



Science of the Andes Run Blog post # 1. It's hot!

The first few days of the expedition have been pretty tough. How tough? We Kevin Valleley who has hiked to the South pole has injured his Achilles tendon, and Bob Cox who has run several ultra marathons had to stop one day due to difficulty breathing while running. Ray Zahab has been fine so far. Tired but fine. These injuries and illnesses are great reminders that you can never take anything for granted on the extreme expeditions and that preparation is so critical.

The first few days on the road have been pretty smoking hot. Air temperatures in the shade are about 30 degrees C and it's hotter out on the road. Not crazy temps but still pretty hot when you consider that we left North America in the middle of winter. So the transition has been challenging. I ran 10 k yesterday with the team after lunch and it felt like I was running with 10 lb weights around my ankles. Ray did 65 km in the same conditions. Pretty epic start to the expedition.

In this blog I'm going to explore some of the physiological science behind the run. And the most important physical challenge so far has been the heat. Normally, the body regulates its temperature by pumping blood from the internal organs and the brain out to the skin, where it can evaporate through sweat. With longer-term exposure to the heat, the body also adapts by:

- developing more capillaries in the skin so the blood can circulate better;
- sweating more to pull heat out of the body through evaporation;
- retaining electrolytes when we sweat; and
- increasing the total blood volume.



We have clearly not adapted yet. By the end of this expedition the bodies of the runners will have changed - allowing them to perform in these conditions no problem! In the meantime hydration is the key to make sure that the body has enough water to keep sweating and drawing heat out of the body. The other problem is that when we first arrive at altitude the body tends to lose a lot of electrolytes (like sodium and potassium) in the sweat. Check out this picture of Ray's shirt after today's run. It's covered in salt. Once again by the end of the run that should not be a problem - the body learns to retain electrolytes and sweat water. Pretty amazing.

We are also doing some blood testing each morning and afternoon. Near the end of the morning run Ray was cramping badly. At lunch we found that Ray's potassium levels had spiked 20%. We worked at lunch to get fluids back into his system and then adjusted his Gatorade concentration for the afternoon to lower the potassium and sodium levels a bit to try to keep him close to his normal values. That seemed to work well and he managed another 25 km after the lunch break.



In the next post I'll talk about how the immune system deals with extreme exercise, and why healthy athletes are actually at a higher risk of illness during expeditions like this one.



