*Note anything unusual about Ellie's behavior or appearance?*

Behavior: Constantly stressed out, and by extension anxious.

Appearance: Unable to maintain a healthy weight, and large eyes.

*What do you think might be going on with Ellie that could cause her difficulties? Consider both physical and psychological causes.*

She's a college student who is under academic pressure to do well in her program, and to not lose the scholarship that is keeping her in school. The stress from this alone could cascade into an anxiety disorder, which could be what is causing her to not be able to maintain a healthy body fat percentage of between 20-30% (for females, according to the National Institute of Health).

*Where is the thyroid gland located?*

In the neck, anterior to and partially encompassing the esophagus.

*List the hormones secreted by the thyroid and describe their general actions.*

The primary hormones secreted by the thyroid gland are *thyroxine (T4)* and *triiodothyronine (T3)*. T3 mostly acts as a precursor to T4. These hormones serve a role in regulating metabolism and calcium levels within the bloodsteam

*Protrusion of the eyes is called exophthalmos. How is it related to thyroid dysfunction? What causes it?*

It is caused by excessive hormones building up in the tissues behind the eyes.

*What is the significance of the slight swelling in Ellie's neck?*

The significance of the swelling in Ellie's neck is that it is likely hypertrophy of the thyroid.

*Based on the information you have at this point, do you think Ellie's thyroid gland is hyperactive or hypoactive? Explain your answer.*

Hyperactive: Her thyroid has grown to an abnormally large size and is most likely secreting too much T3/T4 as a result.

*Dr. Simmons ordered blood tests to measure Ellie's levels of thyroid hormone and thyroid-stimulating hormone (TSH or thyrotropin). If Ellie has a hyperactive thyroid, what are the expected results? What are the anticipated results if she has a hypoactive thyroid?*

In the case of a hyperactive thyroid, I would expect low levels of TSH and high levels of T3/T4.

In the case of a hypoactive thyroid, I'd expect elevated TSH and decreased T3/T4.

*What is causing Ellie's thyroid to secrete too much hormone?*

Normally the amount of TSh that is reaching her thyroid would cause a proportionate production of T3/T4 in her blood stream. However, because of the hypertrophy of her thyroid, the amount of TSH that is reaching it is causing a larger response than would otherwise be caused under "normal" conditions.

*Is Ellie correct in thinking that TSH is a thyroid hormone? Why is her TSH level low instead of high?*

She is mistaken in assuming that TSH is a Thyroid hormone, as it is a hormone of the anterior pituitary gland.

*Ellie is a 20-year-old female. Do some research on the average age of onset and any gender differences in Graves' disease to see if Ellie's diagnosis is unusual.*

Ellie is about a decade younger than the average Grave's disease patient, though it is more common in females than in males. With the typical Grave's Disease patient being a female

between the ages of 30-50. Smoking/tobacco use is also listed as an underlying factor in Grave's disease. Which begs the question of whether she is a tobacco user and not telling anyone (this is factoring the prevalence of vaping amongst 18-25 year olds of Gen Z into the equation).

*How are beta-blockers like propranolol helpful as an initial treatment for Graves' disease? Do they have any effect in reducing thyroid hormone levels or do they counter the effects of the hormones?*

The beta blockers are analogous to tourniquet in that they help to mitigate the surface level issues (increased heart rate/anxiety), but do not address the underlying issues (thyroid hypertrophy)

*Works Cited*

https://pubmed.ncbi.nlm.nih.gov/8615340/#:~:text=Best%20body%20fat%20percentages%20averaged,strict%20application%20may%20be%20counterproductive.