3. Temperature

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Pre-class materials

Read ahead

Before class, you can prepare by reading the following materials:

- 1. Withers chapter 5. Look over the homework, handout, and discussion questions and skim the chapter, reading anything that you need to know.
- 2. [Discussion Questions]
- 3. [Slide Deck] for your reference as we go through the material

Announcements/Reminders

- We are back in the lab this week. Read [Lab 3]. Watch the podcast on peripheral circulation. Read Do prelab quiz and the prelab, focusing on the hypotheses that you will design.
- We will finish Metabolism and begin Temperature.
- HW1 due Tuesday in class, hand-written (you may submit as a group week 2 if you wish).
- HW2 due next Tuesday in class (individual).

Week 3 Discussion Groups

Group	Partner 1	Partner 2	Partner 3
1	Abby	James	Johsua
2	Veronica	Ilan	Kylee
3	Vivian	Hao	Mohamad

Group	Partner 1	Partner 2	Partner 3
4	Adam	Christian	Sean
5	Ashton	Tamako	

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Thought for the day

Physiology is the story of evolution's struggle to maintain an appropriate SA/D ratio in relation to the volume of an animal – Haldane

3. Temperature

Modes of Heat Transfer

- Conduction
- Convection
- Evaporative
- Radiative

Animals also generate heat through Metabolism.

https://youtu.be/BHchDrboqEo

Flux = $C * \nabla$ (Mass or Energy)

$$Q = C * M \nabla T$$

Where: - Flux is the transfer of mass or energy - ∇ is the gradient symbol - Q is heat - C is a material property (resistance or insulation value) - T is temperature

Heat Balance

Metbolic heat production is balanced by all mechanisms for heat exchange:

$$\Delta H_s = H_m \pm H_c \pm H_r \pm H_e$$

Where:

 $\Delta H_s = \text{heat of storage}$

 $\mathbf{H}_m = \text{heat of metabolism}$

 $H_c = \text{heat of conduction}$ and convection

 $\mathbf{H}_r = \mathrm{heat} \ \mathrm{of} \ \mathrm{radiation}$

 \mathbf{H}_e = heat of evaporation

If an animal is in heat balance, Tb (body temperature) is stable.

If ΔH_s is positive, (Gains > Losses), then Tb increases.

If ΔH_s is negative, (Gains < Losses), then Tb decreases.

Body Temperature

Q10

https://youtu.be/T5O9UvSZ_-g

Iterative Method

https://youtu.be/pEzcZCTYPyE

For Next Time

- 1. [HW2] due on Tuesday in class. (Individual)
- 2. Finish temperature, begin [Cardiac Function]
- 3. Start working on design 1 calculations with your partner. See me for help [Office hours]
- 4. Next Lab: [Human ECG]
- 5. Please fill out the TEAMMATES for both discussion week 3 and Lab 2 group lab by MONDAY. (check your email)