**The Urinary System Lab**

**Urinalysis**

1. Read the purpose and Questions
2. Hypothesis: create an answer to the question with a reason
3. Read the [Background Information](https://drive.google.com/file/d/1S1Ryni47LAR4IVzWpnCXy2bwfAjSGYww/view?usp=share_link)
4. Complete the Background Chart using the reading (fill in blank cells only)

**Purpose:** The purpose of this lab is to complete a urinalysis to determine the health condition of mock patients.

**Question:** How can a urinalysis determine the health of a patient?

**Hypothesis** (5 points): A urinalysis can help to determine the health of a patient. For example: If a patient has protein it could mean that the patient is experiencing factors ranging from stress, temporary dehydration or kidney damage. Protein in your urine can indicate that factors like you may have long term high blood pressure, untreated diabetes, autoimmune disease or bacterial infection.

**Background Chart:**

*(complete using background information) (20 points)*

| **Test** | **Normal Range** | **Abnormal Range** | **Possible Condition** |
| --- | --- | --- | --- |
| **pH** | 4.5-7.5 | Below 4.5; above 7.5 | Bacterial Infection, Certain Dietary supplements |
| **Glucose** | None | Any | Diabetes |
| **Protein** | None | Any | Long term high blood pressure, untreated diabetes, autoimmune disease or bacterial infection. |
| **Blood** | None | Any | Liver, kidney damage, infection or damage in the urinary tract, a condition causing extensive red blood cell extension and kidney stones. |
| **Ketones** | Little or None | Large amount (sweet smell) | Fat metabolism, diabetics, strenuous exercise, pregnancy, starvation |
| **Calcium** | None | Any | Hyperparathyroidism, bone disorders or kidney disease, diet, large intake of vitamin D, dehydration |
| **Color** | yellow | Red, brown, green | Excessive fluid intake, a high level of vitamins, B vitamins, Blood in the urine, dehydration, bacterial infections, fever, illness, heavy metal poisoning, bile pigments, phenol |
| **Clarity** | clear | Cloudy | Bacterial infection, excessive levels of white blood cells, fats, proteins or other mineral salts. |
| **Odor** | none | Foul or sweet | Bacterial infection, ketones, diabetes, severe starvation |
| **Bilirubin** | None | Any | Excessive amount of red blood cells being broken down, cirrhosis, gallstones causing bile blockage, types of armenia, traumatic injury to the liver or gallbladder |
| **Nitrites** | None | Any | Urinary tract infection, food metabolism, certain bacteria can reduce the nitrates to nitrites in the bladder or urinary tract. |

**Other Notes:**

**Data and Evidence**

**Table 1. Qualitative Observations (10 points)**

| **Sample** | **Color & Clarity** | **Smell** |
| --- | --- | --- |
| **A** | Transparent, Yellow | No smell |
| **B** | Lighter yellow, transparent | No smell |
| **C** | “Neon” yellow, transparent, amber darker | No smell |
| **D** | Transparent yellow, some particulate | No smell |

**Table 2. Quantitative Observations**

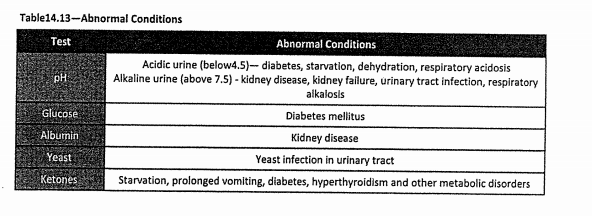
*-For pH- include the actual value*

*-For glucose, albumin, yeast, and calcium use negative or positive as data (30 points)*

| **Sample** | **pH** | **Glucose Test** | **ProteinTest** | **Calcium Test** |
| --- | --- | --- | --- | --- |
| **A** | 6 | negative | negative | negative |
| **B** | 5 | positive | negative | negative |
| **C** | 7 | negative | Positive | negative |
| **D** | 5 | negative | Negative | Positive |

What is your diagnosis and why?\* Read biographical info on next page 15 points

| **Sample** | **Diagnosis** | **Reasons** |
| --- | --- | --- |
| **A** | A is perfectly fine. | A tested negative for glucose, protein and calcium. For the pH it was at the number 6. |
| **B** | Diabetes | In B the urine sample tested negative for all except the glucose which is the most common diagnosis which would be diabetes. |
| **C** | Kidney Failure | In C the protein tested negative for the calcium test, glucose test and the pH had a number of 7. The protein can indicate that the diagnosis for the patient is kidney damage. |
| **D** | Hyperparathyroidism or Bone disorders | In D the calcium was positive while the rest were negative and the pH count was 5. If the calcium is positive it can indicate you have bone disease from being caused by diet or large intakes of Vitamin D. |

**Table 3. Biographical Information on Patients**

| **Patient A** | **Patient B** | **Patient C** | **Patient D** |
| --- | --- | --- | --- |
| 47-year old active female with a well-balanced diet. She enjoys sweets like chocolate and consumes 1-2 alcoholic beverages each week. Often tired, but this is job stress related. | Overweight 36-year old male. He has recently lost a significant amount of weight though he is constantly hungry and thirsty. He complains of feeling tired and runs down frequently. | 21-year old female with fever and nausea. She is a vegetarian. She has been having trouble keeping both food and liquids down. She is not pregnant, but the doctor suspects a bacterial infection. | 65-year old female being examined as part of a routine check up. She is not complaining of any symptoms and generally feels fine. |

**Analysis and Conclusion**

**Form a paragraph using the following outline and rubric (70 points)**

**\*For the analysis, choose patient B, C or D. Compare to A as needed. ONLY write about 1 patient**

| Paragraph Components | Prompt | Rubric (grading criteria) |
| --- | --- | --- |
| **Claim or Topic Statement** | How can a urinalysis be used to diagnose metabolic disorders and/or other conditions?  -includes a topic statement (purpose or prediction) and background information (hypothesis) | *A statement or conclusion*  *that answers the original*  *question/ problem.*  *10 points* |
| **Body statements** | | |
| **Intro: normal urine** | What should be in normal urine? How is urine made (brief)?  5 points per part | * *Sentences support the claim with specific scientific information from notes, discussions, textbook or references* * *Relevant (Directly & clearly* * *responds to question)* * *Accurate (Consistent with* * *evidence and scientific principles)* * *Complete (Complete sentence* * *that stands alone as a topic sentence.* * *Reasoning for hypothesis is supported with information from class that is relevant and accurate* |
| **Evidence: abnormal test results** | What tests did YOUR patient test "abnormal" for?  5 points |
| **Reasoning: explain data** | Explain how the evidence led to the diagnosis. What is happening to cause the test results?  20 points |
| **Extension: treatment & implications** | What is your treatment plan for the patient (non-prescription plan, no meds)? What will happen if the patient ignores your advice (implications)?  Helpful Websites:  [Try this website on kidney issues](https://www.niddk.nih.gov/health-information/kidney-disease/chronic-kidney-disease-ckd/eating-nutrition)  [Glucose in urine](https://www.medicalnewstoday.com/articles/326197#:~:text=Glycosuria%20is%20a%20condition%20in,diabetes%20and%20type%202%20diabetes.)  [Protein in urine](https://www.kidneyfund.org/all-about-kidneys/other-kidney-problems/protein-urine#:~:text=When%20your%20kidneys%20are%20not,that%20your%20kidneys%20are%20damaged.)  [Calcium in urine](https://www.mountsinai.org/health-library/tests/calcium-urine#:~:text=A%20high%20level%20of%20urine,may%20cause%20calcium%20kidney%20stones)  10 points per part |
| **Conclusion:** | *End with a conclusion related to the purpose of the lab (answer the question)*  *5 points* | ***Statement can stand alone as a claim without context and accurately answers the question stated at the start of the lab*** |

**\*For the analysis, choose patient B, C or D. Compare to A as needed.**

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Science 8th

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Urology Lab Analysis

In Patient B, he is an overweight male suffering from too much weight gain along with needing water and food more than a usual person and is very tired as his system runs down frequently. I believe that the user has eaten too much and is not creating enough insulin or the insulin has become ineffective. Without sustaining insulin the studies show that when the body is unable to control glucose levels the body starts a series of blood sugar spikes. The study of urology shows that having glucose in your urine is a disease known as diabetes. Urine is a liquid containing waste products that uses filtration to filtrate out the rest of the waste. Normal urine should have salt, urea, by products of-metabolism, amino acids and proteins, enzymes, pigments, carbohydrates, or medications. Patient B has clearly received too much glucose and sugar may have entered along with other substances to contribute to this diagnosis. The Patient mainly is experiencing increased thirst and urination, increased hunger, tiredness and unexplained weight loss which are symptoms that lead to diabetes. To prevent and heal the patient his treatment will consist of fresh fruits, vegetables, whole grains, and lean proteins doing regular exercise tracking blood sugar levels. Also he can understand how food, therapies, and activities can affect them in terms of health. If the patient however chooses not to follow my advice he will experience loss of consciousness, seizures, or will go into a coma. Urinalysis shows that if something is off putting or different in the urine it could be disease or health problem that people may need to look into.