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Heat Acclimatization Strategies

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Heat Acclimatization Guide for Ranger & Airborne School Students

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Heat Acclimatization Strategies for Ranger & Airborne School Students

This heat acclimatization guidance is for elite soldiers who will be attending strenuous advanced military training 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 advanced training course. Hot weather will make you feel fatigued, make it more difficult to recover, and increase your risk of being a heat casualty. Soldiers with the same abilities but who are used to training in hot weather will out perform 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. Soldiers 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 – Improved	Exercise Performance – Improved
Core Temperature – Reduced Sweating – Earlier & Greater Skin Blood Flow - Earlier Body Heat Production – Lower	Heart Rate - Lowered Thirst - Improved Salt Losses (sweat and urine) – Reduced 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 perfuse 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 soldier, 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. Soldiers who are less fit (APFT run times >15 min) or unusually susceptible to heat may require several days or weeks more to fully acclimatize.

b. Physically fit soldiers (APFT 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 /r 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 PT runs (20 to 40 minutes) at a reduced pace.

d. Consume sufficient water to replace sweat losses. A sweating rates of >1 quart per hour are common. Heat acclimatization increases the sweating rate, and therefore increases water requirements. As a result, heat acclimatized soldiers 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 soldiers going to Ranger, Airborne and other Elite Schools.

Strategy	Suggestions for Implementation
Start early	1. Start at least 1 month prior to School 2. Be flexible and patient: performance benefits take longer than the physiological benefits
Mimic the training environment climate	1. In warm climates, acclimatize in the heat of day. 2. In temperate climates workout in a warm room wearing sweats.
Ensure adequate heat stress	1. Induce sweating. 2. 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 resting. 3. Once you can comfortably exercise for 100 minutes in the heat, then continue for at least 7-14 days with added exercise intensity (loads, or training runs).
Teach yourself to drink and eat	1. Your thirst mechanism will improve as you become heat acclimatized, but you will still under-drink if relying on thirst sensation. 2. Heat acclimatization will increase your water requirements. 3. Dehydration will negate most benefits of physical fitness and heat acclimatization. 4. 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 acclimatization. 5. A convenient way to learn how much water your body needs to replace is to weigh yourself before and after the 100 minutes of exercise in the heat. For each pound lost, you should drink about one-half quart of fluid. 6. Do not skip meals, as this is when your body replaces most of its water and salt losses.