STUDENT GUIDE
EVALUATE LESSON 14

Food and Agriculture Center for Science Education

Part 1: Our Motivation

Record what we were trying to explain about the Anchor Phenomenon.

We are going to revisit our Anchor presentation to determine what new scientific information we can communicate to the audience about how milk helps with recovery from exercise, including the new information that we have figured out about how milk nutrients play a key role in assisting with exercise recovery to stabilize body systems.

Part 2: Communicating Scientific Ideas

Create a presentation with your group that communicates the answer to our Driving Question, ***How can milk help athletes recover from physical exercise?*** to an audience of your choosing. Here, you should add the new content from Module 2 to the presentation you created in Lesson 7.

Presentation Format Requirements:

- Videos cannot exceed 3 minutes.
- Written reports cannot exceed 2 pages.
- Presentation is designed for the same chosen audience and with the same format you selected in Module 1.
- Prepare a script of your presentation before adding multiple media formats.

Presentation Development Steps:

- Develop a script/outline.
- Have the teacher review your script/outline.
- Develop your presentation.
    - If doing a written presentation, create the formal writing product.
    - If doing a video presentation, rehearse and record the video product.
- Receive peer feedback on your presentation.
- (Optional - can be done here or in the final Performance Task) Revise your presentation based on peer feedback.

Be sure to use the Look Fors provided below to guide your presentation. Mark each Look For after you include it.

Included	Look Fors
	Include multiple methods of communication, including models and evidence from the module (video plus graphics/diagrams, written report plus graphics/diagrams, or video with narration of a slideshow). ● You can use the class consensus model, data sets, and/or models from any other resources from the module.
	Clearly communicate scientific information in a way that is appropriate for your chosen audience.
	Describe how exercise can destabilize water balance in the body and how negative feedback mechanisms in the body and the consumption of milk can help the body return water balance to its stable state.
	Describe how the functions of multiple kinds of specialized cells contribute to maintaining and adjusting water levels in the body in response to changes in the body's conditions.

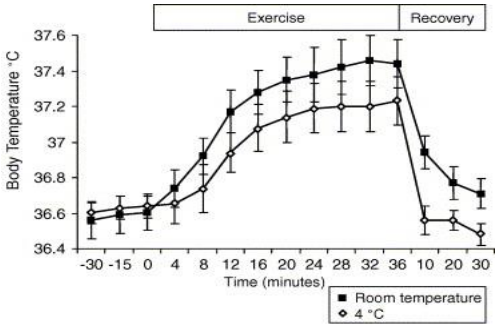
You can use these tips to help you create an effective presentation.

Tips for a Successful Multimedia Presentation	**How I Plan to Use These Tips**
Choose the Focus of This Module ● What do you think is the most important information from this module? ● Stay on point - clarify your objective, never lose sight of it, and shape all of your content around it.	
Engage Your Chosen Audience ● How can you tailor this information to be presented appropriately for the audience you chose? ● Research your audience - why are they here? What do they care about? ● Adapt your approach - keep questioning, “How can I connect to my audience?” and “How do I want them to react?”	
Choose Appropriate Media ● Use media that exemplifies your audience's needs and preferences. ● Use media that adds context to your presentation text rather than compete with it. ○ For example, a graphic should illustrate a science idea you are discussing. A graphic should not be an image that is not relevant to the content being discussed. ● Use media from the module, such as: ○ the class consensus model. ○ models from texts or science theater ○ graphs of data	
Narrate Effectively ● Facts and information should be the focus of your presentation, but the more you can connect them to real-life experiences, the more the audience will relate to your presentation. ● Rehearse your script so that you are confident in what you are saying and so that it doesn’t seem like you are reading a script.	

In the space below, prepare your presentation script or written report.

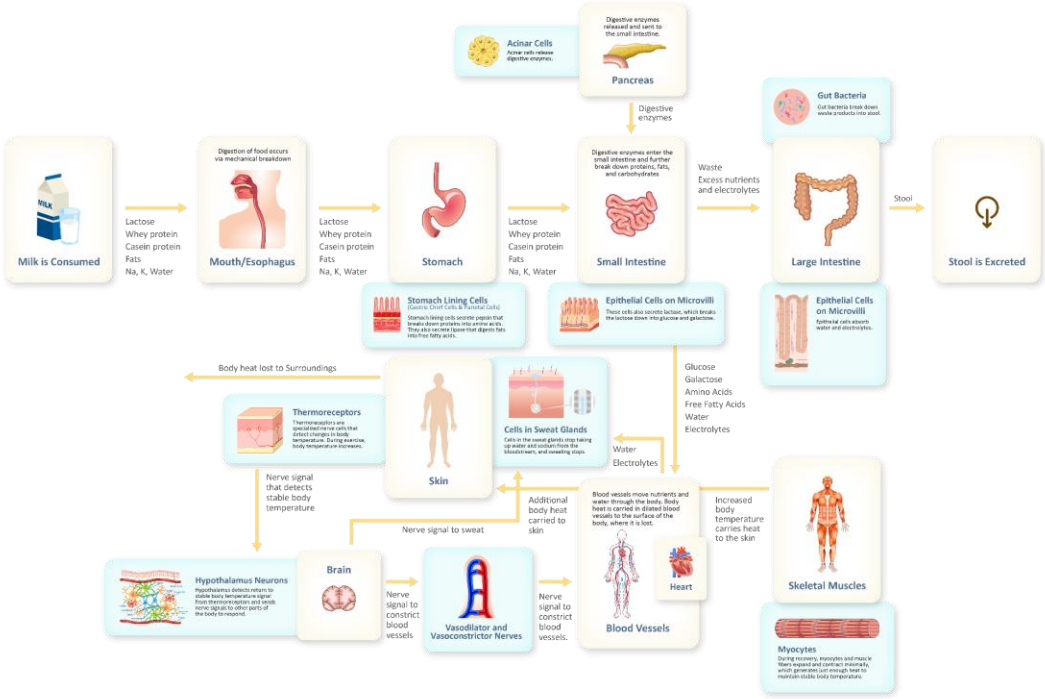
Written Report

Let's now look more closely at what's happening in the body during and after exercise. After a person works out, they typically get hot. Take a look at this study that was done to show how a person's internal body temperature changes during exercise.



Before exercise, the body temperature starts at a normal, stable state at about 36.5°C. When exercising, body temperature increases by about 0.5-1.0°C. Then, after exercise, body temperature returns to about 36.6°C.

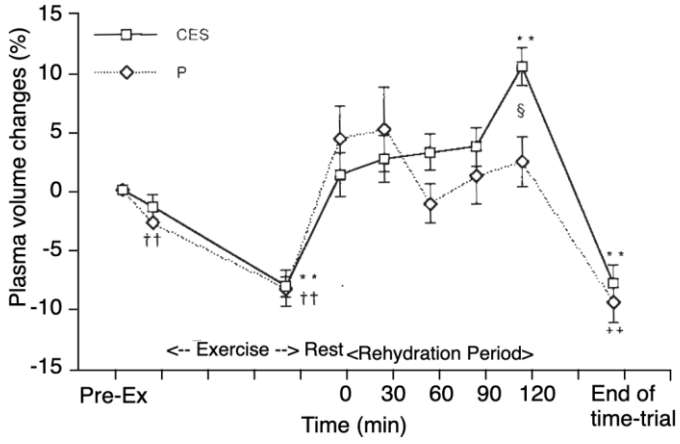
The body gets hot due to exercise, and it has multiple ways in which it tries to cool down. I'll show you them on this model.



Effects of Exercise Model Lesson 10

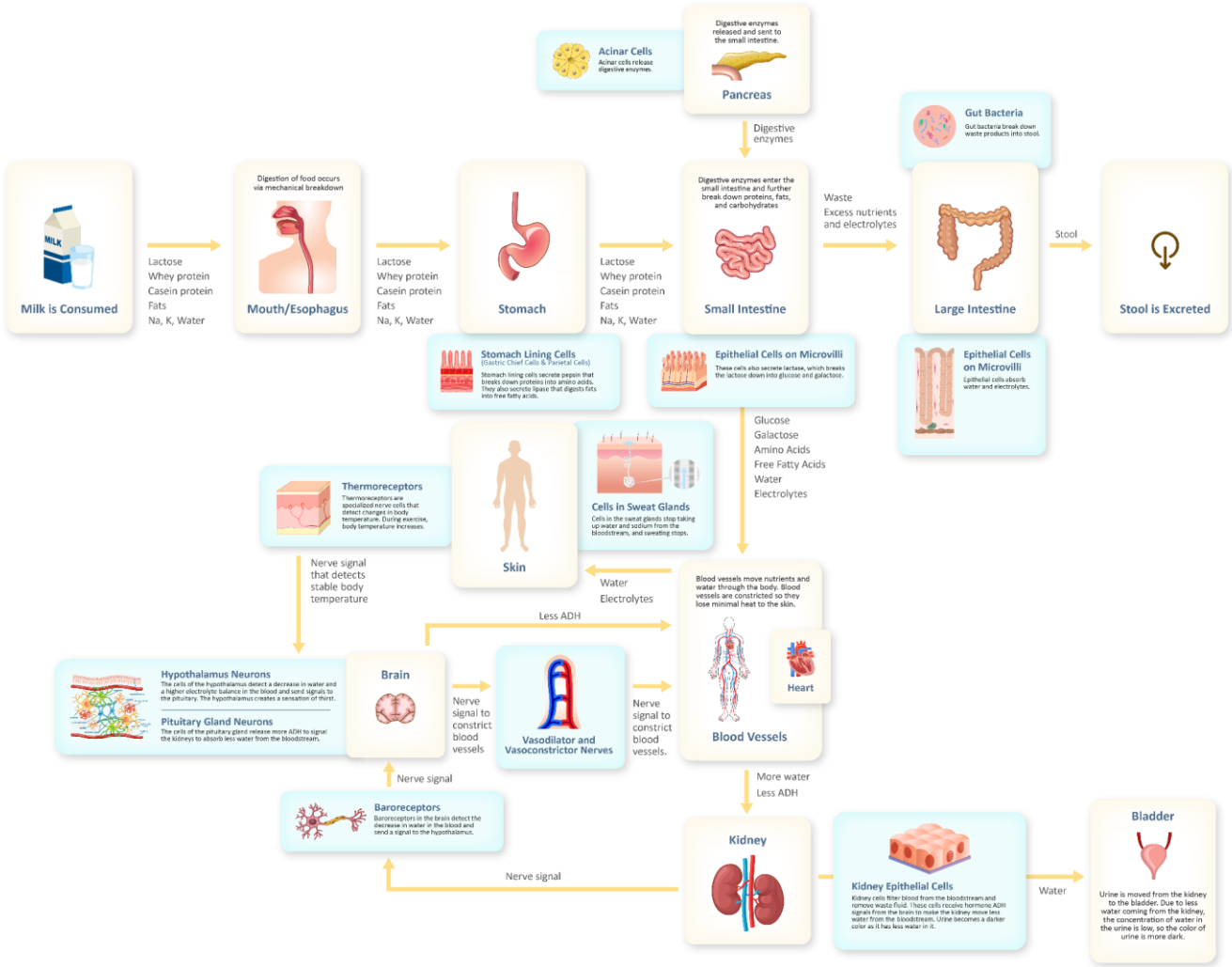
First, thermoreceptors in the skin and muscles detect a change in temperature. They send a nerve signal to the hypothalamus in the brain, which then sends a signal via nerves to the sweat glands to produce sweat to cool the body. The hypothalamus also signals the vasodilation nerves to expand the blood vessels, allowing blood to bring heat from the body to the surroundings. This is one example of a feedback mechanism the body has to respond to the increase in temperature of the body to bring the temperature back to its stable state.

Next, let's talk about why you get thirsty and why your urine color might change in exercise. The loss of water in sweat occurs because water moves from the bloodstream to the skin in sweat. Take a look at this graph of blood volume changes over time in exercise.



We can see that blood volume decreased during two instances of exercise. First, during the moderate effort exercise, it decreased by about 10%. Then, during the max effort exercise, it decreased by 10-20%.

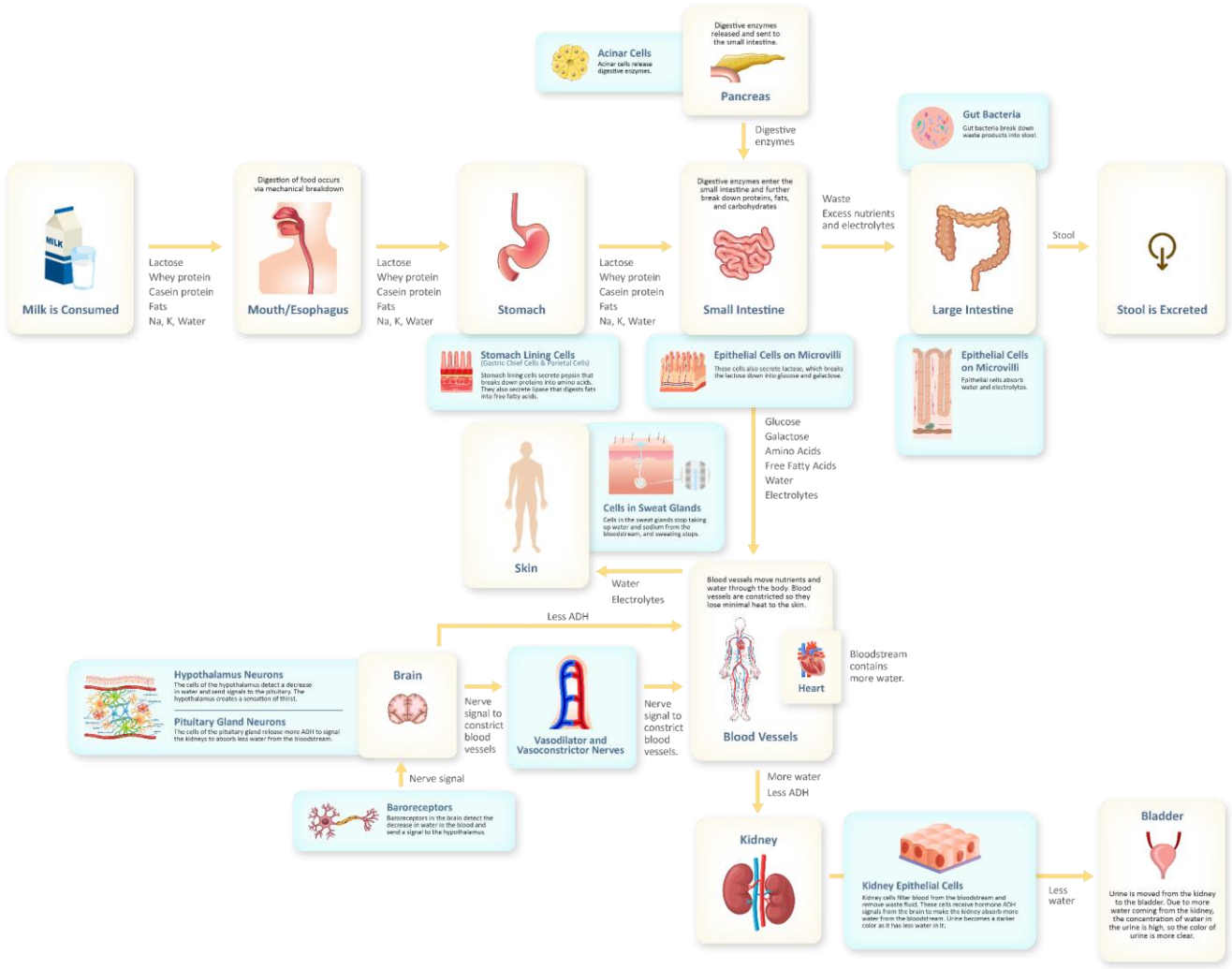
The body has ways of preventing it from losing too much water, which is what happens when your blood volume decreases. Let's again look at this model to see how that happens.



Exercise Effects Model from Lesson 12

Osmoreceptors detect the decrease in water in the blood and send a signal to the brain. The hypothalamus in the brain receives the signal from the osmoreceptors. This results in the sensation of thirst and an increased production of ADH from the pituitary gland in the brain. The pituitary region of the brain sends ADH to the kidney via the bloodstream to absorb less water from the blood, leading to less water moving to the bladder, where it is stored as urine. The urine color becomes darker. This process is also a negative feedback loop and is how the body prevents additional water loss.

Now, these effects of exercise on the body might sound alarming, but they are all part of your body's natural response to try to maintain stable conditions. Milk can also help your body recover from these effects. Let me show you.



Recovery model from Lesson 12

In recovery, when someone stops exercising, they cool down. The temperature change is detected by thermoreceptors, which send a signal to the hypothalamus, which then signals the sweat glands to stop sweating. When someone drinks milk, the water in the milk moves through digestion into the bloodstream, which brings the amount of water in the blood back to its stable state. The osmoreceptors detect this change, cease the sensation of thirst, and send less ADH to the kidneys. The kidneys can now absorb more water from the bloodstream, passing it on to the bladder as urine. Urine is a lighter color as a result.

Part 3: Sharing Presentation Drafts and Receiving Feedback on Our Presentations

As part of the process of preparing your presentation, you will work with another group to rehearse your presentations, then get feedback from your peers and give them feedback.

Pair with another group, then decide which group will rehearse first. After each group finishes their presentation, have a discussion about your observations. Use reasoning and evidence to support your ideas.

When the other group presents:
Respectfully provide feedback to your peers on their presentation. Use the "Peer Feedback Form" handout to document your feedback.

When your group presents:
Listen to the other group's feedback on your presentation and thank them for their suggestions. Be open to receiving critiques on your presentation. Then, as a group:

- Consider each item of feedback from your peers.
- Discuss the suggestions you want to incorporate in your presentation and explain why/why not. Use reasoning and evidence as you talk through ideas.
- (Optional - can be done here or in the final Performance Task) Make any revisions to your script or written report as agreed upon through group consensus.

Use the space below to record your group's discussion.

Suggested Improvement or Additional Science Ideas/Evidence	Reasoning for Incorporating/Not Incorporating