physiological training at the German Air Force Institute of Aviation Medicine (GAF IAM) were recruited. Blood pressure was measured directly before and heart rate continously during +Gz exposure (gradual onset rate +0.1g·s-1 up to standardized contraction of the peripheral visual field) in a human-use centrifuge. Genotyping was performed by polymerase chain reaction and restriction fragment length polymorphism technique. **Results:** Men carrying the T235 allele had a significantly higher DBP and MBP directly before the acceleration stress than those carrying the M allele. DBP [mmHg]: MM (n=44) 66±8; MT (n=78) 69±7; TT (n=27) 72±8; ANOVA p=0.003. MBP [mmHg]: MM 90±10; MT 93±7; TT 96±8; ANOVA p=0.008. However, maximal +Gz-level tolerance and corresponding HR did not differ significantly (ANOVA p=0.745, p=0.549 respectively) in relation to the genotype. **Conclusion:** This is the first report of the relationship between AGT M235T polymorphism and human G tolerance. We conclude that the evaluated AGT polymorphism in this population of healthy young men is associated with altered BP values (DBP, MBP) particularly in situations with no physical rather increased psychological stress. However, AGT M235T polymorphism does not seem to have a significant effect on the relaxed Gz tolerance maximum and its corresponding heart rate response. Whether this is of importance for the blood pressure values during high performance in-flight maneuvers or of operational relevance for agile aircraft pilots has to be determined in future studies.

Educational Objectives: Relation of AGT M235T gene polymorphism with blood pressure and relaxed +Gz tolerance in military aviators is described.

[44]
TILT-TEST AS G TOLERANCE ASSESSMENT METHOD.
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Introduction: Tolerance assessment is an essential element of both military pilot and pilot candidate evaluation. With assumption that during centrifuge examination and tilt-test pilots body is under the influence of the same stimulus the goal was set to establish whether tilt-test results can predict individual G tolerance. **Methods:** In two stage study took part 20 volunteers at the age 20 – 25. During first stage they underwent centrifuge evaluation in gradual onset rate profiles (0.1 G/s) in four seat configurations: a) 13° from vertical; b) 60° from vertical; c) angle change from 13° to 60° in 15s (slow); d) angle change from 13° to 60° in 10s (fast). The second stage was tilt-test performed by Westminster protocol. Systolic (RRs), diastolic (RRr) and mean (RRm) blood pressure registered before and in 2, 15 and 45 min of tilt-test were correlated with G tolerance assessed in centrifuge runs. **Results:** During tilt-test four subject had strong reaction – vasovagal syncope (two in 10th minute of test and two in 17th minute). The rest of subject presented typical reaction of circulatory system. During centrifuge profiles the following mean G tolerance were obtained: a) 4.57 G (SD±0.73); b) 5.72G (SD±0.86); c) 5.91 G (SD±1.04) d) 6.08 G (SD±0.93). G tolerance of subjects with syncope during tilt-test were similar to results of the whole group. Statistical analysis showed significant correlation between RRs, RRr and RRm registered only in 15th min of tilt test and G tolerance from slow and fast profiles. **Conclusion:** Obtained results show that Westminster protocol tilt-test used in clinical evaluations has no application for individual G tolerance assessment.

Educational Objectives: The relationship between orthostatic tollerance in Westminster protocol tilt-test and individual G tolerance is described.

Monday, May 5 ***2:00PM***

Slide: Clinical Aviation Medicine 1

[45]
HYPOXIC SYNCOPE IN AIRLINE PASSENGERS
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Introduction: It is anticipated that the incidence of onboard medical incidents will increase, due to an increasing number of aged and/or diseased passengers, who fly over ever-increasing non-stop distances. Reported percentage of incidents caused by vaso-vagal syncope varies between 9% and 26%, subject to airline´s diagnostic and administrative criteria. Vaso-vagal syncope may be a cause for in-flight panic, diversions, and fear of flying, particularly in patients who have experienced recurrent syncope on repeated exposures. In this context, relationships between syncope and factors related to air travel were studied. **Methods:** ECG, respiration rate, arterial BP, oxygen saturation, and sympathetic nervous activity were studied in healthy volunteers exposed to hypobaric environments causing severe hypoxia (n=30) and moderate hypoxia (n=5). Moreover oxygen saturation in healthy volunteers exposed to minimum airliner cabin pressure (75.8 kPa) was measured (n=8). **Results:** 11 cases of syncope or near-syncope occurred. All recovered spontaneously when placed in supine position and supplemental oxygen was administered. When dozing or sleeping, subjects exposed to airliner cabin pressure showed significantly lower oxygen saturation (80-84%) than what is considered normal in airline passengers (90-94%). **Conclusion:** Hypoxia is a sufficient cause for syncope in healthy individuals. Passengers who are dozing or sleeping may reach levels of hypoxia sufficient to cause syncope. Hypoxia may be facilitated by reduced ventilation due to immobility, cramped seating conditions, drowsiness, and gastro-intestinal distension. A policy for management and prevention of cases is discussed.

Educational Objectives: The causal relationship between aircraft cabin environmental factors and medical events in passengers. The audience will learn the patho-physiology of in-flight syncope and its management and prevention.

[46]
ASSESSMENT OF OXYGEN PRESSURE IN AIRCRAFT CABINS ON LONG HAUL FLIGHTS CORRELATED WITH RESULTING ARTERIAL OXYGEN SATURATION
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Introduction: Modern aircraft operate at altitudes in atmospheric pressure where human life is impossible. For technical and economical reasons, sea level altitude can not be kept in the cabin during flight and a compromise has to be found. The higher flying altitude is associated with a lower cabin pressure, which has an important physiological effect on oxygen saturation in the blood for both crewmembers and passengers. Pilots, physicians and engineers often discuss whether re-circulation of cabin air has a negative influence on oxygen proportion. **Methods:** To assess the real amount of oxygen in the cabin air, we took measurements on different aircraft types and routes at different flight levels. The cockpit and all other aircraft compartments were examined on an hourly basis and the appropriate cabin altitude was noted. During further investigation, different cabin altitudes were simulated in a pressure chamber in order to correlate the oxygen pressure with the resulting arterial oxygen saturation at standardized pressure levels. **Results:** In all compartments and all different flight levels, including during longer flight times, no decrease in oxygen proportion could be measured. On one flight the oxygen proportion dropped significantly in the aft galley of a Jumbo-Jet after 5 hours flight time. In addition to this the measured oxygen tissue pressures were discussed in relation to the cabin pressure on long distance flights. **Conclusion:** The critical state of light to moderate hypoxia is certainly dependent upon the oxygen partial pressure, and to a much lesser degree on re-circulation of cabin air. In low ventilated areas of the airplane, the oxygen percentage could drop due to a lack of fresh air. A bigger effect might be had by the increase of carbon dioxide, especially on smoking flights and in galleys where dry ice is used for cooling purposes.

Educational Objectives: Measurement of the oxygen level in aircraft cabin on long distance flights and resulting arterial oxygen saturation.

[47]
ASSESSMENT OF INFLIGHT COCKPIT NOISE IN HAWK AIRCRAFT AND EVALUATION OF SPECIFIC COUNTERMEASURES
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Inflight Cockpit noise data was recorded for the RAAF Hawk aircraft over a number of sorties, and at-ear noise levels while using the standard aircrew helmets were calculated. It was found that the standard helmet was unable to provide adequate protection against noise for sorties flown for the usual duration, and the noise dose would quickly exceed the Australian Occupational Health and Safety limit of 85 dB(A) LAeq,8h for noise exposure. This would impose severe limits on the operational capabilities of the aircraft. To overcome the problem, sound