EXPERIENCE IN COLOMBIAN AIR FORCE
HYPOBARIC CHAMBER
AEROSPACE MEDICAL CENTER (CEMAE)

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I have the following financial relationships to disclose:

• Employee of Colombian Air Force

I will not discuss off-label use and/or investigational use in my presentation
EXPERIENCE IN COLOMBIAN AIR FORCE
HYPOBARIC CHAMBER

“A successful project based on cooperation between two governments”
2008

Colombian Air Force prepares the Aerospace Medical Center facilities to support a Hypobaric Chamber
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August 2009

Colombian Air Force flight surgeons, attend to the Aerospace Physiologist Course and Aerospace Physiologist Technician Review Course at USAFSAM, Brooks AFB.
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November 2009

The hypobaric chamber 6/2 arrives Bogota.
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December 2009

Start up the chamber, full operational.
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January 2010

First Operators
Chamber course by
Colombian Air
Force Aerospace
Physiologists
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March 2010

First Colombian Air Force hipobaric chamber training flight
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April 2010

Official beginning of Colombian Air Force Hypobaric Chamber Courses
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May 2010

- USAF MTT visits to Colombian Air Force Aerospace Medical Center (CEMAE)

- Provide Hypobaric Chamber and Aerospace Physiology Course in Hypoxia

- USAF initial approval of CEMAE training procedures
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August 2012

- USAF Flight Surgeon and Hyperbaric Hypobaric Team visit to CEMAE
- Second Review of our procedures
February 2013

- Final USAF Flight Surgeon and Aerospace Physiologist visit.

- Colombian Air Force apply to USAF Aerospace Physiology Training Program Recognition.
EXPERIENCE IN COLOMBIAN AIR FORCE HYPOBARIC CHAMBER

• A total of 789 subjects from all Colombia, flight crews and Internal Observers, showed for the altitude chamber course with 1.293 expositions to hypoxic hypoxia between April 2010 and August 2012, at 25,000 feet and 18,000 feet rapid decompression profiles.

• Ages between 21 y 41 years (mean 29.3)

• 90% males and 10% female subjects

NUMBER OF EXPOSITIONS TO HYPOXIC HYPOXIA 2010-2012

SOURCE: CEMAE
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• All subjects were evaluated by a Flight Surgeon prior to flight assessing their middle ears and sinuses status.

• Ears and sinuses check profile were performed at 5.000 feet over ground level during the 30 minutes 100% oxygen breathing period.

• In a normal procedure the 25.000 feet profile never last longer than 30 minutes.
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COLOMBIAN AIR FORCE 25,000 FEET PROFILE

- **HYPOXIA**
- **EAR & SINUS CHECK**
- **NIGHT VISION EXCERCISE**
- **DENIT**

**ASCENT/DESCENT RATE**
- 3,000 ASCENT RATE
- 2,500 ASCENT/DESCENT RATE
- 2,000 DESCENT RATE
- 2,500 DESCENT RATE

**Source:** CEMAE
EXPERIENCE IN COLOMBIAN AIR FORCE HYPOBARIC CHAMBER

- CEMAE has recorded a total of 34 physiological incidents experienced by trainees and inside observers labeled as “reactors”.

- The overall frequency of physiological incidents was 2.62% to include ear pain, sinus pain, hypoxia, joint pain, and nose bleeding.

- 24 reactors were students and 10 inside observers.

- 70% males, 30% female reactors

![Number of Reactors by Position and Year 2010-2012](source: CEMAE)
**EXPERIENCE IN COLOMBIAN AIR FORCE HYPOBARIC CHAMBER**

Of the 24 students reactors, 12 came from Bogotá, and 12 came from other cities below 1,500 feet of altitude.

<table>
<thead>
<tr>
<th>Within the 12 reactors who came from Bogotá:</th>
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<tbody>
<tr>
<td>– 1· severe hypoxia</td>
</tr>
<tr>
<td>– 1· nosebleed</td>
</tr>
<tr>
<td>– 1· DCS Type I</td>
</tr>
<tr>
<td>– 1· aerosinusitis</td>
</tr>
<tr>
<td>– 8· barotrauma</td>
</tr>
<tr>
<td>• 7· descending from 18,000 feet to ground level</td>
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<tr>
<td>• 1· 25,000 Ft during hypoxia exercise</td>
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<table>
<thead>
<tr>
<th>Within the 12 who came from less altitude than Bogota:</th>
</tr>
</thead>
<tbody>
<tr>
<td>– 10· barotrauma</td>
</tr>
<tr>
<td>– 1· aerosinusitis</td>
</tr>
<tr>
<td>– 1· hyperventilation</td>
</tr>
</tbody>
</table>
22 showed problems at the 25,000 feet profile
- 17 · barotrauma
- 2 · aerosinusitis,
- 1 · nosebleed,
- 1 · severe hypoxia,
- 1 · DCS Type I (male subject).

2 showed problems at the rapid decompression profile
- 1 · barotrauma
- 1 · hyperventilation.
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• Of the 10 Inside Observers reactors at the 25,000 feet profile one showed aerosinusitis and one barotrauma.

• In other profiles, 5 IO showed barotrauma, 2 in the rapid decompression profile and 3 in the ears&sinuses check profile.

• The other 3 showed delayed ear pain between 10 and 12 hrs later.
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25 reactors experienced Barotrauma

- 18 (72%) Grade I
- 2 (8%) Grade II
- 5 (20%) Grade III

BAROTRAUMA 2010-2012

FUENTE: CEMAE
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• A question to answer.........

• Does Bogota altitude (8.200 ft) protect our students against physiological incidents?
  – Overall frequency of physiological incidents:
    • Colombian Air Force: 2.62% (1.293 exposures)
    • Japan Air Self-Defense Force: 6.3% (58.454 exposures)
    • Australian Defence Force: 0.39% (10.851 exposures)
  – Frequency of ear pain:
    • Colombian Air Force: 1.9% (1.293 exposures)
    • Japan Air Self-Defense Force: 4.7% (58.454 exposures)

• At least is not harmful.