JUST BREATHE 101

Breathing Retraining Theories

Debra Dent Dip Manip PT OCS (Emeritus) FCAMPT (Emeritus)

OBJECTIVES

1. List two theories of breathing retraining methods.
2. Describe the reasoning for Resonant Frequency Breathing.
3. Describe concept of Alison McConnel's Inspiratory Muscle Training.
4. Describe the concept of Buteyko's Breathing Program.

AN UNDERSTANDING

I declare that I or my family do not have any financial relationship in any amount, with a commercial interest or clinician whose products or services have been discussed in my seminar.

BREATHING RETRAINING:

WHY ARE WE DOING THIS?

- Promotes parasympathetic system response
- Returns the system which is in a chronic state to a normal state of function
- Controlled breathing can decrease the effects of the sympathetic system
- Regular practice can improve psychological and emotional states

- Regular practice can change abnormal acquired physical biomechanics
- Improves ROM of thoracic spine which in turn decreases the demands on other areas of the spine
- Decompresses the thoracic spine
- Improve Rotation of the thoracic spine
- Improves lateral costal expansion

INFLUENTIAL CLINICIANS

- Graduated the University of British Columbia in 1976
  - Bachelor of Science of Rehabilitation
- FCAMPT 1981
  - (Fellow of the Canadian Academy of Manipulative Physiotherapy)
- Instructor and Chief Examiner for the CPA FCAMPT examinations for 20 years
- Clinical Specialist in women's health 2016 (CPA)
- Integrated Systems Model for Disability and Pain (Lee and Lee 2009- 2013)
  - Now teaches ISM solely
- Owns Diane Lee and Associates and continues to see patients
- Designed Pelvic Com-Pressor belt and Baby Belly Pelvic Support
- Presents world wide

DIANE LEE BSR FCAMPT CGIMS

DIANE LEE PT PUBLICATIONS

Diastasis Rectus Abdominis
A Clinical Guide for Those Who Are Split Down the Middle 2017

The Pelvic Girdle: An integration of clinical expertise and research Nov 9 2011

Manual Therapy for the Thorax 1994

The Workbook of Manual Therapy Techniques for the Vertebral Column 1986

Numerous presentations, published articles and book chapters.

https://learnwithdianelee.com/resources

- Graduated the University of British Columbia 1996
- Fellow of the Canadian Academy of Manipulative Physiotherapy 1999
- Creator of the Thoracic Ring Approach
  - Lee LJ., MPA .(2013) Thoracic Ring Control: A Missing Link?
    - Online lecture at ljlee.ca/online-lectures/
- Developed the Integrated Systems Model with Diane Lee (2009-2013)
- PhD University of Queensland 2013
- Clinic is Synergy Physiotherapy Vancouver BC
- Connect Therapy Series
- Presents world wide

DR. LINDA JOY LEE PHD, BSC, BSC(PT), FCAMPT, CGIMS, MCPA, MAPA

L. J. LEE PUBLICATIONS

Books

The Pelvic Girdle 4th Ed. Lee, D., Lee, LJ. (2011)

Numerous scientific articles, book chapters and presentations

Ljlee.ca/research-publications-articles/

- Graduated Northwestern University 1977 with BSPT
- DPT from the University of the Pacific 2004
- Dsc from Rocky Mount University 2011
  - Research was conducted under guidance of Dr. Paul Hodges
  - Aim was to establish a link between the glottis and postural stability
  - Massery, M., Hagins, M., Stafford, R., Moerchen, V., & Hodges, P. W. (2013). Effect of airway control by glottal structures on postural stability. *Journal of Applied Physiology*, *115*(4), 483–490.

- Focus is on linking motor behaviors to breathing and or postural mechanics in both pediatric and adult populations
- Presents world wide
- Florence Kendall Practice Award

MARY MASSERY PT DPT DSC

MARY MASSERY PUBLICATIONS

Extensive

Numerous scientific articles, book chapters and presentations

18 articles, 17 chapters in 8 books, 8 abstracts

- www.masserypt.com/publications

- Seminars

  If You Can't Breathe, You Can't Function

- Senior Principal Research Fellow and the Director of the NHMRC Center for Clinical Research Excellence in Spinal Pain, Injury and Health at the University of Queensland, Brisbane, Australia
- Three Doctorates
  - One in Physiotherapy
  - Two in Neuroscience
- Research is to "understand pain, control of movement and the interaction between multiple functions of the trunk muscles including spine control, continence respiration and balance"
- Attempting to bridge the gap between science and clinical practice
- Taught workshops in more than 40 countries
- Numerous research awards

DR. PAUL HODGES PHD MEDDR DSC BPHTY(HONS) FACP

DR. PAUL HODGES PUBLICATIONS

Books

- **Spine Control: The Rehabilitation of Back Pain:** State of the art and science. Paul Hodges and Jacek Cholewicki 2013
- **Therapeutic Exercise for Lumbopelvic Stabilization: A Motor Control Approach for the Treatment and Prevention of Low Back Pain.** Carolyn Richardson and Paul Hodges 2004

- Published > 280 scientific papers and book chapters

- Physiotherapist
- Doctorate in Pediatrics
- PhD 2009
  - "Stabilizing function of the diaphragm: dynamic MRI and synchronized spirometric assessment"
- Director of the Rehabilitation Department, University Hospital Motol, School of Medicine, Charles University, Prague CZ
- Numerous awards
- Research:
  - "Developmental kinesiology and its application in early diagnosis of central nervous system disorder in newborns and infants"
  - Stabilization and respiratory function of the diaphragm"

PAVEL KOLAR PT, PAED. DR. PHD

PAVEL KOLAR PUBLICATIONS

Book:

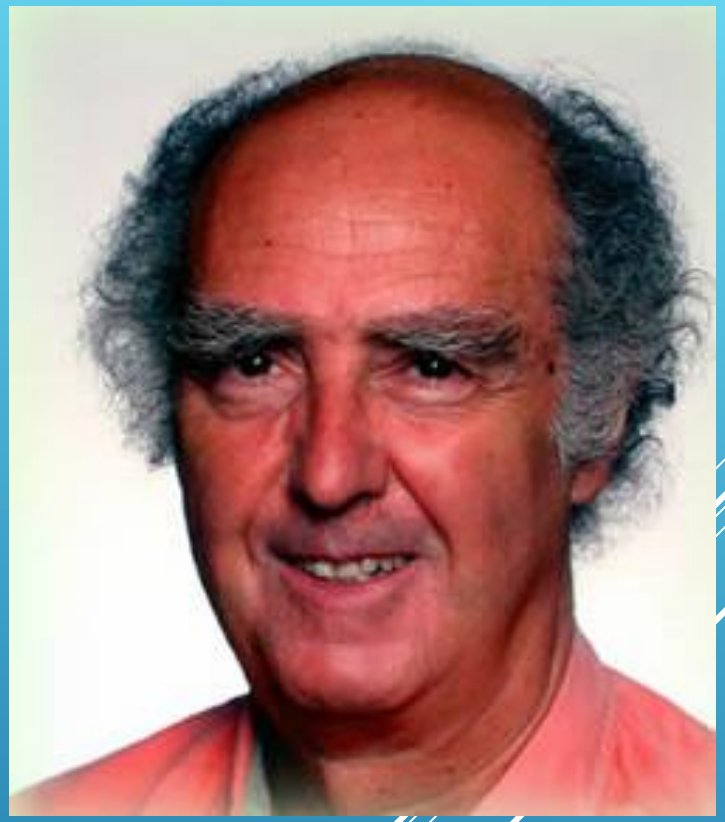
- **Clinical Rehabilitation: Dynamic Neuromuscular Stabilization** 2014

Dynamic Neuromuscular Stabilization

- "Emphasizes neurodevelopmental aspects of motor control to assess and restore dysfunction of the locomotor system and associated syndromes"
- Related to motor control that is established in the initial formative years of life.

- Certification Program
  - DNS for clinicians with medical background
    - Basic A, Basic B, Intermediate C, Advanced D
  - DNS Pediatric
  - DNS Exercise for exercise professionals

- Graduated from the British College of Osteopathic Medicine in 1960
- Visiting lecturer numerous medical schools around the world
- Co-authored over 70 books
- Founding editor in chief of Journal of Bodywork and Movement Therapies
- Retired senior lecturer at University of Westminster
- Honorary Fellowship at the University of Westminster in 2005



LEON CHAITOW ND DO

LEON CHAITOW PUBLICATIONS

Books

Recognizing and Treating Breathing Disorders 2014

Numerous books on Osteopathic Techniques, Fibromyalgia, Headaches, Pain, Stress, Neuromuscular Techniques, Positional Release, Muscle Energy etc

Articles: Numerous

Leonchaitow.com/articles/

- Studied as a DO and has over 35 years of experience
- PhD in 2011 from RMIT University in Melbourne Australia
  - Dysfunctional Breathing: Its Parameters, Measurement and Clinical Relevance:
- One of the first Practioners of the Buteyko method to be trained outside of Russia in the 1990's and was an instructor

- Presented in Australia and internationally
- Conducts seminars for medical professionals on Dysfunctional Breathing

- She has two Sydney Australia clinics
- Has authored 15 clinical articles and chapters on Dysfunctional Breathing

- Scientific study of the interaction of psychology, physiology and breathing http://www.breathandbody.com.au/breathing-therapies/)

- Rosalbacourtney.com

DR. ROSALBA COURTNEY, DO, PHD

DINAH BRADLEY MORRISON AND TANIA CLIFTON SMITH

Bradcliff Breathing Method ®

- Originated in New Zealand
- Significant impact in well- being culture in that country
- Diagnosis and recognition of breathing pattern disorders being noted in all aspects of health care
- Now part of their undergraduate physiotherapy training
- Bradcliff Method ® is a certification program with Practioners in Australia, New Zealand, Canada and Scotland
- Founders met in 1991 and established Breathing Works Ltd in 1999
- Co-wrote **Dynamic Breathing- managing your asthma**

Dinah Bradley Morrison

Tania Clifton smith

- Originally managed and outpatient respiratory physiotherapy service at Green Lane Hospital in New Zealand
- Noted chronic hyperventilators especially in the asthmatic clinics
- Published **Hyperventilation Syndrome a Handbook for Bad Breathers** 3rd edition 2007
- Co-authored **Recognizing and Treating Breathing Disorders** with Leon Chaitow, Christopher Gilbert 2nd edition 2014

DINAH BRADLEY MORRISON

DIPPHYS, NZRP,MNZSP

- Post Graduate Manual Therapy and Manipulation
- Two years of physical education before choosing Physiotherapy

- Worked in the UK before moving to New Zealand
- In the UK she worked high achievers at the top of their professions and found these people had been diagnosed with exhaustion and chronic hyperventilation syndrome
- Worked as well with victims of torture
  - Also suffering from exhaustion and chronic hyperventilation syndrome, psychological trauma and pain

- Wrote **Breathe to Succeed** 1999
- Wrote **Breathing Matters** with Dr. J. Bartley 2006

TANIA CLIFTON SMITH
DIP PHYSIOTHERAPY, MNZP, NZMTA,ITEC(LONDON)

- B.S. Physiotherapy McMaster University 1983
- FCAMPT 1988
- Certification Contemporary Medical Acupuncture McMaster University 2000
- Certification in Capnometry from Behavioral Physiology Institute 2005
- D.Sc. Physiotherapy from Andrews University 2007

- Assistant Clinical Professor at the School of Rehabilitation McMasters
- Examiner Canadian Physiotherapy Assoc. Orthopaedic Division (Chief Examiner (1999-2005)
- Faculty and Examiner NAIOMT

LAURIE MCLAUGHLIN PT, D.SC, FCAMPT, CMAG, MCPA

LAURIE MCLAUGHLIN PUBLICATIONS

- Numerous publications and book chapters
  - Capnography Assessment Chapter in **Recognizing and Treating Breathing Disorders**
  - Breathing chapter in **Movement: Functional Movement Systems: Screening, Assessment, Corrective Strategies** Cook et al 2011
  - Pro-Active Education Seminars

    Proactiveeducation.ca/courses

    Proactiveeducation.ca/publications/

BIOFEEDBACK WITH A CAPNOMETER

CAPNOGRAPHY

- Measure the amount of CO_2 in exhaled air
- Detects the partial pressure of CO_2: end-tidal CO_2 ($EtCO_2$)
- Utilizes infrared wave to measure the CO_2
- Used in the OR, recovery, critical care, hospital wards, ambulance and for breathing retraining
- In conditions of normal breathing the $EtCO_2$ should be similar to the alveolar level
- Dysfunctional breathing may have low $EtCO_2$

Breathing Retraining

- Screening patients with Capnography
- Used as feedback or biofeedback

- Professor of Applied Physiology at Brunel University London (UK)
  - BSc Biological Sciences University of Birmingham
  - MSc in Human and Applied Physiology Kings College London
  - PhD in Respiratory Physiology Kings College Hospital London
- Founding Director Sports Medicine and Human Performance Unit of Birmingham (1994-1999)
  - Established company for Powerbreathe
- Brunel University 2000
- Known for research on IMT and fatigue in patients with respiratory and cardiovascular disease

ALISON MCCONNELL PHD, MSC, BSC (HONS)

ALISON MCCONNELL PUBLICATIONS

- Research (presently)
  - IMT with COPD patients
  - IMT training on balance and postural control
  - Role of respiratory muscle in balance and postural control in patients with LBP, COPD and healthy people
  - Effects of IMT on equine athletes
- Publications

  Breathe Strong Perform Better 2011
- Extensive scientific article publication

Publications:

Breathestrong.com/author/publications.php

INFLUENCE OF INSPIRATORY MUSCLE FATIGUE ON PERIPHERAL FATIGUE

- Alison McConnell and Michelle Lomax 2006
- Eight volunteers undertook seven test conditions two of which followed 4 weeks of inspiratory training
- An inspiratory metaboreflex was induced through calibrated breathing flow resistance
- Monitored EMG and torque of plantar flexors

McConnell, A. K., & Lomax, M. (2006). The influence of inspiratory muscle work history and specific inspiratory muscle training upon human limb muscle fatigue. *The Journal of Physiology*, *577*(1), 445–457.

- Elevating inspiratory muscle work during heavy exercise exacerbates leg fatigue
- Inspiratory muscle metaboreflex reduces exercising limb blood flow and accelerates fatigue
- Inspiratory muscle training IMT attenuates the vasomotor changes induced by the metaboreflex
- IMT improves exercise tolerance by reducing the effect of the metaboreflex during exercise

RESULTS AND CONCLUSIONS

D. Dent 2018





POWERBREATHE OPTIONS

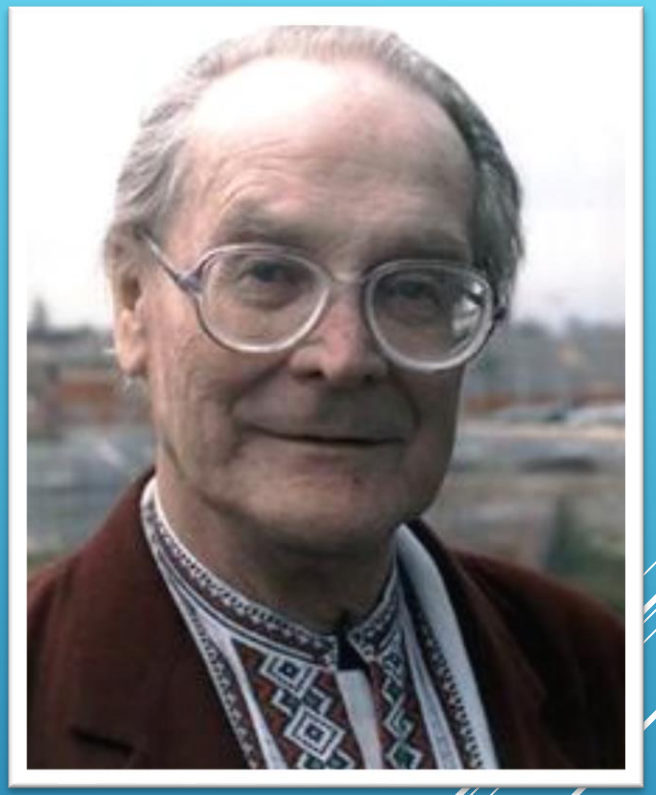
RESPIRATORY MUSCLE TRAINING IMT

- Powerbreathe Device
  - Improvement in breathing effort and whole body effort
  - Metabolic responses
    - Respiratory muscle fatigue
    - Breathing pattern
    - Lactate turnover
    - Heart rate lowering
    - Oxygen uptake kinetics
- Does not change
  - Maximal oxygen uptake
  - Maximum lactate threshold

BUTEYKO BREATHING METHOD

Konstantin Pavlovich Buteyko Physiologist, MD, PhD 1923-2003

- Was a mechanic during WWII in Russia
- Started medical training after WWII
- In 1952 was diagnosed with severe hypertension
- During an evening of contemplation he noted a bright light and he was breathing heavy
- Intentionally slowed his breathing and noted he felt much better
- Spent the next 50 years using and promoting a method of controlled breathing
- Established Buteyko Clinic 1987
- Endured professional ridicule, sabotage and feared imprisonment by the Soviet Government



Konstantin Pavlovich Buteyko

Publications **The Buteyko Method** 1990

Hypothesis

- Hyperventilation is underlying cause of many diseases with lower $PaCO_2$, respiratory alkalosis, lower O_2 levels, pH shift
- pH shift interferes with all protein and vitamin activity and alters the metabolic process
- Bohr effect of hemoglobin and O_2 binding
- Hypoxia with deeper breathing caused bronchial and cardiac spasm
- Excitability of the nervous system
- Strenuous exercise and drugs just made the process worse
- Deep breathing made everything worse and a reduction in breathing improved the situation "excessive air consumption"
- Volitional control of hyperventilation and slow breathing till they feel an air deficit

BUTEYKO BREATHING METHOD

BUTEYKO BREATHING METHOD "PACKAGE"

- Package consists of breathing therapy, relaxation techniques and exercises combined with advice and education about medication use, nutrition and general health

- Classic Buteyko discussed a relationship with length of the control pause with CO2 levels
- Nasal breathing- produces nitric oxide-bronchodilator

- Slow breathing combined with breath holding or Controlled Pause and extended pauses
- Buteyko method of breath holding to reduce the volume of breathing to increase CO2 and reset thresholds
- Bruton and Lewith concluded no evidence in lung function measures in respect to asthma or bronchial responsiveness and four studies they looked it only one demonstrated CO2 levels

Bruton, A. Lewith G.T. The Buteyko breathing technique. A Review. Complimentary Therapies in Medicine. (2005) 13, 41-46

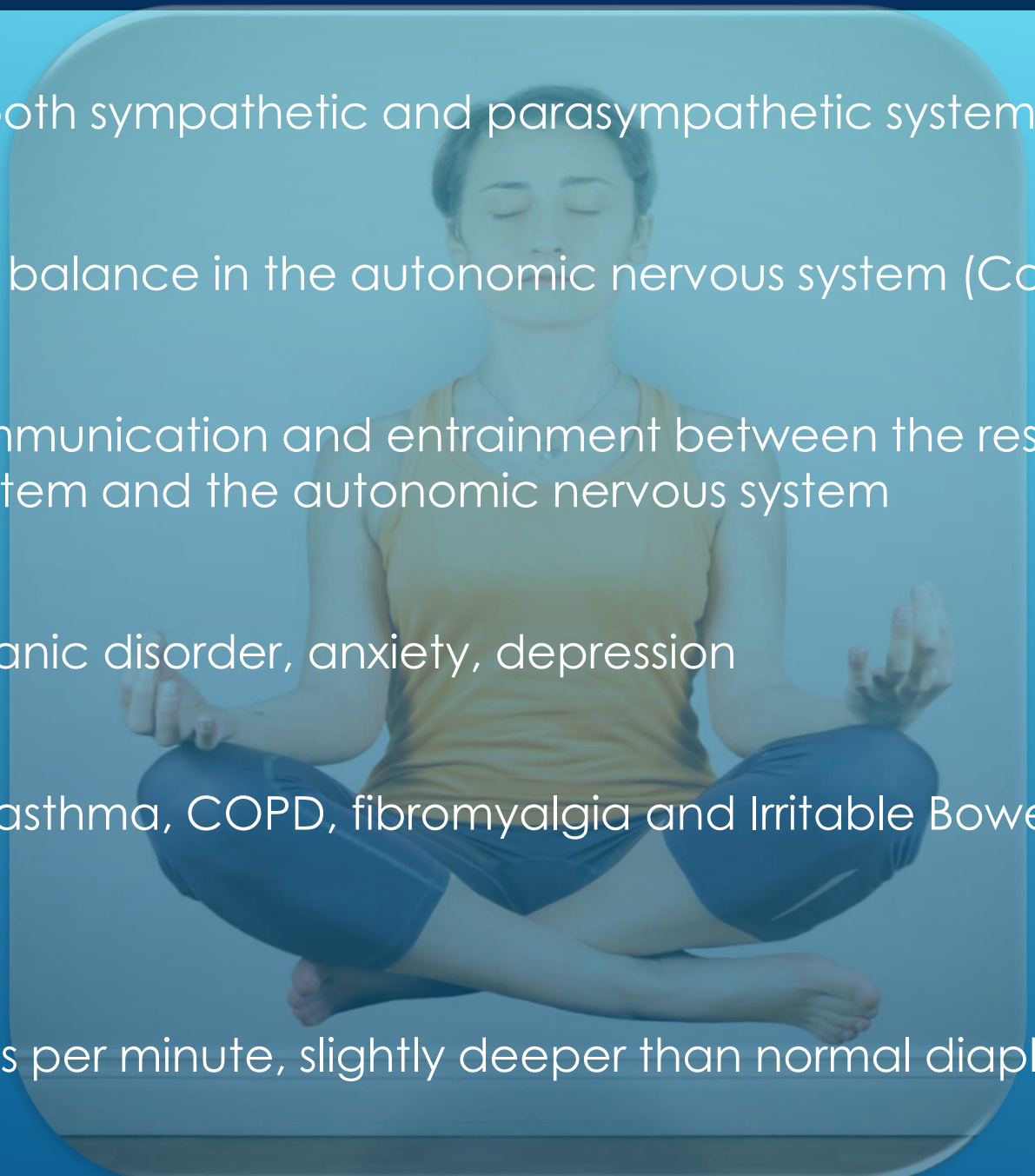
- Claims of curing 150 diseases

- First blinded control study was done in 1995 and published in 1998 with study showing decrease in hypertension and use of inhaler
- more specific studies done since

- 2015 Australia's Department of Health reviewed
  - No clear evidence of effectiveness
- Cochrane Review-no reliable conclusions
- 2014 British Clinical guideline-Evidence may be effective in asthma
- R. Courtney 2007 found there were exact opposite results to his claims in regard to end tidal CO2 volume

- 3-9 breaths per minute, slow and relaxed abdominal breathing
- Respiratory Sinus arrhythmias RSA is a variation in heart rate that accompanies breathing
- Heart rate increases with inspiration and decreases with expiration
- Respiratory Sinus Arrythmia (RSA) may sometime be used as an index for parasympathetic tone
- Breathing within the frequency band of 3-9x minute – low frequency heart rate variability

RESONANT FREQUENCY BREATHING



- Affected by both sympathetic and parasympathetic systems
- Can produce balance in the autonomic nervous system (Courtney)
- Promotes communication and entrainment between the respiratory system, circulatory system and the autonomic nervous system
- Reduce BP, panic disorder, anxiety, depression
- Beneficial for asthma, COPD, fibromyalgia and Irritable Bowel Syndrome (IBS)

Technique

- 5.5 breaths per minute, slightly deeper than normal diaphragmatic breathing

ALTITUDE TRAINING FOR ATHLETES

https://www.outsideonline.com/2035956/maximizing-your-hypoxic-training-mind-gap
Photo: Ryan Smith/Flickr

ALTITUDE TRAINING

Cardiovascular Effects of Altitude on Performance Athletes Shah and Coplan 2016

- Benefits and harms
  - Possible right ventricular dysfunction and pulmonary hypertension
  - 10% pulmonary hypertension and pulmonary edema with possible long term consequences
  - No increase risk of ventricular arrythmias
  - Increase in cortisol production
  - Can only train at 40% of VO2 max at 4000 feet so detraining can occur
  - Negative effect on the immune system
  - Loss of muscle mass due to increased metabolic rate

"Live high, train low"

Just Breathe 101 Program

You have completed Breathing Retraining Theories

- Mechanics of the Region
- Function of Respiration
- Physiology of Respiration
- Altered Breathing and Somatic Dysfunction
- Altered Breathing Effects on the Spine and Trunk
- Sleep Apnea

IN CLOSING