

HEAT ACCLIMATIZATION GUIDE

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THIS HEAT ACCLIMATIZATION GUIDE IS FOR SOLDIERS WHO WILL BE
ATTENDING STRENUOUS MILITARY TRAINING IN HOT WEATHER



HEAT ACCLIMATIZATION STRATEGIES FOR MILITARY MEMBERS

This heat acclimatization guidance is for military members who will be attending strenuous advanced military training or operations in hot weather. It provides practical guidance to obtain optimal heat acclimatization to both maximize performance and minimize the risk of becoming a heat casualty.

SHOULD YOU BE CONCERNED ABOUT HOT WEATHER?

If you are used to working in cool or temperate climates, then exposure to hot weather will make it much more difficult to complete your military training or mission. Hot weather will make you feel fatigued, make it more difficult to recover, and increase your risk of being a heat casualty. Military members with the same physical abilities but have conditioned themselves for hot weather will outperform you.



WHAT IS HEAT ACCLIMATIZATION?

a. Heat acclimatization refers to biological adaptations that reduce physiologic strain (e.g., heart rate and body temperature), improve physical work capabilities, improve comfort and protects vital organs (brain, liver, kidneys, muscles) from heat injury. The most important biological adaptation from heat acclimatization is an earlier and greater sweating response, and for this response to improve it needs to be invoked.

b. Heat acclimatization is specific to the climate (desert or jungle) and physical activity level.



However, acclimatization to desert or jungle climates markedly improves the ability to work in the other climate. Military members who only perform light or brief physical work will achieve the level of heat acclimatization needed to perform that task. If they attempt a more strenuous or prolonged task, additional acclimatization and improved physical fitness will be needed to successfully perform that task in the heat.

TABLE 1. BENEFITS OF HEAT ACCLIMATIZATION	
THERMAL COMFORT - IMPROVE	EXERCISE PERFORMANCE - IMPROVE
Core Temperature – Reduced	Heart Rate - Lowered
Sweating – Earlier & Greater	Thirst - Improved
Skin Blood Flow – Earlier	Salt Losses (sweat and urine) - Reduced
Body Heat Production - Lower	Organ Protection - Improved

HOW DO YOU BECOME HEAT ACCLIMATIZED?

- a. Heat acclimatization occurs when repeated heat exposures are sufficiently stressful to elevate body temperature and provoke profuse sweating. Resting in the heat, with limited physical activity to that required for existence, results in only partial acclimatization. Physical exercise in the heat is required to achieve optimal heat acclimatization for that exercise intensity in a given hot environment.
- b. Generally, about two weeks of daily heat exposure is needed to induce heat acclimatization. Heat acclimatization requires a minimum daily heat exposure of about

two hours (can be broken into two 1-hour exposures) combined with physical exercise that requires cardiovascular endurance, (for example, marching or jogging) rather than strength training (pushups and resistance training). Gradually increase the exercise intensity or duration each day. Work up to an appropriate physical training schedule adapted to the required physical activity level for the advanced military training and environment.

- c. The benefits of heat acclimatization will be retained for ~1 week and then decay with about 75 percent lost by ~3 weeks, once heat exposure ends. A day or two of intervening cool weather will not interfere with acclimatization to hot weather.

HOW FAST CAN YOU BECOME HEAT ACCLIMATIZED?

- a. For the average military member, heat acclimatization requires about two weeks of heat exposure and progressive increases in physical work. By the second day of acclimatization, significant reductions in physiologic strain are observed. By the end of the first week and second week, >60 percent and ~ >80 percent of the physiologic adaptations are complete, respectively. Military members who are less fit (2 mile run times >15 min) or unusually susceptible to heat may require several days or weeks more to fully acclimatize.
- b. Physically fit military members (2 mile run times <14 min) should be able to achieve heat acclimatization in about one week. However, several weeks of living and working in the heat (seasoning) may be required to maximize tolerance to high body temperatures.

WHAT ARE THE BEST HEAT ACCLIMATIZATION STRATEGIES?

- a. Maximize physical fitness and heat acclimatization prior to arriving in hot weather. Maintain physical fitness after arrival with maintenance programs tailored to the environment, such as training runs in the cooler morning or evening hours.
- b. Integrate training and heat acclimatization. Train in the coolest part of the day and acclimatize in the heat of the day. Start slowly by reducing training intensity and duration (compared to what you could achieve in temperate climates). Increase training and heat exposure volume as your heat tolerance permits. Use interval training (work / rest cycles) to modify your activity level.
- c. If the new climate is much hotter than what you are accustomed to, recreational activities may be appropriate for the first two days with periods of run / walk. By the third day, you should be able to integrate physical training runs (20 to 40 minutes) at a reduced pace.
- d. Consume sufficient water to replace sweat losses. A sweating rates of >1 quart (about 1 liter) per hour are common. Heat acclimatization increases the sweating rate, and therefore increases water requirements. As a result, heat acclimatized military members will dehydrate faster if they do not consume fluids. Dehydration negates many of the thermoregulatory advantages conferred by heat acclimatization and high physical fitness.



Table 2. Heat Acclimatization Suggestions for Military Members Attending Training

STRATEGY	Suggestions for Implementation
Start early	<ol style="list-style-type: none">1. Start at least 1 month prior to training2. Be flexible and patient: performance benefits take longer than the physiological benefits
Mimic the training environment climate	<ol style="list-style-type: none">1. In warm climates, acclimatize in the heat of the day2. In temperate climates, train in a room wearing sweats
Ensure adequate heat stress	<ol style="list-style-type: none">1. Induce sweating2. Work up to 100 minutes of continuous physical exercise in the heat. Be patient. The first few days, you may not be able to go 100 minutes without resting3. Once you can comfortably exercise for 100 minutes in the heat, continue for at least 7-14 days with added exercise intensity
Teach yourself to drink and eat properly	<ol style="list-style-type: none">1. Your thirst mechanism will improve as you become heat acclimatized, but you will still under drink if you rely on thirst sensation2. Heat acclimatization will <u>increase</u> your fluid requirements.3. Dehydration will negate most benefits of physical fitness and heat acclimatization4. You will sweat out more electrolytes when not acclimatized, so add salt to your food, or drink electrolyte solutions during the first week of heat acclimatization5. A convenient way to learn how much water your body needs to replace is to weigh yourself before and after the 100 minutes exercise in the heat. For each pound (0.454 kilograms) you should drink about ½ quarts (about ½ liters) of fluids6. Do not skip meals, as this is when your body replaces most of its fluid and salt losses