

FREQUENCER[®]

An Effective & Consistent Therapy for Everyone



Acoustic
Airway
Clearance
Treatment

What is the Frequencer?

The Frequencer® provides airway clearance therapy and promotes bronchial drainage in an innovative way, using acoustics, acting on both the lungs and on the mucus. This form of chest physiotherapy provides a convenient and non-invasive alternative to harsh and painful percussive and shaking techniques. The ability of sound waves to easily travel through the chest, enables the Frequencer® to use minimal external thorax manipulation, allowing the treatment to be indicated for all patients, from neonates to elderly adults, with respiratory ailments. The Frequencer® uses low frequency sound waves that match the resonance frequency of the lungs. This causes the lungs to vibrate and the viscosity of mucus to decrease, making the Frequencer® an ideal solution for any patient requiring help with airway clearance, getting the mucus up and out of the lungs.

Why the Frequencer® works

1. The Frequencer® Uses Sound Waves

Sound waves can easily travel through the body, penetrating the lungs reaching the entire lung. Mechanical waves cause strong surface effects, but diminish rapidly with distance travelled into the chest, while acoustical waves are weaker on the surface, but diminish little with distance.¹

2. The Frequencer® Matches the Lung Resonance Frequency

The Frequencer® can be adjusted to match the resonance frequency of an individual's lungs. In 2002, U.S. Department of Commerce and US Navy study found that the human lung resonance frequency is around 37 to 42 Hz.²

3. The Frequencer® Changes the Viscosity of the Mucus

In a study published in 2019 conducted by Dr. Boffito it was concluded that sound waves at 40 Hz change the viscosity of mucus, making it more liquid and easier to expectorate.³



(1) Transmission d'une onde à l'interface paroi thoracique-poumon, page 98. Quentin Grimal L'UNIVERSITE PARIS XII — VAL DE MARNE, novembre 2003.

(2) Report of the Workshop on Acoustic Resonance as a Source of Tissue Trauma in Cetaceans. April 24 and 25, 2002, Silver Spring, MD.

(3) Schieppati, Dalma, et al. "Influence of Frequency and Amplitude on the Mucus Viscoelasticity of the Novel Mechano-Acoustic Frequencer™." Respiratory Medicine, U.S. National Library of Medicine, July 2019.

An innovative solution for improved treatment delivery

1. Uses Acoustics

- Sound waves penetrate the chest wall more easily than do mechanical waves, due to their ability to propagate through water and air mediums. It takes 1.9N of force to seal the Frequencer® transducer onto the chest, opposed to the 58N involved in clapping.⁴
- The Frequencer® was proven to be as **effective** as clapping.⁴
- The minimal external force needed for the treatment increases patient compliance to and makes it a **gentle** alternative for patients of all ages and physical conditions.⁵
- The use of acoustics allows for a **targeted** treatment via the Frequencer® transducer. Treatment can be concentrated in areas most affected for longer periods of time than in areas less affected.
- Allows for **multiple treatments** per day.
- The Frequencer® is **non-invasive** allowing for it to be combined with other treatments and to continue uninterrupted when the patient coughs.



2. Effective and Consistent Treatment

- Dr. Boffito's study found that the optimal frequency for mucus rehydration was **40 Hz**. The Frequencer® is designed to provide the right treatment to every patient and is the only one that provides the capability of matching the human lung resonance frequency and optimal mucus rehydration frequency of 40 Hz.
- The delivery of the treatment is always **consistent** and does not depend on who is providing the treatment, on the patient's breathing technique or on the caregiver's technique.

3. Safe for numerous Patient Populations

- Can be used in **several departments**: ICU, NICU, PICU, Lung Transplant, CF, COPD without contraindication.
- Can be used **safely** on patients who cannot be moved or have special physical conditions (paraplegic, obese, frail, feeding tube, ventilated, etc.)
- The use of adaptors optimizes treatment delivery and **protects** the patients.

4. Easy to Use and Simple to learn

- The Frequencer® is **easy** to use and does not require complicated training.
- Patients can use the Frequencer® **autonomously**.



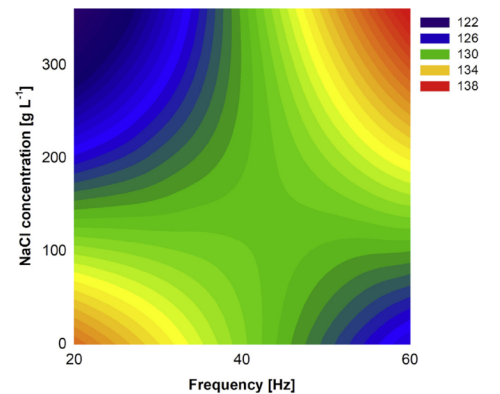
(4) Clin Invest Med. 2006 Jun;29(3): 159 - 165. Mechanical airway clearance using the frequencer electro-acoustical transducer in cystic fibrosis. Cantin AM1, Bacon M, Berthiaume Y.

(5) Theodore S. Vallejos, et al. "Evaluation of Sputum Production With the Use of The Frequencer with Adult Cystic Fibrosis Patients." The Science Journal of the American Association of Respiratory Care". 2010 Open Forum Abstracts. [Abstract]

Latest Study

The optimal frequency is 40 Hz

In individuals with respiratory ailments, mucus tends to be much more viscous than in healthy individuals, making it sticky and hard to expectorate, often resulting in infection and even hospitalisation. Dr. Boffito conducted a study to understand how the mucus rheology and hydration changed depending on the frequency and intensity of the acoustic waves delivered to mucus samples. The optimal frequency for mucus rehydration was found to be 40 Hz, regardless of the intensity of treatment selected and of NaCl concentration.



Basic Knowledge of acoustics

Acoustics

Infrasound covers sounds below 12 Hz down to 0.001 Hz

Sound is within the range of human hearing which is normally limited to frequencies between 12 Hz and 20,000 Hz. The Frequencer operates at frequencies between 20-65 Hz.

Ultrasound covers frequencies greater than the upper limit of human hearing. The most well known application is its use in sonography and echography. Muscles, tendons, breast and neonatal brain are imaged at frequencies in the millions of Hz.



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