of respiration gases, transcranial Doppler cerebral blood flow within the middle cerebral arteries, serum cytokine analysis, and blood miRNA sequencing. Epochs for analysis included 1) Ground Level, 2) Pre-Breathe, 3) 25k feet altitude or "ROBD 25k" including ascent time, and 4) Recovery. We found a significant effect of epoch on SYNWIN composite score with overall performance lower in the hypobaric condition. Within the physiology/oximetry metrics, we found significant effect of epoch on heart rate and heart rate spiked more in the hypobaric condition compared to normobaric condition. SpO_2 measures mirrored heart rate, with SpO_2 dipping more in hypobaric conditions. Blood analysis found that hypobaric hypoxia increased serum levels of Chemokine ligand 13, also known as B lymphocyte chemoattractant (BLC (CXCL13)) and Chitinase-3-like protein 1 (YKL-40 (CHI3L1)) compared to normobaric hypoxia. The effectiveness of aircrew training depends on the explicit assumption that inducing altitude-equivalent hypoxia effects via ROBD, physiologically and cognitively, is directly equivalent to hypobaric exposure as experienced in the cockpit. Our results suggest that in a limited dataset, cognitive and physiologic responses to normobaric hypoxia differ from those resulting from hypobaric hypoxia. This data can be used to inform decisions on aircrew training protocols and to determine the effectiveness of Altitude Physiology curricula primarily employing ROBD hypoxia exposures as opposed to hypobaric hypoxia.

Learning Objectives

1. The audience will learn that heart rate increases more during hypobaric exposure compared to normobaric hypoxia.
2. The audience will learn that oxygen saturation decreases more during hypobaric exposure compared to normobaric hypoxia.
3. The audience will learn that cognitive performance is affected more during hypobaric hypoxia compared to normobaric hypoxia.

[226] HYPOXIA TOLERANCE PREDICTORS

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(Original Research)

INTRODUCTION: Hypoxia may be induced by either cabin pressure failure or oxygen system malfunction during flight. Personal tolerance will determine performance level under hypoxic conditions. Tolerance for hypoxia can be tested during altitude chamber training sessions, designed to expose aircrew to hypoxic conditions in a controlled setting. The aim of this study was to examine the influence of different parameters on hypoxia tolerance. **METHODS:** During altitude chamber training sessions participants reached simulated altitude of 25,000 feet (7,620 meters) and were exposed to oxygen partial pressure of 59.2mmHg. At this altitude they took off their oxygen masks in order to recognize their personal symptoms of hypoxia. Hemoglobin saturation level was measured at 10 second intervals until oxygen mask was returned. **RESULTS:** We retrospectively analyzed the records of 167 trainees. Mean age was 24.5±4.9, and 22 were women (13.2%). Lower hypoxia tolerance was significantly and independently correlated in men with hemoglobin level below 13.9gr/dL (p=0.01), nonsmoking (p=0.01), and BMI below 20.6kg/m^2 (p=0.03). Age, gender, and physical activity were not found to be correlated with hypoxia tolerance. **DISCUSSION:** Aircrew with hemoglobin level under 13.9 gr/Dl should perform ROBD training instead of altitude chamber training for exposure to hypoxic conditions in order to improve the safety of the trainee. Aircrew with BMI under 20.6 kg/m^2 should be aware of their lower resistance to hypoxic conditions, and therefore for their higher risk during pressurization or oxygen system failure.

Learning Objectives

1. Hemoglobin level, smoking and BMI may predict tolerance to hypoxia.
2. High risk trainees and mitigating measures should be implied during altitude chamber training.

[227] MEASURING ARTERIAL OXYGEN SATURATION USING WEARABLE DEVICES UNDER CONDITIONS RELEVANT TO THE FLIGHT ENVIRONMENT: A PRELIMINARY STUDY

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(Original Research)

INTRODUCTION: Pilots are increasingly flying with wearable monitoring devices ('wearables') that can provide arterial oxygen saturation (SpO_2) measurements. It is therefore important to establish whether these wearables determine SpO_2 reliably under conditions associated with the flight environment such as environmental hypoxia and concurrent body motion. The aim of this study was to conduct an initial evaluation of wearables under these conditions and generate preliminary results to provide a basis for further definitive studies. The hypothesis was that the performance of wearables in measuring SpO_2 would be the same as that of a standard pulse oximeter. **METHODS:** Ten healthy participants (six men and four women) were studied breathing air and breathing 11.8% oxygen in a normobaric chamber (≈ 15,000 ft equivalent altitude). SpO_2 was measured using two consumer-grade wearable devices (Apple Watch Series 6 and Garmin Fēnix 6 watch) and two wearables designed for clinical use (Cosinuss° Two in-ear sensor and Oxitone 1000M wrist-worn pulse oximeter). Data was collected while stationary at rest, during very slight body motion, and during moderate body motion, and was compared with simultaneous measurements from a standard pulse oximeter. Standardized body motion was induced by cycling on an ergometer at very low intensity (30W) and moderate intensity (150W) respectively. **RESULTS:** 'Missed readings', defined as failure to record an SpO_2 value within one minute, occurred commonly with all four wearable devices. Even in the presence of only very slight body motion, most wearables missed most readings (percentage of missed readings ranging from 12-82%). The percentage of missed readings increased with increasing body motion, ranging up to 20% at rest, 82% during very slight body motion, and 95% during moderate body motion. When values were successfully obtained, the wearables tended to under-report (one device) or over-report (three devices) SpO_2, and this was generally exacerbated under hypoxic conditions. **DISCUSSION:** The four wearable devices studied did not perform to the same standard as a traditional pulse oximeter. This could have important implications in safety-critical operations and, until further data are forthcoming, these preliminary results indicate a need for caution regarding the use of wearables for in-flight SpO_2 monitoring.

Learning Objectives

1. The audience will learn about recently-developed wearable monitoring devices that can be used to measure arterial oxygen saturation.
2. The audience will learn about the possible limitations of using wearables for arterial oxygen saturation monitoring during flight operations.

[228] RISK OF DECOMPRESSION SICKNESS IN JUMPMASTERS DURING HIGH-ALTITUDE MISSIONS

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(Original Research)

INTRODUCTION: Military parachute operations, with drop of troops or equipment, are often performed at very high altitude, and without pressurization of the parachuter/cargo compartment. Present Swedish Airforce regulations permit exposure of the jumpmasters/loadmasters (JM) to altitudes up to 11000 masl (36000 ft), and the JMs are regularly exposed to 29500 ft for 60 min. Anecdotal information suggests that the JMs may experience decompression sickness (DCS) during such