

## Medical Applications

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### A specific therapy for the respiratory muscle system.

The respiratory process is complex and of crucial importance to life itself. Several systems have to act as one and function flawlessly to ensure its main purpose: the replacement of carbon dioxide by oxygen in the blood. Malfunction is a substantial risk. Many illnesses and health problems can negatively impact the respiratory system. One of the main problem areas is the respiratory musculature, the very "engine" of this process



#### Area of Use

Lung diseases often lead to an overstraining of the inspiratory muscles<sup>[1,2]</sup>. Possible causes are an excessive load on the respiratory muscles (e.g. because of bronchial obstruction), reduction in respiratory strength (e.g. in connection with lung hyperinflation, thorax deformities and drug intake) or neuromuscular disorders<sup>[2]</sup>.

Expiration is largely passive, thus less vulnerable. Still here too respiratory muscle weakness or obstructions can suddenly make an optimal performance of the expiratory muscles (e.g. sputum clearance) absolutely essential.

The respiratory "pump" mainly exists of skeletal muscles. Therefore endurance, coordination, strength and velocity can be explicitly targeted and exercised<sup>[3,4]</sup>.

STMedical therapy both treats muscle weakness and addresses overall deficits in upper body stability. Moreover it avoids stress to the cardiovascular system as it can be applied at rest. It therefore is also suitable for patients with restricted mobility.

STMedical is indicated as a complementary therapeutic measure for:

#### **Pneumology:**

**COPD** (improvement of physical fitness, quality of life and lung function)<sup>[5]</sup>

**Cystic Fibrosis** (increased lung function and sputum clearance)<sup>[6]</sup>

**Snoring** (reduction of snoring incidence and strengthening of the palate muscles)<sup>[7]</sup>

#### **Sleep Apnea, Asthma**



#### **Rheumatology:**

Whiplash, Chronic neck and back complaints

#### **Facts**

- Significantly improves quality of life in lung patients
- Reduces acute shortness of breath and breathing difficulties
- Alleviates back and neck complaints by increasing trunk stability
- Helps against snoring and sleep apnea
- Can be applied individually, either in stationary care or at home.

#### **Neurology:**

**Spinal Cord Injuries** (reduction of respiratory complications, improved physical fitness, improved respiratory endurance and lung function)<sup>[8,9,10,11]</sup>

**Myasthenia Gravis** (improved respiratory endurance, quality of life and breathing economy)<sup>[12]</sup>

#### **Cardiology:**

**Chronic Heart Failure** (reduced dyspnea at rest and under exertion, improved respiratory endurance and physical fitness)<sup>[13]</sup>

Pre-operative respiratory therapy

#### **Various:**

**Obesity** (lower incidence of dyspnea at rest and under exertion, improved quality of life, physical fitness and lung function)<sup>[14]</sup>

Deconditioning, Retraining after sporting trauma



### Development and Operation

Worldwide STMedical is the only mobile respiratory therapy device based on enforced breathing with monitored CO<sub>2</sub> re-inhalation (isocapnic hyperpnea). Thus it closely imitates and reflects the body's own overall respiratory process. It focuses on endurance and coordination of the respiratory muscles, but, dependent on the settings, can also train their strength, mobility and velocity.

STMedical was developed in the last decade of the 20th century as the result of a cooperation between the Swiss Federal Institute of Technology in Zurich (ETHZ) and the Interstate College of Engineering in Buchs (NTB). It has been subject to continuing research and improvement ever since.

The STMedical system consists of a base station, a handheld device, air leading tubes and a breathing bag.

Therapeutic targets are set based on medical standards such as vital capacity (VC) and maximal voluntary ventilation (MVV). They are entered into the base station. This then determines respiratory frequency and monitoring parameters.

Thanks to its broad range, therapy can be completely user specific. During the session both depth and respiratory frequency are monitored. Deviations immediately result in acoustic and visual warnings.

The valve technology used, the breathing bag and the monitoring system, if properly applied, avoid all risk of hyper- or hypoventilation.

### Use

STMedical therapy requires a certain amount of coordination and therefore needs some practice. Therefore first instructions are best performed by medically qualified professionals. But after a short familiarization the device can effectively be applied individually, either in stationary care or at home.

Standard usage recommendations derive from a wealth of scientific and practical data, but should be fine tuned to each patient. Usually one should strive for 3 to 5 weekly exercises of 15 to 30 minutes each. But this requires a phased approach and a gradual progression, based on the individual situation. Regular usage is a key to success.



*For further information on the device or the therapeutic method, please contact the address below.*

### References

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