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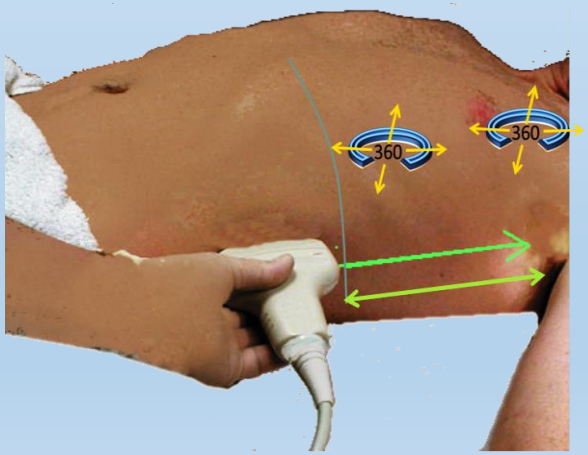
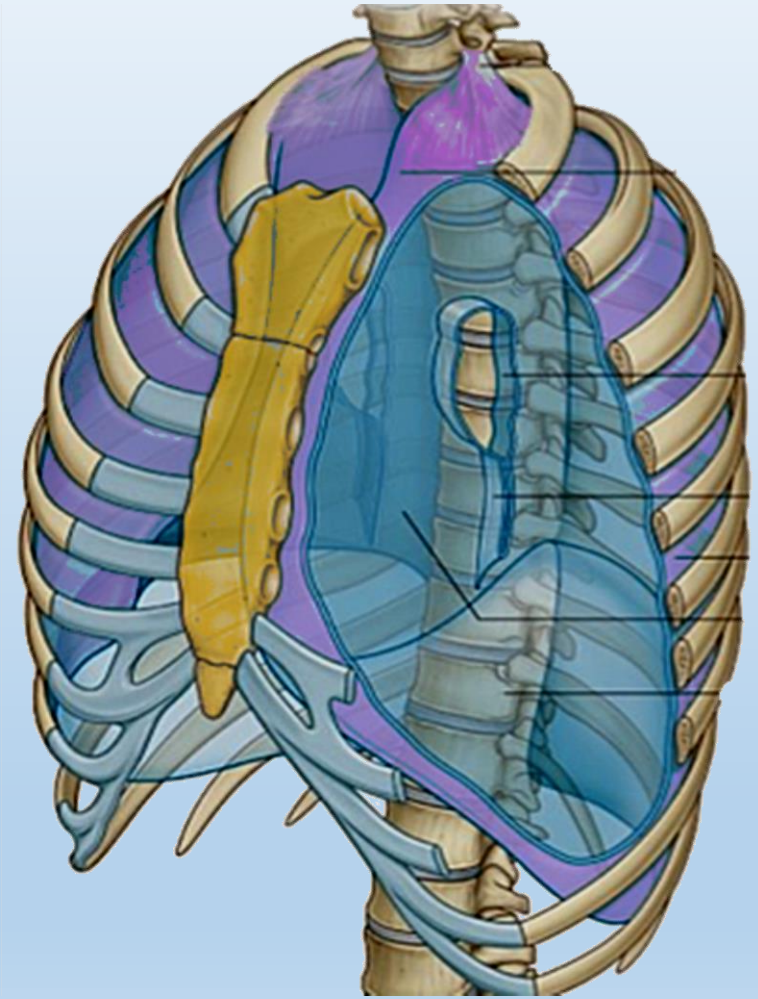
Osteopathic European Academic Network

Open Forum ; "Innovation in Osteopathic Education"

SONOPALPATION OF PLEURA / BREATHING

-introduction & workshop



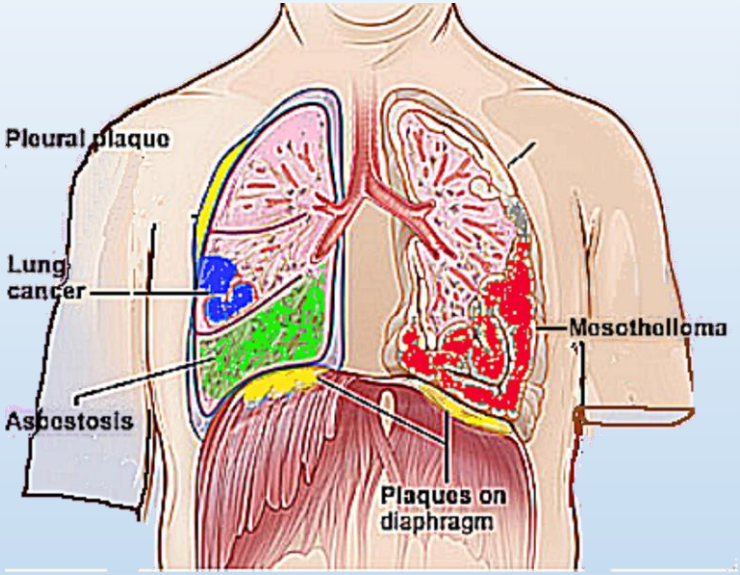


jouko.heiskanen@metropolia.fi

Introduction

Disorders of breathing and continence have a stronger association with back pain than obesity and physical activity.
This relationship may be explained by physiological limitations of co-ordination of postural, respiratory and continence functions of trunk muscles.

Smith MD, Russell A, Hodges PW (2006): ***Australian Journal of Physiotherapy*** **52: 11-16**



pain, adhesions, atrophy, viscerospasm, reflection to visceral functions

The effects of respiratory-muscle exercise on posture:
The spinal curvature was significantly different in the ex group, indicating a decrease in the thoracic (-13.1%, $p < 0.01$) and lumbar (-17.7%, $p < 0.05$) angles. The ex group presented with lower thoracic (-8.6%) and lumbar (-20.9%) angles at postexercise than the control group ($p < 0.05$), after 4 wk in the ex group ($p < 0.05$).

Obayashi H, Urabe Y, Yamanaka Y, Okuma R. Journal of Sport Rehabilitation 2012 Feb;21(1):63-68

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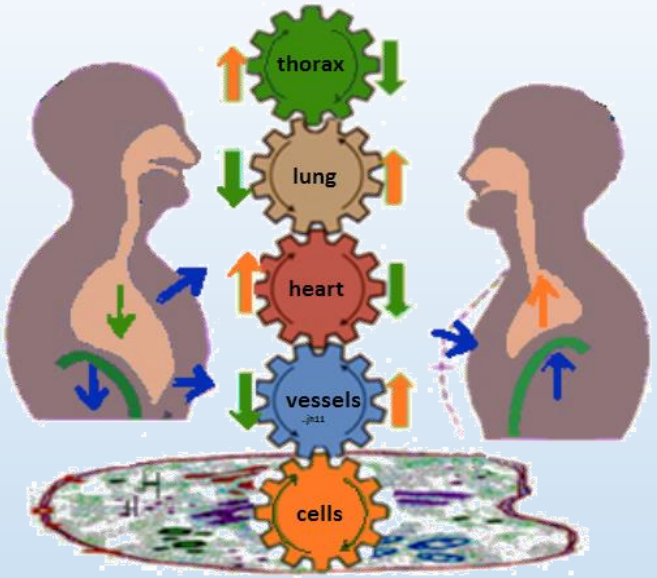
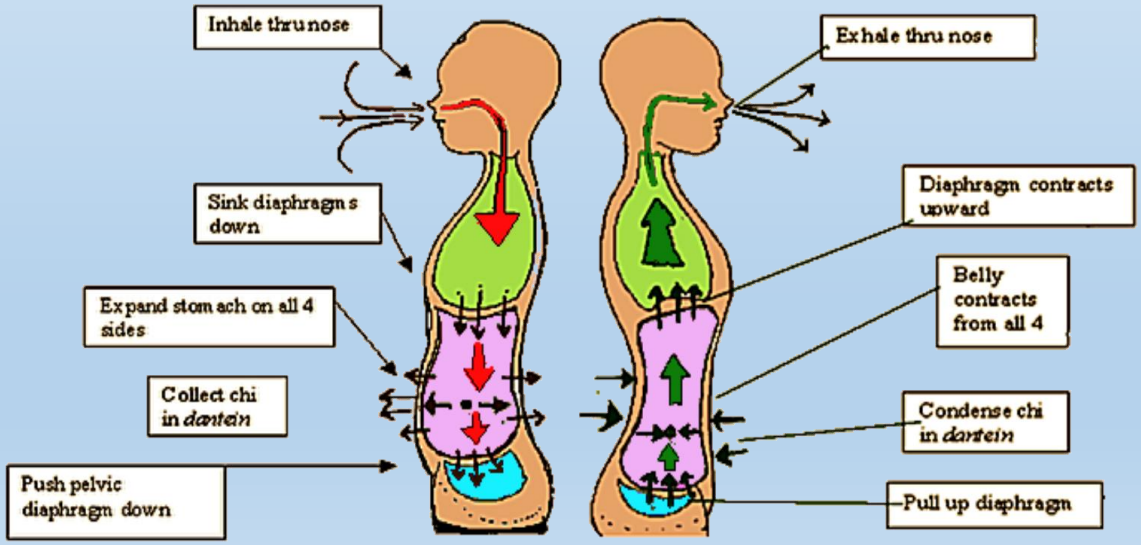
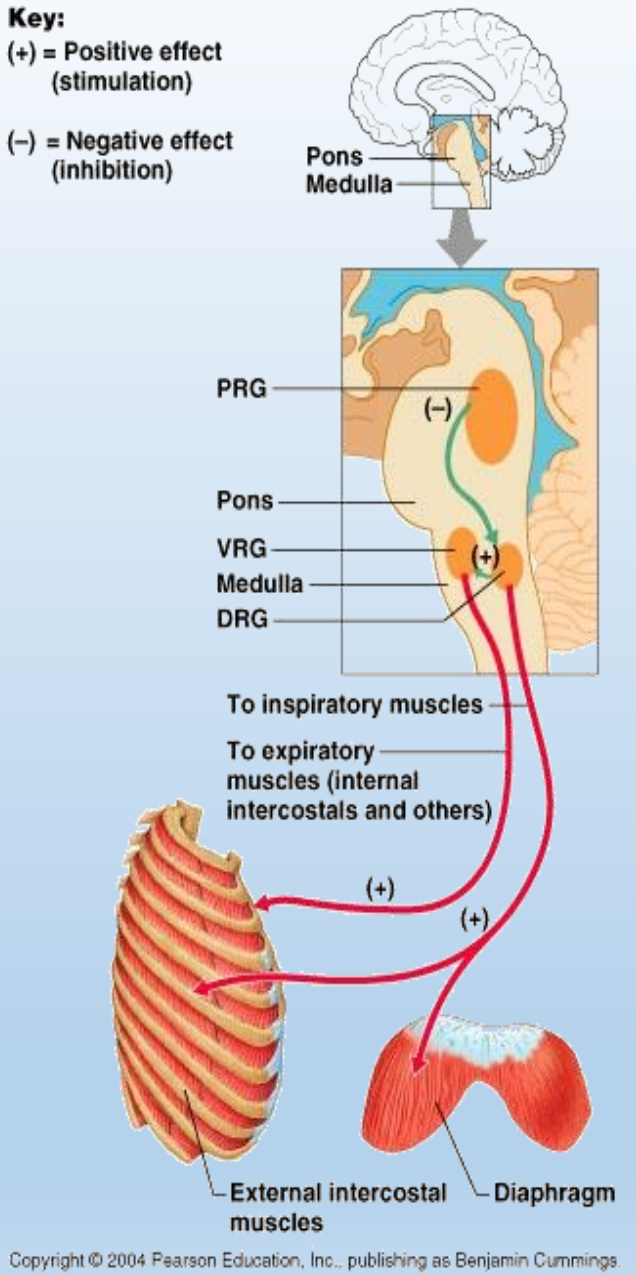


"Buddhist Breathing" or "Post-Birth Breathing"





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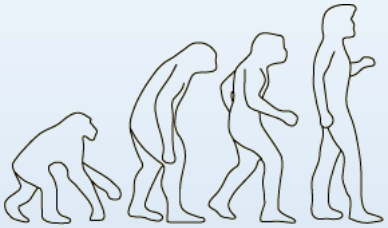
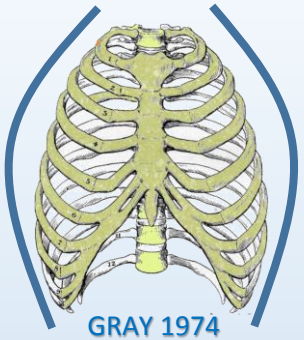
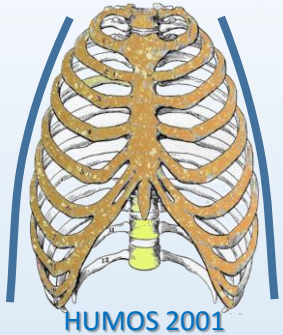
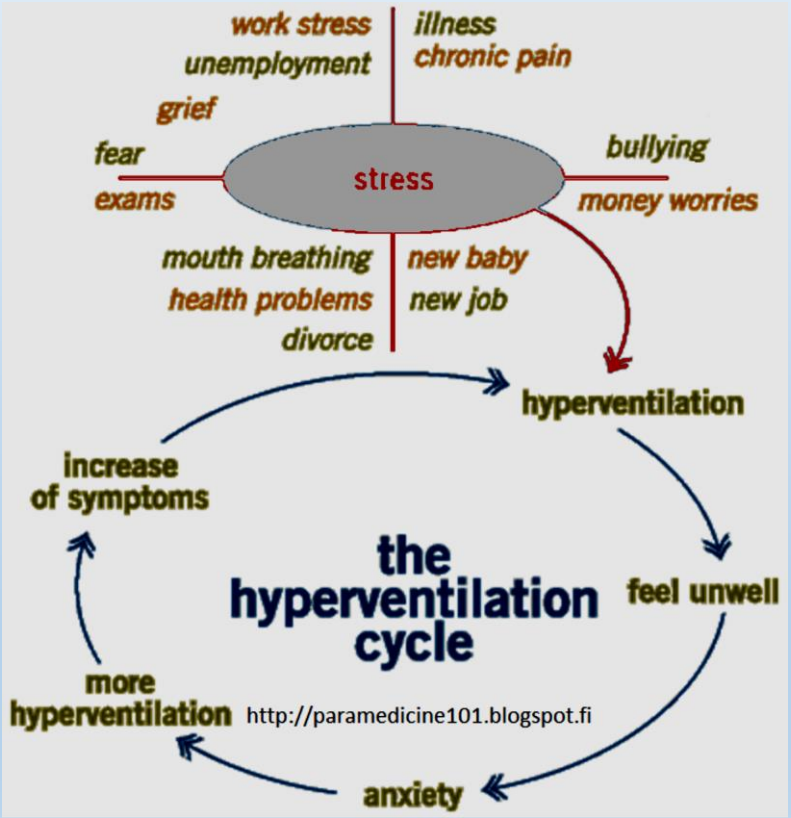
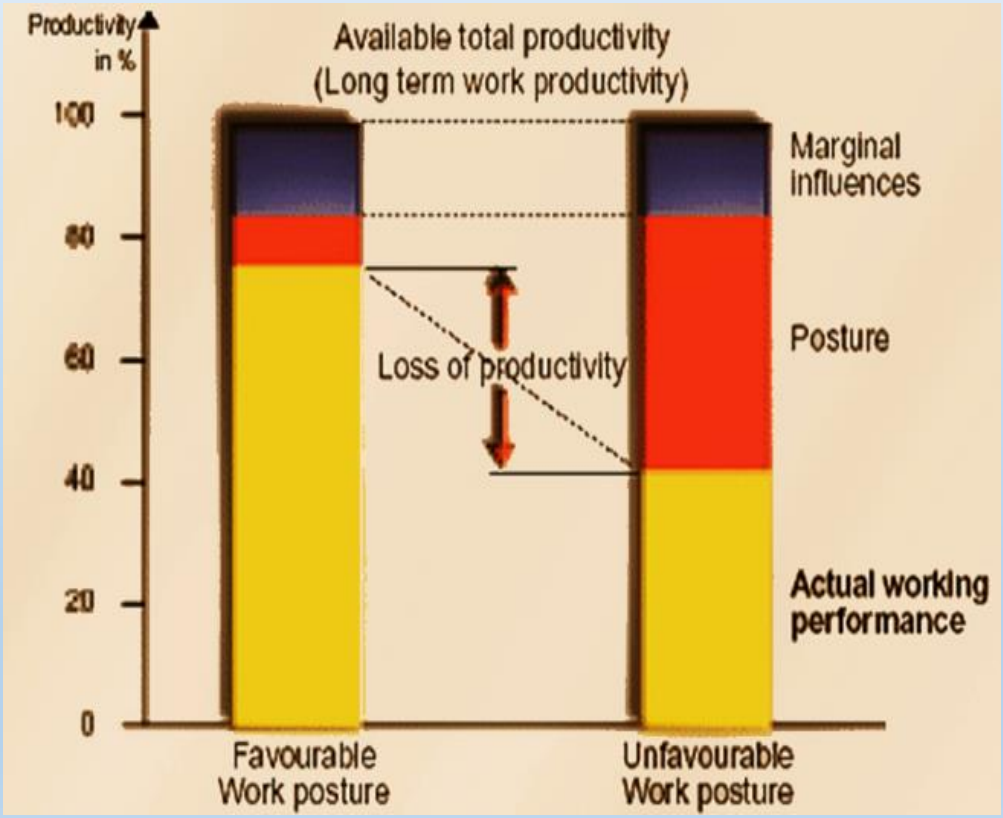
Perhaps we are just in an unfavorable stage of our evolution




GRAY 1974


HUMOS 2001





medicinexplained.blogspot.com

http://www.contactcenterworld.com/

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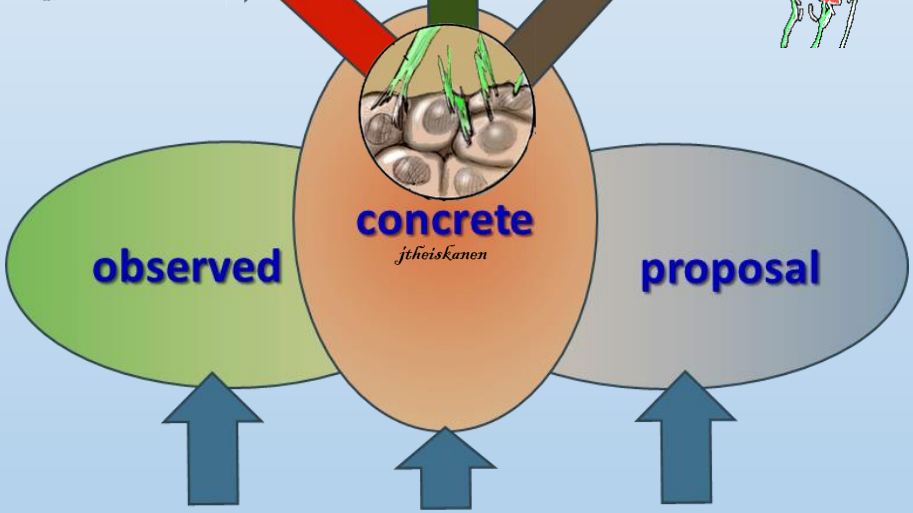
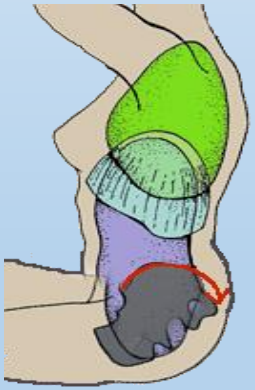
PRODUCTION

BREAKDOWN

RESTORING





reception

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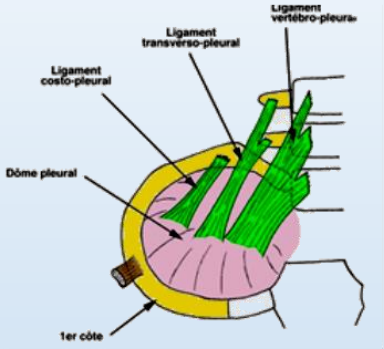

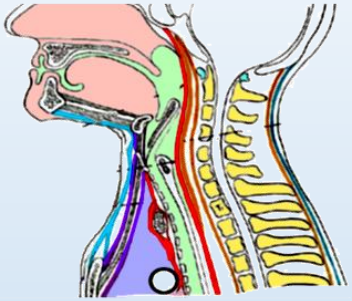

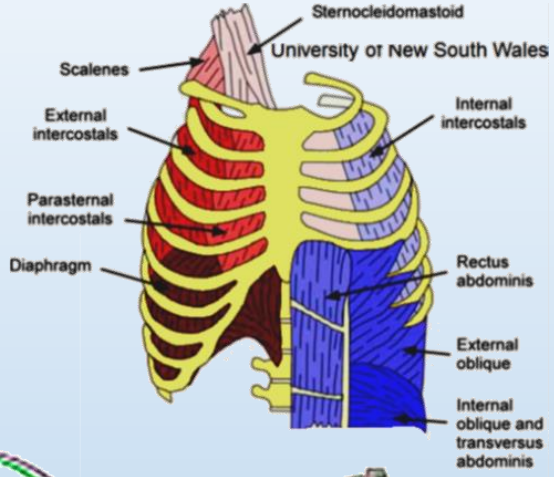

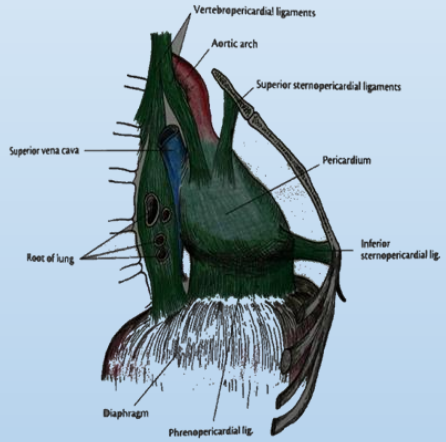

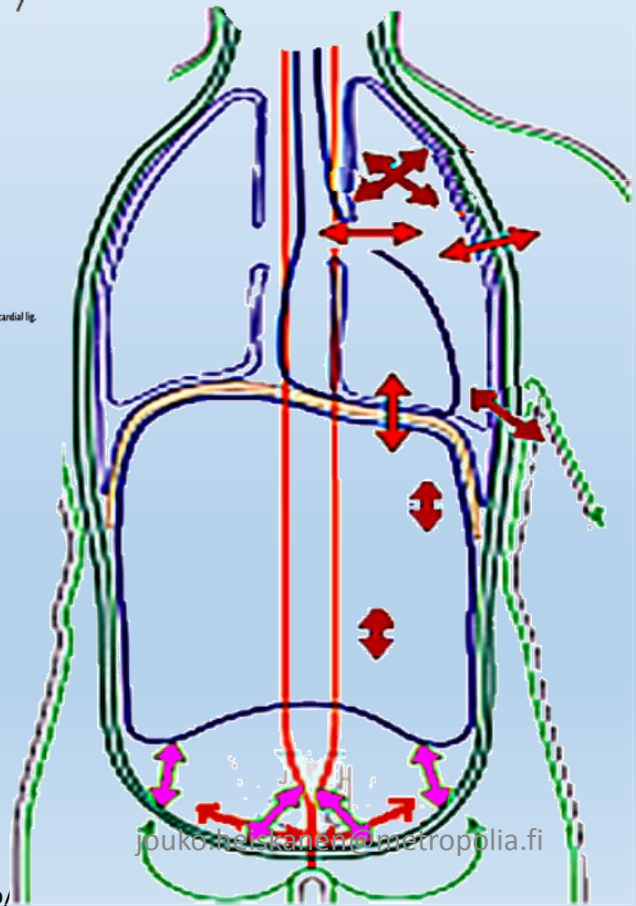

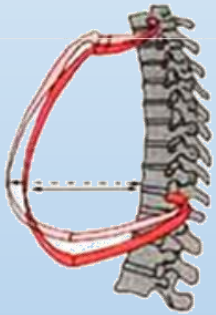

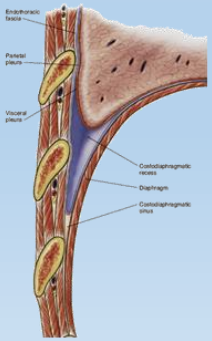

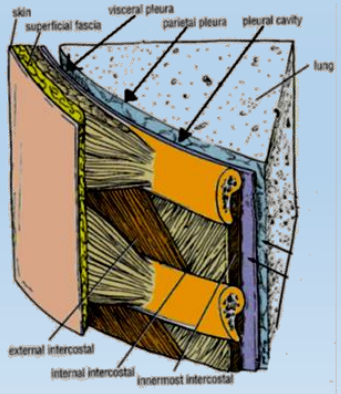

http://academic.amc.edu/martino/

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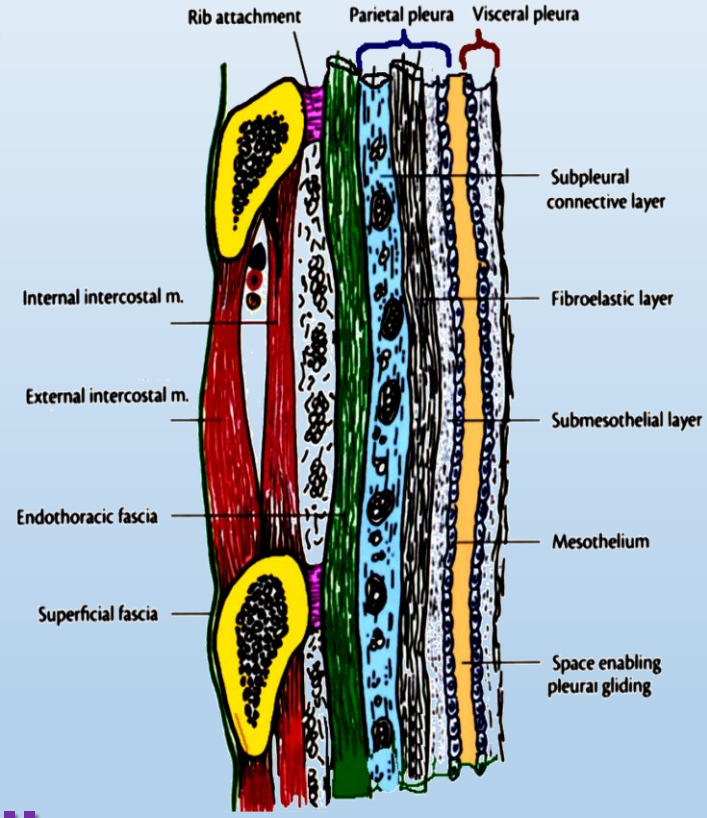
Parietal Pleura

Lines inside of the thoracic cavities.
Subdivided into the costal, mediastinal and diaphragmatic parietal pleura.
Thickness: 20-25 um.
Consist mesothelial cells & loose conn. tissue, capillaries, lymphatic lacunas.
Systemic circulation



Visceral Pleura

Covers the lung parenchyma interlobar fissures.
Consist mesothelium & dense connective tissue.
Provides mechanical support to the lung.
Limits lung expansion, protecting the lung.
Thickness: 25-83 um.
Systemic circulation.

Between layers 15 ml, serous, clear fluid for ubrication. Get easily metastasis

Mesothelial Cells

Very active cells. **Dynamic** cellular membrane. Transport of fluid and particulates. Leukocyte migration. Synthesis of cytokines, growth factors, and extracellular proteins.

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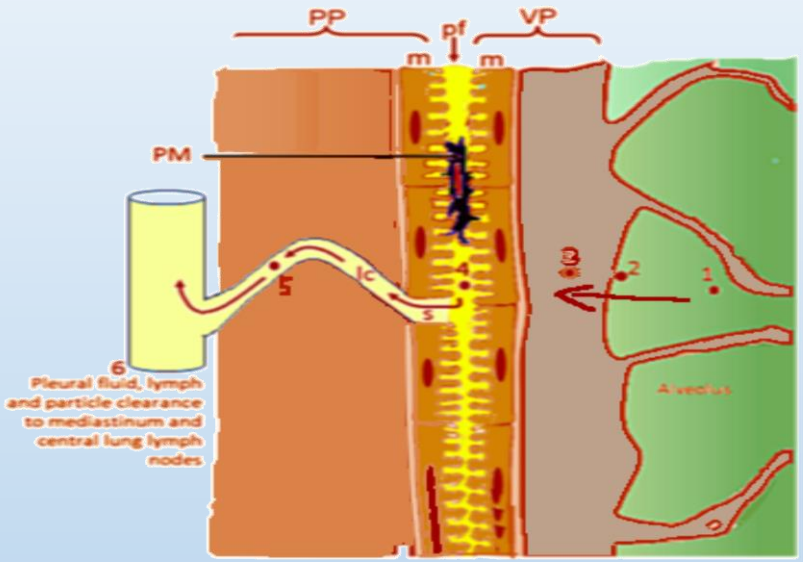
Diagrammatic representation of the relationship between the visceral and parietal pleurae.

the visceral pleura (VP)
the parietal pleura (PP)
the pleural space & pleural fluid (pf)



Contact between the 2 pleurae is made via

the mesothelial cell layers (m)

In the pleural space the can be

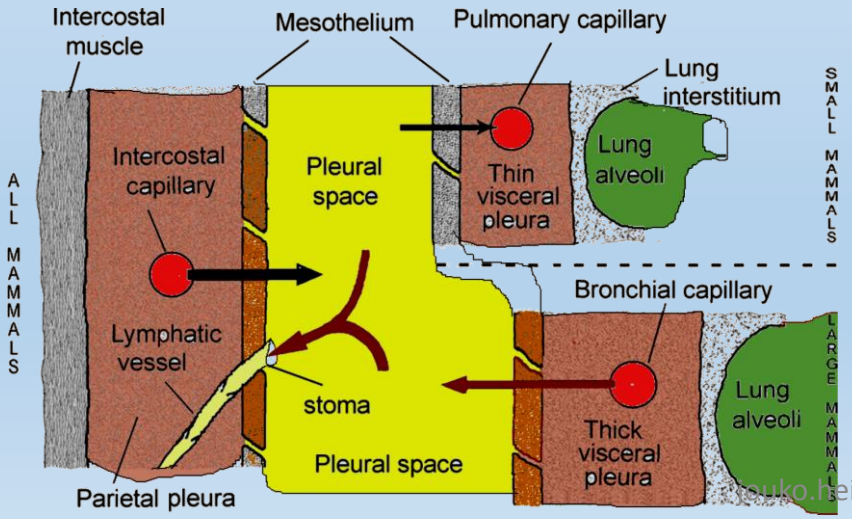
the pleural macrophages (PM)

The pathway for particles to reach the pleural space ?

an airborne particle (1) that deposits in
the distal alveoli (2) is shown as it passes into
the interstitium (3) enters
the pleural space (4) and

Particles exits the pleural space through

the parietal pleura (s)
into a lymphatic capillary (lc, 5)
the lymph nodes in
the mediastinum
central lung.



Donaldson *et al. Particle and Fibre Toxicology* 2010 **7**:5 doi:10.1186/1743-8977-7-5

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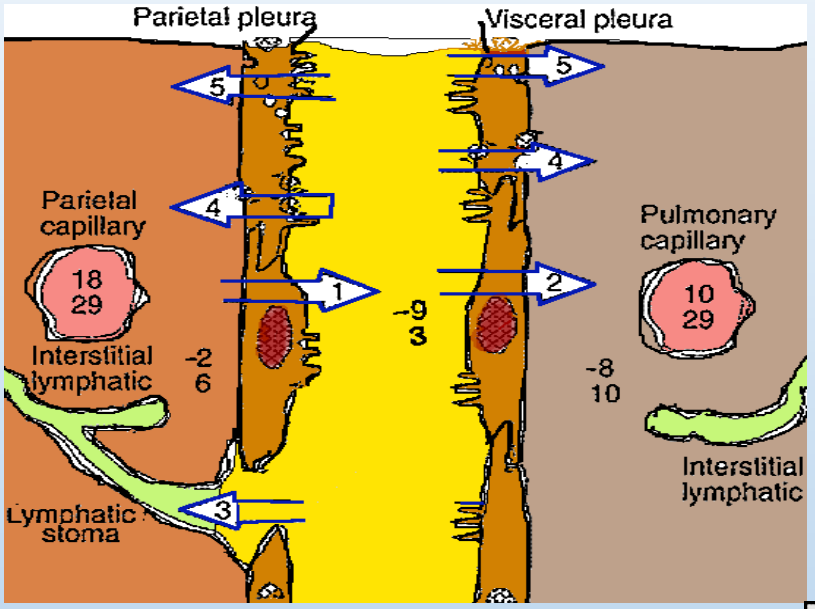
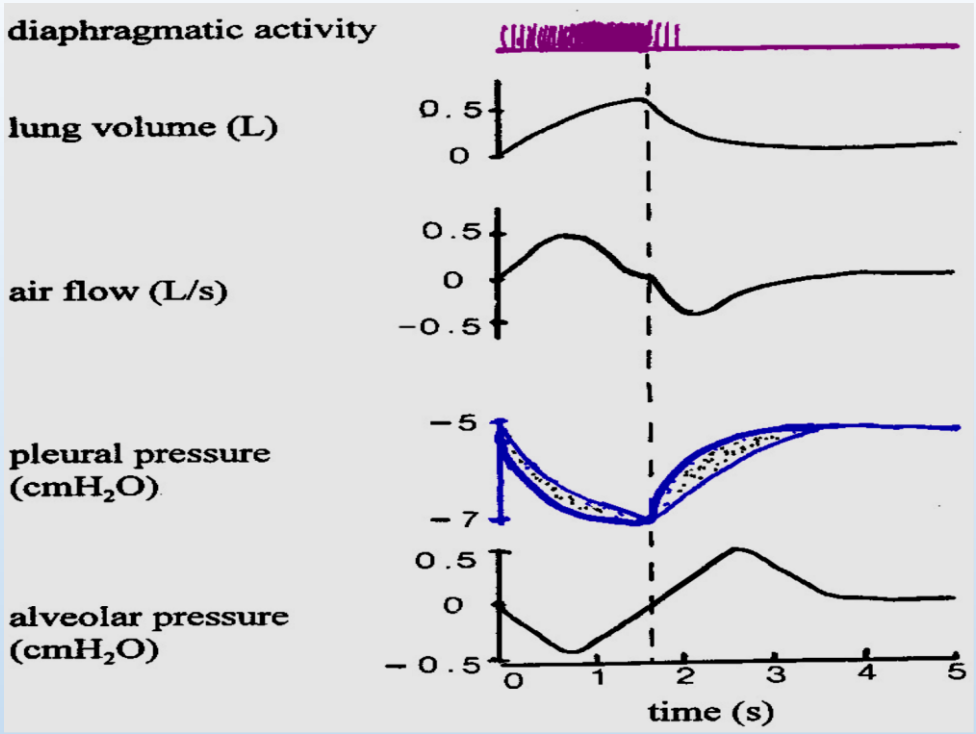
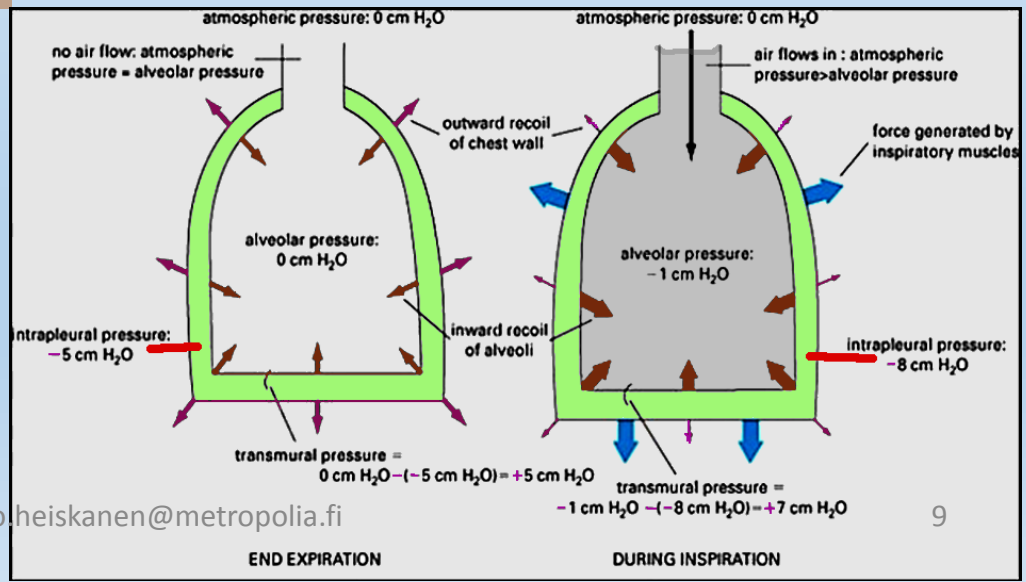




www.medicinemcg.com

1: Starling filtration at the parietal pleura (estimate: ~0.15–0.20 mL·h^{-1}·kg^{-1});
2: Starling absorption at the visceral pleura (estimate: ~0.1 mL·h^{-1}·kg^{-1});
3: direct drainage through lymphatic stomas (estimate : ~0.07 mL·h^{-1}·kg^{-1});
4: electrolyte-coupled liquid outflow (measured 30: 0.07 mL·h^{-1}·kg^{-1});
5: vesicular flow,liquid & protein transcytosis (estimates 0.02 mL·h^{-1}·kg^{-1}).



Eur Respir J 2002; 20: 1545–1558, DOI: 10.1183/09031936.02.00062102

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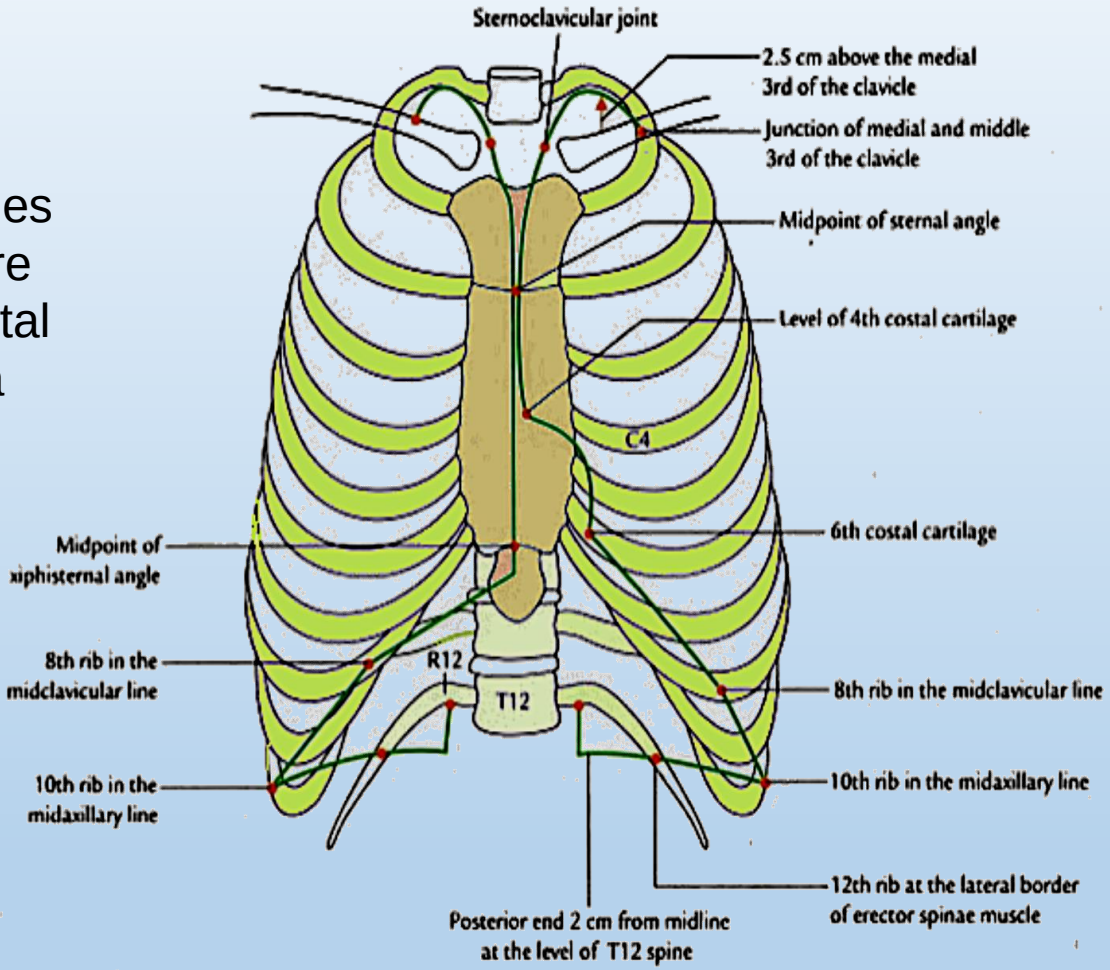
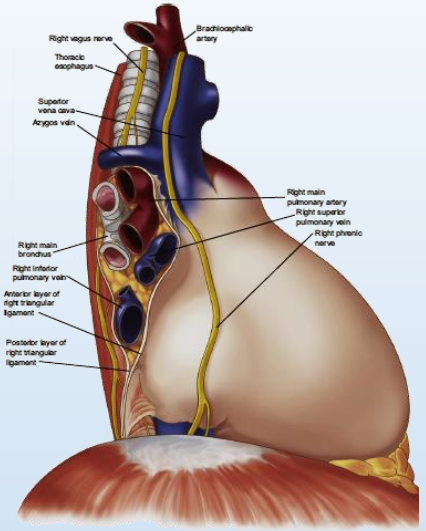
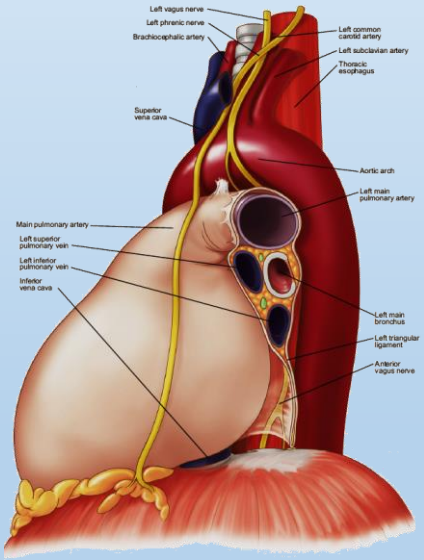
PLEURAL REFLECTIONS

The sternal lines of reflection are where the costal parietal pleura becomes continuous with the mediastinal pleura.







“”The costo-diaphragmatic lines of reflection occur where the costal parietal pleura joins the diaphragmatic pleura inferiorly, and the vertebral lines of reflection run in the paravertebral planes from the first to the 12th thoracic vertebrae””. **Anatomy of the Pleura: Reflection Lines and Recesses François Bertin, Jean Deslauriers**

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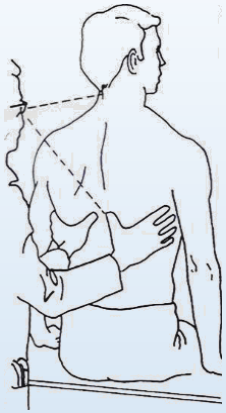
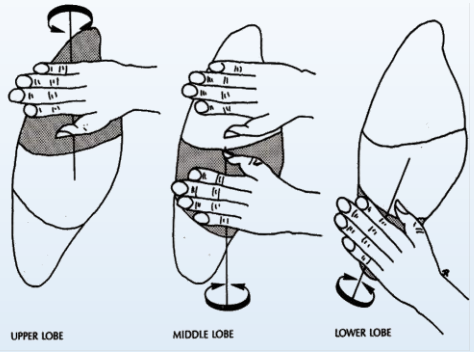
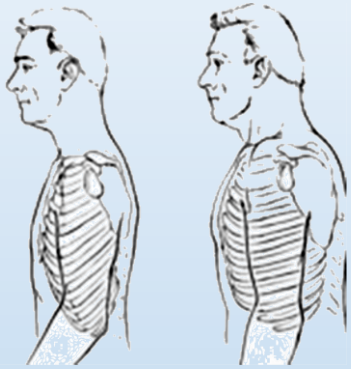
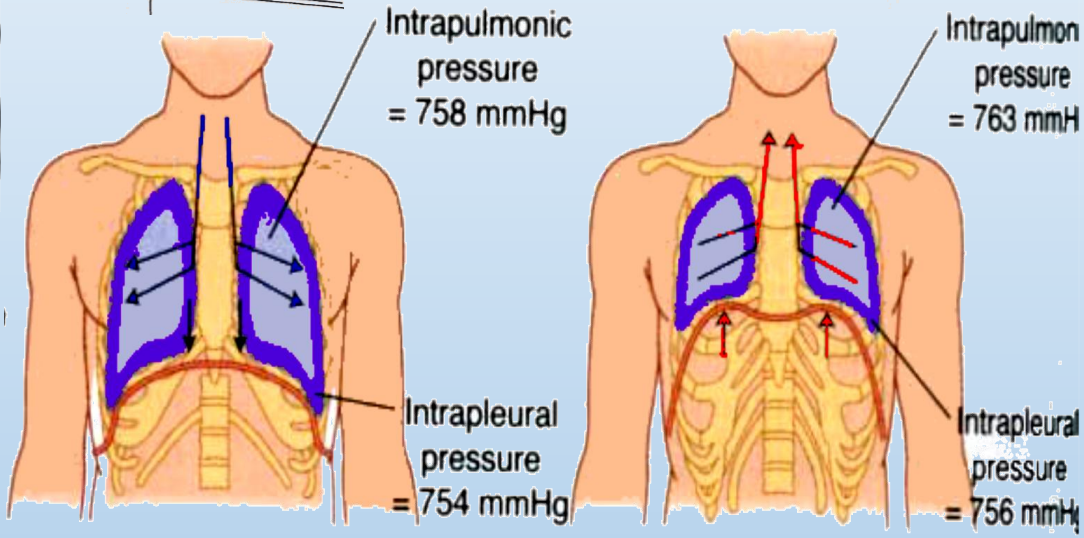


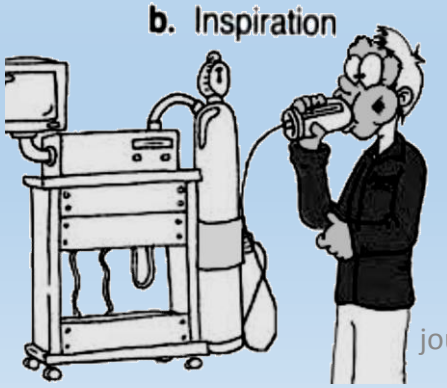


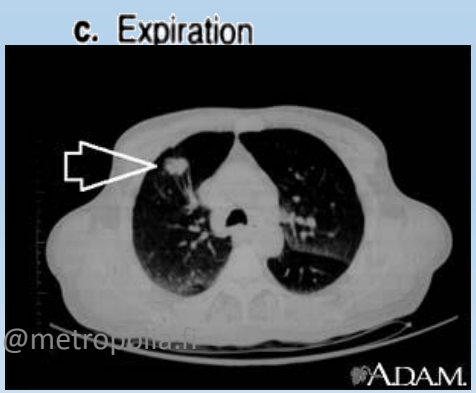




Changed motion
-cause & cosequence
-acute & chronic
-visceral & msk:tal
-compensation

Ventilation
-ampitude
-mobility
-axis
-reflection





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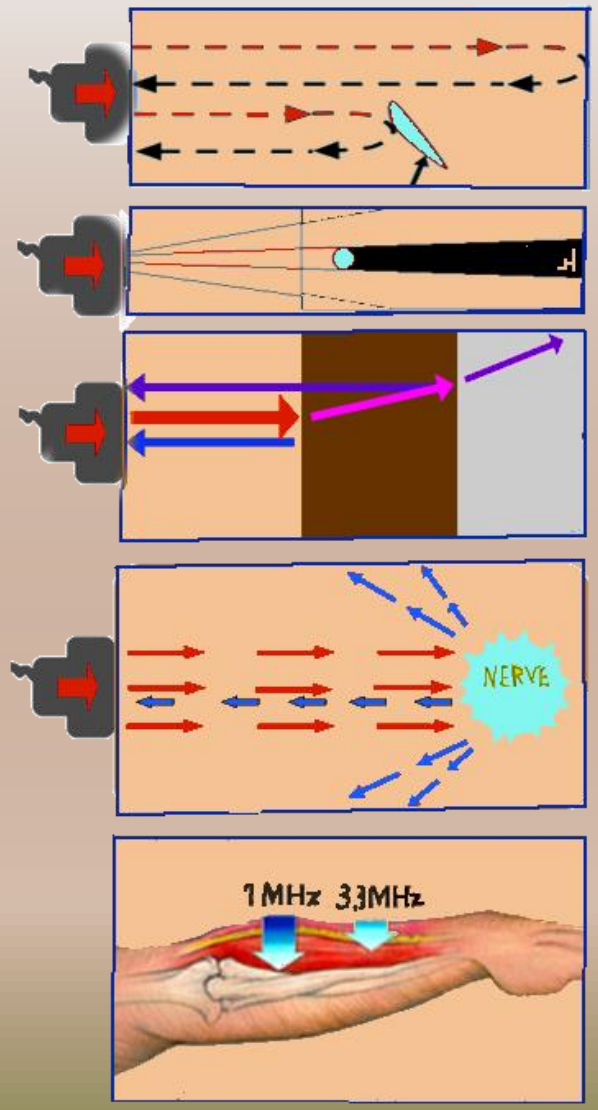


Ultrasound

use in radiologic
diagnosis
procedures
research / studies
use in Physiotherapy
-functional anatomy
-therapeutic exercise

Figure 1 Ultrasonography can have applications in clinical physiotherapy and in anatomy teaching while maintaining professional boundaries Comerfort/Heiskanen

Stokes M, Rankin G, Newham DJ Ultrasound imaging of lumbar multifidus muscle: normal reference ranges for measurements and practical guide on the technique. *Manual Therapy* 2005; 10:116-126
Whittaker JL, Elliott JM, Cook K, Langevin HM, Dahl HH, Stokes M, Teyhen DS Rehabilitative ultrasound imaging: understanding the technology and its applications. *Journal of Orthopaedics & Sports Physical Therapy* 2007; 37(8):434-449
Teyhen D Rehabilitative ultrasound imaging symposium, San Antonio, Texas, *Journal of Orthopaedic & Sports Physical Therapy* 2006; 36(8):A1-A17
Koppenhaver SL, Herbert JJ, Parent, EEC, Fritz JM Rehabilitative ultrasound imaging is a valid measure of trunk muscle size and activation during most isometric sub-maximal contractions: a systematic review. *Australian Journal of Physiotherapy* 2009; 55:153-169

jouko.heiskanen@metropolia.fi

+advantages
-disadvantages

+imaging positions
+modest price
+noninvasive
+biofeedback
+portable
-cavitation
-temp 1.5
(index)

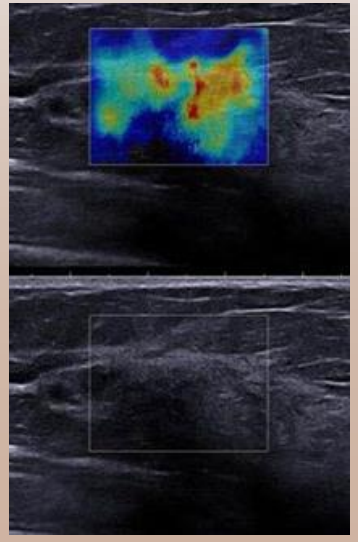
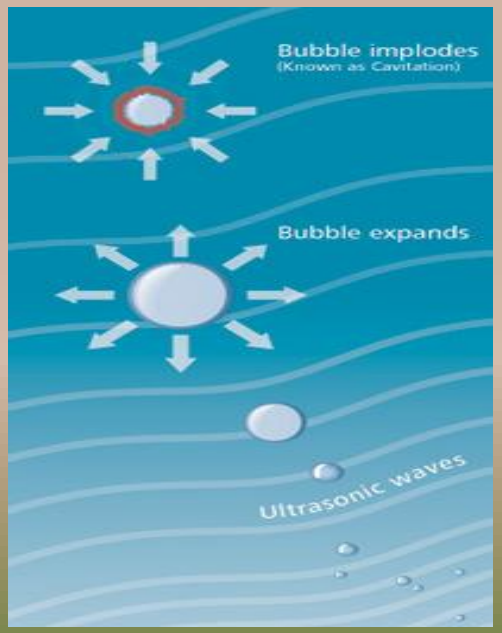


Figure 1 Ultrasonography can have applications in clinical physiotherapy and in anatomy teaching while maintaining professional boundaries Comerfort/Heiskanen



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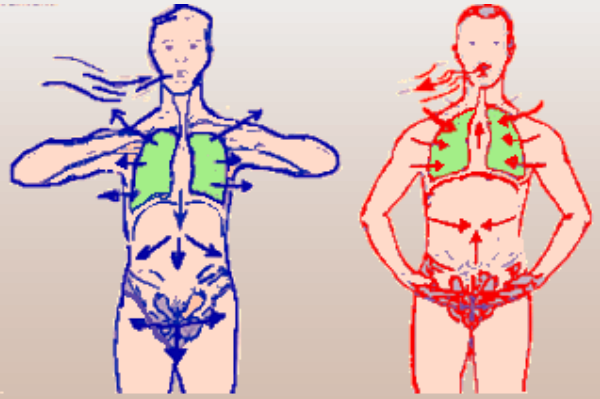
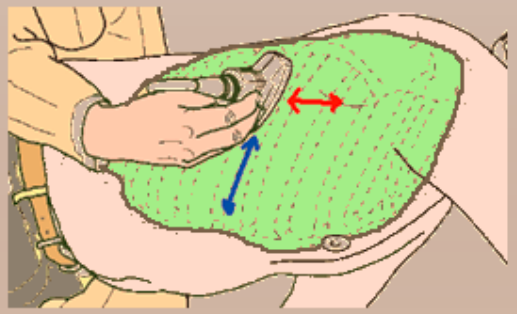
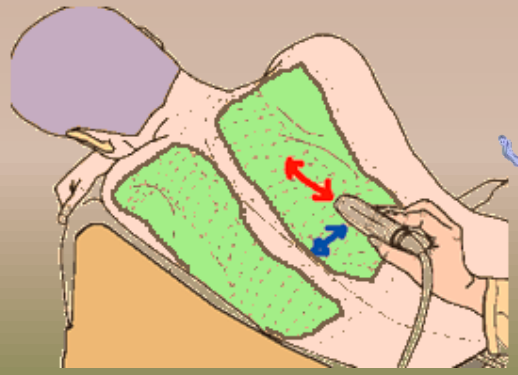


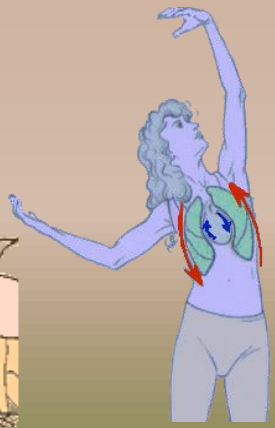
Ultrasound in osteopathic education

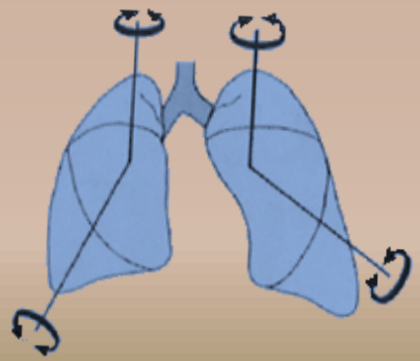
Figure 1 Ultrasonography can have applications in clinical physiotherapy and in anatomy teaching while maintaining professional boundaries Comerfort/Heiskanen

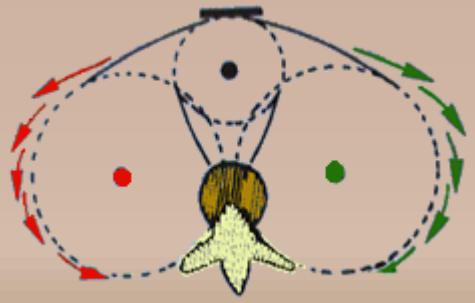
Pleural features, mobility
Pleural motion axis, amplitude
Breathing and visceral effects
Breathing and lymph/venous flow
Fascial tensegrity
Diaphragm and acc breath muscles











jouko.heiskanen@metropolia.fi

Kaneko H, Yamamura K, Mori S, Nagai Y, Yoshizumi K, Shimoda T Ultrasonographic evaluation of the function of respiratory muscles during breathing exercises. *Journal of Physical Therapy Science* 2009; 21 (2):135-139

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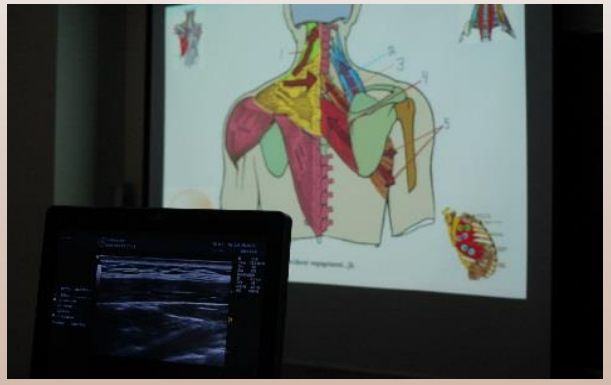
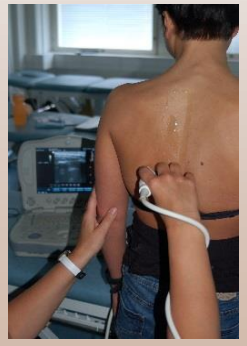


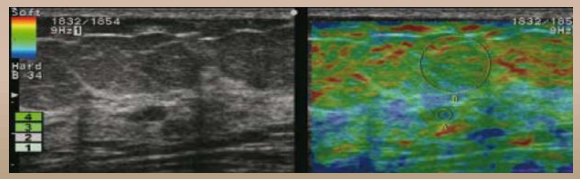


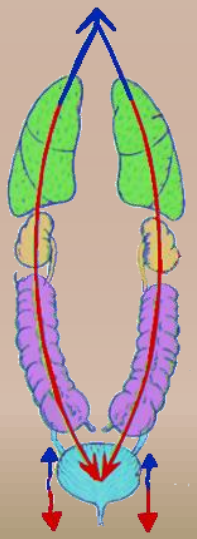
Ultrasound ”opportunity”

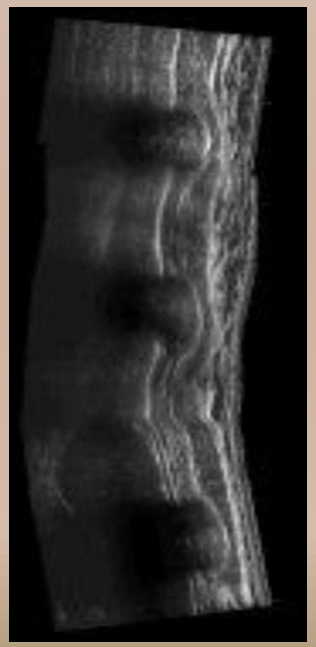
Figure 1 Ultrasonography can have applications in clinical physiotherapy and in anatomy teaching while maintaining professional boundaries Comerfort/Heiskanen

Radiologist evaluate

-intramuscular fibrosis
-pleural effusion
-lung cancer
-…….







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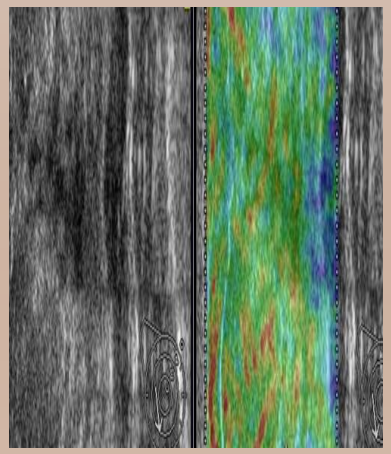
Ultrasound in science



-Musculoskeletal
-Neural tissue
-Breathing
-Circulation

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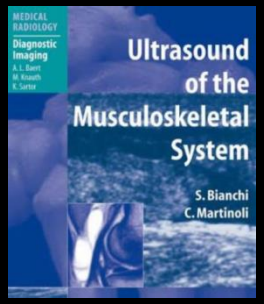
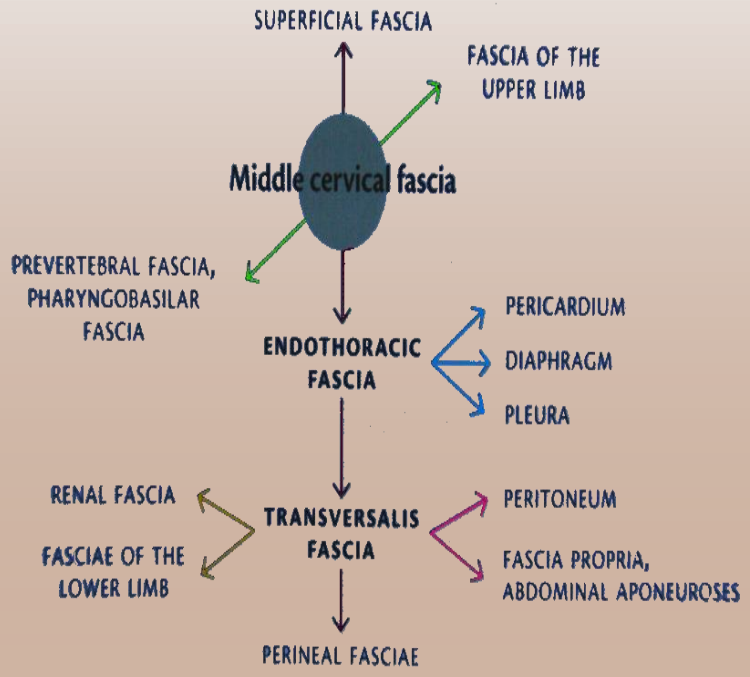
Echo

-equal
-anechoid
-hypoechoid
-hyperechoid
-hyporeflective
-hyperreflective
-acustic shadow





RUSI

Rehabilitative UltraSound Imaging

"A procedure used by therapists to evaluate muscle and related soft tissue **morphology and behavior during physical tasks.** This includes providing feed-back to the patient and therapists to improve clinical outcomes".

Mark Comerford BPhty, Director of Movement Performance Solutions, UK, Principal at Performance Rehab, Qld;
Jouko Heiskanen MD, Pt, Lecturer, Metropolia University of Applied Sciences, Helsinki, Finland. **Soundeftect 3 ; 2012**

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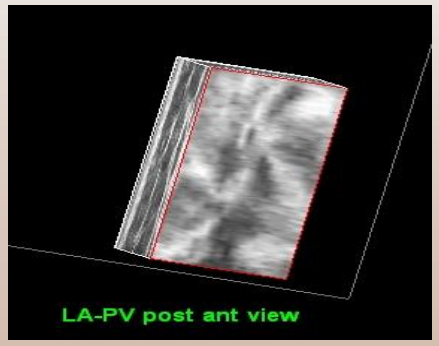
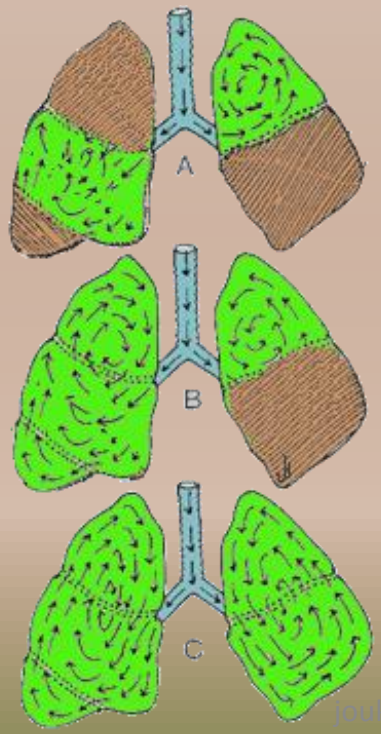


3D CC Carla Stecco it & jouko heiskanen fi



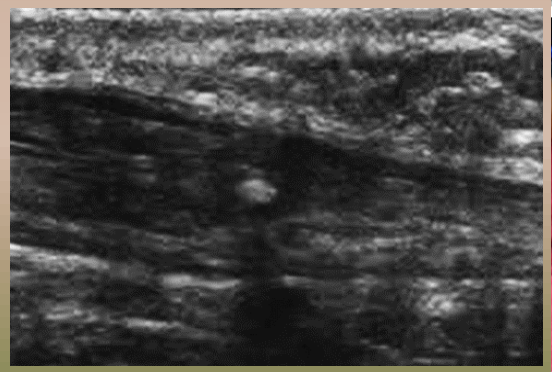
Musculoskeletal evaluation in education…

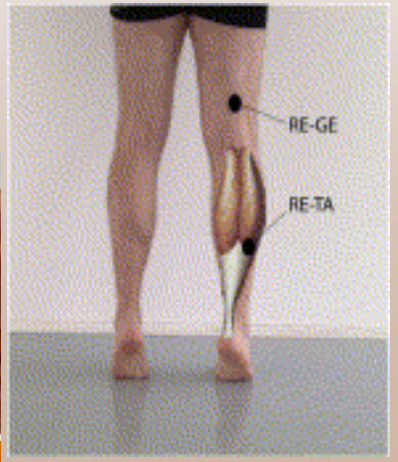
- from anamnesis to question
- from observation to clinical reasoning
- from relaxation to activation inhibition

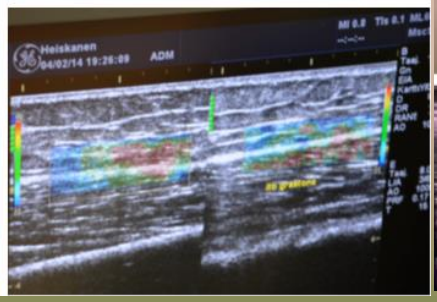
..visualization and recruitment

- postural proprioception
- postural control
- optimal motor control
- power and endurance
- relaxation and inhibition
- effects of orthotics, taping

http://www.essr.org/html/img/pool/ankle.pdf







Journal of Bodywork and Movement Therapies

Could ultrasound and elastography visualize densified areas inside the deep fascia? 09 January 2014

Tuulia Luomala, PTa, Mika Pihlman, PTb, Jouko Heiskanen, MD, PTc, Carla Stecco, MDd