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HIGH-ALTITUDE AWARENESS – SOUTH POLE STATION FAQ

Dear USAP Participant,

In the upcoming season, you will be traveling to not only one of the coldest climates on earth, but also a high-altitude environment. When traveling to Antarctica, we prepare physically and mentally for the physical impacts of extreme cold. Below, we hope to stress the equal importance of preparing for the affects of high altitude on your body and the efforts you can make before and during your first week at altitude to prevent altitude related illnesses.

What is considered high altitude? “High altitude” is defined as altitudes exceeding 6,000 to 8,000 feet. Above these levels, changes in the pressures of gases we breathe, and of oxygen in particular, result in a number of chemical changes in our bodies, some of which can be unpleasant.

How do we adapt to high altitude? We begin to adapt to these changes, or acclimatize, within hours of our exposure to altitude. Significant adaptations occur within the first four days at altitude. It may take a month or more to completely adapt. Individuals with certain medical conditions – most of which we screen for in your Physical Qualification (PQ) process – may never properly adapt to high-altitude environments, and therefore may not qualify for South Pole employment. South Pole residents are challenged in their acclimatization because there is no gradual ascent to altitude as with a gradual climb to a mountain peak; instead, residents are flown directly from sea level to approximately 10,000 feet of altitude. This requires vigilance to prevent overexertion in the first days at altitude, as overexertion can significantly increase the risk of developing an altitude-related illness.

What are the physical problems (altitude-related illnesses) I might experience with my initial arrival at altitude?

- **Periodic Breathing at Altitude:** This irregular breathing pattern, part of normal acclimatization, presents as multiple breaths followed by pauses in breathing. Most evident at night, this breathing pattern can cause repeated awakenings, leading to poor or disrupted sleep and subsequent daytime fatigue. In some individuals, blood oxygen levels will drop significantly with breathing pauses, putting them at risk for further altitude-related illnesses. Chemicals that suppress the drive to breathe – such as alcohol and sleeping medications – can worsen the affects of periodic breathing, and are therefore not recommended while acclimatizing. **Treatment:** Periodic breathing can be reduced through the use of acetazolamide (Diamox) 125mg at bedtime in the first three to four days at altitude.
- **Acute Mountain Sickness (AMS):** AMS, a syndrome of headache, nausea, loss of appetite, dizziness, and worsened periodic breathing, impacts approximately 30% of people traveling to high altitude. AMS normally occurs within days one to three at altitude. Anyone can get AMS – even people who have lived and worked at high altitude in the past without any problem. Excessive exertion and dehydration in one’s first days at altitude, and possibly a high-salt diet, increase the risk for getting AMS. Remaining well hydrated – at least four

liters of water per day, a low-salt diet, and doing no heavy physical exertion for the first two to four days at altitude reduces one's risk of getting AMS. **Treatment:** Diamox (250mg) twice a day, started the day before ascent, and continued for the first three to four days at altitude, will reduce the risk of getting AMS. (This dosing will also treat Periodic Breathing, mentioned above.) Gingko, previously thought to be of benefit at altitude, has recently been found to be ineffective at preventing AMS. Using supplemental oxygen, especially at night, can also help reduce symptoms.

- **High Altitude Pulmonary Edema (HAPE):** HAPE occurs when fluid leaks into the lungs from blood vessels because of blood vessel spasms and back pressure. Three percent of people going to altitude are expected to develop HAPE, which normally presents on day two to three at altitude. Symptoms initially include shortness of breath at rest and when lying flat; they can progress to dry, wet, pink-frothy or bloody cough, associated with an inability to catch one's breath. This is a serious and progressive condition, which, if untreated, can lead to death. Risk for HAPE can be reduced by avoiding heavy exertion in one's first three to four days at altitude, taking Diamox to reduce periodic breathing and pauses, and keeping warm – to include breathing through a neck gaiter outside to prevent cold-induced spasms of blood vessels in the lungs. **Treatment:** Diamox (250mg) twice a day, possible blood vessel dilators like nifedepine or Viagra, inhalers such as albuterol, dexamethasone, oxygen and possible descent from altitude. The medical providers at McMurdo and South Pole Stations can best assist you on the advisability of using any of the other medications in addition to, or in place of, Diamox.
- **High Altitude Cerebral Edema (HACE):** HACE is brain swelling, resulting from the body's chemical reactions to the low-oxygen environment, HACE is rare at South Pole's altitude, but can be seen when oxygenation is worsened by the presence of HAPE. Therefore, HACE and HAPE are commonly seen together. HACE presents with severe headache, dizziness and ataxia (falling or stumbling due to lack of balance), extreme nausea/vomiting, altered levels of consciousness including unconsciousness, and seizures. Without treatment, HACE can be fatal. **Treatment:** Diamox (250mg) twice a day, dexamethasone to reduce brain swelling, oxygen and descent from altitude.

What if I've never had an altitude related illness before, and I've been to altitude many times? You are still at risk for getting altitude illness. If you've gone to altitude 99 times, you may get altitude illness on your hundredth ascent. If you live at altitude, your time in New Zealand and McMurdo is sufficient to allow you to lose your previous altitude acclimatization. The only predictor that you will get sick is that you've been sick before. Therefore, everyone must take seriously the above precautions and strongly consider taking medicine to prevent altitude illness.

Where do I get Acetazolamide (Diamox)? You should be briefed on altitude-related illness and obtain Diamox at McMurdo Station Medical before you go to Pole at any time during the season. If you are going to Pole directly, a member of the McMurdo medical team will meet you upon arrival in Antarctica, provide a briefing about altitude illness and offer Diamox before your Pole flight. If you forget to get your Diamox in McMurdo, it is also available from the South Pole Clinic.

What if I have other questions about Altitude Related Illnesses? Feel free to stop by the medical clinics at McMurdo or South Pole Stations, or speak to your own doctor before you deploy. A good web site to read more about altitude illnesses is: www.basecampmd.com.

**Remember: Do not over exert! Stay well hydrated! Keep warm!
Take acetazolamide (Diamox)!**