

HBOX

THE RAPIDS

**A platform technology for
hyperbaric blood oxygenation!**



Inhalation of carbon monoxide (CO)



Blocked O₂ transport



Internal suffocation

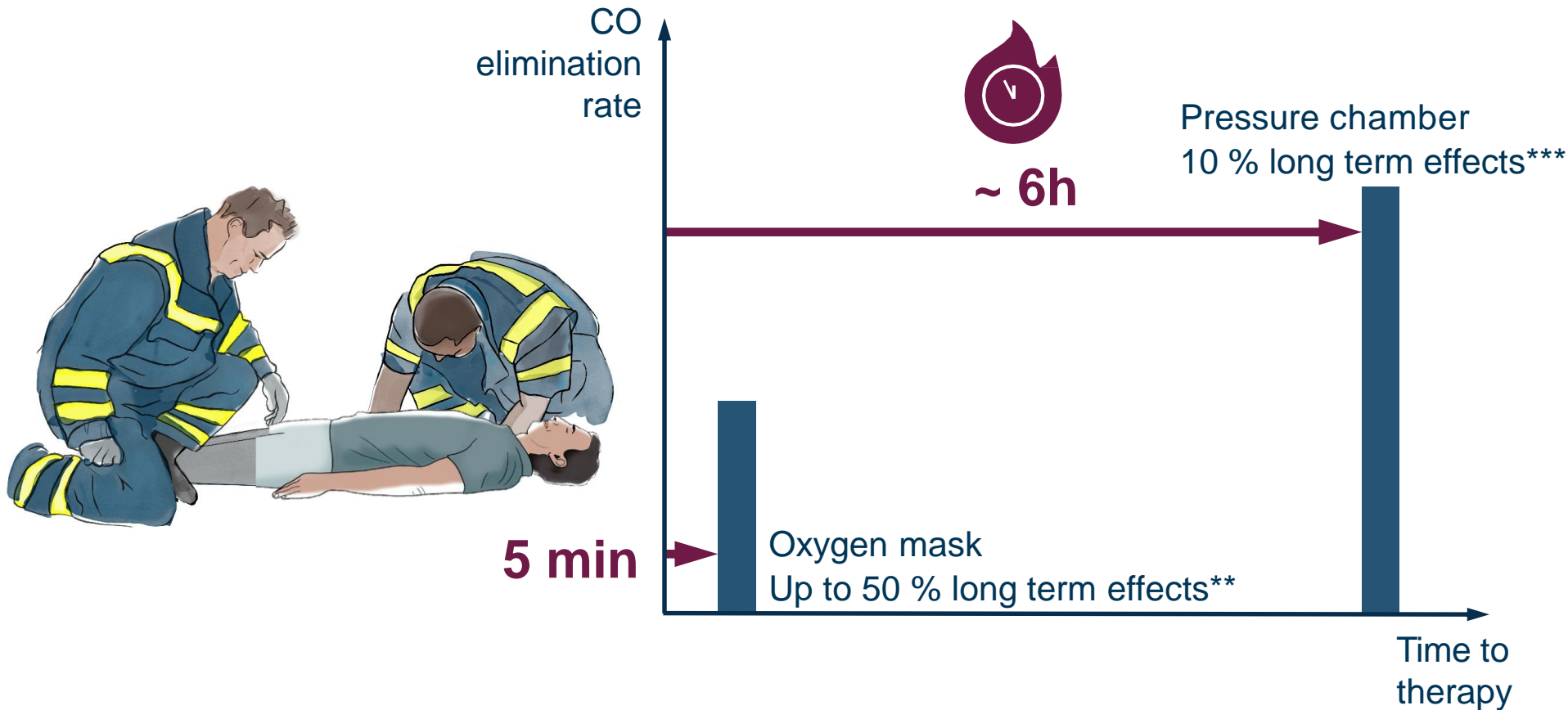


Time is critical!

- Carbon monoxide (CO) is the most common cause of injury and death due to poisoning worldwide.
- Most common causes of CO poisonings are house fires, faulty heating systems, industrial accidents, and suicide attempts.

CURRENT TREATMENT

“The primary goal of therapy is to eliminate carbon monoxide from the body to avert acute and long-term consequences”*



- Two treatment options: Pure oxygen at normal pressure via oxygen mask or in a pressure chamber.
- Oxygen masks are highly available but inefficient.
- **Pressure chambers are efficient but rare (in Germany only 4 available 24/7 with intensive care), resulting in long transportation and waiting times.**
- Pressure chambers are room-sized devices that cost € 1 – 1.5 mn.

* DIVI e.V. S2k-Leitlinie Diagnostik und Therapie der Kohlenmonoxidvergiftung 2021.

** Sykes OT, Walker E. The neurotoxicology of carbon monoxide - Historical perspective and review. Cortex 2016; 74:440–8.

***Hampson NB. Cost of accidental carbon monoxide poisoning: A preventable expense. Prev Med Rep 2016; 3:21–4.

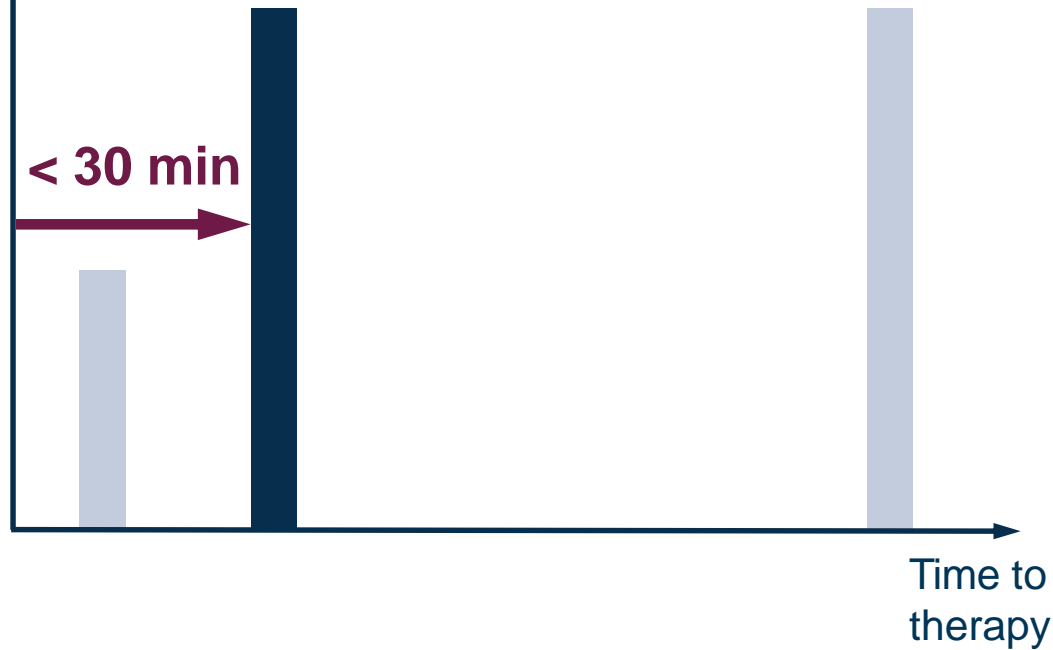


CO
elimination
rate

Mobile, minimally-invasive,
extracorporeal pressure chamber

HBOX

< 30 min



- The HBOX is a mobile, dialysis-like device that greatly increases the partial pressure of oxygen in the blood.
- CO elimination of the patient is amplified, reaching elimination rates of a pressure chamber.
- We are revolutionizing the treatment of CO poisoning by essentially bringing the pressure chamber to the patient.

Prototype

Modified gas exchangers

Pumps

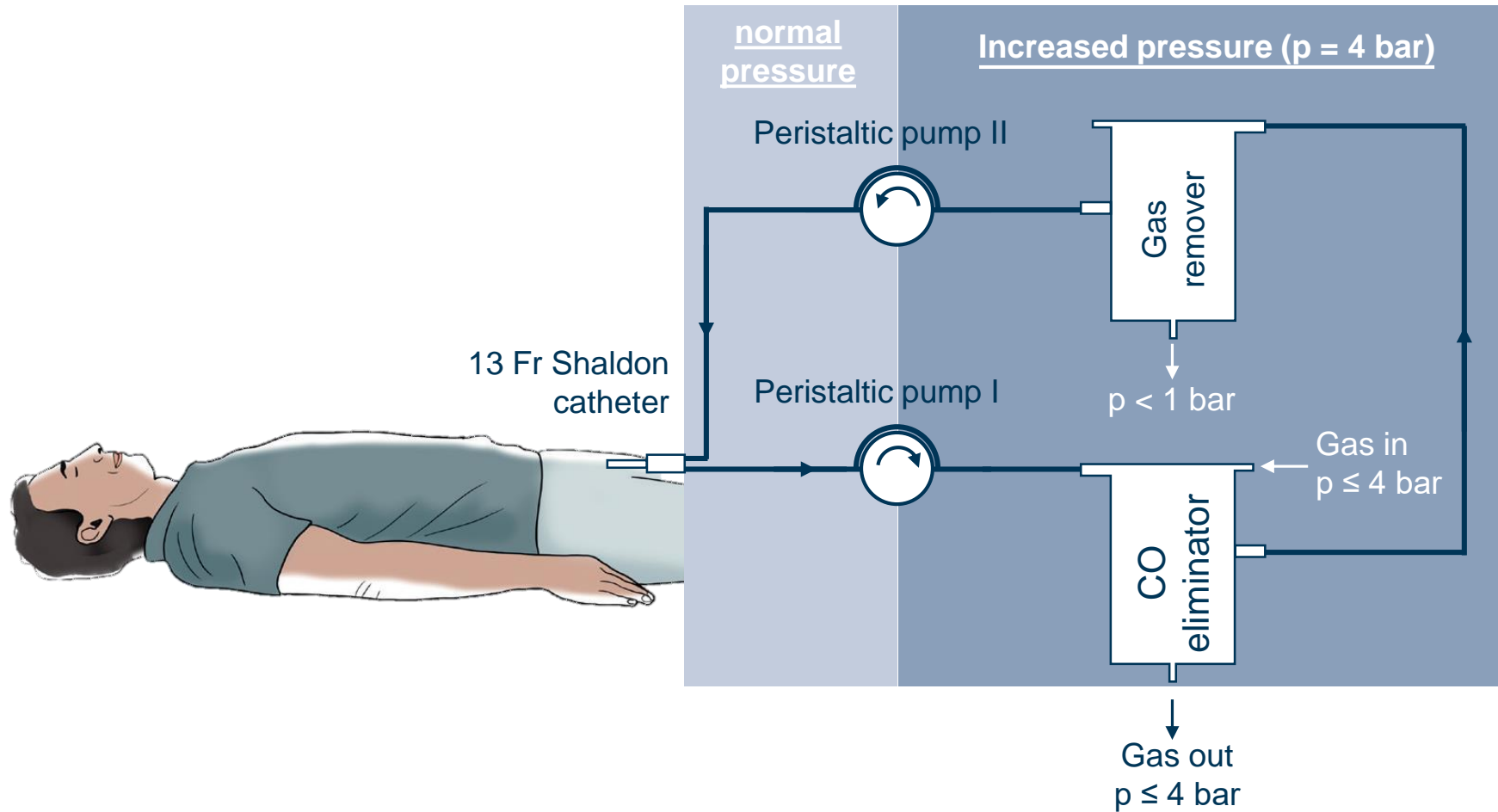
Catheter



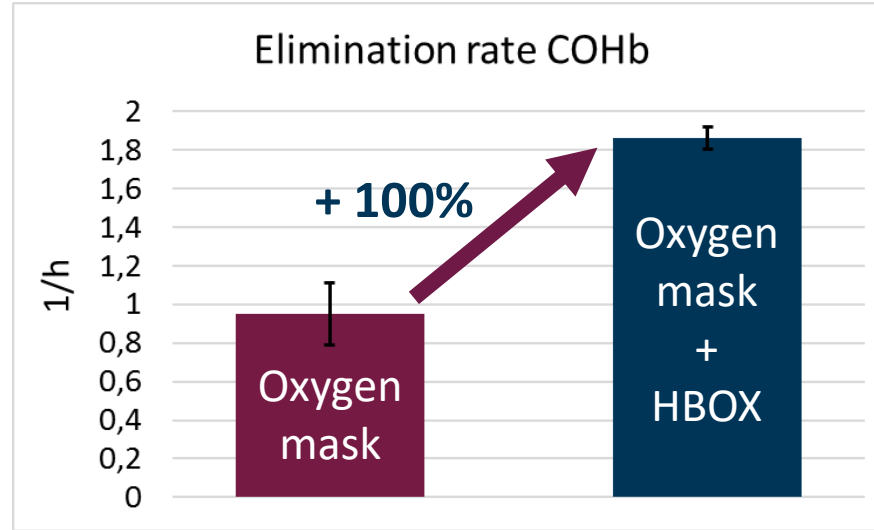
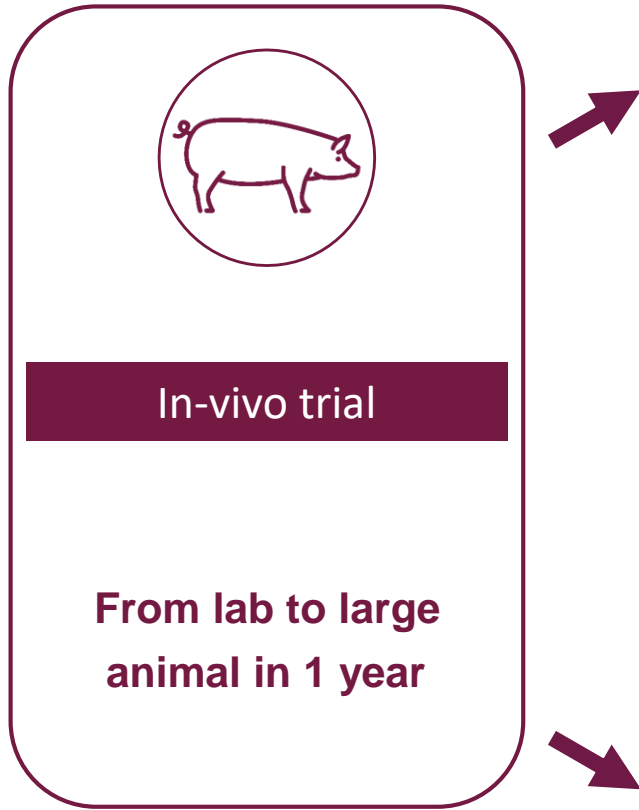
Control

1. Minimally invasive venous access (dialysis-like)
2. Extracorporeal blood loop with flow of ~300 mL/min
3. Oxygenation of the blood under high pressure
4. Duration of treatment: ~1-2 hours

THE HBOX – SCHEMATIC OVERVIEW OF HYPERBARIC TECHNOLOGY

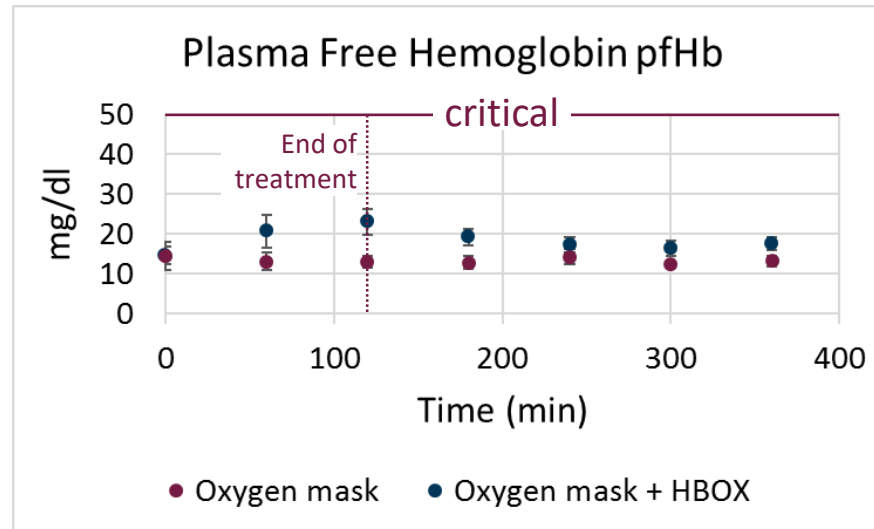


- CO binds with 250-fold higher affinity to hemoglobin compared to O_2 .
- To remove the CO from the hemoglobin in the blood a large amount of O_2 is required.
- Under increased pressure more O_2 can be dissolved in the blood.
- Through additional increase of the gas pressure significantly more O_2 can be dissolved into the blood.



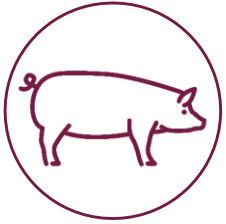
→ We are giving the patient a 2nd lung

First results show less apoptosis (cell death) in hearts and brains of pigs treated with HBOX!



→ Blood damage clinically insignificant

OUR TRACTION



In-vivo trial

From lab to large animal in 1 year



Funding

€ 1.4 mn grant funding
(no equity)



Patents

IP strategy developed
2 Patents pending
Trademark „HBOX“



Awards

2 Technological awards
3 Pitch awards

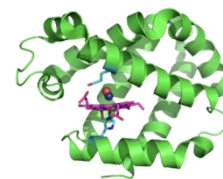
COMPETITORS



ClearMate™*



ECCOR-P**



Infusion drug***



HBOX

	ClearMate™*	ECCOR-P**	Infusion drug***	HBOX
Clinical relevance	0	✓	✓	✓
Short time-to-market	✓	0	✗	✓
Direct elimination approach	✗ (Lung)	✓ (Blood)	✓ (Blood)	✓ (Blood)
Simplicity	✓	✗	✓	✓

Only for light CO poisonings and approach via lungs not ideal in burn victims.

University research, commercialisation intentions unknown. Cumbersome technology.

Very early stage: mouse model. Over 95% of drugs still fail at this stage.

* Zavorsky GS et al. Rates of carbon monoxide elimination in males and females. Physiological reports 2014; 2(12).

* Sein Anand J et al. Hyperventilation with Maintenance of Isocapnia. An "Old New" Method in Carbon Monoxide Intoxication. PLoS One 2017; 12(1):e0170621.

** Fischbach A, et al. Venovenous extracorporeal blood phototherapy increases the rate of carbon monoxide (CO) elimination in CO-poisoned pigs. Lasers Surg Med 2021.

***Azarov I, et al. Five-coordinate H64Q neuroglobin as a ligand-trap antidote for carbon monoxide poisoning. Sci Transl Med 2016; 8(368):368ra173.

HBOX consists of

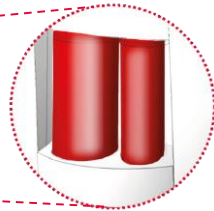
Console

Reusable
→ CapEx



Disposable

Recurring
revenue
→ OpEx



Customers

Hospitals
&
Emergency
medical services



Users

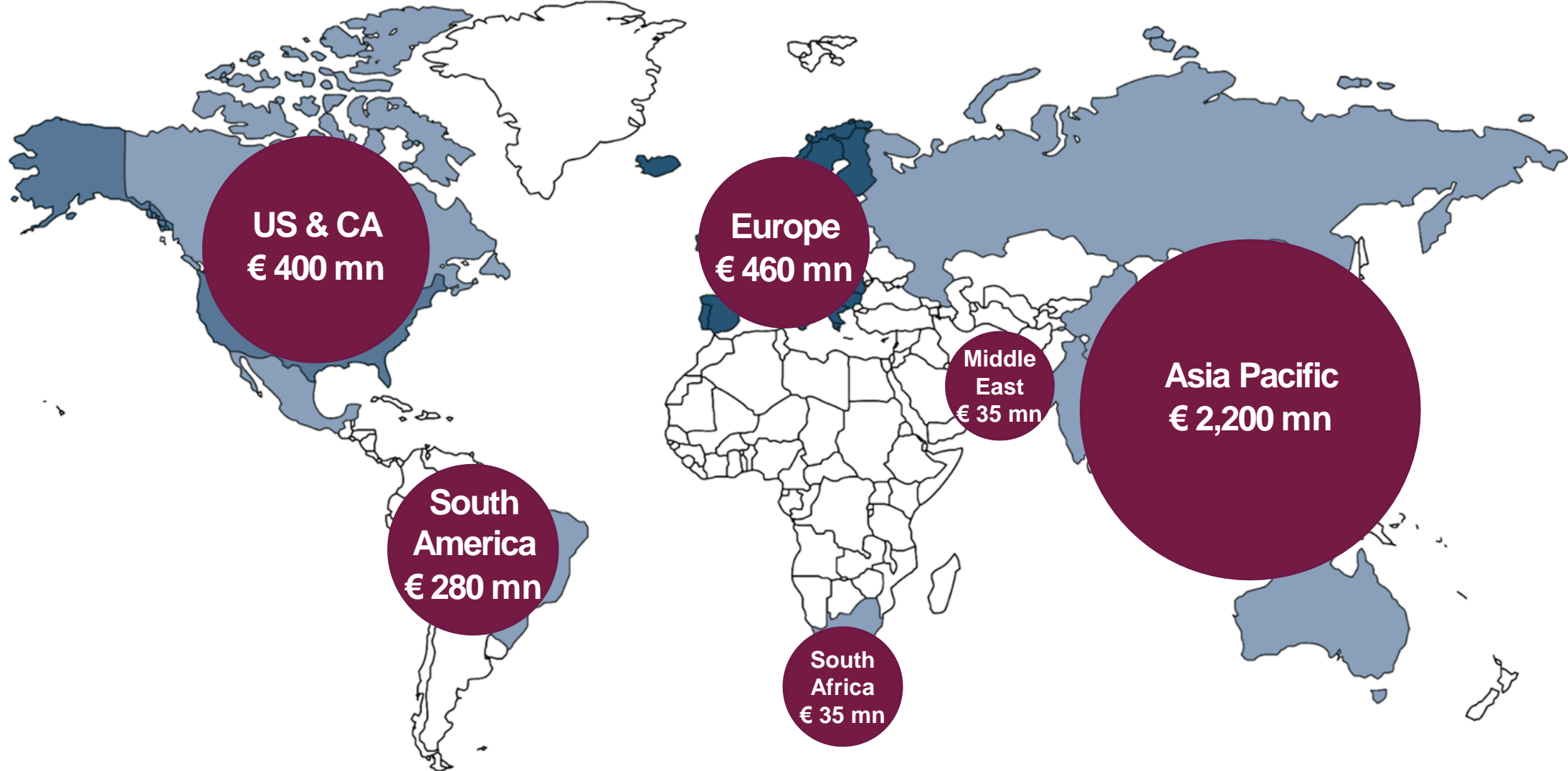
Anesthesiologists
&
Emergency
physicians



- The HBOX consists of a reusable hardware unit (console) and disposables that are disposed of after each use.
- The disposables generate recurring revenue.

GLOBAL MARKET POTENTIAL CO REMOVAL

Based on HBOX price of € 7,500 and number of clinically treated CO poisoning patients; HBOX price derived from € 7,500 cost for 3 pressure chamber treatments



Total global market potential: € 3.4 bn

**Europe
(GER, PL, IT, UK, SP)
17,300 patients**



**USA & CA
53,000 patients**



- Incidence of CO poisoning taken from Mattiuzzi2020***
- Cases shown are eligible for HBOX treatment because they are medium to severe CO poisonings (clinically treated). Based on Hampson2016****.

* 17,300 clinically treated patients, HBOX price € 7,500, current flat fee for pressure chamber treatment € 7,500

** 53,000 clinically treated patients, HBOX price € 7,500, current flat fee for pressure chamber treatment € 7,500

*** Mattiuzzi C, Lippi G. Worldwide epidemiology of carbon monoxide poisoning. Hum Exp Toxicol. 2020 Apr;39(4):387-392

**** Hampson NB. Cost of accidental carbon monoxide poisoning: A preventable expense. Prev Med Rep 2016; 3:21–4.

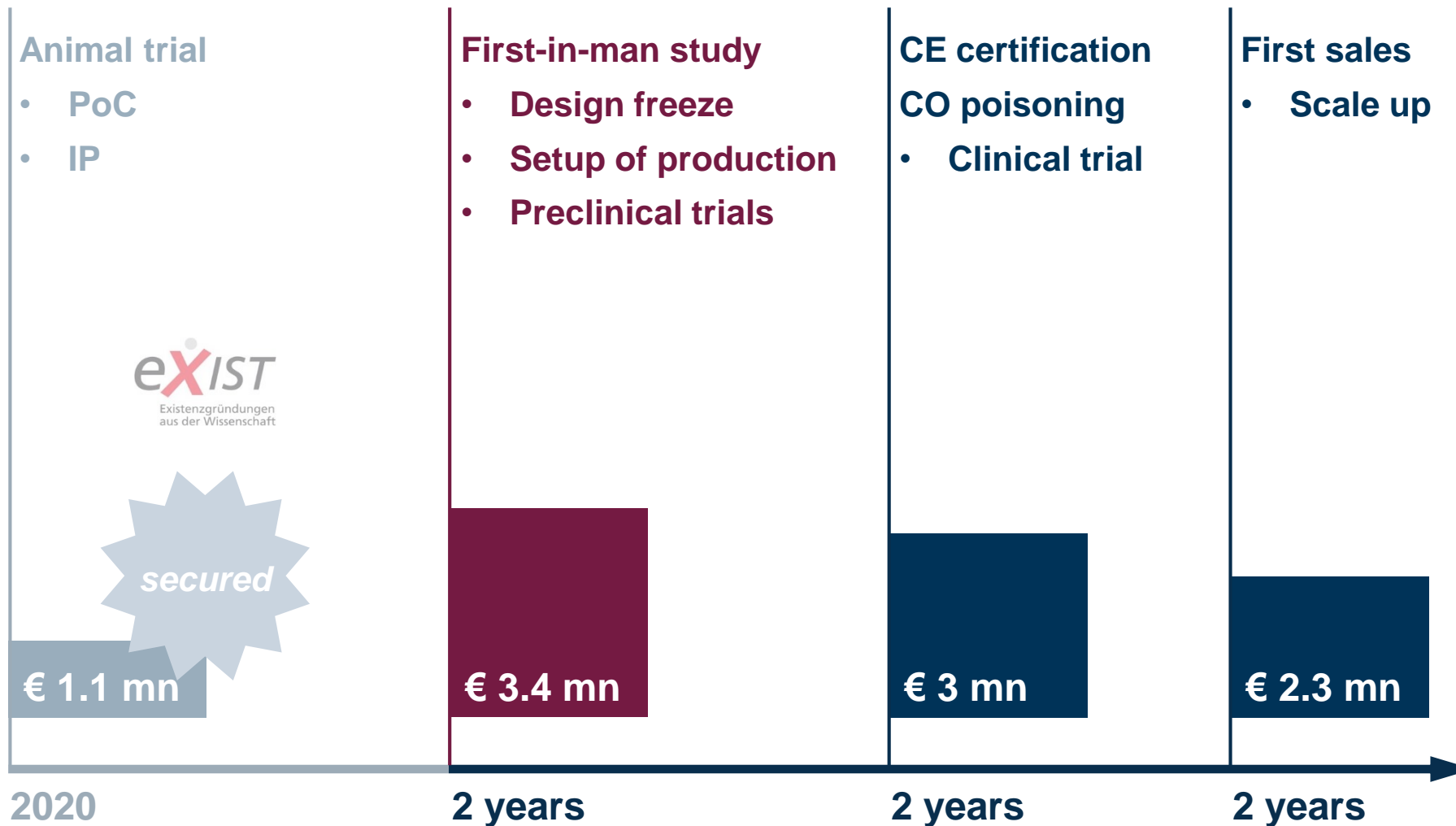
We aim to utilize existing ECMO reimbursement for the HBOX treatment since both use the mechanism of extracorporeal membrane oxygenation.

Potential reimbursement

DRG X62Z		Additional fee OPS 8-852.00 for medical device
€2,300	+	€10,600



- Sufficient to cover the cost of HBOX disposable
- Remaining amount as profit for hospital → incentive



Potential exit partners



Acquired
Hemovent 2021



Acquired
Breeze 2020



Acquired
TherOx 2019



Acquired
Xenios 2016



Acquired
NVT AG 2020



Acquired
Weinmann
Medical 2013



Acquired
Gambro 2012



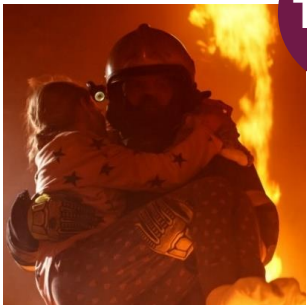
Acquired
TandemLife 2018



Vision

HBOX as a platform technology for hyperbaric blood oxygenation

CO poisoning



€ 3.4 bn
market
potential

TRL 5

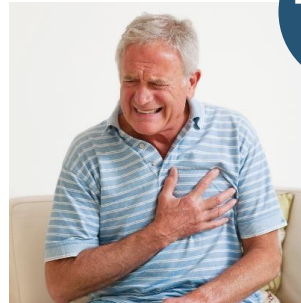
MiRA*



€ 10.8 bn
market
potential

TRL 4

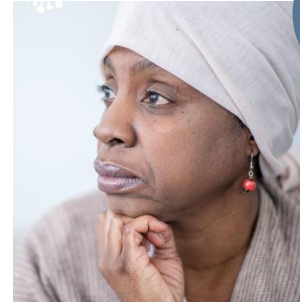
Ischemia



€ 4.3 bn
market
potential

TRL 4

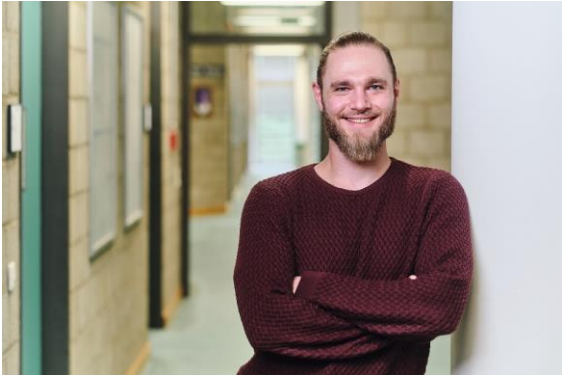
Cancer treatment
adjuvant



€ 15.4 bn
market
potential

TRL 2

- Oxygen deficiency is the cause of many diseases and other problems
- The HBOX delivers extremely high oxygen concentrations into the blood to provide added value in various applications:
 1. Oxygen displaces carbon monoxide from the blood
 2. Hyperoxygenation allows for miniaturized devices
 3. Blood with high oxygen concentrations supplies oxygen deficient tissue
 4. Oxygen in hypoxic tumors enhances the effects of the treatments



Niklas Steuer

Co-founder &
Managing Director
Strategy & Operations

5+ yrs in medical devices

MSc mechanical engineering
Training in organization
development & leadership

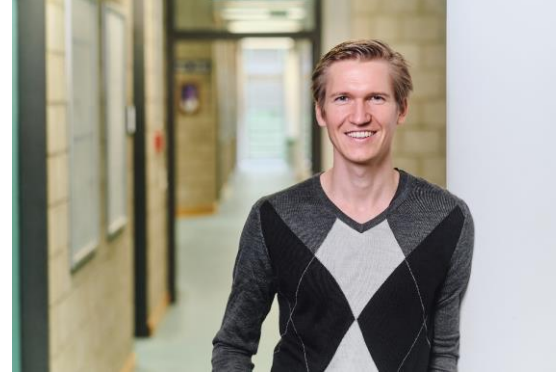


Dr. Peter Schlanstein

Co-founder &
Managing Director
Technology & Production

11+ yrs in medical devices

PhD mechanical engineering
Inventor



Dr. Matthias Menne

Co-founder &
Managing Director
Finance & Marketing

5+ yrs in medical devices

PhD theoretical medicine
MSc business, economics
& management
MSc mechanical engineering



Dr. Christiane Hoffmann

Team member

QM & RA

23+ yrs in medical devices

PhD materials science
Diploma biology
Production, QM, RA
CE certificate for class 3 device

Entrepreneurial support



Prof. Dr.-Ing. Ulrich Steinseifer
Successful serial entrepreneur MedTech
Head of department CVE, RWTH Aachen



Dr. Tim Kaufmann
Successful serial entrepreneur MedTech
Co-Founder & CEO enmodes GmbH

Clinical support



PD Dr. med. Rüdger Kopp
Chief Emergency Doctor Aachen UK
Aachen



Dr. med. Thorsten Janisch
Anesthetist &
pressure chamber physician



Prof. Dr. med. Hans-Gert Heuft
Director Institute for Transfusion Medicine &
Immune Hematology with Blood Bank
University Hospital Magdeburg

Are you a potential investor or strategic partner looking to join our journey?

We are currently compiling our next financing round of € 3.4 mn for 2022!

Contact us:
menne@HBOX-therapies.com