Published studies…

University of Hawaii | Elite Athletes

Significant increase in oxygen- carrying capacity of the blood

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Stanford University | Early-Stage Pre-Diabetes

Placebo-controlled significant improvement in blood glucose levels

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University of California San Diego | Chronic Pain

Significant: reduction in pain, weight loss, improved brain performance

Simple and Profound Mechanism of Action…

Exercise

Many Molecular Pathways are Stimulated by Physical Exercise

- **Changes in pressure**
- **Mitochondrial biogenesis**
- **Glucose metabolism (uptake/disposal)**
- **Lymphatic mobilization**
- **Hypoxia Inducible Factor (HIF-1α)**
- **Endothelial function/Cellular function**

CVAC Active Recovery & Brain Functionality…

- Improved sleep
- Stress reduction
- Mitochondrial biogenesis-Energy production
- Optimized glymphatic and lymphatic mobilization
- Improved glucose metabolism (uptake/disposal)
- Supports Gut-Brain Axis activity
- Supports cellular integrity

Why do we change pressure and vary the changes?
Cell Membranes are Piezoelectric - they respond to pressure

electronic-Liquid Crystal Communications April 10, 2007

Piezoelectricity of phospholipids:

A possible mechanism for mechano-, and magneto-receptions in biology

A. Jákli, J. Harden, C. Notz, C. Bailey

Liquid Crystal Institute and Chemical Physics Interdisciplinary Program,
Kent State University, Kent, OH 44242, U.S.A.

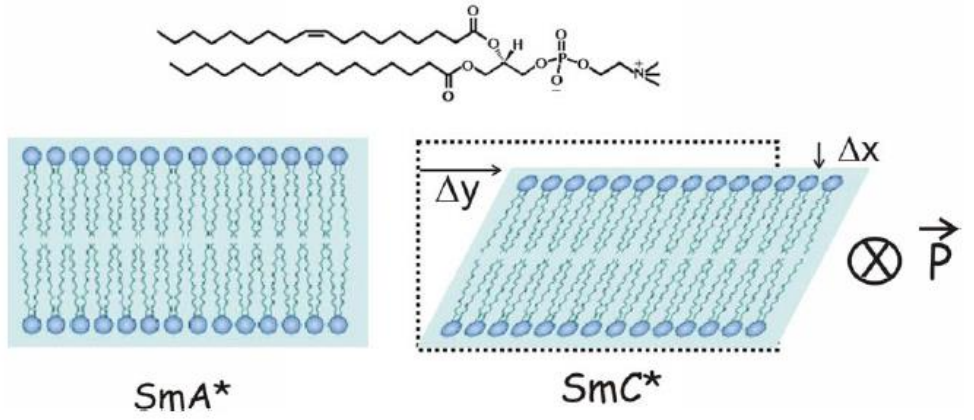

Figure 1: Illustration of the molecular structure of phospholipid L-α-Phosphatidylcholine and of the piezoelectricity of a lipid bilayer. A tilt of the average molecular orientation (director) with respect to the layer normal, induced by mechanical shear and/or layer compression, leads to a SmC configuration with polarization normal to the tilt (shear) plane.*

http://www.e-lc.org/tmp/Antal__J%E1kli_2007_04_09_12_01_56.pdf

Physical Exercise Induces Pressure & Voltage Changes on the Cell Membranes…

electronic-Liquid Crystal Communications April 10, 2007

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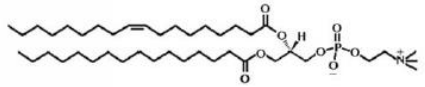

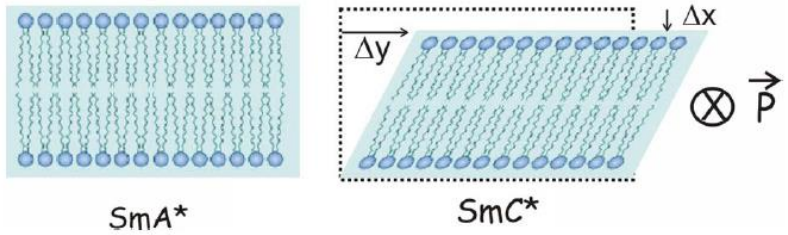

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Google:
Piezoelectricity of Cell Membranes Jakli

https://www.tandfonline.com/doi/abs/10.1080/02678290801905658?scroll=top&needAccess=true&journalCode=tlct20
http://www.e-lc.org/tmp/Antal__J%E1kli_2007_04_09_12_01_56.pdf

Voltage Changes On the Cell Membranes Produce Endogenous Nitric Oxide

ELSEVIER

Biochimica et Biophysica Acta 1757 (2006) 166–172

http://www.elsevier.com/locate/bba

Mitochondrial metabolic states and membrane potential modulate mtNOS activity

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Received 12 May 2005; received in revised form 17 February 2006; accepted 21 February 2006
Available online 20 March 2006

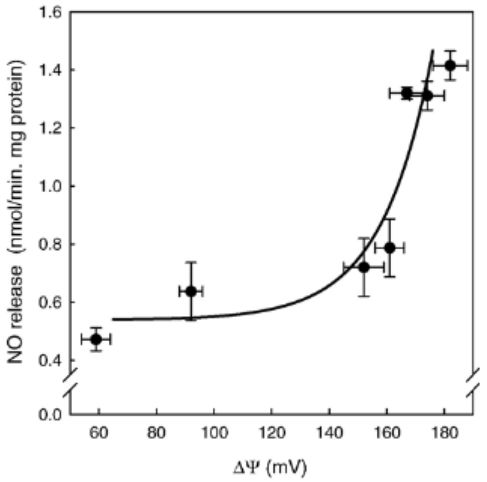
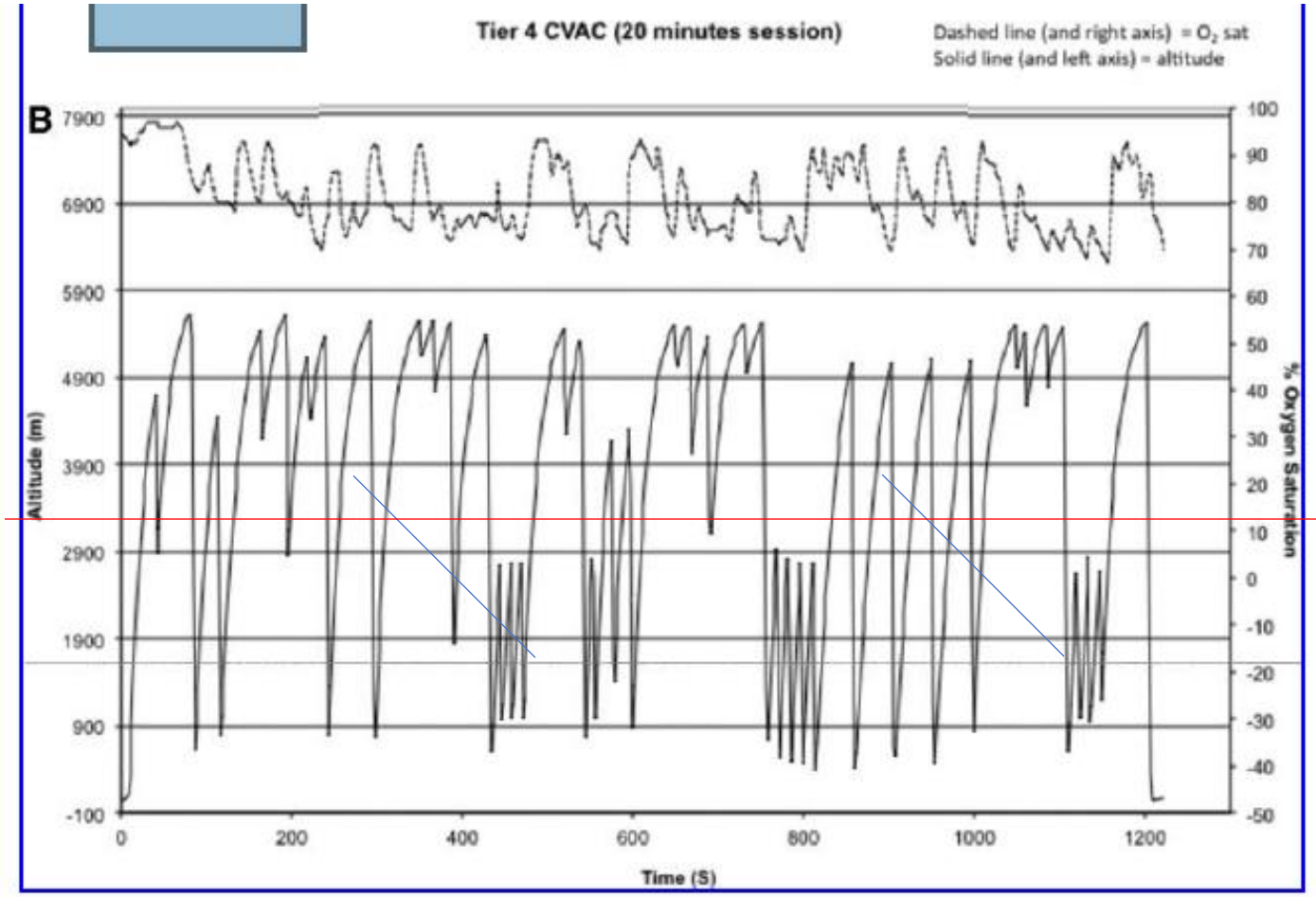


Fig. 3. Exponential relationship between membrane potential (Δψ) and NO release in liver mitochondria. Values are means±S.E.M. of mitochondrial NO release (in nmol NO/min mg protein) and Δψ (mV).

https://www.ncbi.nlm.nih.gov/pubmed/24028640

Hypoxia and Pressure Changes Similar to HIIT Training



Red line denotes elevations of Cusco, Peru, La Paz, Bolivia and Lhaso, Tibet

FIG. 1. **(A)** The CVAC device, and **(B)** simulated altitude of the CVAC device (meters; *solid line, left scale*) and the corresponding oxygen saturation (%, *dashed line; right scale*) in a single CHH subject during a T4 exposure session. Peak elevation is 5639 m (18,500 ft) and O_2 saturation drops as low as 68% over the course of 20 minutes. Time is in seconds (s).

HIIT is more effective than walking for mitochondrial biogenesis

https://www.sciencedaily.com/releases/2017/03/170307155214.htm

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5974531/

https://journals.physiology.org/doi/full/10.1152/ajpregu.00538.2010

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6763680/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6199482/

"Benefits that people don't think about", gained primarily through the deeper, more-effective breathing facilitated by CVAC Active Recovery Routines

- Blood flows into lungs easier
- Oxygenates the brain, supports proper clearance of metabolic waste
- Opens the vasculature
- Promotes circulation, lymphatic and glymphatic flow
- Relieves right side of heart from (over) work
- Promotes relaxation and sleep
- Encourages full oxygen exchange (oxygen in-carbon dioxide out)
- Supports digestion, assimilation of nutrients, energy production, waste removal
- Lungs can take in more air

Supporting the Gut-Brain Axis

- Sympathetic and parasympathetic arms of the autonomic nervous system are supported to work together, in balance
- Improved operation and efficiency of the digestive system
- Mechanical actions occur within the digestive tract during CVAC's proprietary cellular exercise routines
- Internal surfaces of the intestines receive a mild massage. This may tone the entire alimentary tract
- The digestive system is toned with continued usage.