Homeostasis Case Study—HAPS Workshop

Instructions for using the IF AT® Forms:
1. Use a coin. Do not use keys, fingernails, etc. If you do not have a coin, ask for one.
2. If you scratch it, it counts. There are no second-chance scratches, use precision.
3. Please score yourselves as you go. 3 points for 1st try, 2 for 2nd try, 1 for 3rd try, 0 for 4th or 5th try. Tally your total and record it at the top right of the scratch sheet.
4. Write ALL the names of group numbers on the IF AT® form.

Total Points Possible (if answer correctly on all first tries):

A 64-year-old, fair-skinned man in good overall health spent a very hot, humid summer day gardening in his backyard. After several hours in the sun, he began to feel dizzy and confused as he knelt over his vegetable garden. Although he had earlier been perspiring profusely, his sweating had eventually stopped. Because he also felt confused and disoriented, he could not recall for how long he had not been perspiring, or even how long it had been since he had taken a drink of water. He called to his wife, who was alarmed to see that his skin had turned a pale blue color. She asked her husband to come indoors, but he fainted as soon as he tried to stand. The wife called for an ambulance, and the man was taken to a hospital and diagnosed with a condition called heat stroke. What happened to this man that would explain his condition, and how does it relate to homeostasis?

In what ways can you think of that this man’s body deviated from homeostasis? (List as many as you can think of). What mechanisms can the body use to adjust back toward homeostasis for each of these deviations? You may add your own to the list provided, then draw lines from your deviations to the mechanisms that could restore homeostasis.

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<th>Possible Deviations from Homeostasis</th>
<th>Possible Homeostatic Mechanisms</th>
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1. For each of the deviations that you listed, how does the body compensate?
A) Using a combination of physiological homeostatic mechanisms as well as behavioral homeostatic mechanisms
B) Using only 1 homeostatic mechanism
C) Using multiple homeostatic mechanisms

Adapted from Vander's Human Physiology, 13th Ed. Widmaier, Raff and Strang. 2014.
2. In order to return to homeostasis after a deviation in body temperature, which of the following mechanisms can be used by the body?
A) Changes in body and limb position (curling up, spreading out)
B) Sweating
C) Changes in blood flow
D) All of the above
E) A and B only

3. If the temperature outside did not change, why would this man stop sweating?
A) A decrease in available ions
B) A decrease in interstitial fluid
C) A decrease in body temperature (back to homeostatic levels)
D) A decrease in blood circulation to the skin
E) The brain region that controls sweating has been compromised

Sweat is slightly more dilute than interstitial fluid. Using the outline of a sweat gland below, draw in the production of sweat and illustrate for yourself how this statement could be true.

4. After a long period of sweating, what would happen to the osmolarity of interstitial fluid?
A) It would not change
B) It would decrease
C) It would increase

5. What specifically caused fainting in this case?
A) Increased temperature within the brain caused death of neurons
B) Increased metabolism in the heat utilized more sugar, causing low blood sugar and starving brain cells
C) Changes in breathing pattern due to the heat prevented adequate oxygen from reaching the brain
D) Reduced blood pressure and therefore blood perfusion of the brain
E) Changes in atmospheric oxygen that accompany increases in temperature resulted in inadequate oxygen reaching the brain

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