

Pacific Air Forces

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Medical Guidelines for Air Travel: Anemia



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21 March 2019

RAMS 2019 NATO/STO



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Outline

- **Background**
- **Definitions**
- **Anemia**
 - **Sickle Cell Disease**
- **Sickle Cell Trait**
- **Airline Travel Recommendations**



Background

- **Aerospace Medical Association (AsMA) Air Transport Medicine Committee requested in 2014 to update the 2003 anemia guidelines.**

- **Comprehensive and systematic review of the current scientific literature was performed to develop fitness to fly guidelines for the airline traveler with anemia.**

- **Limitations in adapting as clinical guidance by AsMA**
 - **Paucity of published evidence based research**
 - **Expert opinion and consensus**



Anemia

- **Anemia**
 - **Defined by the World Health Organization (WHO) as:**
 - **Reduction in the number of red blood cells**
 - **Hgb < 13.0 g/dL (130 g/L) – adult male**
 - **Hgb < 12.0 g/dL (120 g/L) – adult female (non-gravid)**
 - **Oxygen-carrying capacity is insufficient to meet physiologic needs**
- **Global prevalence estimated at 25% and 400 types**
- **Aeromedical implications with reduced oxygen environment of flight**
 - **Tissue hypoxia**
 - **Lightheadedness**
 - **Dyspnea on exertion**
 - **Syncope**



Anemia

- **Caution for airline travelers with Hgb < 8.5 g/dL (85 g/L)**
 - **Considerable variation in compensation**
 - **Comorbidities – cardiac, cerebellar, pulmonary, etc.**
 - **Level of Fitness**
 - **Ambulate 50m or climb a flight of stairs**
 - **Age**
 - **Obesity**
 - **Smoking – 15% reduction in O₂ carrying capacity**
 - **Alcohol use**
 - **Chronic/stable and not related to active bleeding**



Sickle Cell Disease

- **Hereditary blood disorders with hemoglobin abnormalities**
 - **16 genotypes described**
 - **Sickle Cell Anemia (Hb S/S)**
 - **Sickle Cell Hemoglobin C Disease (Hb S/C)**
 - **Sickle Cell β -Thalassemia (Hb S/ β^0 and Hb S/ β^{+-} thalassemia)**
 - **Under low O₂ tension can form abnormal rigid sickle shapes**
 - **Can occur as low as 1,500m (4,921ft) MSL**
 - **Vaso-occlusive crisis**
 - **Splenic sequestration**
 - **Hepatic sequestration**
 - **Ischemic/hemorrhagic stroke**
 - **Microvascular occlusive pain crisis**



Sickle Cell Disease

- **Hb S/S and Hb S/ β^0 - thalassemia**
 - **Spleen spontaneously autoinfarcts (fibrosis)**
 - **Anecdotal reports/retrospective studies in literature traveling without supplemental O₂ quantify risk of crisis as low**
 - **Crisis can be life-threatening**

- **EASA/FAA airliners must provide cabin altitude of at least 2,438m (8,000ft) MSL**
 - **Temporary cabin elevations authorized for traffic/weather**

- **Predicting with certainty the stressors of flight is difficult**
 - **Should not travel by air without supplemental O₂**
 - **2 L/min O₂ flow via nasal cannula (NC)**



Sickle Cell Disease

- **Hb S/C and Hb S/ β ⁺- thalassemia**
 - **At greater risk of an occlusive crisis**
 - **Numerous case reports of splenic infarction and sequestration during commercial air travel**
 - **Death attributed to long distance air travel (Hb S/C)**

- **Predicting with certainty the stressors of flight is difficult**
 - **Should not travel by air without supplemental O₂**
 - **2 L/min flow via NC**



Sickle Cell Trait

- **Sickle Cell Trait (Hb S/A)**
 - **Definition of Hb S/A \leq 45% Hb S**
 - **Tends to have little aeromedical significance**
 - **Sickling at rest tends to occur at 6,400m (21,000ft) MSL**
 - **One rare case report of splenic sequestration on pressurized transcontinental flight**
 - **Presented as diffuse abdominal pain**
 - **Occurred after consumption of an alcoholic beverage**



Airline Travel Recommendations

- **Caution advised for any airline traveler with Hgb < 8.5 g/dL**
 - **Chronic not related to bleeding**
 - **Considerable compensatory variations among individuals**
 - **Comorbidities**

- **Sickle Cell Disease**
 - **Hb S/C and Hb S/ β^+ - thalassemia at greatest risk**
 - **Crisis potential life threatening**
 - **Estimation of cabin altitude/stresses of flight inexact**
 - **Travel with supplemental O₂ (2 L/min NC)**

- **Sickle Cell Trait**
 - **If asymptomatic no restrictions recommended**



Airline Travel Recommendations

■ **Considerations**

- **Correct the underlying cause**
- **Postpone travel**
- **In-flight O₂ (2 L/min NC)**
- **Stay well hydrated**
- **Refrain from alcoholic beverages**
- **Refrain from pre-flight tobacco use**
- **Dress warmly for the cooler environment**
- **Don't travel ill**
- **Ambulate frequently for short durations**



Questions?





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