Adams JA, Mangino MJ, Bassuk J, Inman DM, Sackner MA. Noninvasive motion ventilation (NIMV): a novel approach to ventilatory support. J Appl Physiol. 2000 Dec;89(6):2438-46.

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A motion platform was developed that oscillates an animal in a foot-to-head direction (z-plane). The platform varies the frequency and intensity of acceleration, imparting periodic sinusoidal inertial forces (pG(z)) to the body. The aim of the study was to characterize ventilation produced by the noninvasive motion ventilator (NIMV) in animals with healthy and diseased lungs. Incremental increases in pG(z) (acceleration) with the frequency held constant (f = 4 Hz) produced almost linear increases in minute ventilation (VE). Frequencies of 2-4 Hz produced the greatest VE and tidal volume (VT) for any given acceleration between +/-0.2 and +/-0.8 G. Increasing the force due to acceleration produced proportional increases in both transpulmonary and transdiaphragmatic pressures. Increasing transpulmonary pressure by increasing pG(z) produced linear increases in VT, similar to spontaneous breathing. NIMV reversed deliberately induced hypoventilation and normalized the changes in arterial blood gases induced by meconium aspiration. In conclusion, a novel motion platform is described that imparts periodic sinusoidal acceleration forces at moderate frequencies (4 Hz) to the whole body in the z-plane. These forces, when properly adjusted, are capable of highly effective ventilation of normal and diseased lungs. Such noninvasive ventilation is accomplished at airway pressures equivalent to atmospheric or continuous positive airway pressure, with acceleration forces less than +/-1 G(z).