

Why a presentation on immersion pulmonary edema, IPE, now?

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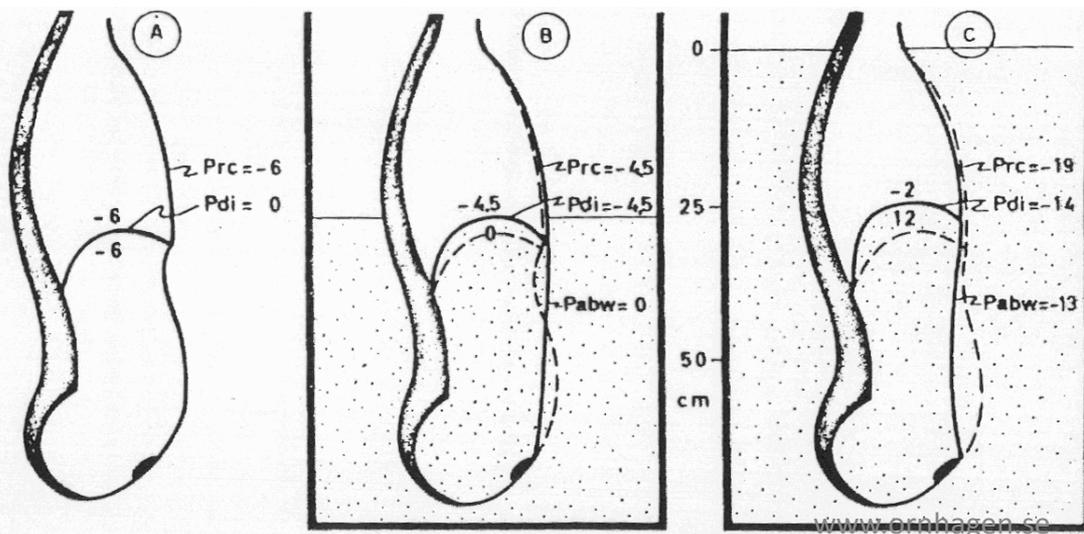
A presentation at PADI Forum, Gothenburg March 17th, 2019

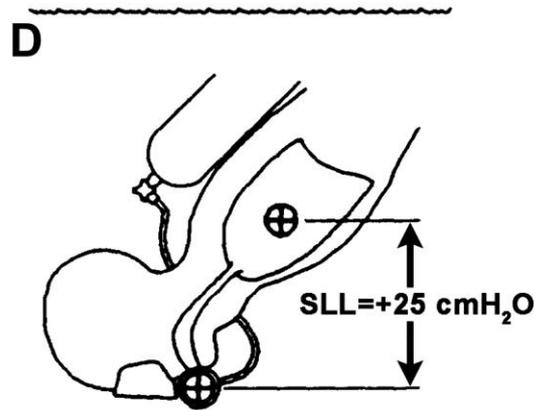
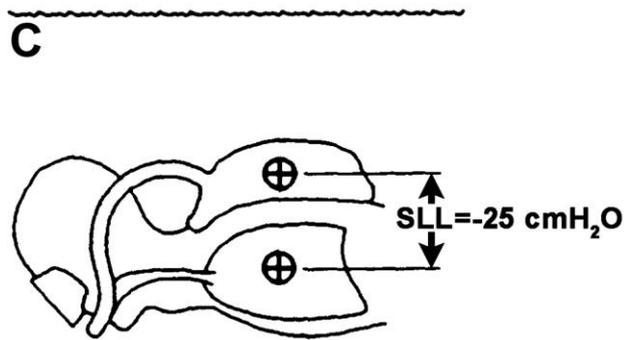
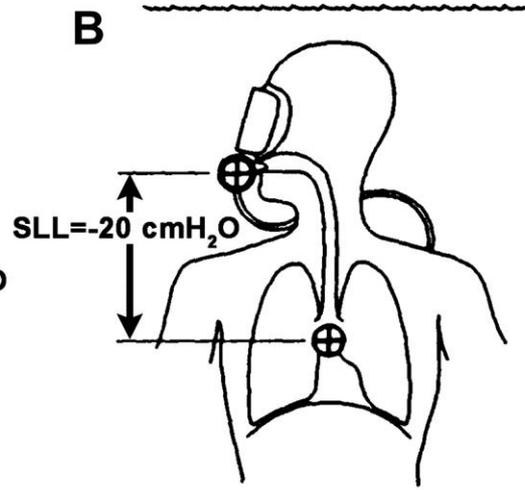
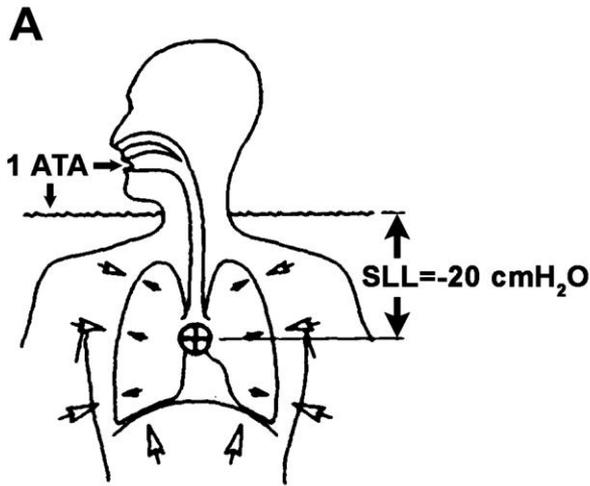


A consultation regarding the tragic death of Kim Lien Pettersson, an experienced Swedish recreational diver in Thailand in November 2016, and three other fatalities the same year, opened my eyes and reminded me of the risks involved in the autotransfusion of up to 700 ml from the lower parts of the body to the pulmonary circulation when you immerse into water.



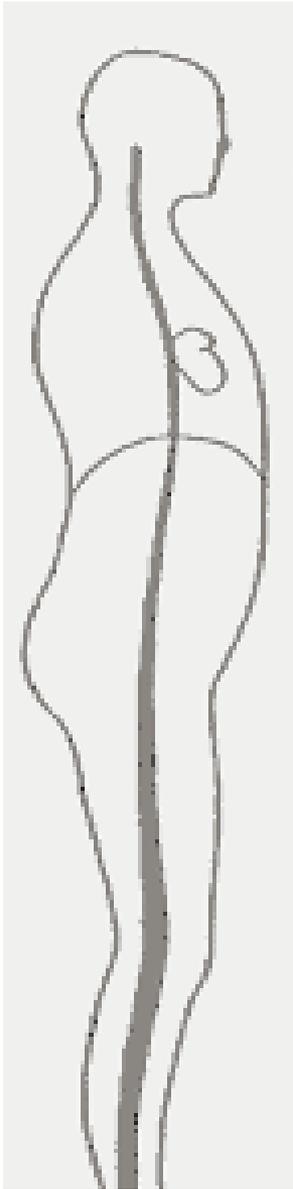
This was taught to me in the early 1970-ties by my tutor Claes Lundgren in Lund, who, together with Måns Arborelius, had proven this. I was also as a student shown the graphs of Dr Gauer, who had measured the diaphragm position and pleural pressures at different grades of immersion and I remember the first time i saw a photo of the UW-X-ray machine.



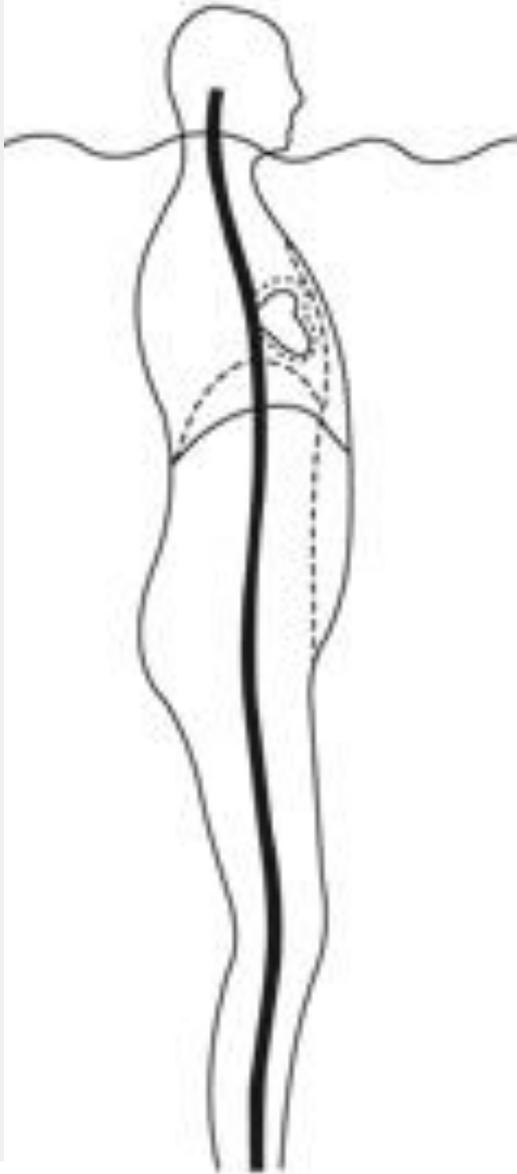


⊕ Centroids

The pressure differences between the center of the lung and the source of air, ambient, demand or breathing bag, as shown in Fig A – C, is partly responsible for the pooling of blood to the pulmonary circulation.



In air

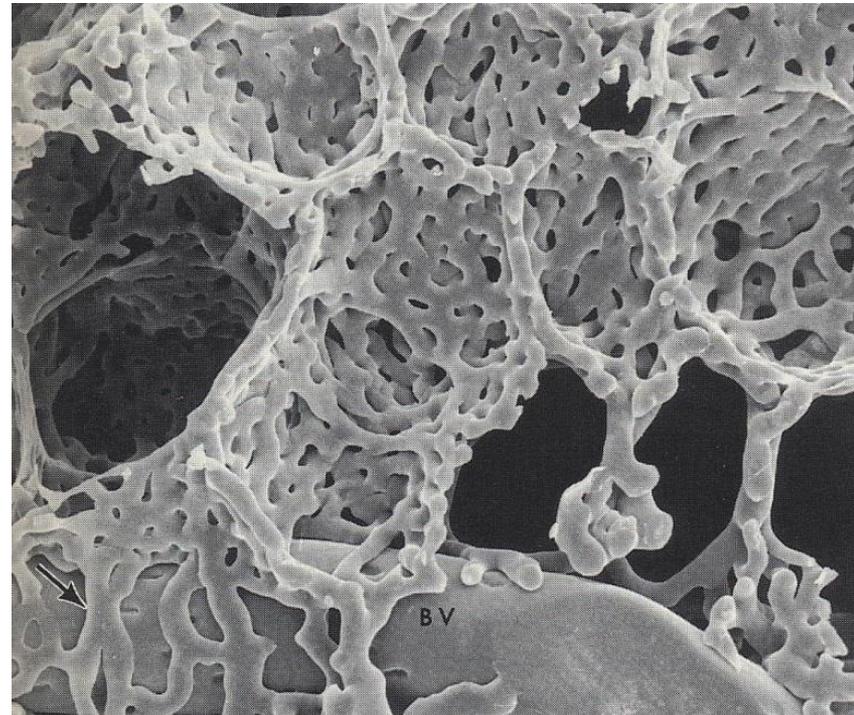


In water

Another factor behind the increase of pressure in the pulmonary circulation, when in water, is that venous blood is more evenly distributed in the body and blood from the legs and abdomen increases the volume in the pulmonary circulation with up to 5 – 700 ml.

We, the students of diving medicine in the 1970-ties, were all surprised that the delicate capillaries of the alveoli could tolerate the volumes and pressures that were involved and we could not find a good explanation to why not everybody developed pulmonary edema during diving.

In the 1980-ties the first clinical reports of immersion pulmonary edema, IPE were published by Dr Peter Wilmshurst.



Pulmonary edema of scuba divers.

Signs/symptoms	Hamson &		
	Dunford	Wilmshurst	Pons
Dyspnea	6/6	11/11	2/3
Cough	5/6	11/11	3/3
Orthopnea	2/6	11/11	0/3
Frothy sputum	3/6	7/11	2/3
Hemoptysis	2/6	6/11	2/3
Chest discomfort	2/6	0/11	0/3
Syncope	0/6	2/11	0/3



The textbooks of diving medicine contain a lot of info on decompression illness, pulmonary barotrauma and AGE, but almost nothing on IPE, immersion pulmonary edema.

Even doctors involved in diving medicine have only vague knowledge about IPE, which led to the fact that the fatality in Thailand was blamed on decompression illness by the doctor on site. Problems starting at depth 10 minutes into a dive are most likely not DCI, but something else, which Ulf, Kim Linh's husband and buddy, understood.



This led to the decision, by Lim Lien's husband, Ulf Pettersson, to support a work-shop on the topic to spread information on IPE.

After the decision to arrange a Swedish workshop on IPE in December 2017, an article on swimming induced pulmonary edema, SIPE, during a long distance cold water swimming competition was published in Läkartidningen. This told us that the problem was maybe even more common and widespread than we believed.

My belief is that knowledge regarding the early signs and symptoms of IPE may help to prevent some fatalities in recreational diving and water sports.



As an instructor you should tell students in scuba courses that:

- A sudden dyspnea or air hunger together with cough reflex could be immersion pulmonary edema IPE.
- If you experience this, let the instructor/ buddy know that you need to abort the dive and surface.
- You need to get out of the water and rest in a sitting position.
- If possible you should breathe 100% oxygen.

In a doctors hand Continuous Positive Airway Pressure, CPAP, with 100% oxygen is the preferred treatment.

