

### **Ever wished that you had something to prescribe for the relief of dyspnoea?**

Well now you do. POWERbreathe® is a new drug-free intervention that helps patients help themselves.

Dyspnoea is a common feature of many disorders. Its source may be respiratory, cardiovascular, neuromuscular, or even psychological, but common to almost all situations in which dyspnoea is present is the existence of inspiratory muscle weakness.

### **How does inspiratory muscle weakness influence dyspnoea?**

Inspiratory muscle weakness has been identified as a contributory factor in the perception of dyspnoea (Killian, 1988). What is more, specific training of the inspiratory muscles (IMT) has been demonstrated to increase their strength, resistance to fatigue and, most importantly, to reduce exertional dyspnoea (Lisboa, 1994; Copestake & McConnell, 1995; Lisboa, 1997; McConnell et al., 1998; Caine & McConnell, 1998; Volianitis et al., 1999).

Unfortunately, the inspiratory muscles also exhibit the well-documented 'use it or lose it' phenomenon and become detrained (atrophy) in the absence of physical activity. In elderly men and women the most potent determinant of respiratory muscle strength is their level of habitual physical activity (McConnell & Copestake, 1999). This link contributes to a downward spiral of dyspnoea and inactivity. Inspiratory muscle training with POWERbreathe can break this spiral.

### **How can the Inspiratory muscles be trained?**

Whilst whole body activity provides a suitable training stimulus for the inspiratory muscles (Coast et al., 1990), this is not an ideal method of training or maintaining optimal function of these muscles in patients or the elderly.

In much the same way as the locomotor muscles can be trained independently of locomotion, so too can the inspiratory muscles. Resistance training (weight training) has the benefit of isolating specific muscle groups and stimulating improvements in both strength and endurance (Caine et al., 1998). Resistance training of the inspiratory muscles is easier than it sounds; in its most simple terms, it involves breathing against an inspiratory load.

Inspiratory muscle training has been applied clinically for a number of years (Anderson et al., 1979), using a variety of training devices with differing degrees of effectiveness and user friendliness.

### **Not all inspiratory muscle trainers are created equal**

Early inspiratory muscle trainers worked on the simple principle of inspiring via a restricted orifice, so-called flow resistive training. Data from studies using this technique was very variable in terms of outcome. An important meta-analysis of the literature up to 1992 identified that flow resistive training required control of inspiratory flow rate in order to be effective (Smith et al., 1992). In the early 1990s a new and far more reliable approach to IMT appeared in the scientific literature - pressure threshold training. This training technique involves breathing against a pressure load and has been shown to be the most effective way to train the inspiratory muscles; POWERbreathe uses the pressure threshold system.

POWERbreathe is the most refined, versatile and well designed inspiratory muscle trainer available - beware of cheap imitations!

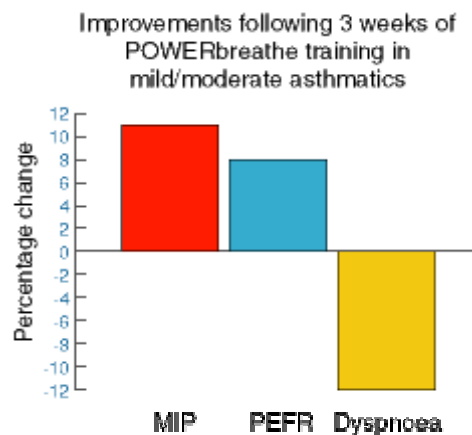
POWERbreathe has also undergone systematic testing to identify the most effective training regimen (Caine & McConnell, 1998); this is an important and often underestimated factor in training the inspiratory muscles; even the best designed trainers will only bring improvements if used in conjunction with an effective training regimen.

As professional exercise scientists and respiratory physiologists, the designers of POWERbreathe are committed to continuous development of their products and training approaches- look out for new developments in the POWERbreathe range.

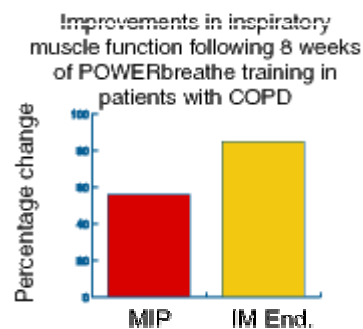
### What is POWERbreathe and why is it so effective?

POWERbreathe is a resistance training device which provides a flow-independent, quantifiable training load to the inspiratory muscles. As the patient inhales against the load, the inspiratory muscles are encouraged to work harder; this training stimulus induces improvements in the force-generating capacity and metabolic efficiency of the inspiratory muscles (Sharpe et al., 1999). POWERbreathe's adjustable loading mechanism provides for a wide range of users and enables training to be progressive.

Using an empirically tested, carefully designed and easily communicated training regimen, POWERbreathe has been shown to improve both the strength and endurance of the inspiratory muscles (Caine & McConnell, 1998). Training is accomplished with as little as 5 min training per day, and benefits are perceived by patients within 3 weeks of commencement of training (McConnell et al., 1998).



In randomised, controlled trials, POWERbreathe generates improvements in inspiratory muscle strength of 55% and endurance of 86% in patients with COPD (Newall et al., 1998). In mild/moderate asthmatics POWERbreathe increased strength by a mean of 11% (McConnell et al., 1998) in just 3 weeks. Even in young athletes, POWERbreathe training has elicited improvements in strength and endurance of 31% and 28%, respectively (Caine & McConnell, 1998). POWERbreathe is the only inspiratory muscle trainer proven to be effective in patients and athletes alike.



MIP= inspiratory muscle strength  
PEFr= peak expiratory flow rate

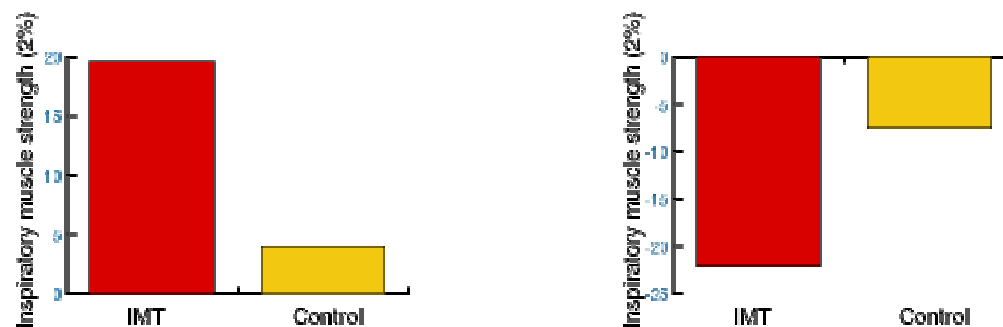
### How does POWERbreathe work?

The secret of POWERbreathe's effectiveness is the reliability of its functional design characteristics and the ease of adhering to a training programme which can be undertaken at home, and which requires just 30 breaths twice a day.

### Which medical conditions have benefited from IMT?

Reduction in exertional dyspnoea has been demonstrated in populations as diverse as healthy elderly people (Copestake & McConnell, 1995), asthmatics (McConnell et al, 1998), patients with COPD (Lisboa et al, 1994, 1997), Bronchiectasis (Newall et al., unpublished observations) and even athletes (Volianitis et al., 1999).

#### Link between improved strength and reduced dyspnoea in elderly men women (Copestake & McConnell, 1995)



Alleviation of dyspnoea is not the only benefit of IMT

A wide range of benefits have been reported in a diversity of disease conditions:

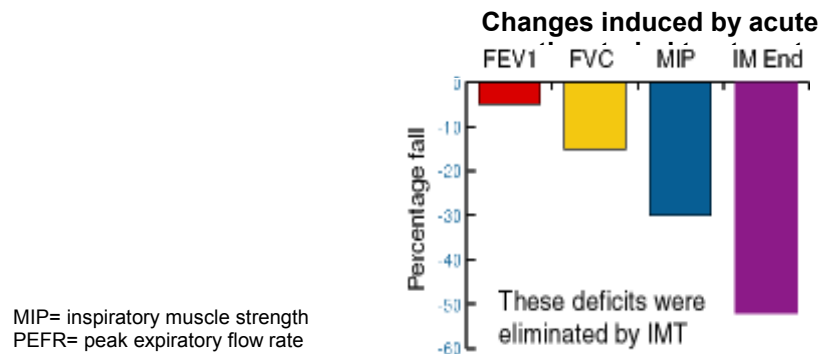
- COPD (Smith et al., 1992; Lisboa et al., 1994; Preusser et al., 1994; Vargas et al., 1995; Heijdra et al., 1996; Lisboa et al., 1996; Villafranca et al., 1998) Improved lung function, improved nocturnal saturation, reduction in ventilatory and metabolic demand during exercise, increase in exercise tolerance, reduction in exertional dyspnoea
- Asthma (Weiner et al., 1992) Improved lung function, reduction in medication usage, fall in hospitalisations and absence from school/work, reduction in exertional dyspnoea
- Cystic fibrosis (Sawyer et al., 1993) Improved lung function, improved exercise tolerance
- Bronchiectasis (Newall et al., unpublished observations) Improved lung function, exercise tolerance and health status (CRDQ)
- Chronic heart failure (Cahalin et al., 1997, Mancini et al., 1995) Reduced dyspnoea, improved lung function and exercise tolerance
- Ischaemic heart disease (Darnley et al., 1998) Improved exercise tolerance and reduced exertional dyspnoea

There is also a wide range of conditions where IMT has improved inspiratory muscle function or where inspiratory muscle function is impaired severely:

- Spinal cord injury (Huldtgren et al., 1980, Gross et al., 1980)
- Neuromuscular diseases including MS (Foglio et al., 1994), Duchenne muscular dystrophy (Wanke et al., 1994, 1998) and stroke
- Heart-lung transplant patients (Ambrosino et al., 1996)
- Spondylitis anklopoetica (van 't Hul et al., 1998)
- Juvenile chronic arthritis (Knook et al., 1999)

## The special problem of corticosteroids Corticosteroids

are used to treat a large number of disease conditions, but their myopathic side-effects are often overlooked in the context of the respiratory muscles. Significant reductions in inspiratory muscle strength have been documented after an acute bout of corticosteroid treatment. The resulting weakness provoked an equally significant impairment of lung function (Weiner et al., 1995). There are clear implications for the management of acute respiratory exacerbations where corticosteroids are administered, i.e., there is a risk of making matters worse by impairing lung function still further. However, research has shown that a concomitant period of IMT can obviate the fall in inspiratory muscle strength and maintained lung function during corticosteroid use (Weiner et al., 1995).



## Helping patients to use their inhaler devices more effectively

For many patients, their inspiratory muscles are so weakened by disease and deconditioning that they are unable to generate sufficient inspiratory pressure and flow to inhale their medication effectively. POWERbreathe improves peak inspiratory flow rate (Caine & McConnell, 1998) and enables patients to maintain inspiratory flow rate to a higher lung volume against the inherent load of their inhaler. Thus, the effectiveness of inhaled medication is likely to be enhanced by POWERbreathe training; indeed, a common finding amongst asthma patients training with POWERbreathe is a reduced reliance upon medication.

## A panacea for the dyspnoeic patient?

Of course not, but a very effective adjunct to the treatment of a wide range of diseases.

***Now there IS something more you can do: POWERbreathe***

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## What they say about POWERbreathe -

"POWERbreathe is a real success story for Research Into Ageing. It's not often that medical research yields a product with the potential to benefit so many individuals of all ages."

**Elizabeth Mills**, Director, Research Into Ageing

"Most of our clients have severely impaired lung function . . . after using POWERbreathe for just four weeks we saw substantial improvement in lung function and a reduction in breathlessness." **David Heard**, Chief Exec., National Rehabilitation Centre for the Paralyzed

"The combined affects of cardiac disease and years of enforced/voluntary inactivity result in a number of our patients being unable to exercise without experiencing extreme breathlessness. I believe that POWERbreathe's ability to reduce breathlessness in similar populations makes it a potentially exciting and valuable tool for cardiac rehabilitation." **Russ Tipson**, Director, Action Heart Cardiac Rehabilitation Project

"Inspiratory muscle training is a promising approach to help improve symptoms in a range of respiratory disorders and POWERbreathe is an innovative and effective means of achieving this training." **Dr. Martin Miller**, Consultant Physician in Respiratory Medicine

"Within a few days of use I began to breathe more easily and to feel better. I am delighted with my progress - 30 days on, and I am beginning to resume activities that were getting beyond me at age 69." **Mr. N. Warner**, Nottingham.

"I now seem to be breathing from my diaphragm whereas before it was shallow breathing from my chest. I hope many more people will feel the benefit" **Mrs. L. McLeod**, Cheshire.

"I can't thank you enough ... I have had asthma for 16 years and this is the first year that I haven't had a chest infection" **Mrs. D. Bailey**, Surrey.

"I find the device a great help ... I have had emphysema and I am now loathe to travel without my POWERbreathe as there is definitely an improvement in my breathing" **Mr. B. Willis**, London.

"I cannot express my appreciation enough ... I am 75 years old and cycle a lot. We live on a hill and I used to have to walk part of the way. Now I cycle all the way.... Unbelievable! ..... more power to your elbow!" **Mr. A. Burman**, Nottinghamshire.

"The product is user friendly and, after only a few weeks, has produced significant improvements" **Mr. S. Biggs**, Warwickshire

## **CONTRAINDICATIONS**

Used properly, POWERbreathe has no harmful side effects and can be used safely by almost anyone. During use POWER breathe induces a negative pressure within the thorax; the magnitude of this depends upon the opening pressure set on the inspiratory valve (maximum value for patient use 100cmH<sub>2</sub>O). The opening pressure is, in turn, determined by the patient's inspiratory muscle strength (weak muscles=small opening pressure). There may be some rare instances in which the induction of a substantial negative pressure within the thorax may exacerbate an existing condition. It is important to consider this in the context of the individual patient's medical history before recommending POWERbreathe.