The Complete Urinalysis

Points: Points are awarded for Admission Tickets, Skills, including general lab requirements, as well as successful and timely completion of Study Questions. The Skills portion of this exercise will be repeated for additional points.

Objectives: According to the standards set by the instructor, the student will:

1. perform complete routine urinalysis on five specimens within the following stated level of accuracy. To meet this objective, the student must:
   a. obtain dipstick results ± one color square of the instructor's results
   b. be able to identify RBCs, WBCs, squamous and renal epithelial cells as well as normal acid and alkaline crystals, mucous threads, bacteria and yeast at least 4 out of 5 times. At the instructor's discretion, microphotographs or electronic pictures may be used to aid in evaluation. In the evaluation of quantity, the student's results must match that of the instructor's ± reporting unit. (Using the quantitation of amorphous urates as and example, if the instructor reviews a representative area and determines the report value as 2+, the student's value can be as low as 1+ or as high as 3+ to be acceptable.)
2. bring to the instructor's attention any abnormal / unexpected results including dipstick results that are > 1 square above the negative or normal, and if the following microscopic structures are suspected: fatty, cellular, or waxy casts, abnormal crystalline structures, oval fat bodies, fat globules, trichomonas, etc.
3. use appropriate recording format to report results as established in previous UA labs.
4. use quality control results to determine the acceptability of test results.
5. answer all pre-test and study questions using related information found in the textbook, lecture guide, and this lab procedure and submit the results to the instructor by the due date.

Equipment:

1. Centrifuge
2. Microscope
3. AO TS Meter
4. Test tubes, racks, marking pencils, Kim-wipes
5. Color charts for Multistix, Acetest and Ictotest
6. Color pictures of urinary sediment

Supplies:

1. Five (5) urine specimens
2. Centrifuge tubes
3. Microscope slides and coverslips
4. Multistix 10 SG reagent strips
5. 3% sulfosalicylic acid
6. Acetest tablets
7. Ictotest tablets and absorbent pads

References: Same as for previous UA Lab Exercises.

Preparation:

1. Review of techniques from UA Lab Exercises 2 and 3.
   Students should review previous UA lab exercises, textbook and lecture materials when preparing Pre-Test and Study Question answers.
2. Review all materials within this lab.

Agenda:

1. Classroom discussion. Turn in lab pre-test.
2. Perform complete urinalysis on five (5) specimens including color, transparency, specific gravity by TS Meter or Multistix.
3. Centrifuge each specimen and perform a microscopic examination of the sediment.
4. Perform a minimum of 3 SSA, and one each Ictotest, Acetest, and Clinitest tablet backup tests.

Principles & Related info:

By definition, a complete urinalysis test would include the recording of:

Physical properties of: color and transparency / clarity;

Using the Chemstrip 7 urine dipstick, the following chemical (semi-quantitative) tests are: pH, glucose, ketones, leukocyte esterase, nitrite, protein, and blood. (the liver tests - bilirubin and urobilinogen as well as dipstick specific gravity are not on the Chemstrip 7 dipstick)

Microscopic evaluation for: red and white blood cells, casts, bacteria and other parasites such as yeast or trichomonas, epithelial cells, crystals and other microscopic structures of interest.

Recording of the urine specific gravity is also part of the routine UA. This may be done either by the refractometer, by harmonic oscillation densitometery or as part of the urine dipstick.

In performing the complete UA , it may be necessary to perform one or more of the 'back up' tests if / when warranted. As a student you will be asked perform the backup tests regularly to obtain competency. (Acetest for positive ketones; Ictotest for positive bilirubin, SSA for positive protein, and Clinitest for glucose and other reducing substances.) In the clinical world, the back-up tests are far more rarely done. Review the principles and other information on the backup tests in the Macroscopic Lab.

As a quality control measure, always correlate microscopic results with physical and chemical properties. For example, a pink, cloudy sample with positive blood should demonstrate the presence of RBCs.

Correlating results:

When the microscopic is performed, its results should be correlated with the findings of the physical /chemical testing results.

Example correlations between physical/chemical analysis and microscopic:

1. Urine that is red in color - hazy to cloudy - has positive blood should demonstrate the presence of RBCs under the microscope.
2. Urine that is hazy to cloudy - has positive protein, leukocytes and nitrite should be carefully examined for WBC and bacteria.
3. Increased turbidity in a refrigerated urine sample often means the presence of crystals.

More information on correlation of physical / chemical results with expected microscopic analysis can be found in your course textbook. Additionally information on urinary casts and crystals is available there.

Trouble - shooting discrepancies

There are many possible reasons that a specimen's physical / chemical characteristics do not correlate with the microscopic results. Among the first thing to be considered is a mix-up in samples where the microscopic was not performed on the same sample as the physical and/or chemical analysis. Another possibility to consider is a deterioration in the sample. This is most commonly seen when there is a significant lag period between the different phases of testing or if the sample is very alkaline. Regardless of the reason, the best course of action is to recollect the sample and repeat the testing ASAP.

Procedure:

This lab is the combined activities of UA Lab Exercises Macroscopic and Microscopic.
Please refer to the materials of those lab sessions.

Results:

Routine urinalysis is done for a number of reasons:

1. Screen for asymptomatic, congenital, and inherited diseases such as diabetes mellitus, galactosemia, renal and liver disease.
2. To aid in diagnosis of diseases such as urinary tract infections, diabetes, and types of jaundice.
3. To determine the progress of a disease and the effectiveness of treatment.

Name _____

Date _____

QC LAB REPORT FORM

/ 10 pts

Specimen # Name / ID		Control 1	Control 1 expected results	Control 2	Control 2 expected results	Comments: Within Range? **Yes or No** (If No, must bring to instructor's attention and add a comment - as to course of action.) **Whether yes or no, you must include your initials!**
Physical Properties:	Color					
	Transparency					
	SpGr - Refractometer					
Dipstick: Read all at 60 seconds. If leukocytes are positive, final reading is at 2 minutes.	pH					
	Glucose					
	Ketones					
	Leukocytes					
	Nitrite					
	Protein					
	Blood					
Microscopic (only if indicated by manufacturer and directed by instructor)						
Back-up Tests 3% sulfosalicylic acid						
	Acetest					
	Ictotest					
	Clinitest					
Refractometer QC	DI water	Control 1	Control 1 expected results	Control 2	Control 2 expected results	Comments: Within Range? (See info above)

Comments

Name_____ Date_____

1st COMPLETE URINALYSIS LAB REPORT FORM for Chemstrip 7

Students have the option of using their own urine specimen as their unknown # 5

Specimen # ID # Name		1	2	3	4	5 - your sample?
Physical Properties:	Color					
	Transparency					
	SG- refracto					
Dipstick: All results read at 60 seconds. If Leukocytes appear to be positive, final reading at 2 minutes.	pH					
	Glucose					
	Ketones					
	Leuk Esterase					
	Nitrite					
	Protein					
	Blood					
Microscopic:	Mucous					
	Casts					
	Epithelial cells					
	RBCs					
	WBCs					
	Crystals					
	Bacteria					
	Other					

Name_____ Date_____

2nd COMPLETE URINALYSIS LAB REPORT FORM

Students have the option of using their own urine specimen as their unknown # 5

Specimen # / ID # / Name		1	2	3	4	5 - your sample?
		_____ / _____	_____ / _____	_____ / _____	_____ / _____	_____ / _____
Physical Properties:	Color					
	Transparency					
	SG- refracto					
Dipstick: All results read at 60 seconds. If Leukocytes appear to be positive, final reading at 2 minutes.	pH					
	Glucose					
	Ketones					
	Leuk Esterase					
	Nitrite					
	Protein					
	Blood					
Microscopic:	Mucous					
	Casts					
	Epithelial cells					
	RBCs					
	WBCs					
	Crystals					
	Bacteria					
	Other					

Name_____

/ 30 pts.

Date_____

Study Questions

Unless otherwise stated, each question is worth one point. using lecture notes, reading assignments and information presented in this lab, answer the following questions.

1.A yellow - brown urine that produces a yellow foam when shaken can be suspected of containing what substance?

2.The technician refrigerates a yellow, clear freshly voided urine specimen. Several hours later she retrieves the sample for testing, but sees a white turbid sediment in the bottom of the cup. Upon testing, the sample is noted to have a pH of 7.5. Which of the following is the most likely reason for the turbid sediment?

A. Uroerythrin
B. Many WBCs
C. Few triple phosphate crystals
D. 3+ amorphous phosphate crystals
E. Pkd amorphous urate crystals

3.The urine sample has a specific gravity of 1.030. What *normal* color would you expect it to be?

4.Which of the following would NOT cause a false positive protein on the urine dipstick?

A. A highly buffered urine sample
B. Detection of proteins other than albumin
C Over-dipping or leaving the strip in the urine sample for too long
D. Contamination by quaternary ammonium compounds

5.What is the primary reagent in the dipstick region that tests for the ketones?

(2 points)

6.List the three (3) ketone bodies and indicate which one is NOT detected by either the dipstick nor the backup test.

7.Testing for ketones has been proven useful in the monitoring of what disease condition?

8.What two (2) dipstick tests provide the most information regarding an urinary tract infection (UTI)?

9.Complete the following: The dipstick reaction for bilirubin is based on the _____reaction.

10.What is indicated in a urine sample that demonstrates a positive glucose dipstick and a negative Clinitest result?

11.What is indicated in a urine sample that demonstrates a negative glucose dipstick and a positive Clinitest result?

12.Explain the expression “protein error of indicators.”

(6 pts)

13.The following terms are common or trivial names sometimes given to common urine crystals. For each one indicate the correct or reportable name and answer the associated question(s) by completing the table.

You must correctly complete all parts of the row for credit.

Trivial name	Reportable name	Normally found in acid or alkaline environment? (Circle one)	Nearly all crystals have been associated with the formation of kidney stones in some people. *Other than that,* is this crystal considered pathological? YES / NO (Circle one)
Brick dust		ACID / ALKALINE	YES / NO (Circle one)
Thorn apples		ACID / ALKALINE	YES / NO (Circle one)
Envelopes		ACID / ALKALINE	YES / NO (Circle one)
Coffin lids		ACID / ALKALINE	YES / NO (Circle one)
Dumbbells		ACID / ALKALINE	YES / NO (Circle one)
Notched plates		ACID / ALKALINE	YES / NO (Circle one)

14.What are oval fat bodies?

15.What is the significance of finding oval fat bodies?

(2 points)

16.Distinguish between hematuria and hemoglobinuria.

17.What gelatinous - like substance makes up casts?

18.What is the most frequently found cast?

(2 points)

19.RBC casts often have serious diagnostic implications. What two (2) minimum criteria should be met before calling a structure an RBC cast?

20.List three (3) crystals that are ***not*** normally found in the urine in any amount. (1 point each)

1.
2.
3.