The Peeing Pitcher: An Inquiry-Based, Laboratory Case Study of the Endocrine and Renal Systems

PART I Questions

1. Evaluate Charlie's condition and fill out the table below. ***NOTE:*** Leave space to add additional notes throughout the case study.

What I know (the facts)	What I need to know (the questions)

2. Based on what you know (without doing any research), which symptoms lead you to believe that Charlie may have a medical problem? Explain.

3. Using the internet, research Charlie's symptoms. Are there any that are indicative renal problems? Put a star by the symptoms in question #1.

4. List some renal problems (conditions) that Charlie may have. Then circle the one that is most likely.

PART II Questions

1. Add additional information to the table in Part I.

2. Charlie had a baseball head injury. What specific part/region of the brain is responsible for urination?

3. Why did Dr. Pearson ask about odd smelling breath?

4. Do you think Charlie has a disease that is inherited? Why or why not?

5. Imagine you were Dr. Pearson's scrubs. What tests might you order to help you diagnose Charlie? Explain your answer.

6. Based on Charlie's visit with Dr. Pearson, which disease(s) are now associated with his symptoms? Did your diagnosis change from Part 1?

PART III Data for blood and urine tests

Blood Hormone Level Results

Hormone	Fluorescence Intensity (Low, Medium, High)	Hormone Level (Low, Medium, High)
ADH Standard, Low Level		
ADH Standard, High Level		
Charlie's ADH Sample		
Insulin Standard, Low Level		
Insulin Standard, High Level		
Charlie's Insulin Level		

Glucose Test Results

Component	Color Change	Glucose Level (mg/dl)
Standard, Low Glucose		
Standard, High Glucose		
Charlie's Sample		

Specific Gravity Test Results

Component	Color Change	Specific Gravity
Standard, Low Specific Gravity		
Standard, High Specific Gravity		
Charlie's Sample		

PART IV

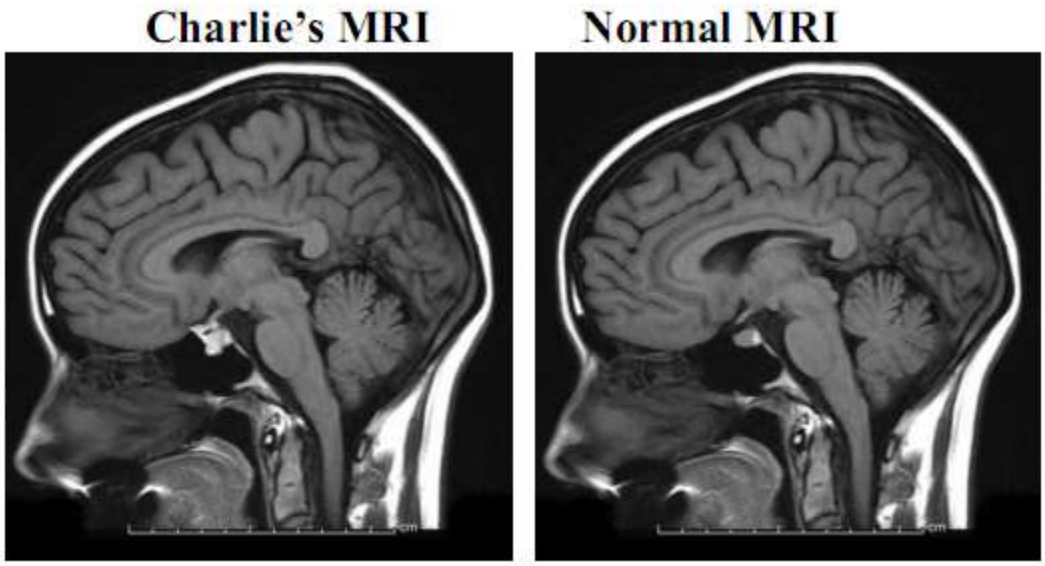
Blood Hormone Levels after Fasting

Component	Normal Values	Charlie's Test Results (High, Low, Normal)
*ADH	High	
*Insulin	Low	

Fluid Deprivation

Component	Normal Values	Charlie's results	Analyze Values (High, Low, Normal)
Urine Osmolarity	500-800	225	

Magnetic Resonance Image (MRI) Results:



Routine Urinalysis:

Component	Normal Values	Charlie's Test Results	Analyze Values (High, Low, Normal)
Color	Yellow	Yellow	
Appearance	Clear	Clear	
*Glucose mg/dl	70-100		
Bilirubin	0	0	
Ketone	0	0	
*Specific Gravity	1.010-1.035		
Blood	0	0	
pH	5.0-8.0	7.2	
Protein mg/dl	0-30	15	
Urobilinogen	0-17	0	
Nitrite	0	0	

Questions

1. What could be the cause of abnormal values revealed in Charlie's blood hormone test?

2. What is osmolarity? What is specific gravity?

3. Which 2 test components relate to osmolarity? How does osmolarity affect urine formation? What could be causing Charlie's abnormal urine osmolarity?

4. How does Charlie's MRI differ from the normal MRI? What body functions are controlled by the misshapen brain part shown in Charlie's MRI?

5. What results are helpful from the Routine Urinalysis? What disease(s) can you now eliminate?

6. What is your final diagnosis for Charlie? What disease does Charlie have?

PART V

1. Explain how the posterior pituitary gland relates to urine formation.

2. Explain how anti-diuretic hormone (ADH) works in normal function individual.

3. How do Charlie's low levels of ADH relate to his initial symptoms of extreme thirst and frequent urination?

4. How do the osmolarity and specific gravity tests relate to Charlie's they relate to his final diagnosis?

5. What are differences between Diabetes Insipidus and Diabetes Mellitus? How can we be sure Charlie does not have Diabetes Mellitus?

6. What lifestyle changes does Charlie need to make?

7. What would happen if Charlie was not diagnosed with Diabetes Insipidus? In other words, how dangerous is this disease if it goes untreated?

8. Describe possible treatments for Diabetes Insipidus. Include any pros and cons in the treatments.