High Altitude Homeostasis

Objective 1: be able to determine the key components of homeostasis in the scenarios below.

Objective 2: identify interrelated systems, any hormones present, and where they were produced.

Scenario 1:

Mr. F was climbing Chimborazo (20,539 feet) after a long delay at the airport. With fewer 2 days to climb the mountain than he wanted, he climbed harder than he had wanted to, so he didn't miss his flight back home. Climbing at this pace found Mr. F consistently hypoxic. Using the feedback loop, answer the following:

a. What was the stimulus that changed Mr. F's internal environment? _____

b. What structure(s) are the receptor for hypoxia? (hint: Google "carotid bodies") and what do they do? Why do you think they are located where they are in the body? _____

_____

_____

c. What organ is the effector in this feedback loop? _____

d. What does it do to restore more normal oxygen levels? _____

_____

e. Where is the hormone erythropoietin produced (source)? _____
and where would its target receptors be found in this case? _____

f. Name two systems of the many involved that are directly interacting here?

_____

Scenario 7:

It is known that altitude greatly reduces your desire to eat which contributes to moderate to severe weight loss while climbing high altitude peaks. Mr. F left for Illimani (21,122 feet) weighing 162 pounds and returned to base camp weighing 155 pounds in a matter of 2 weeks. Use the feedback loops together to help you answer the questions below about this.

a. What stimulus ultimately affected Mr. F's hunger levels? _____

b. What two hormones impacted the will to eat? Causes hunger _____

Causes satiation (feeling content, or full) _____

c. Where are the sources of each of these hormones? _____

_____

d. Which hormone do you predict causes the body to break down fat cells (lipocytes) and which one causes the body to store adipose in lipocytes? _____

_____

e. Name two systems of the many involved that are directly interacting here?

_____

Scenario 6:

With as hard as Mr. F is climbing on Lhotse (27,940), he is developing a terrible migraine and is seeing very concentrated (orange…ewww) urine the closer he gets to the summit of the mountain. Use the feedback loop to answer the questions below.

a. What is the stimulus in the left-hand (blue) feedback loop? _____

b. Where are the receptors for this change in the variable in question? _____

c. What structure releases a hormone that starts the response? _____

d. What is the hormone that is released by this structure? _____

e. What organ is the effector in this scenario? _____

f. What does this organ do to help return Mr. F closer to normal levels of this variable? _____
_____

g. List three systems that are present in this feedback loop? _____
_____

Scenario 2:

With only eating soup and a few powerbars for lunch on Pico de Orizaba (18,491 feet) Mr. F is experiencing a bout of hypoglycemia and starts to heavily drag an hour later. Use the feedback loop to answer the questions below.

a. What is the stimulus of the lower loop (#2 in the photo)? _____

b. Where are the receptors for this variable found? _____

c. What hormone is secreted to help energize Mr. F on his ascent? _____

d. What organ is the effector to help fix Mr. F's issue? _____

e. How does his body help energize him on this trip up the mountain? _____
_____

f. Name four systems that are present in this feedback loop? _____
_____

Choose your own scenario: # _____ *(Only of the unused scenarios. Briefly summarize the scenario and ask FIVE (5) questions regarding the loop you've chosen similar to those in the scenarios above).*