## Curriculum for training in aviation medicine

### A  BASIC TRAINING IN AVIATION MEDICINE  60 HOURS

1. **Introduction to Aviation Medicine** 2 hour
   - History of aviation medicine
   - Specific aspects of civil aviation medicine
   - Different types of recreational flying
   - AME and pilots relationship
   - Responsibility of aeromedical examiner in aviation safety

2. **Basic aeronautical knowledge** 2 hours
   - Flight mechanisms
   - Man-machine interface, informational processing
   - Propulsion
   - Conventional instruments, ‘glass cockpit’
   - Recreational flying
   - Simulator/aircraft experience

3. **Aviation Physiology** 10 hours
   - **ATMOSPHERE**
     - Functional limits for humans in flight
     - Divisions of the atmosphere
     - Gas laws -physiological significance
     - Physiological effects of decompression
   - **RESPIRATION**
     - Blood gas exchange
     - Oxygen saturation
     - HYPOXIA signs and symptoms
     - Average time of useful consciousness (TUC)
     - Hyperventilation signs and symptoms
     - Barotrauma
     - Decompression sickness
   - **ACCELERATION**
     - G-Vector orientation
     - Effects and limits of G-load
Methods to increase gz-tolerance
Positive/negative acceleration
Acceleration and the vestibular system

VISUAL DISORIENTATION
Sloping cloud deck
Ground lights and stars confusion
Visual autokinesis

VESTIBULAR DISORIENTATION
Anatomy of the inner ear
Function of the semicircular canals
Function of the otolith organs
The oculogyral and coriolis illusion
'Leans'

SIMULATOR ILLUSION
Forward acceleration illusion of 'nose up'
Deceleration illusion of 'nose down'
Motion sickness - causes and management

NOISE AND VIBRATION
Preventive measures

4 Ophthalmology
   including demonstration and practical
Anatomy of the eye
Relation to aviation duties
Examination techniques;
   visual acuity assessment;
   visual aids;
   visual fields – acceptable limits for certification;

   ocular muscle balance;
   assessment of pathological eye conditions;
   glaucoma
Monocularity and medical flight tests
Colour vision
   Methods of testing: pseudoisochromatic plates,
   lantern tests, anomaloscopy
Importance of standardization of tests and of test protocols
Assessment after eye surgery

5 Otorhinolaryngology

All materials and information created are property of European Society of Aerospace Medicine – ESAM. Contacts with ESAM are possible by website www.esam.aero
including demonstration and practical skills

Anatomy of the systems
Clinical examination in ORL
Functional hearing tests
Vestibular system; vertigo, examination techniques
Assessment after ENT surgery
Barotrauma ears and sinuses
Aeronautical ENT pathology
ENT requirements

6 Cardiovascular system
including demonstration and practical skills
3 hours
Relation to aviation; risk of incapacitation
Examination procedures; ECG, laboratory testing and other special examinations
Cardiovascular diseases:
Hypertension, treatment and assessment
Ischaemic heart disease
ECG findings
Assessment of satisfactory recovery from myocardial infarction, interventional procedures and surgery
Cardiomyopathies; pericarditis; rheumatic heart disease, valvular diseases
Rhythm and conduction disturbances, treatment and assessment
Congenital heart disease; surgical treatment, assessment
Cardiovascular syncope – single and repeated episodes

7. General Medicine
including demonstration and practical skills
9 hours
Respiratory system
Relation to aviation, risk of incapacitation
Examination procedures: spirometry, peak flow, x-ray, other examinations
Pulmonary diseases: asthma, chronic obstructive pulmonary diseases
Infections, tuberculosis
Bullae, pneumothorax;
Treatment and assessment
Digestive system
Relation to aviation, risk of incapacitation
Examination of the system
Gastro-intestinal disorders: gastritis, ulcer disease
Biliary tract disorders
Hepatitis and pancreatitis
Inflammatory bowel disease, Irritable colon
Hernias
Treatment and assessment including post abdominal surgery

**Endocrine diseases**
Relation to aviation, risk of incapacitation
Endocrine disorders:
Diabetes mellitus type I & II
Diagnostic criteria
Glucose tolerance tests
Anti-diabetic therapy
Operational aspects in aviation
Satisfactory control criteria for aviation
Hyper/hypothyroidism
Pituitary and adrenal glands disorders
Treatment and assessment

**Haematology**
Relation to aviation, risk of incapacitation
Blood donation aspects
Polycythaemia; anaemias; leukaemias; lymphomas
Platelet disorders
Haemoglobinopathies; geographical distribution; classification; sickling conditions.
Treatment and assessment

**Urinary system**
Relation to aviation, risk of incapacitation
Action to be taken after discovery of abnormalities in routine dipstick urinalysis e.g haematuria; albuminuria
Urinary system disorders:
Nephritis; pyelonephritis; obstructive uropathies

Tuberculosis
Lithiasis: single episode; recurrence
Nephrectomy, transplantation, other treatment and assessment

**Gynaecology-obstetrics**
Relation to aviation, risk of incapacitation
Pregnancy and aviation
Disorders, treatment and assessment

**Orthopaedic disorders**
Musculoskeletal disorders, including:
Vertebral column diseases
Arthropathies and arthroprosthesis
Disabled pilots
Treatment of musculoskeletal system, assessment for flying.

**Malignant Disease**
Relation to aviation, risk of metastasis and incapacitation
Risk management and waiver decisions
Different methods of treatment and assessment

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8 **Neurology** 3 hours

Relation to aviation, risk of incapacitation
Examination procedures
Neurological disorders:
seizures – assessment of single episode;
epilepsy;
multiple sclerosis;
head trauma;
post-traumatic states;
vascular diseases;
tumours;
disturbance of consciousness – assessment of single and repeated episodes
Degenerative diseases
Treatment and assessment

9 **Psychiatry in Aviation** 3 hours

Relation to aviation, risk of incapacitation
Psychiatric examination
Psychiatric disorders: neurosis; personality disorders; psychosis; organic mental illness;
Drugs, alcohol and substance abuse
Treatment, rehabilitation and assessment

10 **Psychology** 3 hours

Introduction to psychology in aviation as a supplement to neuropsychiatric assessment
Methods of psychological examination
Behaviour and personality
Workload management and situational awareness
Flight motivation and suitability
Group social factors
Psychological stress, stress coping, fatigue
Psychomotor functions and age
Mental fitness and training

11 Incidents and accidents, Escape and Survival  2 hours

Accident statistics
Injuries
Aviation pathology, postmortem examination, identification

Escape from aircraft in flight
  aircraft on fire
  aircraft in water
  by parachute

12 Medication and Flying  2 hours

Hazards of medications
Common side effects; prescription medications; over-the-counter medications; herbal medications; ‘alternative’ therapies
Medication for sleep disturbance

13 Legislation, Rules and Regulations  4 hours

ICAO Standards and Recommended Practices
JAA provisions (Requirements, Appendices, AMCs and IEMs)
Incapacitation: acceptable aeromedical risk of incapacitation; types of incapacitation; ‘two communication’ rule; operational aspects
Basic principles in assessment of fitness for aviation
Operational and environmental conditions
Use of medical literature in assessing medical fitness; differences between scientific study populations and licensed populations
Flexibility
ICAO Annex 1, paragraph 1.2.4.8,
Accredited Medical Conclusion; consideration of knowledge, skill and experience
Trained versus untrained crews; incapacitation training
Medical flight tests.

14 **Practical demonstrations of basic aeronautical knowledge**
   8 hours

15 **Concluding items**
   2 hours
   
   Final examination
   De-briefing and critique

B **ADVANCED TRAINING IN AVIATION MEDICINE**
60 hours

1 **Pilot working environment**
6 hours

   Commercial aircraft cockpit
   Business jet, commuter flights
   Military aviation:
      low level high speed flying
      high dynamic flight
      night vision devices (NVD)
      forward looking infrared (FLIR)

   Professional airline operations
   Fixed wing and helicopter, aerial work
   Air traffic control
   Single-pilot/multi-crew

2 **Aerospace physiology**
3 hours

   Brief review of basics in physiology
   (hypoxia, rapid/slow decompression,
   hyperventilation, acceleration, ejection seat,
   spatial disorientation)

3 **Ophthalmology including demonstration and practical skills**
4 hours

   Brief review of basics
(visual acuity, refraction, colour vision, visual fields, night vision, stereopsis, monocularity... )
Class 1 visual requirements
Implications of refractive and other eye surgery
Case review

4  **Otorhinolaryngology including demonstration and practical skills**

Brief review of basics
(barotrauma -ears and sinuses, functional hearing tests..)
Noise and its prevention
Vibration, kinetosis
Class 1 hearing requirements
Case review

5  **Dentistry**

Oral examination including dental formula
Oral cavity, dental disorders and treatment, including implants, fillings, prosthesis etc.
Barodontalgia
Class 1 requirements
Case review

6  **Cardiology including demonstration and practical skills**

Cardiological examination and review of basics

Class 1 requirements
Diagnostic steps in cardiology
Clinical cases

7  **General Medicine including demonstration and practical skills**

Complete physical examination
Review of basics with relationship to commercial flight operations
Class 1 requirements
Clinical cases

8  **Neurology/Psychiatry including demonstration and practical skills**

Brief review of basics
(neurological and psychiatric examination)
Drugs and alcohol
Class 1 requirements
Case review

9 Human Factors in aviation including 8 hours demonstration and practical experience 19 hours

a. Long haul flight operations
   - flight time limitations
   - sleep disturbance
   - extended/expanded crew
   - jet lag/time zones

b. Human information processing and system design
   - FMS, PFD, datalink, fly by wire
   - adaptation to the glass cockpit
   - CCC, CRM, LOFT etc.
   - practical simulator training
   - ergonomics

c. Crew commonality:
   - flying under the same type rating
   - e.g. B737-300, -400, -500

d. Human factors in aircraft incidents and accidents

e. Flight safety strategies in commercial aviation

f. Fear and refusal of flying

g. Psychological selection criteria

h. Operational requirements (flight time limitation, exposure to radiation etc.)

10 Incidents and accidents, Escape and Survival 2 hours

Accident statistics
Types of injuries
Aviation pathology, postmortem examination
specific related to aircraft accidents, identification

Rescue and emergency evacuation

11 Hygiene 2 hours

Aircraft and transmission of diseases
Hygiene aboard aircraft:
water supply, oxygen supply, disposal of waste, cleaning, disinfection and disinsection
Catering
Crew nutrition

12 Tropical medicine 2 hours
Endemicity of tropical disease
Infections diseases (communicable diseases, sexual transmitted diseases, HIV etc.)
Vaccination of flight crew and passengers
Diseases transmitted by vectors
Food and water-borne diseases
Parasitic diseases.
International health regulations
Personal hygiene of aviation personnel

13 Cabin crew working conditions 2 hours
Cabin environment, workload, duty and rest time

General health conditions

14 Space medicine 1 hour
Microgravity and metabolism, life sciences

15 Concluding items 2 hours
Final examination
De-briefing and critique

C REFRESHER TRAINING IN AVIATION MEDICINE 20 hours

Refresher course supervised by the NAA (minimum 6 hours)
Including updates in clinical aviation medicine, regulation etc.

Agreed accreditation times for training:
Attendance at International Academy of Aviation and Space Medicine Annual Congresses Hours of the scientific presentations
Attendance at Aerospace Medical Association Annual Scientific Meetings Hours of the scientific presentations
Other scientific meetings, as organised or approved by AMS of Member State.*

Hours of the scientific presentations

Flight deck experience (a maximum of 5 hours credit per 3 years)

i. jump seat
   (5 sectors -1 hour credit)

ii. simulator
   (4 hours -1 hour credit)

iii. aircraft piloting
   (4 hours -1 hour credit)

All credited time must be agreed with the AMS.

* A minimum of 6 hours must be under the direct supervision of the AMS.

Abbreviations
CCC Crew Co-ordination Concept
CRM Crew Resource Management
FMS Flight Management System
LOFT Line Oriented Flight Training
PFD Primary Flight Display