Chapter 34 Lab  **Diagnosing Endocrine Disorders**

**Problem**  
Can you diagnose an endocrine disorder based on a patient's symptoms?

**Introduction**  
Glands in the endocrine system secrete chemical messengers called hormones. Feedback mechanisms regulate the amounts of hormones released. When the levels of hormones in the blood are normal, reactions in the body take place at a normal rate and homeostasis is maintained.

Sometimes, however, endocrine glands do not respond properly to feedback mechanisms. A gland might produce too much of a hormone, or it might produce too little. Or, a receptor might not respond to a hormone as expected. Either way, some reactions do not occur at a normal rate. As a result, a person may experience certain symptoms, which prompt a visit to a primary care doctor.

The doctor will ask the patient some questions and do a brief medical exam. If the doctor suspects an endocrine disorder, he or she will refer the patient to a specialist. A doctor who diagnoses and treats disorders of the endocrine system is an endocrinologist. In this lab, you will play the role of an endocrinologist. Based on a patient's symptoms, you will form a hypothesis about the cause and consider what should be done to confirm the diagnosis.

**Skills Focus**  
Analyze Data, Draw Conclusions, Relate Cause and Effect

**Pre-Lab Questions**

1. **Interpret Tables**  
When patients complain of fatigue they are usually referring to a lack of energy or motivation. Which conditions listed in the table have fatigue as a symptom?

2. **Apply Concepts**  
Why do doctors typically use blood tests to diagnose endocrine disorders?
3. **Infer** Why is it important for doctors to consider the age and sex of a patient when diagnosing a disorder?

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**Procedure**

You will use your knowledge of hormones and the table provided to diagnose the patients described in four case studies. Column 2 in the table lists common complaints that a patient might make. Column 3 lists the results of tests that a doctor could order to confirm or rule out an initial diagnosis. Most lab tests involve chemical analysis of blood or urine samples. If you do not recall the functions of any hormones mentioned in the table, look up this information in your textbook.

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Symptoms</th>
<th>Lab Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addison's Disease</td>
<td>Fatigue, muscle weakness, weight loss, increased pigment in the skin</td>
<td>High potassium and low sodium levels in blood; high ACTH level in blood, low cortisol level in blood</td>
</tr>
<tr>
<td>Cushing's Syndrome</td>
<td>Muscle weakness, backache, anxiety, depression, extra fat deposits on the back of the neck and upper back, irregular menstrual cycle in females</td>
<td>High levels of cortisol in blood</td>
</tr>
<tr>
<td>Diabetes Insipidus</td>
<td>Frequent urination, excessive thirst</td>
<td>No glucose in urine, normal glucose level in blood; low ADH level in blood</td>
</tr>
<tr>
<td>Hyperparathyroidism</td>
<td>Excessive thirst, weakened or broken bones, fatigue, nausea</td>
<td>High calcium levels in blood; high parathyroid hormone levels in blood</td>
</tr>
<tr>
<td>Hyperthyroidism</td>
<td>Nervousness, elevated body temperature, excessive sweating, rapid heart rate, weight loss, irregular menstrual cycle in females</td>
<td>High thyroxine level in blood, low TSH level in blood</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>Muscle weakness, fatigue, weight gain, depression, slow heart rate, low body temperature and intolerance of cold</td>
<td>Low thyroxine level in blood, high TSH level in blood</td>
</tr>
<tr>
<td>Type I Diabetes Mellitus</td>
<td>Frequent urination, excessive thirst, weight loss</td>
<td>Glucose present in urine, elevated blood glucose, islet cell antibody in blood</td>
</tr>
<tr>
<td>Type II Diabetes Mellitus</td>
<td>Frequent urination, excessive thirst</td>
<td>Glucose present in urine, elevated blood glucose, no islet cell antibodies in blood</td>
</tr>
</tbody>
</table>
Case Study 1
A 35-year-old woman complains of muscle weakness, anxiety, and depression. Which disorders listed in the table could account for these symptoms? What other symptoms might you look for or ask about to distinguish between these disorders?

Case Study 2
A 42-year-old man broke a bone in his arm. The doctor who set his arm was concerned that the man’s bones were unusually weak. The doctor sent the man to see an endocrinologist. The man also complained of fatigue and nausea. What disorder could this patient have? What could you do to confirm this diagnosis?

Case Study 3
A 33-year-old man complains of fatigue. He has lost weight, although he is not trying to lose weight. A routine blood test shows that his blood glucose level is normal, but he has a low level of sodium in the blood. What test would you order next, and why?

Case Study 4
Both hyperthyroidism and hypothyroidism can cause a goiter, a swelling of the thyroid gland. You notice that a patient has a swollen thyroid gland. Before you order any lab tests, you could make two measurements during a physical exam to help determine the cause of the goiter. What measurements could you make and why would they be helpful?
Analyze and Conclude

1. **Draw Conclusions**  Why is it important for a doctor to ask a patient questions in addition to doing a physical exam?

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2. **Relate Cause and Effect**  Why would a doctor expect to see low levels of TSH in the blood of a patient with hyperthyroidism?

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3. **Compare and Contrast**  How are Type I and Type II diabetes similar? How are they different?

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4. **Infer**  A patient is told not to eat or drink anything for 12 hours before having blood drawn to test the level of glucose. Why do you think it is necessary for the patient to fast before the test?

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5. **Relate Cause and Effect**  One indication of diabetes insipidus is a low level of ADH in the blood. ADH is the hormone that signals the body to retain water. How could a low level of ADH lead to frequent urination and excessive thirst?

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**Extend Your Inquiry**

Write your own case study of a patient with an endocrine disorder. Use the case studies in the lab as models. Give your description to a classmate who will try to diagnose the disorder.