Food For Thought:
A Modeling unit investigating connections between the endocrine and nervous systems, metabolism, and health

Tommy Wolfe, Barbara Hug, Hillary Lauren, Claire Scavuzzo
University of Illinois at Urbana Champaign
What is Project NEURON?

- SEPA, NIH
- Curriculum development
  - Inquiry-based
  - Connect to standards
- Professional development
  - Summer institutes
  - Conferences
- Educators, scientists, and graduate students
The Microbe Unit: A Collaborative Process

• Science Educators (Project NEURON)
  – Initial unit planning
  – Developing lessons
  – Modify/revise materials based on feedback

• Scientists (Donna & Paul Gold)
  – Initial unit planning
  – Provide feedback on lesson content

• Teachers (High School Science)
  – Initial unit planning
  – Enact lessons in the classroom
  – Provide feedback
An Iterative Development Process

1. Determine main understanding goals and develop unit outline
2. Develop and revise lesson plan and student materials
3. Teachers provide feedback (based on workshops and classroom enactments)
4. Scientists provide feedback

The process is iterative, allowing for continuous improvement and feedback from both teachers and scientists.
Nature of the “Food For Thought” Unit

- Emphasis on the scientific practice of modeling
- Small groups (4-5 students)
- Teacher and students actively engaged
Modeling in NGSS

- **Scientific Practice 2**: Developing and Using Models
- **Crosscutting Concept 4**: Systems and System Models
- Scientists use models to
  - Predict
  - Test and revise
  - Explain and Communicate
- Models not static, but explore a process, an event, a phenomena over time
- Student-generated models
Modeling in Teaching

- Models can serve to connect ideas arising from multiple activities and readings

- Through modeling, student’s mental models (student thinking) can be made known to teacher. Great for formative assessment

- The nature of models leads into other scientific practices

- Better understanding of the nature of science
Food for Thought:

L1: Why is glucose important for the body and brain?

L2: How does the body regulate glucose?

L3: What effect does adrenalin have on the body and brain?

L4: How does glucose affect memory in aging populations?

L5: How does glucose dysregulation lead to disease?
Lesson 1

Why is glucose important for the body and the brain?

- Glucunculus as an explanatory model
Lesson 1
Why is glucose important for the body and the brain?
Lesson 2

How does the body regulate glucose levels?

• Cracker activity
• Stop-animation video
• Connecting analogy through class discussion

See the video used to introduce this concept at https://neuron.illinois.edu/videos/video-the-endocrine-system
Lesson 2
How does the body regulate glucose levels?

• Students apply their framework of the endocrine system to specific hormones: glucose and insulin

• Students apply their models working through different medical scenarios.
How does adrenalin (epinephrine) have an effect on the body and the mind?
PREDICT:
Develop a model of how adrenalin (epinephrine) induces changes in the body.
• Use what you know about the endocrine system
• Use what you know from prior experience

REMEMBER:
At this point you are creating a model to make predictions. This is exactly how scientists create models. They make predictions through observation and from previous scientific knowledge. After using their models to predict, scientists then test their models to see if their predictions are supported. If not, scientists then need to revise their existing model in light of new evidence. You will be testing your model in the second part of this activity.
TEST:

Based on new evidence determine if:

• Your model is supported by evidence
• If you need to add to your model
• If you need to revise your model
Lesson 4

Do glucose and adrenalin affect memory in aging populations?
Lesson 5

How does glucose dysregulation lead to disease?
Discussion

• How could you use this unit in your classroom?
  – To teach content?
  – To teach scientific practices, crosscutting concepts, and disciplinary core ideas?

• Do you have comments or suggestions about Lesson 3?

• Questions about Modeling for teachers, students, scientists?

All materials can be found at: neuron.illinois.edu
Acknowledgements

• NIH, SEPA
• University of Illinois

This project was supported by SEPA and the National Center for Research Resources and the Division of Program Coordination, Planning, and Strategic Initiatives of the National Institutes of Health through Grant Number R25 RR024251. The contents of this presentation are solely the responsibility of Project NEURON and do not necessarily represent the official views of the funding agencies.

Thank You