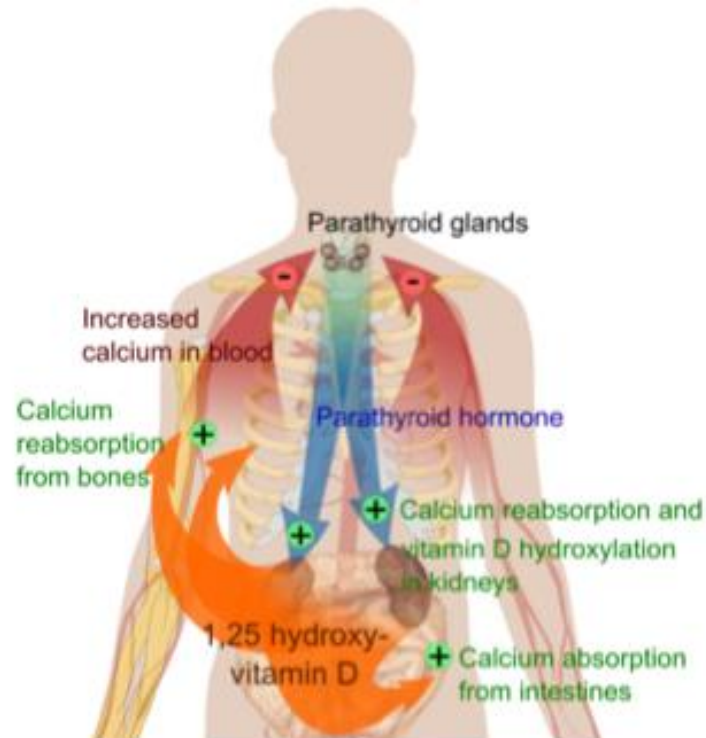


# Homeostasis Investigation, Part I



How does your body work to maintain balance?  
What happens when this balance is disrupted?

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## **Hypernatremia Due to Dehydration in Dementia**

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### **Individual think-write: preview**

- Take out your science reading and talking stems, then turn to the text “Hypernatremia Due to Dehydration in Dementia,” page R1 in your Reader.
- Take two minutes to look over the text and respond to the prompts below.
  - What might be challenging about reading this article?
  - What might be interesting about reading this article?
  - What kind of text is this? How do you know?
  - What predictions can you make about the kind of science information it may contain?
  - What might you do to get as much out of the reading this article as possible?

### **Pair discussion**

- Take turns sharing your ideas for one minute each.
- Add notes about your partner's ideas onto your own response.
- **Stellar idea:** Select one response that you or your partner can share with the class. Mark it with a star.

### **Whole class discussion**

- Share stellar ideas.
- Listen closely and respond to your classmates' ideas.
- Use science talk stems.
- Add peers' best ideas onto your own response.
- What new words can we add to our word wall?

### **Reading and making thinking visible**

- **Talk to the text:** Individually talk to the text on "Hypernatremia due to dehydration in dementia."

### **Pair discussion**

- Take out your science reading and talking stems.
- Talk with your table partners and take turns sharing your talk to the text comments, going paragraph by paragraph.
- Help each other work through any confusions or roadblocks you may encounter.
- Keep track of any new reading strategies you or your partner use to make sense of this text, and discuss with your partner: what could be added to our reading strategies list (RSL)?

**Generating questions about the phenomenon** (partners/whole class)

- **Reading process:** What science reading processes were important for your reading? See if you can add any new ideas to your class' RSL.
- **Inquiry:** think about what you *understand* about this **86 year-old female patient** and/or **hypernatremia**, any *connections* you've made to what you already know, and write down other *questions* you have below.

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## When Too Much Water Hurts a Runner

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### Individual think-write: preview

- Turn to Reader page R3 and take out your science reading and talking stems.
- Take two minutes to look over “When Too Much Water Hurts a Runner” and respond to the prompts below.
  - What might be challenging about reading this article?
  - What might be interesting about reading this article?
  - What kind of text is this? How do you know?
  - What predictions can you make about the kind of science information it may contain?
  - What might you do to get the most out of the reading this article as possible?

### Pair share

- With your partner, preview this text and see if you can make some any *connections* between this text and the text on page R1 - R2: “Hypernatremia Due to Dehydration in Dementia.”
- Use your talk stems bookmark to talk with your partner.
- Based on your preview of the text and any connections you made to the previous text, *set a purpose* for reading this article.
- Make sure you are ready to share you and your partner’s ideas to the class!

### Whole class discussion

- Share the ideas you and your partner came up with when you previewed the texts.
- Listen closely and respond to your classmates’ ideas.
- Use science talk stems.

## Reading and making thinking visible (individual and partner)

Use your reading strategies bookmark and do a close reading of this text.

While you read, talk to the text to document your thinking and reading processes in the margins. Pay special attention to the connections you make and to the questions that the texts make you think about as you read.

## Pair discussion

After reading, respond to the prompts below and discuss with your partner:

- **Sense-making:** Work together to make sense of the text.
- **Reading process:** What science reading processes were important for your reading?
- **Inquiry:** What are you noticing or wondering now about **hyponatremia**? What new understandings or connections are you forming? What is interesting? What is important? Write down those ideas in the space below.
- **Stellar ideas:** Select one reading process **AND** one idea or question about hyponatremia that you or your partner can share with the class. Mark each with a star.

## Whole class discussion

Share stellar ideas about **reading process**

- What did you notice about your partner's (or your own) reading processes with this text?
- What reading challenges did you or your partner encounter and how did you respond to the reading challenge?
- What additions or revisions can we make on the reading strategies list poster?

Share stellar ideas about **hyponatremia**.

- What questions, connections, or ah-ha's do you have from your reading?
- What new words can we add to our word wall?

**Too much or too little... what’s going on inside the body?**

Phenomena are events or processes that occur in the world that can be explained by science. One of the ways that scientists do the important work of investigating and explaining phenomena is by gathering information from texts of all types, including written and visual text.

Hyper- and hyponatremia are the phenomena you are investigating. You and your classmates’ have just read about two individuals experiencing some extreme conditions. Next you will work with your partner or tablemates and think about the similarities and differences in what’s going on inside the body of someone who is *hyper* vs. *hyponatremic*.

**Teacher model**

- Listen and make notes below about the teacher’s reading process. Pay particular attention to *how* the teacher identifies similarities and differences.

	Hypernatremic dementia patient	Hyponatremic marathon runner
Differences		
Similarities		

**Whole class discussion**

- What did you notice about how your teacher identified differences and similarities?



**Pairs/small groups**

Work with your partner or tablemates and think about the similarities and differences in what’s going on inside the body of someone who is *hyper* vs. *hyponatremic*.

- Put a star by ideas that are supported by the texts you’ve read. Put a question mark by the ideas that you may need to do more research to be sure about.
- Chose a similarity or a difference to share with the class.

	Hypernatremia dementia patient	Hyponatremic marathon runner
Differences		
Similarities		

**Whole class discussion**

- Share a similarity or difference and the reading strategies you used to identify it.
- What additions or revisions can we make on the reading strategies list poster?
- Add your peers’ ideas to your own chart.

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## **Building our inquiry questions (IQs)**

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Scientists looking to understand puzzling phenomena don't find every answer using their lab equipment. They also do a lot of reading to help them identify the interesting questions that they want to pursue and investigate. Think about the questions you and your classmates have generated by reading.

### **Individual brainstorming**

Based on your close reading of the two texts in this module and based on what you know, what questions do you have about **water**, **sodium**, and the **human body**? Jot them down in the space below:

### **Think-pair-share**

- Share the inquiry questions you generated from these two texts. Which ones rise to the top as the most important? Why do you think these are the most important? How might these questions impact how you read? Circle the questions you would like to share with your classmates and be ready to share why you think this question is important.

### **Whole class discussion**

- Share one of the questions you and your partner discussed.
- Use your science talk stems to contribute and listen and build on your classmate's ideas.
- Work together to create an inquiry question poster based on you and your classmates' questions about water, sodium, and the human body.

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## Hyponatremia: what's going on inside the body?

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### Reading and making thinking visible

- Take out your science reading and talking bookmark and turn to Reader page R5.
- Read “Hyponatremia: what’s going on inside the body?” and annotate the text, showing your reading and thinking process in the margins.

### Pair share

After reading, respond to the prompts and discuss with your partner:

- **Sense-making:** Work together to make sense of the text.
- **Reading process:** What did you notice about your own reading and thinking process?
- **Inquiry:** What do you notice about the patient with and without hyponatremia?
- **Cross-text connections:** What connections can you make between “Hypernatremia due to Dehydration in Dementia,” “When Too Much Water Hurts a Runner” and the poster ideas you have generated as a class?

### Whole class discussion

Ideas about **reading process**

- What did you notice about your partner’s (or your own) reading processes with this text?
- What reading challenges did you or your partner encounter and how did you respond to the reading challenge?
- What additions or revisions can we make on the reading strategies list poster?

Share about **hypernatremia** and **hyponatremia**

- What new understandings about hyponatremia have you built? What new connections have you made? What new questions do you have?
- What new words can we add to our word wall?

**Reading and modifying scientific models** (partner and whole class)

- Look back at the model criteria poster you built together as a class.
- Discuss with your partner and class:
  - **Criteria:** What are science models? What makes a good science model?
  - **Purpose:** Why do you think the authors created this model? What is a model of? How do you know?
- **Extending the model:** Based on your thinking and reading, work with your partners to draw a model in the blank space on R5 of what might be happening inside a patient who has **hypernatremia**, like the dementia patient you read about in “Hypernatremia Due to Dehydration.”
- Share your model with the class: Why did you choose to draw the model the way you did? What text-based information did you use to construct your model?
- Discuss this question with your class: **How would you describe differences in what’s going on inside the bodies of someone with hypernatremia and hyponatremia?**

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## Evidence and interpretation notetakers

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One of the ways to keep track of the important ideas that we get from reading is through evidence and interpretation (E/I) charts. Although many ideas can be important or interesting, they may not all be considered evidence that relates to our inquiry questions about homeostasis.

### Individual

Read the three words/concepts below and respond to the prompts.

- What do you know, think, or remember about each word?
- Describe a real life experience when you used information, evidence, and interpretations.

Information

Evidence

Interpretation

### Pairs/table group

Take turns sharing your notes about the three words and your real life experience related to these three words. Discuss the similarities and differences.

### Whole class discussion

- Share the ideas that you, your partner, and table group came up with about the difference between evidence, information, and interpretations.
- Look at the poster or list of inquiry questions you have been building about hypo and hypernatremia. Discuss this question with your class: **What kind of evidence might you look for to help you answer those questions?**
- Turn to your evidence and interpretation charts. Write down your ideas for what counts as evidence and interpretations in the top row of the table.

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## Evidence and interpretation notetakers

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### Teacher model

- Listen and make notes in your own E/I notetaker as the teacher models the process of identifying evidence, making interpretations, and asking new questions.

### Whole class discussion

- What did you notice about your teacher's thought processes as he/she identified evidence and formed interpretations?

### Pair-think-write

- Turn to R1 - R5 in your reader and take out your science reading and talking stems.
- With your partner, identify one or more pieces of evidence from the articles and record these in your E/I notetaker.
- As you identify and record each piece of **evidence**, think about the **interpretations** you can make from them. For example, what does each piece of evidence tell you about hyponatremia, hypernatremia, or homeostasis?
- For each piece of evidence and interpretation, write down additional **questions** you now have in the last column of your E/I chart.
- Repeat these steps to find additional evidence, interpretations, and questions about hyponatremia, hypernatremia, or homeostasis.
- **Stellar idea:** Select one response that you or your partner can share with the class. Mark it with a star.

### Whole class discussion

- Share your evidence, interpretations, and questions with the class.
- Discuss the following questions:
  - How do you know the evidence is important?
  - What are some inferences you might draw? Could you draw different inferences from the same piece of evidence?
  - How might the evidence, interpretation, or questions help you build an explanation that answers our inquiry questions?

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## Homeostasis

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### Setting a purpose for reading (individual)

- Turn to page R6 – R7 (“Homeostasis”) in your reader and take out your science reading and talking stems.
- Turn to the inquiry questions you and your classmates generated together. These may be located in your E/I notetaker, on your classroom inquiry questions poster, or recorded on page 8.
- Using these inquiry questions, set your purpose for reading this text.

### Whole class discussion

- Share your purpose for reading with your classmates.
- Use your science talking stems to listen and respond to other’s ideas.
- Discuss this with your class: How did you identify your purpose for reading? How does setting purposes for reading affect your reading process?

### Reading and making thinking visible

- **Think aloud:** Partners take turns thinking aloud by paragraph for the first section. One partner thinks aloud while the other partner makes notes in the margin of the text about their partner’s thoughts. Help each other make sense of the text.

OR

- **Talk to the text:** Individually talk to the text on the first section. Pairs take turns sharing their talk to the text annotations. Help each other make sense of the text.
- Use the science reading stems to help you share your reading process.

## Pair discussion

After reading, discuss and respond to the prompts.

- **Words:** What new words or word-uses did you encounter? How did you make sense of their meaning?
- **Confusions or clarifications:** What parts of the text (visual or written) were unclear? Where do you have questions? Work together to clarify confusing parts of the text and to answer questions that you have.
- **Reading process:** What other science reading processes were important for your reading?
- **Inquiry:** What are you noticing or wondering now about homeostasis, hypernatremia, or hyponatremia, during or after reading?

## Whole class discussion

Ideas about reading process

- What did you notice about your partner's (or your own) reading processes with this text?
- What reading challenges did you or your partner encounter and how did you respond to the reading challenge?
- What additions or revisions can we make on the reading strategies list poster?

Share about homeostasis.

- What new understandings about homeostasis have you built? What new connections have you made? What new questions do you have?
- What new words can we add to our word wall?



### **Looking for evidence and making interpretations to address our IQs**

- Take out to your E/I notetaker. Look through this text and identify a single piece of evidence you want to add to your notetaker and the interpretations and questions you have about that evidence.
- Share this idea with your partner and get feedback on your idea. How does it address your IQs? Switch roles and have your partner share their evidence.
- Return to your classroom IQs. Were you able to answer any of these questions with text-based evidence? Record answers to your inquiry questions on a new classroom poster.

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## What's in our blood?

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### Previewing and setting purposes for reading (individual and partners)

- Take out and use the following set of tools to generate a goal for reading “What’s in our blood?” (R8).
  - Science reading and talking book mark
  - E/I notetaker
  - The list of inquiry questions generated by your class
  - The prior texts in this module (R1 - R7)
- Take a minute to preview “What’s in our blood?”

### Pair share

- Discuss with your partner: What have you already figured out about hypo/hyponatremia, sodium, water, and the human body? What do else do you need to figure out? How might this text give you some of the information you still need?
- Establish your goal for reading, based on your analysis of what else you need to find out and what this text might offer. Write your goal below.

### Reading and making thinking visible

- Individually talk to the text on each section of “What’s in our blood?”
- Use your science reading stems to help you make your thinking visible by writing annotations in the margins.
- **Stellar ideas:** Select a new word, a confusion or clarification, or a reading process AND one idea or question about homeostasis, hypernatremia or hyponatremia that you can share with the class. Mark them on your text with a star.

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**What's in our blood? continued**

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**Think-pair-share:**

- **Reading process:** Talk with your partner about your reading process:
  - What strategies helped you make sense of the text?
  - Did you read the diagram or written text on this page first? Why?
  - Were you able to make connections between the written text and the diagram? How did those connections help you read?
  - Did you make any connections to you already know or other texts we have read in this module?
- **About your stellar idea:** Share your stellar idea with your partner. Use your science talk stems to add, clarify, and respond to your partner's ideas.
- **Identifying evidence and making interpretations:**
  - Turn to your E/I notetaker. Identify new pieces of evidence, interpretation, or questions that arose from reading this text.

**Whole class discussion:**

- **Reading process:** What reading strategies helped you or your partner make sense of the text?
- **Stellar ideas:** Share stellar idea you or your partner came up with by reading.
- **Answers to our IQs:** Return to the list of inquiry questions (IQs) you and your classmates generated. As a class, see if you now have answers to some of those questions. Document these on the “Answers to our inquiry questions” poster in your class.

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**Salt: A World History**

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**Setting a purpose for reading**

Look through the set of inquiry questions that you and your classmates have generated. Talk with one another, using your science reading and talking stems and the following prompts to get you started:

- What have we figured out about hyponatremia, hypernatremia, and homeostasis?
- What else do we need to find out?

**Reading and making thinking visible**

- Turn to “Salt: A World History” (R9).
- **Think aloud:** Partners take turns thinking aloud by paragraph for the first section. One partner thinks aloud while the other partner makes notes in the margin of the text about their partner’s thoughts. Help each other make sense of the text.

OR

- **Talk to the text:** Individually talk to the text on the first section. Pairs take turns sharing their talk to the text comments. Help each other make sense of the text.
- Use the science reading stems to help you share your reading process.

**Developing the “big idea” through reading**

- As you share your reading and thinking processes with your partner, see if you can identify the big idea of this text.

**Identify evidence, make interpretations and generate more questions**

- Take out your E/I notetaker
- Review the notes you made on “Salt: a World History” and add a star to ideas that might go in your E/I notetaker.
- Share with your partner:
  - Why did you choose to star that idea?
  - How do you think it will help us understanding homeostasis, hypernatremia, or hyponatremia?
- After sharing and talking with your partner, work together to identify important pieces of evidence, interpretations, and question and record these in your E/I notetaker.

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## Regulation of water by vasopressin

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### Preview

- Turn to “Regulation of water by vasopressin” on R12. Preview the text on your own or with a partner and then discuss the following questions:
  - How is this text *similar* or *different* than the other texts we’ve read up to this point?
  - What connections can you make to what we have discussed so far?
  - What do you think will make this text difficult or easy to read?

### Reading and making thinking visible

- Use your science reading stems to read and annotate this text, using the following questions as a guide:
  - **Reading process:** What other science reading processes were important for your reading?
  - **Confusions or clarifications:** What was *confusing*, *interesting*, or *helpful* about this model?
  - **Cross-text connections:** What kinds of connections you can make to the previous texts?
  - **Inquiry:** How does this model help you understand how the body regulates sodium concentrations in blood? What new pieces of evidence can you identify in this text that will help answer the inquiry questions your class came up with?

### Whole class discussion:

- What is this a science model of? What does it help explain? What does it *not* explain?
- How might you change this model to account for hyponatremic or hypernatremic patients? What might need to be added, removed, or modified?
- Support your ideas with text-based evidence from all the texts you have read so far in this module.

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## **Vaptans for the treatment of hyponatremia**

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You and your classmates have read a model for how sodium concentrations are regulated in the human body. As learners of science, one way we can assess our own understanding of something is when we try to apply what we know to something new.

### **Reading and making thinking visible**

- Turn to page R13, “Vaptans for the treatment of hyponatremia” in your reader.
- Use your reading and talking stems to think aloud and talk to the text on your own or with a partner.
- Share your inquiry questions, connections, and reading roadblocks as you read. Try to see if you can help one another make sense of the text.

### **Making connections and using our models to explain phenomena**

- After you read, if you haven’t already, look back at “Regulation of water by vasopressin” and see if making connections between these two texts helps you understand how vaptans work to treat hyponatremia.
- Use the space below to jot down your ideas about vaptans, the kidney, vasopressin, and the sodium concentration in the blood.

### **Identify evidence and interpretations**

- Turn to your E/I chart and record important pieces of evidence, interpretations, and questions that help you answer your inquiry questions from the last two texts (“Regulation of water by vasopressin” and “Vaptans for the treatment of hyponatremia”).

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## **Putting it together: How does the body regulate sodium concentrations?**

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### **Think-pair-share:**

- Take out your reader and E/I notetaker and look over the questions you and your classmates generated at the beginning of class.
- Spend some time thinking on your own about the questions you are able to answer, and then share your ideas with your partner. Be ready to share your ideas with your class!

Drawing on all that you now know, how would you explain **how the body regulates sodium concentrations and what happens when this balance is disrupted?** Use the space below to write down how you would explain these ideas to another student who was not a part of our class.

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