
Aero-medical guidance for pilots

MED-UPUTE-015

Revision No: 2, Revision Date: 30.03.2021.

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INTRODUCTION

The purpose of this guidance is to inform pilots about the requirements, procedures, and obligations regarding aero-medical fitness, and to provide preventive advice to preserve physical and mental health. In case of any questions and the need for further clarification of any statement in this manual, please contact us without hesitation. If you think that some topic needs to be clarified more or you have a proposal for a new topic in this guidance, do let us know. Also, if you have any doubts or problems that you cannot solve on your own, please contact us, we will try to help, an appointment will be arranged to talk while respecting confidentiality at all times. Asking questions is the first step in solving a problem.

CONTACTS

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MEDICAL CONFIDENTIALITY

All persons involved in medical examinations, assessment, and certification must ensure that medical confidentiality is respected at all times. Do not send medical documentation by fax, send it exclusively by e-mail to aeromedical@ccaa.hr or by mail with a note on the envelope: MEDICAL CONFIDENTIALITY, AUTHORIZED MEDICAL PERSONEL ONLY.

REGULATION

The pilot's fitness is regulated by Commission Regulation (EU) 1178/2011 and its amendments (Aircrew regulation). Regulations are available on the EASA website:

https://www.easa.europa.eu/sites/default/files/dfu/Easy_Access_Rules_for_Medical_Requirements-Jun20.pdf.

LIST OF AME/AeMC

The complete list of certified aero-medical examiners (AMEs) and certified aero-medical centers (AeMC), with contact details, is published on the CCAA website, <http://www.ccaa.hr/en/aero-medical-centres-and-examiners-aemcs-68747>

FORMS

Forms used outside the EMPIC Medical system are published on the CCAA website, <https://www.ccaa.hr/en/forms-91421>, at the bottom of the page, below the title - Aero-medical fitness – aviation personnel:

LIC-FRM-105 Application form for secondary review procedure

LIC-FRM-208 Decrease in medical fitness – aircrew / ATCO

LIC-FRM-215 Form for the transfer of aero-medical records – for change of state of licence issue (AERO-MEDICAL SOLI FORM)

Other forms used in the assessment of aero-medical fitness are part of the EMPIC Medical application and are printed by the AME upon completion of the examination.

REVALIDATION OF MEDICAL CERTIFICATE

A medical examination may be performed within 45 days before the expiration of the certificate of medical fitness. Make an appointment with AME by phone or e-mail.

You must provide:

- proof of identity with a photograph (a passport).
- medical certificate (if you have it or have had it)
- medical documentation if any health issues have not been reported as a decrease in medical fitness
- AME may ask you to bring a note from your family doctor, about your illnesses and medication

Before undergoing a medical examination, the AME must ensure that communication can be established with the person without language barriers and that the person is made aware of the consequences of making an incomplete, inaccurate, or false statement of his or her medical history when applying for a health certificate.

Before signing the application form, check that all content is accurate, and pay special attention to the contact information, as errors sometimes occur.

The examination for certificate revalidation is regulated and the EMPIC application automatically generates the procedures that need to be done. However, pay attention to the validity of certain diagnostic procedures on your medical certificate. For details on the content of the examination, see [Table 1](#) on the next page. The AME may extend the content of the examination on clinical indication, and to assess aero-medical fitness, request additional diagnostic procedures.

Upon completion of the aero-medical examination and/or assessment, the AME must inform the applicant whether he/she is: fit, unfit, or refer him/her to a medical assessor of the pilot licensing authority. A referral is a procedure needed for certain health conditions when a medical assessor of the authority responsible for the pilot's license must be included in the medical assessment.

Furthermore, the AME must notify the person of any limitation that may restrict flight training or license privileges, as applicable - if the limitation is added for the first time, you should receive written instruction. For limitations, see [Table 2](#).

If the applicant is assessed as unfit, the AME must advise him/her on the legal possibility of the secondary review procedure, ie that applicant can submit a request for secondary review to the medical assessor of Licensing authority, if to CCAA - than within 15 days from the receiving of the Letter of denial.

Before signing the certificate, carefully check the certificate of medical fitness because sometimes errors can occur.

When the examination is finished, AME completes the documentation and sends it via the EMPIC application to the Aero-medical section of CCAA. If you performed the examination abroad, be sure to remind the EU AME to send the documentation of your examination either electronically to aeromedical@ccaa.hr or by post to the CCAA address.

AMEs must keep records detailing medical examinations and assessments, as well as their results, for at least 10 years from the expiration of the certificate. All aero-medical records are available to the pilot upon his written request.

RENEWAL OF MEDICAL CERTIFICATE

If the period of validity of the certificate of medical fitness has expired up to 2 years, the renewal of the medical certificate requires regular medical examination (+ drug testing for class 1 in Croatia) and may be extended by additional diagnostic procedures or specialist examination if AME determines such procedure as necessary.

If the period of validity of the medical certificate has expired for more than 2 years, an assessment of the holder's previous medical documentation and regular medical examination (+ drug and alcohol testing (CDT) for class 1 in Croatia) is required and may be extended by additional diagnostic procedures or specialist examination if AME determines such procedure as necessary.

If the period of validity of the certificate of medical fitness has expired for more than 5 years, an initial examination at the AeMC is required for renewal, but the assessment will be based on the requirements for revalidation of the medical certificate.

Table 1. Classes of medical certificates-**INFORMATION**

CLASS	1	2	LAPL
LICENCE	CPL / MPL / ATPL	PPL / SPL-comm. / BPL-comm.	LAPL, SBFCL, BFCL
INITIAL	AeMC	AeMC/AME	AeMC/AME
REVALIDATION (45 days prior to expiry date)	AeMC/AME	AeMC/AME	AeMC/AME
RENEWAL	- less than 5 years: AeMC/AME - more than 5 years: AeMC	AeMC/AME	AeMC/AME
MEDICAL CERTIFICATE VALIDITY	<p><i>Single pilot air operations carrying passengers</i> - until 40 years of age: 12 months</p> <p><i>Other commercial operations</i> - until 60 years of age: 12 months</p> <p>- over 40 years: 6 months</p> <p>- over 60 years: 6 months</p>	<p>- until 40: 60 months (until 42. birthday) - 40-49: 24 months (until 51. birthday) - over 50: 12 months</p>	<p>- until 40: 60 months (until 42. birthday) - over 40: 24 months</p>
ELECTROCARDIOGRAM (ECG)	At initial, then: - until 30: 60 months - until 40: 24 months - until 50: 12 months - over 50: at each medical	At initial, then: - at first examination after 40 - over 50: 24 months	
CARDIO-VASCULAR RISK ASSESSMENT	- over 40 years - 2 or more risk factors: hypertension, diabetes, smoking, blood lipids.... - Body Mass Index equal or over 35	- 2 or more risk factors: hypertension, diabetes, smoking, blood lipids.... - Body Mass Index equal or over 35	
COMPREHENSIVE CARDIO-VASCULAR ASSESSMENT	-if clinically indicated -if the cardio-vascular risk score is $\geq 10\%$ -at first examination after 65, then every 4 years	-if clinically indicated -if cardio-vascular risk score is $\geq 15\%$	Initial, and every examination after 50 includes: (1) clinical examination. (2) blood pressure. (3) urine. (4) routine eye/sight examination); (5) hearing.
AUDIOMETRY	At initial, then: - until 40: 60 months - over 40: 24 months	If an instrument rating is added to PPL immediately, then : - until 40: 60 months - over 40: 24 months	
HEARING	Routinely- at each medical	Routinely- at each medical	
OPHTHALMOLOGY	Routinely- at each medical Comprehensive ophthalmology: - at initial, then: -if between +3D to +5D or -3D to -6D: 60 months -if over -6D: 24 months -if anisometropia or astigmatism over 3D: 24 months -if clinically indicated	Routinely- at each medical Comprehensive ophthalmology: - if clinically indicated - if night rating is added to the PPL licence, the holder shall be colour safe!	Examination until age 50 includes: (1) medical history (2) aero-medical examination/assessment if clinically indicated
COLOUR VISION	Ishihara plates (24 plates version)-test is considered passed if first 15 plates, presented in random order, are identified without error Anomaloscopy-colour match is trichromatic and the matching range is 4 scale units or less CAD	Ishihara plates	If night rating is added to the LAPL licence, the holder shall be colour safe!
HEMOGLOBIN	At each medical	At each medical	
LIPIDS, CHOLESTEROL	At initial, then the first examination after age 40 If clinically indicated	If clinically indicated	
URINALYSIS	At each medical	At each medical	
PULMONARY FUNCTION TESTS	At initial (FEV1/FVC), then if clinically indicated	If clinically indicated	
CHEST X-RAY	At initial If clinically indicated	If clinically indicated	If clinically indicated
MENTAL HEALTH ASSESSEMENT	At initial- AME assessment +psychologist, psychiatrist if clinically indicated Revalidation/Renewal - AME assessment; psychologist /psychiatrist if clinically indicated	At each medical - AME assessment; psychologist /psychiatrist if clinically indicated	If clinically indicated
DRUG TESTING	Initial/Renewal (if validity expired due to COVID-excepted) If clinically indicated	If clinically indicated	If clinically indicated
ALCOHOL TESTING (CDT)	Initial/Renewal (validity expired ≥ 2 years) If clinically indicated	If clinically indicated	If clinically indicated

Table 2. Limitations

Code	LIMITATION	IMPOSED BY	REMOVAL
TML	Restriction of the period of validity of the medical certificate	AME/AeMC	<p>For class 1 medical certificates, all limitations should only be removed by the medical assessor of the licensing authority.</p> <p>For class 2 medical certificates, limitations may be removed by the medical assessor of the licensing authority or by an AeMC or AME in consultation with the medical assessor of the licensing authority.</p> <p>For LAPL medical certificates, limitations may be removed by an AeMC or AME..</p>
VDL	Correction for defective distant vision	AME/AeMC	
VML	Correction for defective distant, intermediate, and near vision	AME/AeMC	
VNL	Correction for defective near vision	AME/AeMC	
CCL	Correction by means of contact lenses only	Class. 1 - referral Class. 2 - consultation	
VCL	Valid by day only	AME/AeMC	
RXO	Specialist ophthalmological examinations	Class. 1 - referral Class. 2 - consultation	
SIC	Specific regular medical examination(s) — contact licensing authority	Class. 1 - referral Class. 2 - consultation	
HAL	Valid only when hearing aids are worn	Class. 1 - referral Class. 2 - consultation	
APL	Valid only with approved prosthesis	Class. 1 - referral Class. 2 - consultation	
AHL	Valid only with approved hand controls	Class. 1 - referral Class. 2 - consultation	
OML	Valid only as, or with, a qualified co-pilot	Class. 1 - referral	
OCL	Valid only as co-pilot	Class. 1 - referral	
OSL	Valid only with a safety pilot and in aircraft with dual controls	Class. 2 - consultation	
OPL	Valid only without passengers (PPL and LAPL only)	Class. 2 - consultation	
ORL	Valid only with a safety pilot if passengers are carried	Class. 2 - consultation	
OAL	Restricted to demonstrated aircraft type	Class. 1 - referral Class. 2 - consultation	
SSL	Special restriction as specified	Class. 1 - referral Class. 2 - consultation	

TML Time limitation - Restriction of the period of validity of the medical certificate

The period of validity of the medical certificate is limited to the duration as shown on the medical certificate. This period of validity commences on the date of the medical examination. Any period of validity remaining on the previous medical certificate is no longer valid. The holder of the medical certificate should present themselves for re-examination when advised and should follow any medical recommendations.

VDL Wear corrective lenses and carry a spare set of spectacles -Correction for defective distant vision

Correction for defective distant vision: whilst exercising the privileges of the licence, the holder of the medical certificate should wear spectacles or contact lenses that correct for defective distant vision as examined and approved by the AeMC, or AME. Contact lenses may not be worn until cleared to do so by the AeMC, or AME. A spare set of spectacles, approved by the AeMC, or AME, should be readily available.

VML **Wear multifocal spectacles and carry a spare set of spectacles -Correction for defective distant, intermediate, and near vision**

Correction for defective distant, intermediate, and near vision: whilst exercising the privileges of the licence, the pilot should wear spectacles that correct for defective distant, intermediate, and near vision as examined and approved by the AME. Contact lenses or full-frame spectacles, when either correct for near vision only, may not be worn.

VNL **Have available corrective spectacles and carry a spare set of spectacles - Correction for defective near vision**

Correction for defective near vision: whilst exercising the privileges of the licence, the pilot should have readily available spectacles that correct for defective near vision as examined and approved by the AME. Contact lenses or full-frame spectacles, when either correct for near vision only, may not be worn.

CCL **Correction by means of contact lenses only**

Correction for defective distant vision: whilst exercising the privileges of the licence, the holder of a medical certificate should wear contact lenses that correct for defective distant vision, as examined and approved by the AeMC, AME, or GMP. A spare set of similarly correcting spectacles, approved by the AeMC, AME, or GMP, should be readily available for immediate use whilst exercising the privileges of the licence.

VCL **Valid by day only**

This limitation allows holders of class 2 or LAPL medical certificate with varying degrees of colour deficiency, to exercise the privileges of their licence by daytime only.

RXO **Specialist ophthalmological examinations**

Specialist ophthalmological examination(s), other than the examinations stipulated in Part-MED, are required for a significant reason.

SIC **Specific regular medical examination(s) contact medical assessor of the licensing authority**

This limitation requires the AeMC, or AME to contact the medical assessor of the licensing authority before embarking upon a revalidation or renewal of aero-medical assessment. The limitation is likely to concern a medical history or additional examination(s) which the AeMC or AME should be aware of prior to undertaking the assessment.

HAL **Valid only when hearing aids are worn**

Whilst exercising the privileges of the licence, the holder of the medical certificate should use hearing aid(s) that compensate for defective hearing as examined and approved by the AeMC or AME. A spare set of batteries should be readily available.

APL **Valid only with approved prosthesis**

This limitation applies to the holder of a medical certificate with a musculoskeletal condition when a medical flight test or a flight simulator test has shown that the use of a prosthesis is required to safely exercise the privileges of the licence. The prosthesis to be used should be approved.

AHL **Valid only with approved hand controls**

This limitation applies to the holder of a medical certificate who has a limb deficiency or other anatomical problem which had been shown by a medical flight test or flight simulator testing to be acceptable but to require the aircraft to be equipped with suitable, approved hand controls.

OML **Valid only as, or with, a qualified co-pilot**

This limitation applies to holders of class 1 medical certificate who do not fully meet the aero-medical requirements for single-pilot operations but are fit for multi-pilot operations. Refer to MED.B.001(d)(1).

OCL **Valid only as co-pilot**

This limitation is an extension of the OML and is restricted to the role of co-pilot.

OSL **Valid only with a safety pilot and in aircraft with dual controls**

This limitation applies to holders of class 2 or a LAPL medical certificate only. The safety pilot should be made aware of the type(s) of possible incapacity that the pilot whose medical certificate has been issued with this limitation may suffer and should be prepared to take over the aircraft controls during flight. Refer to MED.B.001(d)(2).

OPL **Valid only without passengers (PPL and LAPL only)**

This limitation applies to holders of class 2 or LAPL medical certificates with a medical condition that may lead to an increased level of risk to flight safety when exercising the privileges of the licence. This limitation is to be applied when this risk is not acceptable for the carriage of passengers. Refer to MED.B.001(d)(3).

ORL **Valid only with a safety pilot if passengers are carried**

This limitation applies to holders of class 2 or LAPL medical certificates with a medical condition that may lead to an increased level of risk to flight safety when exercising the privileges of the licence. The safety pilot, if carried, should be made aware of the type(s) of possible incapacity that the pilot whose medical certificate has been issued with this limitation may suffer and should be prepared to take over the aircraft controls during flight. Refer to MED.B.001(d)(4).

OAL **Restricted to demonstrated aircraft type**

This limitation applies to the holder of a medical certificate who has a limb deficiency or other medical problem which had been shown by a medical flight test or flight simulator testing to be acceptable but to require a restriction to a specific class and type of aircraft.

SSL **Special restriction as specified**

This limitation may be considered when an individually specified limitation, not defined in this AMC, is appropriate to mitigate an increased level of risk to flight safety. The description of the SSL should be entered on the medical certificate or in a separate document to be carried with the medical certificate.

DECREASE IN MEDICAL FITNESS

License holders shall not exercise the privileges of their license and associated authorizations or certificates, and student pilots shall not fly alone at any time:

1. are aware of any decrease in their medical fitness which might render them unable to safely exercise those privileges;
2. take or use any prescribed or non-prescribed medication which is likely to interfere with the safe exercise of the privileges of the applicable licence;
3. receive any medical, surgical, or other treatment that is likely to interfere with the safe exercise of the privileges of the applicable licence.

In addition, holders of a medical certificate shall, without undue delay and before exercising the privileges of their licence, seek aero-medical advice from the AeMC, or AME as applicable, when they:

1. have undergone a surgical operation or invasive procedure;
2. have commenced the regular use of any medication;
3. have suffered any significant personal injury involving incapacity to function as a member of the flight crew;
4. have been suffering from any significant illness involving incapacity to function as a member of the flight crew;
5. are pregnant;
6. have been admitted to hospital or medical clinic;
7. first require correcting lenses.

During the decrease in medical fitness, the certificate holder must fill in Decrease in medical fitness – aircrew / ATCO LIC-FRM-208 (only the first page), and with the accompanying medical documentation contact a doctor - certified HR.AME (Croatian AME), preferably the one with whom he/she performed the last examination, by e-mail or as agreed with AME.

If the holder is assessed as temporarily unfit to use the privileges of the license, the AME will determine the reassessment date on the form or, if a date cannot be determined, the reassessment should be made after a satisfactory recovery.

If the holder is employed in the aviation industry, the third page of the form is completed and delivered to his/her employer (without medically confidential details!).

A decrease in medical fitness is registered in the EMPIC Medical application.

If the holder is assessed as unfit the AME must take the certificate.

COVID-19

Due to the COVID pandemic, AME will pay special attention to the following questions in the Application Form: (Eye trouble), (Other respiratory diseases), (Heart or vascular trouble), (Nose, throat disorder), (Dizziness), (Neurological disorders), (Musculoskeletal illness), (Other diseases), (Hospitalization), (Medical visit). At the examination, be sure to report if you were COVID-19 positive but did not need to contact AME to report a decrease in medical fitness.

The aero-medical assessment of COVID-positive candidates is performed taking into account medical history, clinical examination, and relevant additional tests and procedures that the AME finds appropriate.

Applicants who have had **asymptomatic** COVID and do not report a decrease in medical fitness and any subjective difficulties do not require further diagnostic procedures and may be assessed as fit.

Candidates who have had **symptomatic** COVID should submit a complete medical history and at least spirometry should be performed. If the COVID-19 infection was more severe, the AME must assess whether an additional procedure, ie specialist control, is required before issuing a certificate of medical fitness, depending on the findings or symptoms.

COVID-19 VACCINATION

Aviation personnel is advised and recommended to be vaccinated, emphasizing that the vaccine must be approved by the European Medicines Agency (EMA) or the Croatian Medicines and Medical Devices Agency (HALMED).

Detailed information on approved vaccines can be found at the link: <https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines-covid-19>.

At this time, no evidence is available regarding the impact of in-flight conditions on the severity of the side effects, nor on the resulting impact on the performance of the crew members during their safety-related tasks. For these reasons, taking into account that these vaccines are new pharmacological products, EASA issued the current SIB providing recommendations in order to ensure that the side effects do not interfere with the completion of any safety-related tasks. The European Union Aviation Safety Agency published a Safety Information Bulletin, SIB 2021-06, containing operational recommendations related to the vaccination of aircrew: <https://www.easa.europa.eu/newsroom-and-events/news/easa-publishes-safety-information-bulletin-sib-2021-06-vaccination-aircrew>. Briefly, EASA recommends the following:

1. Due to their increased exposure, it is highly recommended for aircrew members to receive the COVID-19 vaccine as soon as they become available in accordance with the national COVID-19 vaccine roll-out plan.
2. Operators and aircrew members should consider a waiting period of 48 hours after each dose of COVID-19 vaccine, before aircrew members should be engaged in any flight-related tasks in accordance with the privileges of their flight crew licence or cabin crew attestation. This interval could be extended to 72 hours for aircrew members performing single crew operations.
3. Aircrew members are advised to consult with their AME in case side effects persist for more than 48 hours following the vaccination and, in consultation with the AME, extend the waiting period until the time when the side effects completely disappear.
4. Aircrew members are reminded to give proper consideration to the requirements of MED.A.020-Decrease in medical fitness and the corresponding GM1 MED.A.020.
5. AMEs and AeMCs performing medical examinations of aircrew should encourage consultation regarding the indication and side effects of vaccination.

We also remind of the responsibility and obligation concerning the provisions of MED.A.020 Decrease in medical fitness in case of side effects that could have an impact on the safe use of license privileges.

In any case, if you have any uncertainties or doubts, feel free to consult before and/or after vaccination with the AME at which you are being examined or with the Aero-medical section of CCAA.

Vaccination details (vaccine type and time of vaccination, side effects) should be recorded by your AME, either in the process of reporting a decrease in medical fitness or at the next certificate renewal/revalidation examination.

USE OF MEDICATION, DRUGS, AND PSYCHOACTIVE SUBSTANCES

The holder of a medical certificate shall not exercise the privileges of a license if he takes any prescription or non-prescription drugs, narcotics, or psychoactive substances, including those used to treat diseases or disorders, if he is aware of any side effects that are incompatible with the safe use of license privileges. The holder of a medical certificate must not take any prescription or over-the-counter medicine and must not undergo any therapy unless he is sure that the medicine or therapy will not affect his ability to safely use privileges of the licence, and if there is any doubt, must seek advice from the AeMC or AME.

The term **“problematic use”** is defined as follows:

The use of one or more psychoactive substances by aviation personnel in a way that:

- a) constitutes a direct hazard to the user or endangers the lives, health, or welfare of others; and/or
- b) causes or worsens an occupational, social, mental, or physical problem or disorder.

psychoactive substances' means alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, with the exception of caffeine and tobacco.

Alcohol/drug testing is conducted by airlines at random.

At the initial medical examination for the medical certificate, and the renewal of the certificate or any examination, if indicated (see Table 1), a test for drugs (opiates, cannabinoids, sedatives, hypnotics, cocaine, psychostimulants, hallucinogenic substances, and volatile solvents) is performed as well as a test for chronic alcohol consumption - carbohydrate-deficient transferrin (CDT).

MEDICATION – GUIDANCE FOR PILOTS AND CABIN CREW MEMBERS (GM1 MED.A.020)

(a) Any medication can cause side effects some of which may impair the safe performance of flying duties. Equally, symptoms of colds, sore throats, diarrhea, and other abdominal upsets may cause little or no problem whilst on the ground but may distract the pilot or cabin crew member and degrade their performance whilst on duty. The in-flight environment may also increase the severity of symptoms which may be minor while on the ground. Therefore, one issue in medication and flying is the underlying condition and, in addition, the symptoms may be compounded by the side effects of the medication prescribed or bought over the counter for the treatment of such ailments. This guidance material is to provide some help to pilots and cabin crew in deciding whether expert aero-medical advice by an AME, AeMC, GMP, OHMP, or Medical Assessor is needed.

(b) Before taking any medication and acting as a pilot or cabin crew member, the following three basic questions should be satisfactorily answered.

- 1) Do I feel fit to fly?
- 2) Do I really need to take medication at all?
- 3) Have I given this particular medication a personal trial on the ground to ensure that it will not have any adverse effects whatever on my ability to fly?

(c) Confirming the absence of adverse effects may well need expert aero-advice.

(d) The following are some widely used medicines with a description of their compatibility with flying duties:

(1) **Antibiotics.** Various Penicillin's, Tetracycline's, macrolides, gyrase inhibitors and others may have short-term or delayed side effects which can affect pilot or cabin crew performance. More significantly, however, their use usually indicates that an infection is present and, thus, the effects of this infection may mean that a pilot or cabin crew member is not fit to fly and should obtain expert aero-medical advice.

(2) **Anti-malaria drugs.** The decision of the need of anti-malaria drugs depends on the areas to be visited, and the risk that the pilot or cabin crew member has of being exposed to mosquitoes and of developing malaria. An expert medical opinion should be obtained in terms of whether anti-malaria drugs are needed and what kind of drugs should be used. Most of the anti-malaria drugs (atovaquone plus proguanil, chloroquine, doxycycline) are compatible with flying duties. However, adverse effects associated with mefloquine include insomnia, strange dreams, mood changes, nausea, diarrhoea and headaches. In addition, mefloquine may cause spatial disorientation and lack of fine coordination and is, therefore, not compatible with flying duties.

- (3) **Antihistamines.** Antihistamines can cause drowsiness. They are widely used in 'cold cures' and in treatment of hay fever, asthma, and allergic rashes. They may be in tablet form or a constituent of nose drops or sprays. In many cases, the condition itself may preclude flying, so that, if treatment is necessary, expert aero-medical advice should be sought so that so-called non-sedative antihistamines, which do not degrade human performance, can be prescribed.
- (4) **Cough medicines.** Antitussives often contain codeine, dextromethorphan, or pseudo-ephedrine which are not compatible with flying duties. However, mucolytic agents (e.g. carbocysteine) are well-tolerated and are compatible with flying duties.
- (5) **Decongestants.** Nasal decongestants with no effect on alertness (e.g. clobutinol or oxeladine) are compatible with flying duties. However, often the oedema of the mucosal membranes causes difficulties in equalising the pressure in the ears or sinuses, and, thus, makes the pilot and cabin crew member unfit for flying duties.
- (6) **Nasal corticosteroids** are commonly used to treat hay fever, and they are compatible with flying duties.
- (7) **Pain killers, antifebrile, and anti-headache drugs.** The Non-Steroidal Anti Inflammatory Drugs (NSAIDs), commonly used to treat pain, fever, and headache, may be compatible with flying duties (paracetamol, aspirin, ibuprofen). However, the pilot or cabin crew member should have given positive answers to the three basic questions before using the medication and flying.
- (8) **Anti-ulcer medicines (Antacids).** Gastric secretion inhibitors such as H2 antagonists (e.g. ranitidine, cimetidine) or proton pump inhibitors (e.g. omeprazole) may be acceptable after diagnosis of the pathological condition. It is important to seek medical diagnosis and not to treat only the dyspeptic symptoms.
- (9) **Anti-diarrhoeal drugs.** Loperamide is the commonest anti-diarrheal drug and is safe when flying. However, the diarrhoea itself often makes the pilot and cabin crew member unfit for flying.
- (10) **Hormonal contraceptives and hormone replacement** therapy usually have no adverse effects and are compatible with flying and cabin safety duties.
- (11) **Erectile dysfunction medication.** This medication may cause disturbances in colour vision and dizziness. There should be at least 24 hours in between medication taken and flying duty.
- (12) **Smoking cessation.** Nicotine replacement therapy may be allowed. However, other medication affecting the central nervous system (bupropion, varenicline) is not acceptable for pilots.
- (13) **High blood pressure medication.** Antihypertensive drugs are compatible with flying duties only after consultation with the AME, AeMC, GMP, OHMP, or Medical Assessor as applicable as some of these drugs can cause a change in the normal cardiovascular reflexes and impair intellectual performance which can seriously affect flight safety. If the level of blood pressure is such that drug therapy is required, the pilot should be temporarily grounded and monitored for any side effects. Any treatment instituted should, therefore, be discussed with the AME, AeMC, GMP, OHMP, or Medical Assessor as applicable (see MED.B.010(j)).
- (14) **Asthma medication.** Asthma has to be clinically stable before a pilot or cabin crew member can return to flying duties. The use of respiratory aerosols, such as corticosteroids, beta-2-agonists, chromoglycic acid, or anticholinergic drugs in low doses may be compatible with flying duties. However, the use of oral steroids or theophylline derivatives is incompatible whilst flying duty. If a pilot or cabin crew member uses any medication indicated for asthma, he/she should consult the AME, AeMC, GMP, OHMP, or Medical Assessor, as applicable (see MED.B.015(c)).
- (15) **Analgesics.** The more potent analgesics are opiate derivatives and may produce a significant decrement in human performance. If such potent analgesics are required, the pain for which they are taken generally indicates a condition that precludes flying duties.
- (16) **Tranquillisers, anti-depressants, and sedatives.** The inability to react, due to the use of this group of medicines, has been a contributory cause of fatal aircraft accidents. In addition, the underlying condition for which these medications have been prescribed

will almost certainly mean that the mental state of a pilot or cabin crew member is not compatible with flying duties (see MED.B.050).

(17) **Sleeping tablets.** Sleeping tablets dull the senses may cause mental confusion and slow reaction times. The duration of effect is variable and may vary from person to person and maybe unduly prolonged. This medication should be avoided at least the night before duty, and expert aero-medical advice should be obtained before using them.

(18) **Melatonin.** Melatonin is a hormone that is involved with the regulation of the circadian rhythm. In some countries, it is a prescription medicine, whereas in most of the countries it is regarded as a 'dietary supplement' and can be bought without any prescription. The results from the efficiency of melatonin in the treatment of jet lag or sleep disorders have been contradictory. However, as melatonin may cause sleepiness, it should be avoided at least the night before the flight. Also, expert aero-medical advice should be obtained.

(19) **Stimulants.** Caffeine, amphetamines, etc. (often known as 'pep' pills) used to maintain wakefulness or suppress appetite, are often habit-forming. Susceptibility to different stimulants varies from one individual to another, and all may cause dangerous overconfidence. Overdosage causes headaches, dizziness, and mental disturbance. The use of 'pep' pills is not permitted while flying. Where coffee intake does not offer sufficient stimulation, then an individual is not fit to fly. Remember that excessive coffee drinking has harmful effects including disturbance of the heart's rhythm (see MED.B.055(b)).

(20) **Anaesthetics.** Following local, general, dental, and other anesthetics, a period of time should elapse before returning to flying. The period will vary considerably from individual to individual, but a pilot or cabin crew member should not fly for at least 12 hours after a local anesthetic, and for at least 48 hours after a general, spinal, or epidural anesthetic (see MED.A.020)

(e) Many preparations on the market nowadays contain a combination of medicines. It is, therefore, essential that if there is any new medication or dosage, however slight, the effect should be observed by the pilot or the cabin crew member on the ground prior to flying. It should be noted that medication, which is not normally affecting pilot or cabin crew performance, may do so in individuals who are 'oversensitive' to a particular preparation. Individuals are, therefore, advised not to take any medicines before or during flight unless they are completely familiar with their effects on their own bodies. In cases of doubt, pilots and cabin crew members should consult an AME, AeMC, GMP, OHMP or Medical Assessor, as applicable.

(f) **Other treatments: Alternative or complementary medicine,** such as acupuncture, homeopathy, hypnotherapy and several other disciplines, is developing and gaining greater credibility. Such treatments are more acceptable in some States than others. There is a need to ensure that 'other treatments', as well as the underlying condition, are declared and considered by the AME, AeMC, OHMP or Medical Assessor, as applicable when assessing fitness.

PREVENTIVE ADVICE

CARDIO-VASCULAR RISKS

Cardiovascular diseases (heart attack, stroke) are the leading cause of death, both in Croatia and in the world. Out of 100 people in Croatia, 50 die from cardiovascular diseases. The promotion of a healthy lifestyle is a process that allows people to improve their health and be able to control their health status. Controlling risk factors such as diet, physical activity, tobacco use, and blood pressure can reduce the risk of disease.

Having some of the risk factors does not necessarily mean that you will develop cardiovascular disease. But the more risk factors you have, the more likely you are to get sick if you don't take the necessary measures to modify your risk factors and work to prevent them from endangering the health of your heart. Variable risk factors (those that can be modified) are physical inactivity, use of tobacco products, unhealthy diet, high blood cholesterol, high blood pressure/hypertension, diabetes, and obesity. Invariant risk factors (those that cannot be modified) are genetic predisposition (family inheritance), age, sex, and ethnicity.

Prevention of cardiovascular disease

Smoking

Smoking cessation reduces the risk of cardiovascular disease and death by 30%

Overweight and obesity

In the prevention of overweight and obesity, the population should be aware of the health risks associated with it, proper nutrition, and the balance of energy intake and consumption. Each individual must develop healthy eating habits, and in the prevention of cardiovascular disease, moderate salt intake (up to 5g sodium/day), reduced fat intake, especially those of animal origin, reduced intake of refined carbohydrates, with increased consumption of vegetables, fruits, and fish.

Physical activity

Physical activity has a major impact on the prevention of cardiovascular disease, especially coronary heart disease, high blood pressure, blood lipids, and reduces the risk of illness and death by 35%.

Physical activity enhances the action of antioxidants that neutralize the action of free radicals, substances that lead to changes in the structure and function of the cell and thus cause the onset of many diseases. Exercise gets up to 50% more oxygen and nutrients into the heart muscle and brain. Deeper and faster breathing has the same effect on cell nutrition. A trained heart can do more work with less effort. The electrical stability of the cardiac nerve centers is also strengthened, which reduces the risk of cardiac arrhythmias. The blood flow thru arteries is more efficient, which has a beneficial effect on blood pressure. The incidence of heart attack and stroke is reduced by a third to a half, especially in middle-aged people. Walking briskly for 4 - 5 kilometers (about one hour) burns 340 calories, which helps regulate body weight. "Bad" fats in the blood are reduced by 40%, and "good" fats are increased. The number of platelets, which can lead to blockage of blood vessels, is reduced by half. The activity of muscle bundles increases bone mass, which prevents osteoporosis. The self-confidence gained by mastering the set of physical activities raises the mental strength needed to defend against stress, which is also one of the risk factors for heart disease.

At medical examinations, AMEs, among other things, perform a cardiovascular risk assessment. The risk scores are:

- **low** cardiovascular risk
- **moderate** cardiovascular risk 1-5 indicates that the risk of a fatal cardiovascular event is less than 5% over 10 years
- **high** cardiovascular risk 5-10 indicates that the risk of a fatal cardiovascular event is 5-10% in 10 years
- **very high** cardiovascular risk > 10 indicates that the risk of a fatal cardiovascular event is higher than 10% over 10 years

If your risk score is low or medium, non-pharmacological measures are enough. They include a change of life-style habits -that means an adequate diet and engaging in moderate physical activity. For persons with increased and high cardiovascular risk, in

addition to the above measures, pharmacological treatment is necessary. Today, doctors have at their disposal several highly effective medications used to treat high blood pressure and increased blood lipids. The goal of treatment is to establish adequate control of risk factors.

Assessment of cardiovascular risks is required for all candidates for medical certificates with the accumulation of 2 or more risk factors (smoking, family history, elevated lipids/cholesterol, hypertension, etc.), also for candidates with Body Mass Index equal or higher than 35 and for class 1 pilots aged 40 and over.

You can calculate the risk for yourself using the calculators at the following links:

<https://grisk.org/three/>

<https://grisk.org/2017/>

http://www.heartscore.org/en_GB/access

https://qxmd.com/calculate/calculator_85/epworth-sleepiness-scale-N

<http://www.framinghamheartstudy.org/risk-functions/cardiovascular-disease/10-year-risk.php>

At examination AME will periodically calculate your cardiovascular risk with the same calculators: If the risk score is $\geq 10\%$ for class 1/3, the candidate must make a comprehensive cardiovascular assessment before issuance of a medical certificate. If the risk score is $\geq 15\%$ for class 2 the candidate must make a comprehensive cardiovascular assessment until the next examination or in the period specified by AME.

All candidates, including those within the limits of 5 -10% for class 1/3 or 10-15% for class 2, should be thoroughly advised by AME on the need for lifestyle changes (dietary changes, smoking cessation, physical activity, weight loss).

A comprehensive cardiovascular assessment MUST be made for a class 1/3 medical certificate at the initial examination for revalidation or renewal after age 65 and then every 4 years; for candidates with a body mass index equal to or higher than 35 and class 1 candidates if the cardiovascular risk score is $\geq 10\%$ or for class 2 candidates if the cardiovascular risk score is $\geq 15\%$. Comprehensive cardiovascular assessment includes laboratory findings: CBC, HDL, LDL, triglycerides, glucose, HbA1C, liver function tests, and examination by the cardiologist and cardiologic tests as assessed by a cardiologist, but at least examination, ECG, exercise EKG, and ultrasound of the heart. If the findings are not satisfactory a cardiologist or medical assessor may require an additional test.

MENTAL HEALTH

The World Health Organization (WHO 2004) defines mental health as a state of well-being in which the individual realizes his or her abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can make a contribution to his or her community.

From the definition of health by the World Health Organization, which says that "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity", it is clear that there is no health if there is no mental health.

In these modern times, especially in urban areas where traditional forms of support and assistance are increasingly lacking, with alienation and the belief that one must and can succeed in everything, it is difficult to achieve all goals professionally and personally and to reconcile the aspirations of existence insurance and family harmony. To succeed in this today, one must make additional efforts bearing in mind the importance of investing in mental and physical health.

Mental illness is gaining momentum, especially in Western civilization due to many changes and influences that characterize the modern way of life and work: changes in the structure and role of the family, negative impacts of technological development, substance abuse, risks for growth and development of young people, natural disasters, wars, pandemics, etc.

Mental health prevention

Get to know yourself

reconsider your attitudes and habits (what helps you and what retaliates), become aware of your emotional strengths, psychic abilities, desires, and inclinations remember what your daily thoughts and feelings are, what causes you stress, and choose the best way to react

Build self-confidence

recognize and accept your strengths and weaknesses and build your self-confidence upon them, learn new knowledge and skills because it also contributes to your self-esteem

Find time for yourself

relax with music, a good book, meditation, walks, or anything nice and pleasant for you

Engage in moderate physical activity

choose exercise according to your abilities and exercise regularly every day, it improves emotional stability, reduces anxiety and depression

Create and nurture supportive, close relationships with family and friends

family and friend support is important, especially in difficult times, a wider social circle can provide you with new experiences and bring balance to life, inclusion in the community and volunteering gives a sense of meaning and satisfaction and strengthens self-esteem

Self-awareness and counseling

Recognize your difficulties and obstacles, especially if you have the feeling that difficulties are overwhelming, and you are unable to cope with them alone. Consult your doctor and use psychological services.

<https://www.centreforaviationpsychology.com/publications>
<https://flightsafety.org/wp-content/uploads/2020/04/Guide-to-Wellbeing.pdf>
<https://www.centreforaviationpsychology.com/publications>
<https://www.core-ap.co.uk/>
<https://www.tcd.ie/cihs/>

At medical examinations for the renewal and revalidation of class 1 and 2 medical certificates, AMEs, among other things, conduct a triage assessment of mental health. Sometimes this assessment also requires further psychological evaluation or testing for drugs or alcohol. Due to the impact/consequences of the COVID pandemic and earthquake, AMEs must pay special attention to mental health issues and give preventive advice in this regard when renewing/revalidating medical certificates, so do not hesitate to talk openly with them about mental health. During the assessment AME should take into account changes in psychological and mental status as a result of a family tragedy or grief due to loss of loved ones, long hospital stays as well as financial consequences due to reduced flights or loss of employment, changes in work schedule, etc. Sudden changes in the applicant's well-being and mindset can be warning signs. Most AMEs have psychologists at their disposal who can help.

FACTS AND INFORMATION

General Health

While piloting an aircraft, an individual should be free of conditions that are harmful to alertness, the ability to make correct decisions, or affect reaction times. Persons with conditions that are apt to produce sudden incapacitation, such as seizures, serious heart trouble, uncontrolled diabetes or diabetes requiring insulin, and certain other conditions hazardous to flight, are medically unfit. Conditions such as acute infections, anemias, and peptic ulcers are disqualifying while they last. Consult your designated medical examiner when in doubt about any aspect of your health status, just as you would consult a licensed aviation mechanic when in doubt about the engine status.

Pilot Risk Management: The I'M SAFE Checklist

There is a self-assessment checklist to assist pilots in determining their own physical and mental health before a flight, to assess their overall readiness for the flight when it comes to illness, medication, stress, alcohol, fatigue, and emotion.

I'M SAFE

I - Illness

Pilots possess a valid medical certificate for flight, but the occasional aero-medical exam doesn't cover illnesses such as colds and flu. In the interest of safety, if a pilot has or develops a known medical condition that would prevent him from obtaining a medical certificate, he is prohibited from flying as a required crewmember. The pilot in command is directly responsible for the operation of the flight. The pilot alone is responsible for ensuring his health is up to par before taking the controls. Colds, allergies, and other common illnesses can cause problems for pilots. From sinus pressure to general malaise, pilots can easily become more of a risk to the flight than an asset. Before flying, pilots should think about recent or current illnesses that might affect flight. After the coughing and sneezing subside, a pilot might feel well enough to fly but could still have trouble performing the Valsalva maneuver, for example, which equalizes the pressure inside of his ears.

M - Medication

With illness, it's mostly clear when a pilot should or shouldn't fly. But with illness comes medication, and all medications should be scrutinized by both the pilot and his or her doctor before taking it. Many prescription and over-the-counter medications can be dangerous for a pilot to take before flying. If medication is necessary, pilots should discuss the specific effects of the medication with an aviation medical examiner to determine if it causes mental or physical impairment that would interfere with the safety of flight. Then, pilots need to be aware of the residual effects of both short-term and long-term use of medications. Even after the medication has been stopped, the effects of it may remain in the body for some time. So how long should you wait after taking medication to fly? Well, that depends on the drug itself, recommendation is to wait until at least five dosage periods have passed. If the medication is taken once a day, for example, you would wait five days before flying again.

S – Stress

There are at least three kinds of stress that pilots should be aware of: Physiological, environmental, and psychological stress. Physiological stress is stress in the physical sense. It comes from fatigue, strenuous exercise, being out of shape, or changing time zones, to name a few. Unhealthy eating habits, illness, and other physical ailments are included in this category, too. Environmental stress comes from the immediate surroundings and includes things such as being too hot or too cold, inadequate oxygen levels, or loud noises. Psychological stress can be more difficult to identify. This category of stress includes anxiety, social and emotional factors, and mental fatigue. Psychological stress can occur for many reasons such as divorce, family problems, financial troubles, or just a schedule change. A small level of stress can be a good thing, as it keeps pilots aware and on their toes. But stress can

accumulate and affect performance. Also, everyone handles stress differently. A source of anxiety for one person might be a fun challenge for another person. Pilots need to be able to recognize and evaluate their stressors so they can mitigate risk.

A - Alcohol

There's no doubt that alcohol and flying don't mix. Alcohol abuse affects the brain, eyes, ears, motor skills, and judgment, all of which are necessary components to safe flight. Alcohol makes people dizzy and sleepy which decreases reaction time. The rules surrounding the use of alcohol while flying are clear: The recommendation is that pilots wait at least 24 hours after drinking to get behind the controls. A pilot should remember, though, that they can follow the "8 hours from bottle to throttle" rule and still not be fit to fly. Hangovers are dangerous in the cockpit, too, with effects similar to being drunk or ill: Nausea, vomiting, extreme fatigue, problems focusing, dizziness, etc.

F - Fatigue

Pilot fatigue is a difficult problem to address completely, as fatigue affects everyone differently. Some people can function well with little sleep; others don't perform well at all without at least ten hours of sleep per night. There's no medical way to address the sleep issue with pilots -- each pilot must be responsible for knowing his or her limitations. The effects of fatigue are cumulative, meaning that small sleep deprivations over time can be dangerous for pilots. Pilots should also take into account time changes, jet lag, and day/night scheduling options when managing fatigue. Although there are few regulations and company policies for commercial pilots to help manage fatigue, the responsibility for safety lies with the pilot alone.

E - Emotion

For some people, emotions can get in the way of behaving in a safe, productive manner. Pilots should ask themselves if they are in an emotionally stable state of mind before departing. Emotions can be subdued and managed most of the time, but they can also resurface easily, especially when faced with a stressful situation. Most of the time, this type of self-assessment is hard, but pilots need to try to maintain an objective view of themselves to assess their behaviour and emotions in a safe way. For example, if a pilot notices that he is unusually angry or impatient while preparing for a flight, he may want to reconsider flying.

Glasses and contact lenses

If you wear glasses you must have the same kind of spare whenever you use license privileges. If you wear contact lenses, you must have spare glasses whenever you use license privileges.

Sunglasses

Sunglasses worn during the exercise of the privileges of the licence held should be non-polarizing and of a neutral grey tint. As useful as polarized lenses can be, pilots are advised to refrain from using them because of a few risk factors including reduced visibility through windshields from "visual noise" (the rainbow effect), impaired ability to see reflections of aircraft in high traffic situations (take-off and landing) and reduce the visibility of LCD panels.

Hypoxia

Hypoxia, in simple terms, is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. Wide individual variation occurs with respect to susceptibility to hypoxia. In addition to a progressive lack of oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (e.g. anemias, carbon monoxide, certain drugs). Your brain has no built-in alarm system to let you know when you are not getting enough oxygen. A major early symptom of hypoxia is an increased sense of well-being (referred to as "euphoria"). This progresses to slowed reaction, impaired thinking ability, unusual fatigue, and a dull headache. The symptoms are slow but progressive, insidious in onset, and become marked at altitudes above 10 000 ft (3 300 m). Night vision, however, can be impaired at altitudes even lower than that. If you observe the general rule of not flying above 10 000 ft without supplemental oxygen, you are unlikely to get into trouble.

Alcohol

Do not fly while under the influence of alcohol. Remember that if a significant amount of alcohol has been consumed, performance can be affected up to 48 or even 72 hours after the last drink, because of a hangover effect. Even small amounts of alcohol in the system can adversely affect judgment and decision-making abilities. Your body metabolizes alcohol at a fixed rate, and coffee or medication does not affect this. Do not fly with a hangover or a “masked hangover” (symptoms suppressed by aspirin or other medication).

Medication

Self-medication when you are flying can be hazardous. Simple “over-the-counter” (obtained without prescription) remedies such as aspirin, antihistamines, cold tablets, cough mixtures, laxatives, tranquillizers and appetite suppressors may have unwanted effects. Herbal remedies can also have significant adverse effects. The safest rule is to take no medicine while flying, except on the advice of your aero-medical advisor. The condition for which the medicine is required may of itself be hazardous to flying, even when the symptoms are suppressed by the medication. Certain specific medicines which have been found in post mortem samples after fatal aircraft accidents are: antihistamines (widely prescribed for hay fever and other allergies); tranquillizers (prescribed for nervous conditions, hypertension, sleep disorders and other conditions); weight-reducing drugs (amphetamines and other appetite suppressing drugs can produce sensations of well-being which have an adverse effect on judgement); barbiturates or nerve “tonics” (barbiturates produce a marked suppression of mental alertness). Following general anaesthesia, a period of at least 48 hours should be spent on the ground. Twelve hours is reasonable for a local anaesthetic. If in any doubt concerning the right time to resume flying, then seek appropriate aero-medical advice.

Carbon monoxide

Carbon monoxide (CO) is a colourless, odourless, tasteless product of an internal combustion engine and is always present in exhaust fumes. The concentration in exhaust fumes from piston engines is much greater than from turbine engines — carbon monoxide poisoning from turbine engine exhausts is rare. For biochemical reasons, carbon monoxide has a greater ability than oxygen to combine with the haemoglobin of the blood. Furthermore, once carbon monoxide is absorbed in the blood, it sticks “like glue” to the haemoglobin and actually prevents oxygen from attaching to the haemoglobin. Most cockpit heaters in light aircraft work by air flowing over the exhaust manifold is heated and then delivered to the cockpit. So if you have to use the heater, be very wary if you smell exhaust fumes — there may be a leak from the engine exhaust pipe into the air used for cockpit warming. The onset of symptoms is insidious, with “blurred thinking”, a possible feeling of uneasiness, and subsequent dizziness. Later headache occurs. Immediately shut off the heater, open the air ventilators, descend to lower altitudes, and land at the nearest airfield. Consult a designated aero-medical examiner for advice. It may take several days to fully recover and clear the body of the carbon monoxide. Use carbon monoxide detectors in the cockpit, since affected pilots may otherwise be completely unaware that they are being exposed to CO.

Spatial disorientation

On the ground we know which way is “up” by the combined use of three senses: Vision — we can see where we are in relation to fixed objects; Pressure — gravitational pull on muscles and joints tells us which way is down; Special parts in our inner ear — the otoliths — tell us which way is down by gravitational pull. It should be noted that rotation of the head is detected by the fluid in the semi-circular canals of the inner ear, and this tells us when we change angular position. However, in the absence of a visual reference, such as flying into a cloud, the rotatory accelerations can be confusing, especially since their forces can be misinterpreted as gravitational pulls on the muscles and otoliths. The result is often disorientation. Pilots should have an instructor demonstrate manoeuvres which will produce disorientation. Once experienced, later unanticipated incidents of disorientation can be overcome as long as instruments (for pilots trained to use them) or reliable ground references are available. Such a demonstration will show you how confusing the false inputs from the inner ear can be. Many accidents have occurred when pilots without adequate

instrumentation in the cockpit or without proper training in instrument flying have flown into instrument meteorological conditions, and have become disorientated. Pilots are susceptible to experiencing disorientation at night, and in any flight condition when outside visibility is reduced to the point that the horizon is obscured. An additional type of vertigo is known as flicker vertigo. Light, flickering at certain frequencies, from four to twenty times per second, can produce unpleasant reactions in some persons. These reactions may include nausea, dizziness, unconsciousness, or even reactions similar to an epileptic fit. In a single-engine propeller airplane heading into the sun, the propeller may cut across the sun to give this flashing effect, particularly during landings when the engine is throttled back and propeller rotation is relatively slow. These undesirable effects may be avoided by not staring directly through the propeller for more than a moment, and by making frequent but small changes in RPM. The flickering light traversing helicopter blades has also been known to cause this effect, as has the reflection from rotating beacons on aircraft while flying in clouds. If the beacon is bothersome, shut it off during these periods, advise air traffic control and remember to turn it back on when clear of clouds.

Vision

To avoid eye fatigue in bright light, use colour-neutral (rather than coloured) sunglass lenses as this will permit normal colour discrimination. If you need to use correcting lenses for good vision (for near or distant vision) make sure you keep a spare pair of spectacles within easy reach so that you can easily find them if you lose or break your first pair, or develop problems with contact lenses if you wear them. Visit an eye care specialist if you notice a change in visual acuity.

Middle ear discomfort or pain

Certain persons (whether pilots or passengers) have difficulty balancing the air pressure on either side of the eardrum while descending. Sometimes pressure equalization can occur at different times in each ear, resulting in a form of disorientation named “alternobaric vertigo”. Problems arise if a head cold or throat inflammation keeps the Eustachian tube (from the middle ear to the throat) from opening properly. If this trouble occurs during descent, try swallowing, yawning, or holding the nose and mouth shut and forcibly attempting to exhale (Valsalva manoeuvre — pilots should know how to do this manoeuvre, and if you do not, ask your medical examiner about it). If no relief occurs, climb back up a few thousand feet (if feasible) to relieve the pressure on the eardrum. Then descend again, using these measures. A more gradual descent may be tried, and it may be necessary to go through several climbs and descents to “stair-step” down. If a nasal inhaler is available, it may afford relief. If trouble persists several hours after landing, consult your aeromedical advisor. NOTE—If you develop symptoms of a cold when airborne, you may possibly avoid trouble by using a nasal spray, kept as part of the flight kit. Take aviation medicine advice before purchasing one. Remember that if you fly with an upper respiratory infection, you are at increased risk of developing middle ear or sinus problems.

Panic

The development of panic in inexperienced pilots is a process that can give rise to a vicious circle with unwise and precipitous actions resulting in increased anxiety. If lost or in some other predicament, forcibly take stock of yourself and do not allow panic to mushroom. Panic can be controlled. Fear is a normal protective reaction and occurs in normal individuals. If you believe it occurs frequently or too easily to you, seek aero-medical advice — some techniques can be learned and used to reduce the effects.

Underwater diving

If you go flying after scuba diving or any underwater activity using compressed air, you should be aware that if insufficient time has elapsed between surfacing and take-off, the medical consequences can be serious or even fatal. Due to greatly increased pressures underwater, nitrogen is absorbed into the blood and tissues. The amount depends on the depth and duration of exposure. If take-off follows the dive too soon to allow the body to rid itself normally of this excess nitrogen, the gas may form bubbles in the blood or tissues causing discomfort, pain, difficulty in breathing, or even death, at altitudes of 7 000 ft (2 135 m) or less, altitudes attained by most light aircraft. Older or overweight individuals are more susceptible to this condition. As a general rule, individuals should not fly within 12-48 hours following diving using compressed air, the difference depending mainly on the duration and how deep

they dive(s) were. Occasionally a medical emergency arises as a result of compressed air diving when a diver has been unable to adequately decompress before surfacing. In some of these cases, air-evacuation is the only feasible method of getting the patient to a recompression chamber in time to treat the condition. The flight should be at the lowest possible altitude to avoid aggravating the condition.

Blood donations

Following a blood donation, time off flying is needed for the body to readjust. Allow 24 hours before flying after donation unless you have received specific aero-medical advice that this period can be safely shortened.

Hyperventilation

Hyperventilation, or over-breathing, is a disturbance of respiration that may occur in individuals as a result of emotional tension or anxiety. Under conditions of emotional stress, fright or pain, the breathing rate may increase, causing increased lung ventilation. More carbon dioxide is exhaled from the lungs than is produced by the body and as a result, carbon dioxide is “washed out” of the blood. The most common symptoms of hyperventilation are dizziness; hot and cold sensations; tingling of the hands, legs, and feet; muscle spasms; nausea; sleepiness; and finally unconsciousness. In an individual who is behaving unusually, and you suspect hyperventilation or hypoxia (the initial symptoms are similar), assume the condition is hypoxia and supply oxygen. Select 100 percent oxygen, check the oxygen supply, oxygen equipment, and flow mechanism. If the condition was hypoxia, recovery is rapid. If the symptoms persist, consciously slow the breathing rate until symptoms clear and then resume normal breathing rate. Breathing can be slowed by breathing into a paper bag, and this increases the amount of carbon dioxide taken into the lungs since expired carbon dioxide is re-breathed.

Fatigue

Fatigue generally slows reaction times and causes errors due to inattention. In addition to the most common cause of fatigue, insufficient rest, and loss of sleep, the pressures of business, financial worries, and family problems can be important contributing factors. If your fatigue is marked before a given flight, don't fly. Ensure you obtain a good night's sleep before you fly and if scheduling prevents this, discuss your situation with an aviation medicine specialist.

“FREQUENTLY ASKED QUESTIONS” CONCERNING PERSONAL STRATEGIES FOR FATIGUE MANAGEMENT IN FLIGHT CREW

How do I predict when I am most likely to be fatigued?

Your level of fatigue at any duty point is influenced by a few major factors: — Time since last major sleep – the longer it is, the more likely you are to be fatigued, — Time on duty – the longer it is, the more likely you are to be fatigued, — Time of day (according to your body clock) – see below. There are also some further factors including your workload during the duty, environmental factors (such as temperature, noise, etc), and whether you already were short of sleep before starting the duty. This last factor is important, and you may need to manage your activities before a duty to ensure that you are adequately rested. The effect of most of these factors is reasonably obvious, however, “Time of day” requires further explanation:

How does the body clockwork? Is it important?

Most physical and mental functions vary throughout the 24-hour day, and most, especially mental functions, are worst between the hours of 01:00 and 05:00, which is the time one naturally feels most sleepy. These daily or “circadian” (which means “about a day”) rhythms are controlled by brain chemicals that are regulated by exposure to sunlight. Note that there is a second sleepy period during the day which occurs in the mid-afternoon. This latter period of sleepiness is sometimes called the “post-lunch dip”, although it occurs whether or not lunch has been eaten. When you cross time zones, adjustment of your “body clock” to local time takes a few days to achieve, or longer when many time zones are crossed. If you have only been away from home base for two or

three days, you can consider your body clock to be still on home time. This means your naturally sleepy periods will correspond to 01:00-05:00 and mid-afternoon at a home time; these are the hours that you should target for sleep.

Can I train myself to require less sleep?

No. The only effective remedy for fatigue is sleep. Although the amount of sleep required per day varies between people, we cannot sustain a sleep deficit for long periods without our performance and safety being compromised. Missing a few hours of sleep each night will cause significant impairment of performance after two or three days.

What can I do to help me get to sleep?

- ☺**Timing** — the sleep should be timed to coincide with the naturally sleepy periods, as mentioned above; if it is daytime sleep, time it for the afternoon sleepy period.
- ☺**Light** — sunlight should be blocked out, using blackout curtains or eyeshades or both.
- ☺**Sound** — use earplugs, with or without background “white noise” (such as a fan or air conditioning) to mask external noises that might disturb you.
- ☺**Temperature** — most people sleep better if the temperature is close to 21°C.
- ☺**Anxiety** — ensure that there are reliable alarms set so that you will not oversleep. Ensure you are not under time pressure and have had a period to “wind down” from undertaking any stressful activities before resting.
- ☺**Exercise** — it will help to be physically fit, and exercise can improve sleep; however, do not undertake vigorous and prolonged aerobic exercise within two hours before resting.
- ☺**Stimulants** — avoid caffeine, tobacco (and food) for a few hours before bed. Caffeine can take 4-6 hours to disappear from the system.
- ☺**Alcohol** — although alcohol can help you fall asleep, it disrupts the normal sleep cycle of the brain and causes sleep to be restless. Any more than one drink has the potential to impair your sleep.
- ☺**Expectation** — follow a routine or ritual before going to bed; if you are sleeping during the day, the routine should match your normal night-time routine, this provides the brain with an expectation of sleep.
- ☺**Diet** — eat before day sleep to avoid waking due to hunger but avoid overeating (> 20 percent of daily energy intake) one to two hours before the main sleep episode.

Surely naps are a bad idea because I feel worse afterward?

Naps can have a powerful effect on restoring alertness and improving safety. Even after 10 minutes a nap can produce an improvement in alertness and help maintain performance, although this cannot be sustained indefinitely. Note that naps beyond about 45 minutes will result in a sleepy feeling on waking, known as “sleep inertia” which can impair your performance for 20 minutes or longer. Beware of this effect.

What about sleeping tablets?

As a crew member, you should only use sleeping tablets on the advice of a doctor who understands the medical considerations of aviation. In some countries, pilots are not allowed to use such medications within 24 hours before flying. Medication needs to be of an approved type, taken following the prescribed instructions. It can be habit-forming, so should not ever be used more than three or four times per week. The time required between taking a sleeping tablet and reporting for duty (to make sure there are no persistent effects) depends on the tablet used and requires the advice of an aviation medicine doctor. As with any medication, a ground trial i.e. when not required to operate afterward needs to be done before using the sleeping tablet before a flight, to ensure there are no unwanted side effects. Sleeping tablets should not be used together with alcohol. Do not use sleeping tablets that have been bought “over-the-counter” when away from home.