The OXY PACK: Working towards new mountain rescue strategies

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PGHM
Mountain Search and Rescue

- Public Rescue, established in 1958
- Staff: 40 mountain rescuers
- Manages all mountain rescue operations in the Mont Blanc Massif
- Deals with 1000 mountain rescue operations per year in the Mont Blanc Massif

La Chamoniarde

Non-profit organisation for mountain rescue and risk prevention (created in 1948):

- Brings together all entities involved in mountain search and rescue operations
- Provides free information about hiking, climbing and skiing to visitors year-round
- Contributes to the development of safety in the mountains by being involved daily in prevention: awareness, events and courses (including rare mountain safety training courses)
- Organises simulated avalanche exercises with the PGHM and rescue organisations from neighbouring countries
- Collaborates with the PGHM to develop innovative equipment and techniques

Origins of the project 22/07/2020

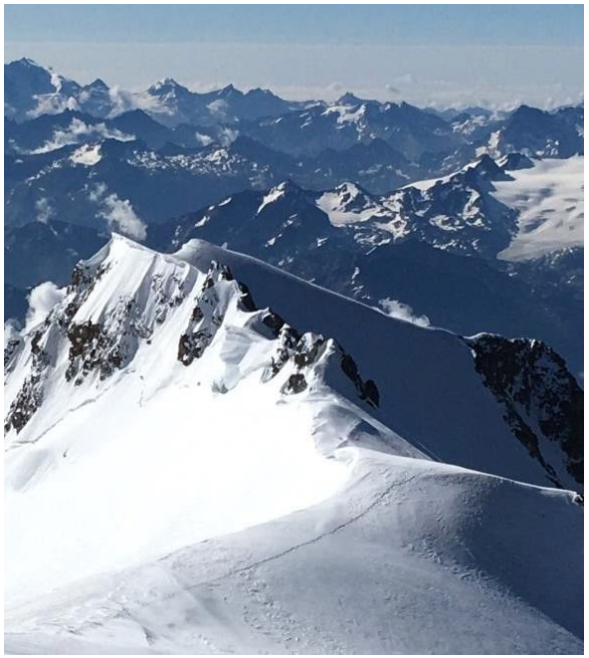
Rescue at the Mont Blanc de Courmayeur

Origins of the project

FEEDBACK 22nd July 2020: Rescue at Mont-Blanc de Courmayeur

12:35 Alert:

A roped party of two mountaineers came off the Peuterey Integral which they had climbed in 4 days. They were blocked at the Mont Blanc de Courmayeur. One of the two mountaineers was suffering from acute mountain sickness.
He was unconscious. He had also reportedly fallen into a rimaye in the morning, which had caused his condition to deteriorate.
The two climbers had been caught in the clouds since the morning.



Origins of the project

FEEDBACK 22nd July 2020: Rescue at Mont-Blanc de Courmayeur

Constraints:

- Altitude
- Victim's condition – incapable of walking
- Terrain incompatible with using a stretcher
- Rescue team had just returned from a demanding rescue
- Bad weather, intense thunderstorms planned for the evening and night

Strategy:

- Act quickly (no heavy equipment)
- Extract only the mountaineer capable of walking
- Administer medicine (corticosteroids) and oxygen (with the resources available) in a last attempt treatment for the mountaineer with acute mountain sickness.

Origins of the project

FEEDBACK 22nd July 2020: Rescue at Mont-Blanc de Courmayeur

Rescue Process

Origins of the project

FEEDBACK and RESCUE ANALYSIS

- Administration of oxygen with a positive outcome
- What about the acclimatisation of rescue workers 365 d/year?
- A situation that is likely to reoccur

How to optimise the use of oxygen in a walk-in rescue party?

"Oxy Pack" project
OBJECTIVES

1 – TO ENABLE VICTIMS TO WALK EFFICIENTLY

Effects of altitude:

- Above 4000 m: blood oxygen level less than 80% with effort
- Acute mountain sickness (50 call outs/year)
- Limitations of "usual" treatments for "walking"

Downward spiral:

Hypothermia Exhaustion Dehydration High altitude pulmonary edema

↓

Inability to move

↓

High altitude cerebral edema

↓

Death

"Oxy Pack" project
OBJECTIVES

1 TO ENABLE VICTIMS TO WALK EFFICIENTLY

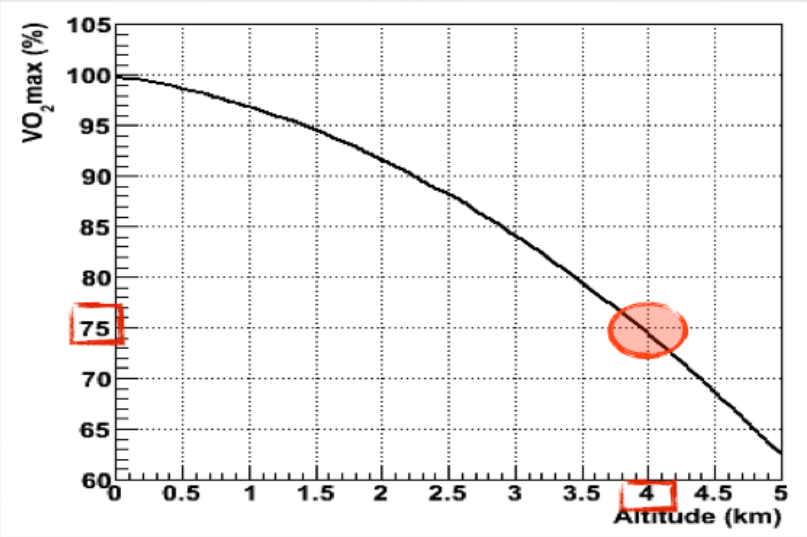
Oxygen administration objectives:

- To stabilise victims and prevent from reaching an irreversible state
- To enable victims to go back down (ideally) – to reach a safety point (shelter / hyperbaric chamber) – to wait for helicopter evacuation
- To consider new strategies for rescue and taking care of the victims

"Oxy Pack" project
OBJECTIVES

2- KEEP "WALK-IN" RESCUE PARTIES SAFE

Altitude impact on performance



- At 4000m the VO2 max is reduced by 25%!
- Even with good fitness, you go slower…

"Oxy Pack" project
OBJECTIVES

2- KEEP "WALK-IN" RESCUE PARTIES SAFE

The limits of acclimatisation

- Requires spending several days at altitude
- Varies between different people
- Difficulties maintaining a satisfactory level of acclimatisation 365 days a year

Use oxygen for walk-in rescue parties at high altitudes.

"Oxy Pack" project STEPS

RESEARCH AND DEVELOPMENT!

FEEDBACK from Mont Blanc de Courmayeur rescue:

- Weight of steel bottles…
- Significant loss and overconsumption
- Not adapted to the cold (rigidity, tubes breaking)

⇨ Masks adapted to the use and the environment
Carbon oxygen bottles

"Himalayan" masks?!

“Oxy Pack” project STEPS

Tried and tested masks at very high altitude

"Oxy Pack" project
STEPS

Issue/bottles:

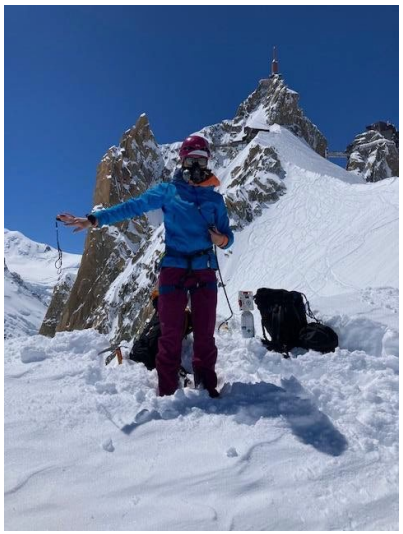
Weight: light
Standards: compliant (Medical oxygen)
Re-filling
Safety (/helicopter)

⇨ Available on the European market
No heavy modifications
Low pressure connection

Mask and bottle connections: custom-made connectors

"Oxy Pack" project
STEPS

First field tests with steel bottles
2L at 200 bar



➡ Undeniable added value from 3800m

But…
- Only 400L of oyxgen
- Weight: 4.2 kg

Optimising with the use of "Swiss" carbon bottles
2L at 300 bar

- 600L of oxygen
- Weight: 2.9 kg

-30% weight +50% capacity

➡ Appropriate for walk-in rescue parties

USE of the "Oxy Pack" in rescue missions

- Col de La Brenva 07/2021

- North face of Mont Blanc 07/2021

- Rochers Rouge 08/2021

- Col du Dôme 09/2022

USE of the "Oxy Pack" in rescue missions FEEDBACK

- Proven to be effective for both victims and rescuers
- Comfort of use while staying within a middle-range of effort
- Easy to use
- Provides security and peace of mind
- Flow management yet to be refined

"Oxy Pack" ASSESSMENT and PROSPECTS

- Optimisation and generalisation of quick connections *(3-pin)*
- Ultra-light bottles
  "Oxycos" developed by the SSA for the special forces: 1L 300 bar 2 kg

- Appropriate for use above 3800m
- Makes it possible to consider new rescue strategies
- Broader reflection on the use of oxygen in mountain rescue and questioning on other uses
- Complementarity with work carried out on closed circuit rebreather

Thank you for listening.

Do you have any questions?