Expiratory Retraining Techniques

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What is Expiratory Retraining?

- Expiratory retraining techniques include various procedures one may use to alter the ways in which air is expelled from the lungs.

- Used by specialists to make the process of expelling air from the lungs optimal with respects to breathing, as well as speech production.
What is Expiratory Retraining?

- Such procedures include specific breathing exercises, as well as using a special device to gradually retrain the breathing mechanism.

- As with most types of therapy, it will take time and interest to show true effects and improvement.
Why?

- Clients may choose to be trained through these techniques for a variety of reasons.

- The main reasons often include improving speech production and breath support.

- Coordinates one’s breathing with his or her vocalizations.
What Voice Problems can these Techniques help?

- Can be used on adult clients of any gender or race
- Vocal Nodules
- Paralyzed Vocal Folds
- Dysphonia
- Lesions
- Those who need increased breath support
  - Professional speakers
  - Instrumentalists
  - Professional singers
What Systems are Involved?

**ANATOMICAL STRUCTURES**

- **Lungs** shape the duration of inspiratory and expiratory efforts during both tidal breathing and speech breathing

- **Larynx** and **pharynx** aid in the process of respiration
**MUSCULAR SYSTEMS**

- The **muscles of expiration** are strengthened and trained using expiratory retraining techniques.

- The **diaphragm** and **thorax** are also effected, due to the fact that they play a large role in the process of respiration.
NEUROLOGICAL SYSTEMS

• Because these techniques retrain muscles in the body, researchers suggest that a neural mechanism is involved.

• As muscles change and learn new movement patterns, the nervous system must be responsible for recalling this information when needed.

Sapienza, et al. 2002
The Physiology of Breathing

- **Tidal breathing**: breathing at rest, non-speech
  - Muscles of inspiration expand thorax, which will return to the rest position due to passive recoil forces.
  - Durations of inhalation and exhalation are equal.

- **Speech breathing**: breathing during speech
  - Muscles of inspiration expand thorax, while passive recoil forces and muscles of expiration are used to return thorax to resting position.
  - Durations of inhalation are shorter than exhalation.
  - Speech should be spoken on exhalation.
Technology and Equipment Used

- Pneumotechnograph (Sapienza, et al 1997)
- Expiratory pressure threshold trainer (Sapienza & Davenport, 2002)
Pneumotechograph

Used to measure airflow signals before, during, and after treatment.

Source: www.unc.edu
- Small and cylindrical
- Consists of mouthpiece and one-way spring loaded valve
- Desired pressure threshold set by therapist
- Air will flow through device as long as this threshold is maintained
- This will cause muscles of exhalation to be strengthened over time.

Source: www.scielo.br/img/

Figure 7. Breathing exercises using positive expiratory pressure (PEP) mask on a patient with cystic fibrosis.

**Expiratory Pressure Threshold Trainer**
How it Works

- Clients are given different “exercise regimens” to follow when using pressure threshold trainer
  - This is most often a varied program of high intensity, low repetition exercises (Sapienza & Davenport, 2002)

- Devices are almost always used in conjunction with traditional voice therapy
<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Details of Study</th>
<th>Results</th>
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<tbody>
<tr>
<td>Sapienza, Stathopoulos, &amp; Brown (1997)</td>
<td>Studied women with vocal nodules compared to a control group of women with healthy vocal folds. Breath support for both groups was measured and compared in order to find significant differences and possible treatment plans</td>
<td>Women with vocal nodules expel more air per syllable than those with healthy vocal folds. Rate of speech had no significant results, though the nodule group tended to use up larger lung volumes per utterance.</td>
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<td>Sapienza &amp; Davenport (2002)</td>
<td>Expiratory muscle training was used to increase pressure and breath support in instrumentalists. A high intensity, low repetition system was used in conjunction with an expiratory pressure threshold trainer device.</td>
<td>Results show that this “strength training” regimen is both “effective and efficient for increasing expiratory pressure support” in instrumentalists.</td>
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<td>Wingate, et al (2007)</td>
<td>Studied professional voice users. Participants included Dysphonia group and lesion group. Two treatments were used, including expiratory muscle strength training followed by traditional therapy. The order of each was reversed for each group.</td>
<td>Results showed significant improvement for each group in max. expiratory pressure, VHI scores, etc., as well as glottal pressure and range.</td>
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<td>Pattie, Murdoch &amp; Theodoros (1998)</td>
<td>Hormonal treatments in women were studied for their effect on vocal folds as well as speech production and breath support.</td>
<td>While evidence of changes in vocal quality was documented as a result of hormonal therapy in this study, researchers suggest continued research on the subject with varying treatment techniques in the future</td>
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What Research Has Found

- Overall, empirical data suggests that strength training exercises are effective in increasing the amount and pressure of air expelled from the lungs.

- Using expiratory retraining techniques in conjunction with traditional voice therapy has been shown to have a greater effect on a client than traditional voice therapy alone.
What does this mean?

- Has the potential to help countless numbers of people attain various goals.

- These expiratory retraining techniques are available to help people extend and strengthen exhalation during respiration and speech
Evidence

- Researchers used the best current information available, and built off of that knowledge in the creation of their own studies.
- Results were compared against those of previous studies, and analyzed according to approved procedure.
- Researchers used clinical expertise, combined with client value and need, to compose studies.

www.asha.org
In The Future

- Somewhat limited amount of scholarly information exists at this time.

- Much room for further growth and exploration of this fascinating subject in the future.
Sources

- Expiratory Pressure mask, retrieved May 1, 2009, from www.scielo.br/img/
- Pneumotechograph photograph, retrieved May 1, 2009, from www.unc.edu