Heat acclimatisation for deployment to hot climates

1. The risk of heat illness in hot (dry or humid) climates can be reduced, but not eliminated, by acclimatisation. Repeated exposure to exercise in hot conditions will result in physiological adaptations to improve heat dissipation, for example increased sweat rate and earlier onset of sweating.

Weather and WBGT forecasts

2. When planning an activity overseas that is five days or less before the activity starts, a more accurate Met Office WBGT forecast temperature (˚C) **should** be used to review the maximum continuous exercise duration determined from the work / rest tables (Annex C). The Met Office WBGT forecast can be obtained from the Met Office Military Information Distribution System (MOMIDS), however a MOMIDS user account is required to be set up.

3. To set up a MOMIDS account an initial request should be made to the Met Office using the following group mailbox momidsacrequest@metoffice.gov.uk The Met Office will then provide the new account holder with a MOMIDS account username and password.

4. For planning overseas activities that are five-days or more in advance of the activity, the Joint Operational Meteorology and Oceanographic Centre (JOMOC) **should** be contacted to obtain a weather forecast for the location of the planned activity. The JOMOC can be contacted 24 hours a day on the following numbers.

Military personnel: 9360 58112
Civilian personnel: (01923) 958112 (+ 44 (0)1923 958112 from overseas)
Email: jomoc@metoffice.gov.uk

5. **Prior to Deployment**. Building and maintaining a good level of aerobic fitness (VO_2 max) reduces the risk of heat illness. When a risk of heat illness has been identified in a commander or line manager's risk assessment, personnel **should** participate in a progressive physical training programme normally under the supervision of a Physical Training Instructor for approximately 6 weeks prior to departure.

a. **6 weeks before Deployment.** Build or improve aerobic fitness over 3-4 weeks. Aim to increase and maintain heart rate above 65% of maximum heart rate[12] for periods of 40 min initially, then extending to an hour. Allow at least 2 days full rest per week and vary the exercise type to use different muscle groups.

b. **10-14 days before Deployment.** Aim to raise and maintain an elevated body temperature for at least one hour each day; this can be checked by visual assessment of sweating. To achieve this, team or individual sport participation might be preceded by circuit training in the gym to raise body temperature. At all times care **should** be taken to work within the WBGT Index Limits and to ensure sufficient fluids are taken.

c. **High Readiness Units (including Aircrew).** Personnel in units held at high readiness or who deploy regularly for short periods of time are to be aware of the causes, symptoms and signs of heat related illness. Pre-deployment heat acclimatisation training is not always possible. Opportunity to increase VO_2 max through regular exercise will help support the individual's ability to acclimatise.

6. **Arrival in Theatre.** Air transit (resulting in jet lag, lack of sleep and dehydration) is likely to reduce individual tolerance to heat stress. It is imperative that no exercise is undertaken for 24 hours after arrival in theatre. Personnel **should** be encouraged to sleep, eat and drink plenty of fluids.

7. **Time to Acclimatise**. Full acclimatisation normally requires 15 days or longer. Until fully acclimatised personnel **should** be considered not acclimatised and managed accordingly. Extended travel to location and living or working in air-conditioned accommodation also slows or prevents acclimatisation.

8. The majority of acclimatisation will occur in 8 days providing personnel have been undertaking regular exercise in the same environmental conditions as the proposed activity. However, individuals will acclimatise at different rates and some may acclimatise more slowly and will require longer. A structured 7-day programme can commence following a 24-hour rest day. Table 1 below shows a progressive physical training programme that has been validated for use in military populations and **should** be followed as far as practicable.

9. If the programme cannot be followed, the Institute of Naval Medicine (INM) **should** be contacted for advice (NAVYINM-ACCLIMATISATIONSUPPORT@mod.gov.uk). **During this period, individuals should not undertake additional personal physical training.** Water intake **should** be managed in accordance with guidance in Annex A. Table 1 is for fit personnel; those less fit may have to progress more slowly. Personnel will acclimatise only to the prevailing environmental temperature to which they are exposed. A move to a hotter location will need a further period of acclimatisation.

10. **Loss of Acclimatisation.** Personnel moving to cooler locations (e.g. return to the UK or move within deployed location to higher altitude) gradually lose acclimatisation over 14 days after which they are no longer acclimatised. Loss of acclimatisation is slowed if regular exercise is undertaken whilst in the cooler environment.

11. **Re-acclimatisation.** Individuals returning to a hot climate **must** re-acclimatise. The period of re-acclimatisation will depend on the duration spent in the cooler climate, the environmental temperature in that climate and the fitness of the individual.

a. **Short Absence (less than 14 days)**. 4-7 days is required to re-acclimatise (4 days **should** be sufficient for physically fit personnel). It is recommended that after an initial 24-hour period of inactivity, the procedure for days 5-8 in Table 1 below is followed. Consideration **should** be given to the individual risk factors for heat illness in Annex A.

b. **Long Absence (more than 14 days)**. Personnel **must** be considered not acclimatised and therefore **must** undertake the complete acclimatisation programme.

Note that UK and Northern Europe based personnel should always be considered not acclimatised. This is due to environmental conditions across these locations being generally temperate without extended hot periods required to fully acclimatise.

Table 1 Generic Acclimatisation programme

Day	**Clothing and Equipment**(or equivalent skin covering and weight load)	**Target WBGT Index (°C WBGT)**[14,15]	**Duration (mins)**	**Activity**[16,17]
1	**NO ACTIVITY. REST, EAT, DRINK AND SLEEP (for 24 hours)**			
2	T-shirt and shorts	26 – 30	1 x 50	Walk at 6 km/h (3.7 miles/h).
3	T-shirt and shorts	26 – 30	2 x 50	Walk at 6 km/h; rest for 15 min; resume walking.
4	T-shirt and shorts	26 – 30	100	Walk at 6 km/h.
5	T-shirt, Multi Terrain Pattern (MTP) clothing, and body armour	26 – 30	2 x 50	Walk at 6 km/h for 50 mins then **remove body armour**[18] **and jacket** and rest for 15 min; resume walking.
6	T-shirt, MTP clothing and body armour	26 – 30	100	Walk at 6 km/h.
7	T-shirt, MTP clothing, body armour and webbing (10 kg)	26 – 30	2 x 50	Walk at 6 km/h; **remove webbing**, rest for 15 min; resume walking.
8	T-shirt, MTP clothing, body armour and webbing (10 kg)	26 – 30	100	Walk at 6 km/h.
PERSONNEL UNDERTAKING ACCLIMATISATION SHOPULD BE ALLOWED FLUIDS AS REQUIRED				

12. **Specialist Groups.** Acclimatisation programmes have been developed for certain specialist groups that undertake regular activity or career courses in hot environments. These specialist programmes are called the Group Heat Acclimatisation Training Tools (gHATT) and currently are only authorised to be used by.

a. Jungle Warfare Division, British Forces Brunei.[1]

b. Specialist Users.[2]

[1] Delves, S. K., Fallowfield, J. L. and Buller, M. J. (2020) INM Report 2020.019. The efficacy of a group heat acclimatisation training tool for Jungle Warfare Division, British Forces Brunei.

[2] Delves, S. K., Richards, S. L., Fallowfield, J. L. Mesite, T. and Buller, M.J. (2020) INM Report 2020.021. The efficacy of a group heat acclimatisation training tool.