Recent changes in hypoxia training at the Royal Air Force Centre of Aviation Medicine

Surg Lt Cdr A Wrigley

Abstract

Hypoxia training at the Royal Air Force Centre of Aviation Medicine (RAF CAM) has traditionally involved the use of a hypobaric chamber to induce hypoxia. While giving the student experience of both hypoxia and decompression, hypobaric chamber training is not without risks such as decompression sickness and barotrauma. This article describes the new system for hypoxia training known as Scenario-Based Hypoxia Training (SBHT), which involves the subject sitting in an aircraft simulator and wearing a mask linked by hose to a Reduced Oxygen Breathing Device (ROBD). The occupational requirements to be declared fit for this new training method are also discussed.

Hypoxia training

Royal Navy Medical Officers (RN MOs) undertaking aircrew medicals or attending aviation medicine training at Royal Air Force Centre of Aviation Medicine (RAF CAM), should be aware that the method of hypoxia training has changed fundamentally in the last three years.

Senior MOs may recall receiving a hypobaric chamber experience as part of their aviation medicine training; this used to be the way that all aircrew did their initial and refresher hypoxia training. In hypobaric chamber training, while the chamber occupants breathe 100% oxygen through a mask, the air pressure in the chamber is reduced

Fig 1. Scenario-Based Hypoxia Training (SBHT) in an aircraft simulator, wearing a mask linked by hose to a Reduced Oxygen Breathing Device (ROBD) (Photograph by SAC Runciman RAF).

(often very quickly to mimic a rapid decompression) to that found at 25,000 feet. At this 'altitude', students drop their masks in pairs and experience the effects of hypoxia for up to four minutes, before replacing their masks. Whilst giving the student experience of both hypoxia and decompression, hypobaric chamber training is not without risks, including decompression sickness and barotrauma.

Although chamber training is still undertaken (generally as a one-off experience during initial training for multi-engine and fast jet aircrew), the majority of hypoxia training at RAF CAM is now undertaken in normobaric conditions. The system, known as Scenario-Based Hypoxia Training (SBHT), involves the subject sitting in an aircraft simulator and wearing a mask linked by hose to a Reduced Oxygen Breathing Device (ROBD) (Fig 1). This progressively reduces the percentage of oxygen in the breathing gas, mimicking an ascent to altitude on ambient air. Different serials can be programmed into the ROBD, meaning that the starting altitude and rate of ascent to 25,000ft can be tailored to the type of scenario one wishes to simulate. SBHT has received positive feedback from aircrew, who like the fact they can see how hypoxia affects them when they are undertaking a task akin to their role in the aircraft. There is also, arguably, more training benefit in trying to discern when one's performance is affected during the gradual onset of hypoxic conditions as generated in SBHT, compared to the more rapid onset of symptoms when one drops the mask in the hypobaric chamber.

While the fact that one does not experience hypobaria during SBHT can be seen as a drawback, it does mean that from a medical point of view, those who would be unfit for hypobaric chamber training (e.g. because of rhinorrhoea precluding middle ear equalising, or because of recent sub-aqua diving) may well remain fit to undertake SBHT.

Guidance on fitness for hypoxia training can be found in AP1269A Leaflet 3-03 Annex L: Medical Requirements – Hypoxia Training (1). This explains that aircrew with a current Joint Medical Employment Standard (JMES) of A1 (fit for unrestricted flying duties) or A2 (fit for flying duties but has sub-optimal hearing or vision) have achieved the medical standards for both SBHT and hypobaric chamber training. Aircrew of JMES A3 or below require a Leaflet 3-03 Annex L Appendix 1 Medical Examination for Hypoxia Training, performed by a Military Aviation Medical Examiner (MAME). When they attend for their course, their medical form will then be reviewed by RAF CAM and a decision made regarding fitness for training. As Annex L states, the MAME is welcome to contact the Chief Instructor to discuss cases prior to individuals travelling to RAF CAM to attend a course.

'Non-aircrew regular fliers' (e.g. parachutists) are required to be in-date for an annual level 3 or level 4 medical examination (these terms are explained in AP1269A Leaflet 3-01 (2)), with a JMES no lower than A4L2 in order to be fit for SBHT. For hypobaric chamber training, they require an Appendix 1 medical as described above, although those in date for service occupational diving may use this qualification in lieu of an Appendix 1 medical.

Category 1 frequent fliers have an initial medical at RAF Medical Boards. Category 2 frequent fliers and other non-aircrew personnel, whose duties involve hypoxia training, require an Appendix 1 medical, completed by a doctor with access to the individual's primary care record.

In all cases where the Appendix 1 medical form is used, it should be completed within 28 days of training, but can be valid for six months providing the individual signs the declaration to say that there has been no change in his or her medical history since the examination. Historically, doctors undertaking Appendix 1 examinations have often failed to complete the 'Current JMES (military)' box. A lack of this information can cause significant delay when running a SBHT or hypobaric chamber training serial.

In summary, most hypobaric hypoxia training has been replaced by normobaric SBHT. Without the requirement for hypobaric conditions, some individuals in whom chamber training was contraindicated are now fit for hypoxia training using SBHT. Leaflet 3-03 Annex L (1) contains the latest information for Unit MOs and MAMEs with regards to medical fitness and certification for hypoxia training.

References

1. Ministry of Defence. Assessment of Medical Fitness. Royal Air Force Manual AP 1269(A), 3rd ed., Feb 1998. Annex L to Leaflet 3-03 - Medical Requirements – Hypoxia Training. 29/04/2015.
2. Ministry of Defence. Assessment of Medical Fitness. Royal Air Force Manual AP 1269(A), 3rd ed., Feb 1998. Leaflet 3-01 - Assessments of Medical Fitness. 29/04/2015.

Author

Surgeon Lieutenant Commander A Wrigley MRCGP, DAvMed, MRAeS
RNAS Yeovilton
[NB at time of writing, place of work was RAF Centre of Aviation Medicine]
alexander.wrigley231@mod.uk