| **Lesson Plan for Grades: 9-12****Length of Lesson: 90 minutes** |
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| **Authored by:** UT Environmental Science Institute |
| **Subject area/course:*** Science
	+ Biology
	+ Anatomy and physiology
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| **Materials:*** Endocrine Disorder Worksheet and Exit Ticket (Print double sided, Worksheet on front, exit ticket on back)
* A computer
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| **TEKS/SEs:**Biology RULE §112.4212. Science concepts--biological structures, functions, and processes. The student knows that multicellular organisms are composed of multiple systems that interact to perform complex functions. The student is expected to: (A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals; and (B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures. |
| **Lesson objective(s):*** Students will be able to explain how hormones like insulin, estrogen, and testerone affect the body
* Students will be able to model how the endocrine system creates hormones and how other systems interact with thim
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| **Differentiation strategies to meet diverse learner needs:*** ELL students and students with learning disabilities should have multiple forms of instruction including visual and written instruction sheets, sentence stems as well as a verbal instruction and demonstration.
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| **ENGAGEMENT (5 minutes)*** Open up the The Power of Hormones! slides and have students discuss the “what do you know” questions in small groups
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| **EXPLORATION (25 minutes)*** Students will then be introduced to the organs and glands that make up the endocrine system alongside the hormones they produce through a short lecture and a video from the amoeba sisters
* Students will then play a game where they must work with their table groups to match hormones with the body systems they affect.
	+ Students will be given a short description of a hormone, its effects and the organ/gland that produces it.
	+ They will then spend 1 minute in their table groups deciding which body system(or 2 body systems) is/are most affected by the given hormone
		- Each group should have a small whiteboard to give their answers
	+ If a group answers with a body system not listed on the slide as one of the top 2, they may be asked to justify their answer.
	+ The hormones included, as well as there intended answers are
		- Gastrin: Muscular, Digestive, Endocrine
		- Insulin: Cardiovascular, Neurovous, Muscular, Digestive, Endocrine
		- Testosterone: Reproductive, Endocrine and Nervous. (Integumentary and muscular is also acceptable)
		- Adrenaline: Cardiovascular, Muscular, Nervous, Respiratory, Integumentary, Endocrine
		- HGH: Skeletal, Muscular, Nervous, Endocrine
	+ Student should then spend a few minutes discussing the question on slide 11
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| **EXPLANATION (30 minutes)*** The effects that hormonal birth control and menopause have on women due to the decrease in estrogen will be explored through slides 12-16 (the notes section of these slide provide suggested answers)
	+ On slide 13, students should discuss each question with their group for about 1 minute (per question) before the whole class answers
		- During this time, students should write their thoughts on their groups white board to share with class
	+ On slide 14. students will work together as a class to determine how the effects estrogen and progesterone have on the body during each stage of the menstrual cycle.
		- The answers are on the next two slides
	+ On slide 17, the teacher will host a class discussion on each of the questions.
		- During this time, students should write their thoughts on their groups white board to share with class
		- Points that should be discussed are listed in the presenter's notes of the slide
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| **ELABORATION (15-30 minutes)*** Pass out the Endocrine Disorder Worksheet(listed below) and split them into groups of 2-4
* Each group will be given one of the following endocrine disorders to research.
	+ Diabetes type 1&2( Disorder of insulin)
	+ Hypothyroidism(Overproduction of thyroid hormones)
	+ Cushing's syndrome(Cortisol disorder)
	+ Allergies (Both severe and minor) (Histamine overreaction)
	+ Hypogonadism (Low testosterone in males)
* The students are required to identify the following
	+ The hormone(or class of hormones) responsible for the illness
	+ The normal function of said hormones
	+ The symptoms of the illness
	+ The primary(top 3) body systems affected by the disorder
	+ The typical treatment(if any exists) for the illness
	+ How common the illness is
	+ The populations most affected
* Instructions for the activity are on slide 19
* If time allows, students will be asked to explain their chosen illness to a student from another group as an exit ticket(instructions on slide 20)
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| **EVALUATION (throughout entire lesson)*** The students will turn in the Endocrine disorder worksheet and an exit ticket(if time permits).
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| **SOURCES AND RESOURCES*** **Dr Sarah Hill *Hot Science – Cool Talks #132,* “This is Your Brain on Birth Control”**
* **https://my.clevelandclinic.org/health/body/21201-endocrine-system**
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Endocrine disorder worksheet

Name:

Name of group members:

Chosen Illness:

Which hormone or hormones are responsible for the illness:

What's wrong with the affected hormones:

*For example: Is there too much hormone? Too little? Is the body responding to the hormone correctly?*

| Symptom(list at least 3) | Affected body system(s) |
| --- | --- |
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How are these systems affected?

How common is the illness?

What populations are most affected by this illness? Why?

*(ex: Does the illness affect one age group more than another? Is one sex more likely to have it than another?)*

What is the treatment for this illness? Is it curable?

Exit ticket

Name:

Partners name:

Which illness did your partner study?

Which hormone or hormones are responsible for the illness?

What are some symptoms of the illness?

What body systems are affected by these illnesses?

What populations are most affected by this illness?

How is your illness similar to your partners? How is it different?

Rubric

| Criteria | 4 | 3 | 2 | 1 | 0 |
| --- | --- | --- | --- | --- | --- |
| Participation | Student actively contributed to group work and group discussions | Student participated in group work and group discussions | Student sometimes participated in group work and group discussions | Student rarely participated in group work and group discussions | Students did not participate or turn in work. |
| Research Project  | Student gave detailed explanations to their answers that demonstrated an understanding of their chosen illness | Student gave gave complete and accurate explanations to their answers | Student gave incomplete or inaccurate explanations to their answers | Student did not explain any of their answers or demonstrate understanding of their illness |
| Exit ticket | Student presented a clear, concise and accurate comparison between their diseases  | Student presented a clear and accurate comparison between diseases  | Students comparison between diseases was unclear or inaccurate | Student did not complete the comparison between diseases or they did not  |