Report: Core Body Temperature and Energy Expenditure assessment during a 5-km walk using the Swing-Through Gait technique

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Michael Haddad (MH), a paraplegic athlete, is thought to consume approximately 30 times more energy while walking compared to able-bodied individuals. The main reason is that during the Swing-Through Gait (SWG) technique, Michael lifts his body approximately 8 – 10 cm over the ground to swing his body though the crutches and later drop it. This lifting energy is entirely lost when he drops his body. MH uses the upper 25% of his body; basically, his arms lift his body, therefore most of the energy expended comes from his upper body. Consequently, the arms are forced to produce large amount of energy in a short period and would require significant amount of fuel substrates. These substrates are likely to be derived using both aerobic and anaerobic glycolysis. This area is of great interest and requires investigation to identify the sources of fuel. Second, it is well known that energy efficiency is about 25% and remaining is heat production and this infers elevation in body temperatures of the upper body. Increased body temperatures would be expected to have detrimental impact on performance and therefore there will be a need to neutralize the temperature either by evaporation of sweat or cold exposure (e.g cold water, ice). Thus, it is important to determine the magnitude of rise in body temperature and to identify a practical procedure(s) to neutralize in order to optimize performance.

Svalbard's 5 km walk

Energy Expenditure

In his last 5km walk in Svalbard, Michael had an elevation change of approximately 80 meters towards the end of the walk. Based on previous calculations, Michael consumes 30x the regular energy spent by a healthy subject (data taken from Dr. Barbar Akle). In other words, Michael walked an equivalent of 5 km x 30 = 150 km. A Marathon is 42.195 KM, so, in that terminology, Michael "walked" an equivalent of 3.55 Marathons.

Core Body Temperature

Michael 's core body temperature ranged between 37.3 and 38.2 degrees Celsius (check Figure 1). There is no considerable differences when compared to his walk in Faraya, Lebanon, where Michael's core body temperature rose up to 38.6 degrees Celsius.

Controlling his core temperature is the most important component in maintaining his overall wellbeing and performance. In addition, the lack of reported cramping despite physical exertion and a significant rise in core body temperature, may indicate an optimal hydration status, which was the result of a modified diet, customized specifically following Michael preferences.

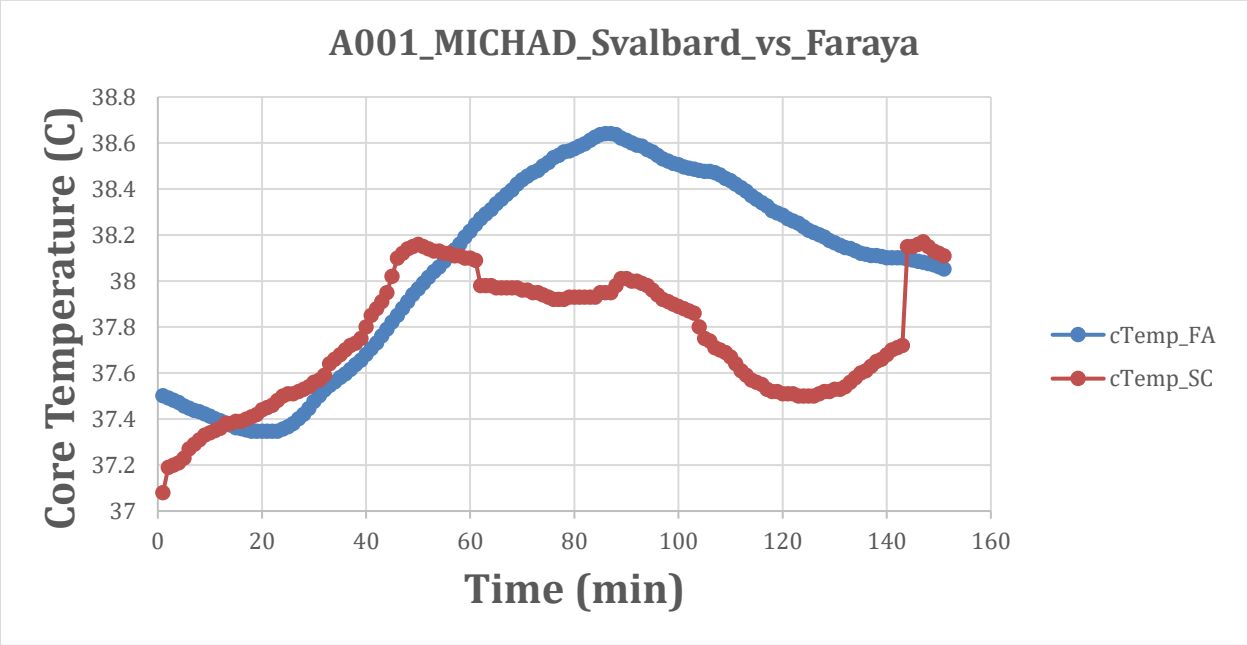

Figure 1. Core body Temperature during 5 km walk in Svalbard, Norway (cTemp_SC) and Faraya, Lebanon (cTemp_FA)

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