BREATHING+

Pursed Lip Breathing
Respiratory Training Device
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1 BASIC INFORMATION

1.1 Breathing mechanics

- Slow breathing is an indicator of one’s health and generally shows a relaxed state, while fast and intensive breathing shows distress, panic, fear or hostility.
- Most people breathe shallow and fast - keeping air trapped inside, not allowing for new air to enter the lungs. Breath holding, mouth breathing, and over-breathing are commonly observed in modern society.
- In people with asthma or COPD airways sometimes collapse making it even more difficult to breathe. Such a collapse can be prevented by exhaling against the resistance of pursed lips, a technique commonly known as “Pursed Lip Breathing”.
- Breathing is the only autonomous function that we can control consciously, therefore it provides a way to control our autonomous body processes such as heart rate, digestion and endocrine glands.
- Breathing affects heart rate in such a way that each inhalation speeds up the heart, while each exhalation slows it down, this phenomena is observed as “Heart Rate Variability” and is commonly explained as “Respiratory Sinus Arrhythmia”.
- When exposed to stress, humans inhale air in order to prepare for a “fight or flight” activity. It speeds up heart rate and it starts secretion of stress hormones.
- People who breathe quickly or rapidly often overeat. Breathing more slowly reduces your appetite. making exhalations longer is also known to improve digestion and is being used as a “Long Breath Diet” in Japan and many other countries.

1.2 Breathing exercises

Breathing exercises are most often practiced to treat asthma and COPD as they improve breathing muscle functions, reduce breathlessness and ease breathing. In asthma and COPD, reduced breathing exercises are being prescribed either in the form of prolonged exhalation through pursed lips (Pursed Lip Breathing) or in the form of prolonged pause after exhalation, such as the Buteyko method, and some alternative techniques such as alternative nasal breathing.

Slower breathing has been effectively used to treat hypertension and elevated blood pressure resulting in lower blood pressure and lower consumption of drugs. The effects are explained as a behavioral change towards a slower breathing resulting in better heart function and increased heart rate variability. Drugs used to treat hypertension include diuretics, beta blockers, calcium channel blockers, and angiotensin converting enzyme (ACE) inhibitors.

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Additionally breathing exercises have shown positive effects in treating stress and anxiety related disorders. In general humans respond to stress in a so-called *fight-or-flight* response by raising their sympathetic nervous system. It increases breathing frequency, heart rate and cardiac ejection force consequently raising blood pressure. Simultaneously secretion of stress hormones starts (*cortisol*, *glucagon*, *catecholamines*, *growth hormone*, *antidiuretic hormone*), thus digestion slows down and the activity of cognitive functions is increased. Parasympathetic tone, which is achieved by slow breathing works *vice versa*, the body relaxes, peripheral vascular blood flow occurs due to the release of nitric oxide and the heart slows down. Frequent or constant activity of the sympathetic tone imposes a lasting impact in the form of high blood pressure, disturbed digestion, and stomach ulcers.

1.3 Pursed Lip Breathing

Pursed Lip Breathing (PLB) is described in the American Thoracic Society guidelines as involving ‘a nasal inspiration followed by expiratory blowing against partially closed lips, avoiding forceful exhalation’. PLB reduces breathing rate, helps make exhalation more efficient, reduces dyspnoea (shortness of breath), and improves cellular oxygenation. is a breathing technique that aims to make exhalations longer and more efficient helps people cope with asthma, COPD, emphysema, and stress related disorders. PLB is gaining recognition in medical community since mid 60s when its positive effects had been first observed. Today there are over 2000 articles indexed in google scholar, pubmed and similar medical databases describing its clinical benefits. According to Cleveland Clinic¹, its effects as are:

- Improves ventilation
- Releases trapped air in the lungs
- Keeps the airways open longer and decreases the work of breathing
- Prolongs exhalation to slow the breathing rate
- Improves breathing patterns by moving old air out of the lungs
- Relieves shortness of breath
- Causes general relaxation

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¹ "Pursed Lip Breathing - Cleveland Clinic." 2014. 9 Apr. 2015
2 BREATHING PROBLEMS

2.1 Shortness of breath

Difficulty in breathing (also known as shortness of breath, breathlessness, or dyspnea) is caused by inefficient breathing. In one’s lifetime, one may experience rare episodes of shortness of breath as part of high levels of activity like exhaustive exertion, or during environmental conditions such as high altitude or very warm or cold temperatures. Other than these extreme conditions, shortness of breath is commonly a sign of a medical problem. One of the causes of difficulty in breathing are also lung problems, such as; asthma, bronchitis, tuberculosis, COPD and emphysema. These problems can be treated with medical help and also breathing exercises such as Pursed Lip Breathing.2

2.2 Asthma and COPD

Asthma is most common chronic disease among children, and affects more than 253 million people around the world. It has to be treated with appropriate management and pursed lip breathing is most often practiced to treat asthma and COPD as it makes breathing more efficient, improves oxygenation and reduces breathing rate3. Additionally Pursed Lip Breathing is recommended during an asthma attack.4

2.3 Emphysema

In emphysema the alveoli and lung tissue are destroyed - with this damage, the alveoli cannot support the bronchial tubes. Consequently the airway collapses which causes an “obstruction” (a blockage), which traps air inside the lungs. Too much air trapped in the lungs can give some patients a barrel-chested appearance. Pursed Lip Breathing helps emphysema sufferers exhale more efficiently and teaches them to prevent airway collapse by maintaining a positive pressure inside airways5.

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2.4 Stress and Anxiety

Anxiety is the psychophysiologic signal that the stress response has been initiated. The stress response by-product, stress, is difficult to define. The response has multiple dimensions that have yielded research with many foci. Most salient to nursing are investigations of psychobiological variables, the influence of life events, and the interactional model of the stress response. The stress response can be viewed as an interactional process that causes psychophysiologic reactions that are immediate and can occur up to and including physiologic events 3 weeks after confrontation with the stressor. Pursed lip breathing helps in coping with stress and anxiety related disorders. It can be used as a 10-20 minutes daily systematic respiratory exercise to train breathing in complex with other rehabilitative activities.

2.5 Pulmonary Rehabilitation

Pulmonary rehabilitation has become a standard of care for patients with chronic lung diseases. There is substantial new evidence that pulmonary rehabilitation is beneficial for patients with COPD and other chronic lung diseases. Several areas of research provide opportunities for future research that can advance the field and make rehabilitative treatment available to many more eligible patients in need. Pursed Lip Breathing should be applied several times through the day to avoid pulmonary complications, such as atelectasis, pneumonia, respiratory failure, sputum retention and shortness of breath. It also provides resistance on expiration and aims to improve lung volumes and to facilitate secretion mobilization.

2.6 Attention Deficit Disorder

Attention deficit hyperactivity disorder (ADHD, also know as just plain attention deficit disorder or ADD) does not show physical signs that can be detected by a blood or other lab test. Typical ADHD symptoms can often overlap — or even mimic — those of other physical and psychological disorders. The causes remain unknown, but ADHD can be diagnosed and effectively treated. Many resources are available to support families in managing ADHD behaviors when they occur. ADHD usually appears first in childhood, but

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can also now be diagnosed in adults (as long as some symptoms were present in the individual's childhood, but simply never diagnosed).\textsuperscript{11}

2.7 Speech Disorders

Speech disorders or speech impediments are a type of communication disorder where 'normal' speech is disrupted. This can mean stuttering, lisps, etc. Someone who is unable to speak due to a speech disorder is considered mute. In many cases the cause is unknown. However, there are various known causes of speech impediments, such as "hearing loss, neurological disorders, brain injury, intellectual disability, drug abuse, physical impairments such as Cleft lip and palate, and vocal abuse or misuse." Many of these types of disorders can be treated by speech therapy, but others require medical attention by a doctor in phoniatrics. Other treatments include correction of organic conditions and psychotherapy.\textsuperscript{12,13}

\textsuperscript{11} "Attention Deficit Disorder (ADD and ADHD) - Psych Central." 2004. 9 Apr. 2015
\textsuperscript{12} "Speech and Language Disorders and Diseases." 2003. 9 Apr. 2015
\textsuperscript{13} "Speech disorder - Wikipedia, the free encyclopedia." 2003. 9 Apr. 2015

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3 TREATMENT AND PREVENTION

3.1 Breathing Exercises

Poor breathing, either induced by asthma, stress or lack of exercise affects us. Lack of oxygen in the blood makes us feeling unfocused. Inefficient breathing is also wasteful in terms of energy consumption and thus we feel tired. We go for a gym or walk to get few breaths out but either than that we just feel sort of down through the day. It is crucial for us to improve our breathing technique in order to achieve better health and better performance.

3.2 Technology Review

Technology for breathing exercises range in respiratory detection principles, biofeedback principles and its methods of operation (Table 1).
<table>
<thead>
<tr>
<th>Device</th>
<th>Respiratory DetectionSys</th>
<th>Description</th>
<th>Advantages and Disadvantages</th>
<th>Price range</th>
</tr>
</thead>
</table>
| RESPeRATE InterCure Ltd. | Mechanic principle expansion detection | -Non-drug therapy  
-Guidance system: visual  
-For the treatment of high blood pressure  
-Portable computerized device | ✓ Guidance provided  
✗ Does not require exhalation against pressure, therefore it is less beneficial | 100 USD - 500 USD |
| HFCWO Device Electromed | Mechanic principle expansion detection | -High Frequency Chest Wall Oscillation device  
- Guidance system: N/A  
-Positive pressure air pulses are applied to the chest wall | ✓ Therapy session lasts about 10 minutes  
✗ Not entertaining  
✗ Expensive | 7500 USD - 8000 USD |
| OHFO device          | Pneumatic principle (mouth to force air into device) | -Oral High Frequency Oscillation  
- Guidance system: N/A  
- Developed from the technique of frequency jet ventilation  
- Provides a practical and simple method supplementing breathing in conscious subjects | ✓ Used only in USA  
✗ Not entertaining  
✗ Unhygienic | N/A |
| IPV device Percussionaire Corp. | Pneumatic principle (mouth to force air into device) | -Intrapulmonary Percussive Ventilation  
- Guidance system: N/A  
- Utilizes high frequency  
- Combines aerosol inhalation and intrathoracic percussion applies via mouthpiece | ✓ Unhygienic  
✗ Not entertaining | N/A |
| Acapella by Smiths Med | Pneumatic principle (mouth to force air into device) | -Combines the benefits of both PEP therapy and airway vibrations  
- Guidance system: N/A  
- Improves clearance of secretions  
- Can accommodate virtually any patient lung capacity | ✓ Allows inhalation and exhalation without removing from mouth  
✗ Unhygienic  
✗ Not entertaining | 45 USD - 100 USD |
<p>| Cornet device by R. C. Gmbh &amp; Co. KG | Pneumatic principle (mouth to force air into device) | -Adapter with mouthpiece | ✓ Unhygienic | 50 USD - 100 USD |</p>
<table>
<thead>
<tr>
<th>Product</th>
<th>Pneumatic principle</th>
<th>Function</th>
<th>Guidance system</th>
<th>Additional Comments</th>
<th>Price Range</th>
</tr>
</thead>
</table>
| Flutter by Aptalis Pharma US, Inc.         | Pneumatic principle (using mouth to force air into device) | Mucus Clearance Device  
- Reduces unproductive cough  
- Increases the vital capacity  
- Provides PEP  
- Ability to vibrate the airways, intermittently increase endobronchial pressure, accelerate expiratory airflow  
- Changing inclinations makes higher or lower frequency | Audio           | Not entertaining  
Unhygienic  
For single patient use only                                                                 | 50 USD - 100 USD |
| Frolov breathing Dinamika Ltd., Russia    | Pneumatic principle (using mouth to force air into device) | A type of intermittent hypercaric hypoxic training  
- Guidance system: visual  
- Exposure to the short-term hypoxia state of oxygen deficiency  
- Cures asthma, pneumonia, tuberculosis  
- Helps with sports | Visual          | Unhygienic  
Not entertaining                                                                 | 50 USD - 100 USD |
| Powerlung by PowerLung Inc.               | Pneumatic principle (using mouth to force air into device) | Strength training techniques  
- Guidance system: N/A  
- Expanding lung capacity  
- Different models | N/A             | Unhygienic  
Not entertaining                                                                 | 120-140 USD   |
| Spiro-Ball by Leventon, Barcelona (Werfen Group Corporation) | Pneumatic principle (using mouth to force air into device) | Volumetric/Spirometric Exerciser  
- Guidance system: visual  
- Shows inspiratory volume | Visual          | Easy usage  
Unhygienic  
Not entertaining                                                                 | 20-50 USD     |
| Three-ball by Leventon, Barcelona (Werfen Group Corporation) | Pneumatic principle (using mouth to force air into device) | Restores and maintains lung capacity  
- Guidance system: visual | Visual          | Easy usage  
Unhygienic                                                                 | 15 USD - 30 USD |

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<table>
<thead>
<tr>
<th>Device</th>
<th>Principle</th>
<th>Features</th>
<th>Pricing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold PEEP/IMT</td>
<td>Pneumatic principle (using mouth to force air into device)</td>
<td>-Enhances inspiratory and expiratory muscles ✗ Not entertaining</td>
<td></td>
</tr>
<tr>
<td>Respironics Inc. Healthscan</td>
<td>PEEP</td>
<td>-Designed for therapy with positive expiratory pressure</td>
<td>400 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Guidance system: N/A</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>-PEEP therapy helps reducing the amount of air that is trapped in the lungs</td>
<td></td>
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<td></td>
<td></td>
<td>-Resistance is provided by a spring-loaded valve</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>-Forced pressure opens the airways and helps mobilize secretions</td>
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<tr>
<td></td>
<td></td>
<td>IMT</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>-Provides consistent and specific pressure for inspiratory muscle strength and endurance training</td>
<td></td>
</tr>
<tr>
<td>RFB micro biofeedback</td>
<td>Pneumatic principle (using mouth to force air into device)</td>
<td>-For functional disturbances of heart cycles ✗ A lot of machinery</td>
<td>1900 USD - 2100 USD</td>
</tr>
<tr>
<td>BioMental GmbH</td>
<td></td>
<td>-Guidance system: visual, audio</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Influence on blood pressure</td>
<td></td>
</tr>
<tr>
<td>I-330 C2 by J&amp;J engineering</td>
<td>Mechanic principle (measuring lung expansion)</td>
<td>-12 channel capability</td>
<td>1900 USD - 2100 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Guidance system: visual</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>-Supports simultaneous monitoring signals</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-More options for analyses (ECG, HRV, Respiration, Skin Resistance...)</td>
<td></td>
</tr>
<tr>
<td>Pulmonica by Harmonica Tech</td>
<td>Pneumatic principle (using mouth to force air into device)</td>
<td>-It produces deep, resonant, meditative sounds that can be felt vibrating in the lungs and sinuses ✗ Forcing air</td>
<td>150 USD - 230 USD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Guidance system: N/A</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Device Name</th>
<th>Functionality</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alvio by Alvio</td>
<td>Pneumatic principle (using mouth to force air into device)</td>
<td>✔ Wirelessly communication phones/tablets</td>
<td>× Detaining water inside during usage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✔ Cloud sharing information</td>
<td>× Unhygienic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✔ Forcing air</td>
<td>× Unhygienic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✔ Danger for open mouth breathing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- An all-in-one breathing trainer, symptom tracker and mobile game controller</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Guidance system: visual</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Controlling a video game on a smartphone or tablet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respi by Respio</td>
<td>Pneumatic principle (using mouth to force air into device)</td>
<td>✔ Linked to smart phone</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✔ Hygienic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>✔ Forcing air</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>× No positive side effects (relaxation, longer exhalation)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- For preventing or reducing asthma attacks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Guidance system: visual</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Disposable mouth tube</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Proper body posture with smartphone sensors</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- GPS for ascertaining dangerous areas for asthmatics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Analyzed data sent to physicians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zenytime by Zenytime</td>
<td>Pneumatic principle (using mouth to force air into device)</td>
<td>✔ Lightweight dongle</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>× Unhygienic use (you hold dongle with bare hands)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>× Water collecting on the device</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- For promoting deep, rhythmic breathing to increase oxygen levels</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Guidance System: visual</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>- Scientifically engineered</td>
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<tr>
<td></td>
<td>- Comes with an application</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Sharing experiences on social media</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Dongle is connected with Bluetooth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My Spiroo by My Spiro</td>
<td>Pneumatic principle (using mouth to force air into device)</td>
<td>✔ For assessing what is causing bronchial flare-up</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>× Unhygienic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Mobile spirometer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Guidance System: visual</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Connected, ultra portable peak flow meter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Dongle is connected with Bluetooth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Product</th>
<th>Principle</th>
<th>Features</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Sensawft by Zyxio| Pneumatic principle (using mouth to force air into device) | - Measures how much air is passing out users’ lung  
- My Spiroo Pro: version for doctors to patients data  
- My Spiroo Home: version for patients | ✔ Chipset can be integrated hardware (mp3 players, phones, laptops)  
✗ Fun  
✗ Non-medical purpose (does not describe how should people improve breathing)  
✗ Dizziness if one breathes incorrectly |
| Talk by Arsh Shah Dilbagi | Pneumatic principle (using mouth to force air into device) | - For disabled people or hands-free mobile phone makers  
- Guidance system: visual  
- Senses pressure variations from the into which user exhales | ✔ For people with developmental disabilities  
✗ Not entertaining  
✗ Non-medical purpose (does not describe how should people improve breathing) |
| Powerbreathe     | Pneumatic principle (using mouth to force air into device) | - Inspiratory Muscle Trainer  
- Guidance system: N/A  
- For strengthening the muscles we use breathe  
- Optimisation of airflow  
- 3 variable resistance levels | ✔ Suitable for beginners  
✗ Not entertaining  
✗ Mostly designed for athletes |
| BREATHING+       | Non-contact pneumatic principle (using mouth to force air into device) | - Making exhalations longer and efficient  
- Guidance system: Visual and auditory  
- Operates on Android, iOS, Windows, Mac devices  
- Includes numerous “breathing games” accessibility tools for pulmonary rehabilitation | ✔ Fun, entertaining  
✔ Medical purpose  
✔ Non-contact operation  
✔ Realtime feedback  
✔ Progress tracking  
✗ Does not operate standalone, requires mobile phone or computer to operate |

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- Clinically tested “Pursed Lip Breathing” technique
4 OUR PRODUCTS

4.1 Breathing Games

Breathing games are based on a breathing technique called Pursed Lip Breathing and they are designed to train kids to make exhalations longer. They run on computers and mobile devices where 3-d characters are animated for the best interactive breathing experience. Breathing guidance is being provided and breathing rate is being monitored.

Anyone can observe that conventional video games aren't healthy. They cause tension in hands and upper back and so kids start breathing with upper part of their lungs which is causing shortness of breath and low oxygenation. With breathing games kids learn to breathe deeper and slower and they also improve speaking skills and consequently become more confident and social.

4.2 Breathing Television

Breathing Television is a tool to improve breathing by watching television. It is designed to most efficiently reduce users breathing rate. It does so by synchronising television content with the act of exhaling through pursed lips. Breathing TV has been featured in Journal of Respiratory diseases. Conventional television has emerged into an efficient multimedia distribution mechanism, yet it is shown to have no positive impact in the form of improving breathing. In both, western and eastern medical practice, exhalation through pursed lips has proven to be an efficient method to reduce breathing rate, ease breathing and improve cellular oxygenation.

4.3 Breathing Scrolling

Breathing Scrolling™ is a new healthy way to scroll websites or pdf documents, without using your mouse or keyboard. Just Blow into the headset to scroll any website or pdf document. Scrolling speed can be adjusted to your preference. Breathing scrolling is available as a Chrome extension on Google Chrome browser or as a bookmarklet that can be easily dragged and dropped into your bookmarks bar in other web browser.

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4.4 Breathing Headset

BREATHING+ headset is built out of soft and comfortable polyethylene plastic. It is adjustable for different head sizes, durable and washable. It is designed to provide maximum comfort, firm position and best possible PLB detection in a quiet or loud environment.

4.5 BREATHING+ Package

BREATHING+ package is a complete solution that turns your desktop computer and/or mobile phone into a fun interactive breathing exercises gaming system. BREATHING+ is already being used in clinical environments to manage asthma, COPD, postoperative rehabilitation, stress and anxiety. Now you can use this technology in your home to play breathing games and efficiently improve your breathing. It's a new kind of fitness, it's "pilates" of the next century!
5 ADVANTAGES

5.1 Advantages over other available technology for breathing exercises (see table 1)

- blowing air into the mouthpiece does not require a physical contact with users’ mouth or lips, therefore it provides less possibilities for infection.
- user can be eventually taught to implement the exhalation through pursed lips into their daily routine and change their breathing behavior without raising dependence on technology. Such a behavior can already be observed in humans, for example when a person exhales through pursed lips as a sign of relief.
- Not required to use tubes or pipes to achieve resistance during exhalation as kids eventually learn to provide such a resistance by exhaling through pursed lips
- breathing games provide an enhanced motivation and more efficient learning process that keeps kids entertained and motivated
- audio feedback allows user’s to perform exercises with their eyes closed, resulting in a more relaxing experience
- breathing games make kids track their breathing progress which improves commitment and provides a more efficient long term learning

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## 5.2 BREATHING+ SWOT ANALYSIS

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ better motivation achieved with breathing games leads to higher motivation and compliance</td>
<td>❑ cannot be used standalone, requires mobile phone or personal computer to work</td>
</tr>
<tr>
<td>❑ better hygiene by using non-invasive detection of breathing</td>
<td>❑ dehydration; after exercise it is necessary for a user to drink a glass of water</td>
</tr>
<tr>
<td>❑ improves breathing without raising dependence on technology (because user provides pressure by exhaling through pursed lips and not by exhaling into a tube or pipe)</td>
<td></td>
</tr>
<tr>
<td>❑ weekly new breathing games on Android, iOS, Windows and Mac devices which leads to higher long term motivation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ healthier way to use computers, for example “breathing scrolling” or “breathing television”</td>
<td>❑ kids under 7 years should use the product in assistance with their parents or caregivers.</td>
</tr>
<tr>
<td>❑ improves speaking and singing skills</td>
<td>❑ in elderly patients a short-term dizziness is possible. The patient should rest for a while after exercise.</td>
</tr>
<tr>
<td>❑ “breathing scrolling” may reduce repetitive strain injuries such as carpal tunnel syndrome</td>
<td></td>
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</tbody>
</table>
6 EXPERT OPINIONS

6.1 American Lung Association
"Keep using the pursed-lip breathing Until the breathless feeling goes away. Rest in between breaths if you feel Dizzy. Give sips of room temperature water."

6.2 Cleveland Clinic
"Pursed lip breathing is one of the simplest ways to control shortness of breath. It provides a quick and easy way to slow your pace of breathing, making each breath more effective."

6.3 University of Iowa Children's Hospital
"Pursed lip breathing helps you use less energy to breathe. It can help you relax. When you are short of breath, it helps you slow the pace of your breathing and can help you feel less short of breath."

6.4 The Ohio State University Medical Center
"Pursed Lip Breathing keeps airways open longer during exhalation. This helps release trapped air from your lungs and allow fresh air to come in. Practise PLB while you are resting so you can use this technique when you are feeling short of breath."

6.5 University of Minnesota Medical Center
"Inhaling through the nose and exhaling through pursed lips makes breathing easier. Pursed-lip breathing can also help you regain control if you're having trouble catching your breath. You can practice breathing this way anytime, anywhere. If you're watching TV, practice during the commercials. Try to practice several times a day. Over time, pursed-lip breathing will feel natural."

6.6 University Health Service, University of Michigan
"Pursed-lip breathing helps you breathe more air out so that your next breath can be deeper."

6.7 Vanderbilt University Medical Center
"Pursed-lip breathing can help you get more oxygen into your lungs when you are short of breath. When you start to feel short of breath, use pursed-lip breathing to control your breathing. Breathing in through the nose and exhaling through pursed or closed lips makes breathing easier."

6.8 UTMB, The University of Texas
"It is often helpful to have a patient with asthma or COPD exhale through "pursed lips," a maneuver that increases resistance to exhalation at the mouth. This maneuver is believed to transmit an early expiratory back pressure to the bronchial tree and the back pressure is believed to prevent early collapse of small bronchioles and improve exhalation from alveoli (specifically COPD patients)."

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6.9 American Thoracic Society

“Pursed-lip breathing attempts to prolong active expiration through half-opened lips, thus helping to prevent airway collapse. Compared with spontaneous breathing, pursed-lip breathing reduces respiratory rate, dyspnea, and PaCO2, while improving tidal volume and oxygen saturation in resting conditions.
7 CONTACT AND MORE INFORMATION

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