



From Physiological Fatigue to
Peak Performance
- Technological Implications

Prof. Christina M. Spengler, PhD MD
Department of Health Sciences and Technology,
Exercise Physiology Lab

From Physiological Fatigue to Peak Performance - Challenges

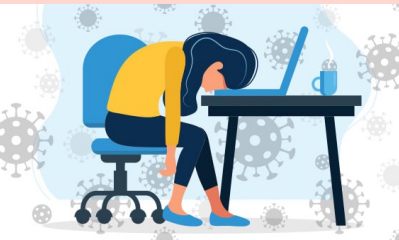
Limits to Performance



www.palmbeachchronocrossrunners.com



www.abendzeitung-muenchen.de



www.baptistjax.com

in health & disease



Search for individual limits

Measure & Model



Industry collaboration



Improve performance & health

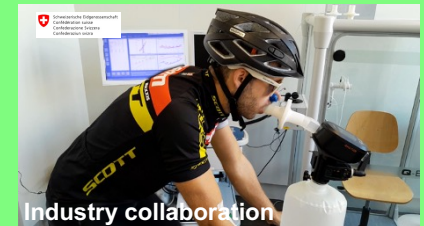
Develop & Optimize



www.ems-fitness.ch



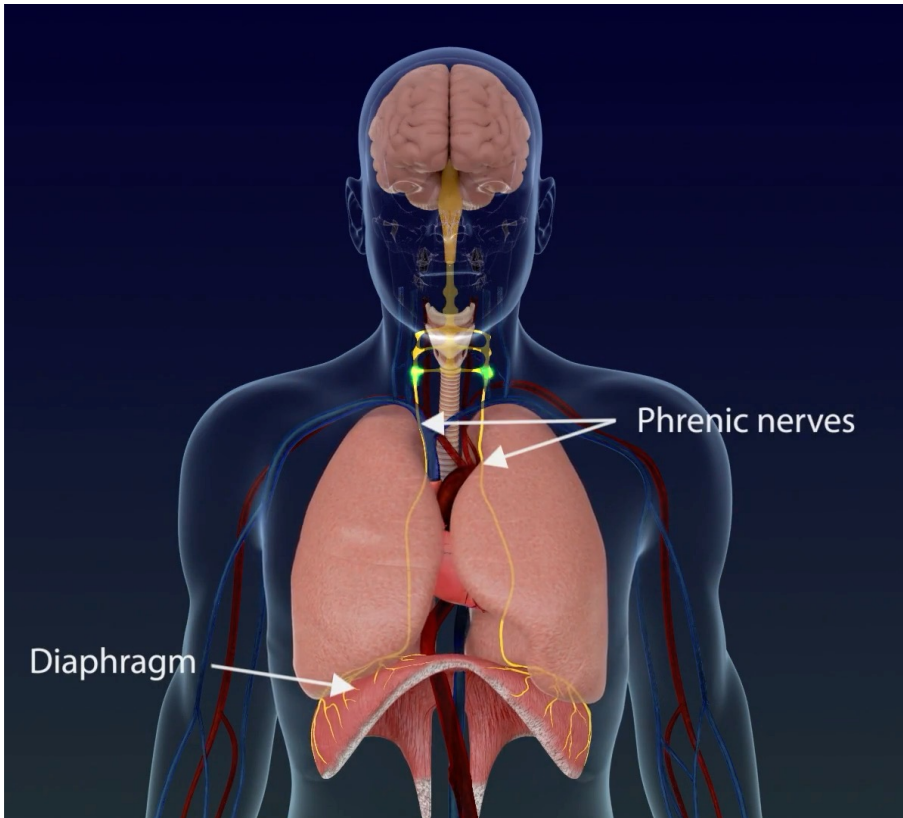
Industry collaboration



Industry collaboration

Optimize Performance of the Diaphragm

Spontaneous breathing (Diaphragm *active*)



Ventilator pushes air into the lung (Diaphragm *passive*)



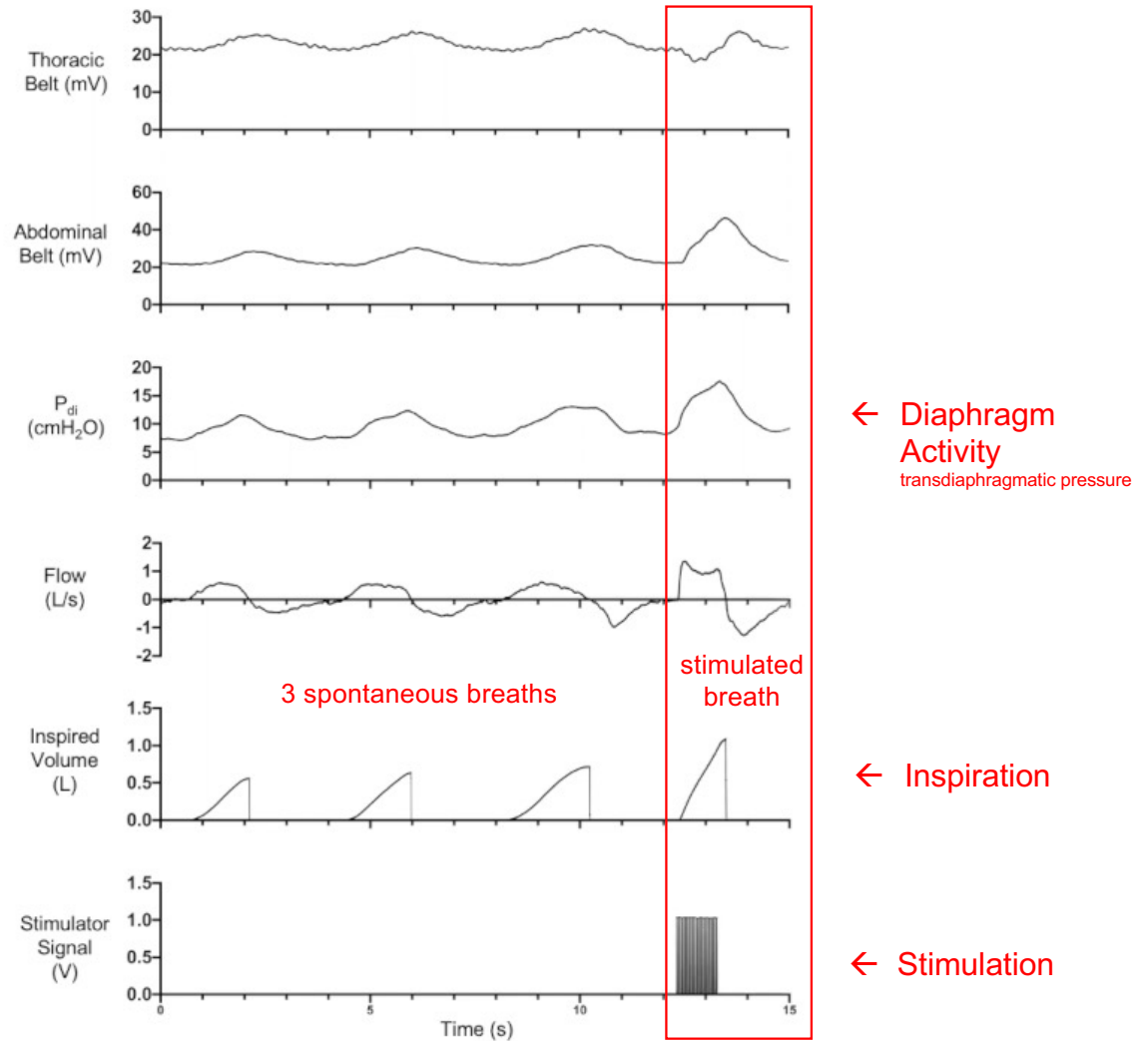
- Diaphragm atrophy (& risk of lung injury)
- Weaning difficulty

Optimize Performance of the Diaphragm by Stimulation

Single-train RMS_{BAMPS} Example



Three spontaneous breaths followed by one RMS_{BAMPS}-induced breath (25Hz, 1s, 20%)



Optimize Performance of the Diaphragm via Stimulation by STIMIT



Developed by STIMIT:
The new, specific
phrenic nerve stimulator
to activate the diaphragm
and reduce development of
atrophy during mechanical
ventilation!



Thank you for your attention!

Professor Christina M. Spengler
christina.spengler@hest.ethz.ch

ETH Zurich
Department of Health Sciences and Technology
Exercise Physiology Lab
Winterthurerstrasse 190
8057 Zurich, Switzerland