings suggest that not all high-frequency ventilatory devices yield the same clinical results."

Setting Positive End-Expiratory Pressure During Jet Ventilation to Replicate the Mean Airway Pressure of Oscillatory Ventilation

**Bass A, Gentile M, Heinz J, Craig D, Hamel D, and Cheifetz I
Respir Care 2007; 52(1):50-55**

"HFJV is an accurate monitor during HFOV. These measurements can be used to calculate the predicted PEEP necessary to match mean airway pressure on the two ventilators. Replicating the mean airway pressure with adequate PEEP on HFJV may help simplify transitioning between (the two) ventilators when clinically indicated."

Comparison of High-Frequency Oscillatory Ventilation and High-Frequency Jet Ventilation in Cats with Normal Lungs

**Boros S, Mammel M, Coleman J, et al.
Pediatric Pulmonology 1989; 7:35-41**

"Following the change from HFOV to HFJV at similar proximal airway pressures, HFJV always produced higher pH values, higher PaCO₂ values, lower PaCO₂ values, as well as higher cardiac outputs, lower pulmonary artery pressures, and lower pulmonary vascular resistances. Following the reciprocal crossover, from HFJV to HFOV, HFJV pH values were again higher, and PaCO₂ values were again lower. A comparison of HFOV and HFJV at similar pH and PaCO₂ values showed HFOV consistently required higher peak inspiratory pressure, and higher pressure wave amplitudes. Under the circumstances of this study, HFJV produced better gas exchange at lower proximal airway pressures."

High-Frequency Jet Ventilation Improves Gas Exchange in Extremely Immature Infants with Evolving Chronic Lung Disease

Plavka R, Dokoupilova' M, Pazderova' L, Kopecky P, Sebron V, Zapadlo M, and Keszler M. Am J Perinatol 2006; 23:467-472

"Compared with conventional ventilation and high-frequency ventilation, HFJV used with an optimal lung volume strategy appears to improve gas exchange and may facilitate weaning from mechanical ventilation in extremely immature infants with evolving CLD."

Multicenter Controlled Clinical Trial of High Frequency Jet Ventilation in Preterm Infants with Uncomplicated Respiratory Distress Syndrome

**Keszler M, Modanlou H, Brudno D, et al.
Pediatrics 1997; 100(4):593 599**

"HFJV reduces the incidence of BPD at 36 wk. and the need for home oxygen in premature infants with uncomplicated RDS . . . There is no increase in adverse outcomes when compared to CV. The optimal volume strategy improves oxygenation, decreases exposure to hypocarbia and reduces the risk of grade 3-4 IVH and/or PVL."

Controlled Prospective Randomized Comparison of High-Frequency Jet Ventilation and Conventional Ventilation in Neonates with Respiratory Failure and Persistent Pulmonary Hypertension

**Engle W, Yoder M, Andreoli S, et al.
Journal of Perinatology 1997; 17(1):3-9**

"High-frequency jet ventilation acutely improves oxygenation and ventilation without significantly increasing morbidity. Therefore high-frequency jet ventilation may be a useful adjunct for stabilization of the conditions of neonates with severe pulmonary hypertension."

Multicenter Controlled Trial Comparing High Frequency Jet Ventilation and Conventional Ventilation in Newborn Infants with Pulmonary Interstitial Emphysema

**Keszler M, Donn S, Bucciarelli R, et al.
Journal of Pediatrics 1991; 119(1):85-93**

"Therapy with HFJV resulted in improved ventilation at lower peak and mean airway pressures, as well as more rapid radiographic improvement of PIE, in comparison with CV. . .the survival rate was 64.9% for HFJV, compared with 47.1% for CV ($p < 0.05$). . .We conclude that HFJV, as used in this study, is safe and is more effective than rapid rate CV in the treatment of newborn infants with PIE."

Safety and Efficacy of High-Frequency Jet Ventilation in Neonatal Transport

**Mainali E, Greene C, Rozycki H, and Gutcher G
J Perinatol 2007; 27:609-613**

"Independent of the use of inhaled nitric oxide, high-frequency jet ventilation appears to provide better ventilation than conventional mechanical ventilation and is safe to transport pre-ECMO neonates."

**Ventilatory Response to Combined High Frequency Jet Ventilation
and Conventional Mechanical Ventilation for the Rescue Treatment of
Severe Neonatal Lung Disease**

**Spitzer A, Butler S, and Fox W.
Pediatric Pulmonology 1989; 7:244-250**

"This study suggests that HFJV provides improved oxygenation and ventilation of infants at lower mean and peak pressures compared to conventional mechanical ventilation. HFJV combined with CMV may be a valuable adjunct to therapy in infants with severe lung disease."

**High-Frequency Jet Ventilation in Children with Adult Respiratory
Distress Syndrome Complicated by Pulmonary Barotrauma**

**Smith D, Frankel L, Derish M, et al.
Pediatric Pulmonology 1993; 15:279-286**

"Survivors had significantly less time on CV prior to HFJV than non-survivors, with a mean of 3.7 days vs 9.6 days, respectively. Survivors underwent an average of 4.4 days of HFJV, which supported adequate gas exchange with lower airway pressures, and produced resolution or significant improvement in airleak on chest radiograph . . . we speculate that the application of HFJV early in the course of severe hypoxemic respiratory failure complicated by airleak, allows the reduction of airway pressures, thereby minimizing pulmonary barotrauma and allowing the lung to recover from underlying insult."

**High Frequency Jet Ventilation for Respiratory Failure After
Congenital Heart Surgery**

**Kocis K, Meliones J, Dekeon M. et al.
Circulation 1992; 86(5):Suppl II127 II132**

"This study suggests that HFJV improves ventilation and is an alternative to ECMO in patients with respiratory failure after surgery for congenital heart disease."

High-Frequency Jet Ventilation Improves Cardiac Function After the Fontan Procedure

**Meliones J, Bove E, Dekeon M, et al.
Circulation 1991; 84 [suppl III]:III-364-III-368**

"High-frequency jet ventilation (HFJV) is an alternate form of mechanical ventilation which supports gas exchange at mean lower pressure. This study was done to determine if HFJV could lower mean airway pressure and pulmonary vascular resistance and result in an increase in cardiac output after the Fontan procedure . . . HFJV resulted in a 50% reduction in mean airway pressure, a 59% reduction in pulmonary vascular resistance, and a 25% increase in cardiac index. These data demonstrate that HFJV favorably affects ventilatory and hemodynamic parameters and may be a preferable means of ventilation in patients after the Fontan procedure."

High Frequency Jet Versus Conventional Ventilation in Infants Undergoing Blalock Taussig Shunts

**Davis D, Russo P, Greenspan J, Speziali G, and Spitzer A
Ann Thorac Surg 1994; 57/4:846-849**

"Lung movement and degree of retraction necessary for surgical exposure as evaluated by an independent observer was less with HFJV compared with CV. Compared with CV during the creation of Blalock Taussig shunts, HFJV provides better gas exchange at lower mean airway pressure with similar lung function, lung volume, and hemodynamics."

High-Frequency Jet Ventilation: Intraoperative Application in Infants

**Greenspan J, Davis D, Pierantonio R, et al.
Pediatric Pulmonology 1994; 17:155-160**

"The surgical team observed a diminished need for lung manipulation and improved ease of access to the surgical field with HFJV. These results indicate that the use of HFJV during closed-heart cardiac surgical procedures in infants provides similar cardiopulmonary stability and some potentially important clinical benefits when compared with CV."

Diagnosis Related Criteria in the Consideration of Extracorporeal Membrane Oxygenation in Neonates Previously Treated with High-Frequency Jet Ventilation

**Baumgart S, Hirschl R, Butler S, et al.
Pediatrics 1992; 89:491-494**

"From these results, it appears that neonates with severe intractable respiratory distress and/or air leak are most likely to respond favorably within 6 hours of starting HFJV."

High-Frequency Jet Ventilation and Surfactant Treatment of Newborns with Severe Respiratory Failure

**Davis J, Richter S, Kendig J, et al.
Pediatric Pulmonology 1992; 13:108-112**

"Study infants had failed surfactant and conventional ventilation prior to the start of HFJV. Exogenous surfactant and HFJV resulted in significant improvement in several respiratory variables. Twenty-five of the 28 patients studied survived (89%). No patients received ECMO or were discharged home on oxygen. The results of this pilot study suggest that a combination of HFJV and calf lung surfactant extract may be effective in treating infants with more severe respiratory failure, and indicated the need for more extensive controlled investigations."

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