

**MLAB 1211**  
**Body Fluids**  
**BF Cell Counts - preTest**

Instructor: Carolyn Ragland  
MLAB 1211  
Body Fluids  
pre-Test #1  
Spring  
No Extra Materials Needed

/10

Name \_\_\_\_\_  
Date \_\_\_\_\_

Instructions: Neatly write your answer in the space provided. Unless otherwise noted, each question is worth one point.

1. Which tube number is used for body fluid cell counts?
2. Complete the following table. (2 pts.)

	<b>Normal Color</b>	<b>Normal Clarity</b>
A. serous fluid		
B. CSF		

3. Define xanthochromia. (Be specific.)
4. What three body fluids are referred to as serous fluids? (3 pts.)
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
5. What is the diluent of choice for body fluid cell counts?
6. Using the information provided below, calculate the body fluid WBC & RBC cell counts. No dilution was made. **Show your work, and use correct units.** (2 pts)

WBC – The four large corner squares were used for the count.

Side 1 = 81  
Side 2 = 73

Reported results \_\_\_\_\_

RBC – All 25 small squares (of the center square) were used for the count.

Side 1 = 47  
Side 2 = 39

Reported results \_\_\_\_\_

## Body Fluids Lab 1 - Cell Counts

**Points:** Points are awarded for Pre-test, Skills, (including general points awarded for neatness, lab clean-up, teamwork, etc.) , as well as successful and timely completion of Study Questions.

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

1. Correctly classify color and transparency
2. Perform WBC and RBC cell counts on two body fluid specimens within  $\pm 20\%$  accuracy using the hemacytometer.

**Materials:**

1. Two body fluid specimens
2. Capillary pipets, and Kimwipes
3. Hemacytometer with coverslip
4. Lens cleaner, lens paper, and alcohol prep pads
5. Microscope
6. Cell Counter
7. Petri dish with cover and dampened cottonball

**References:** Harmening, D. M. Clinical Hematology and Fundamentals of Hemostasis. 3rd ed. F.A. Davis  
McBride, L.J. (1998). Textbook of Urinalysis and Body Fluids. Lippincott.  
Lecture and Laboratory Study Guides for MLAB 1315 - Hematology, and MLAB 1211 - Urinalysis / Body Fluids.

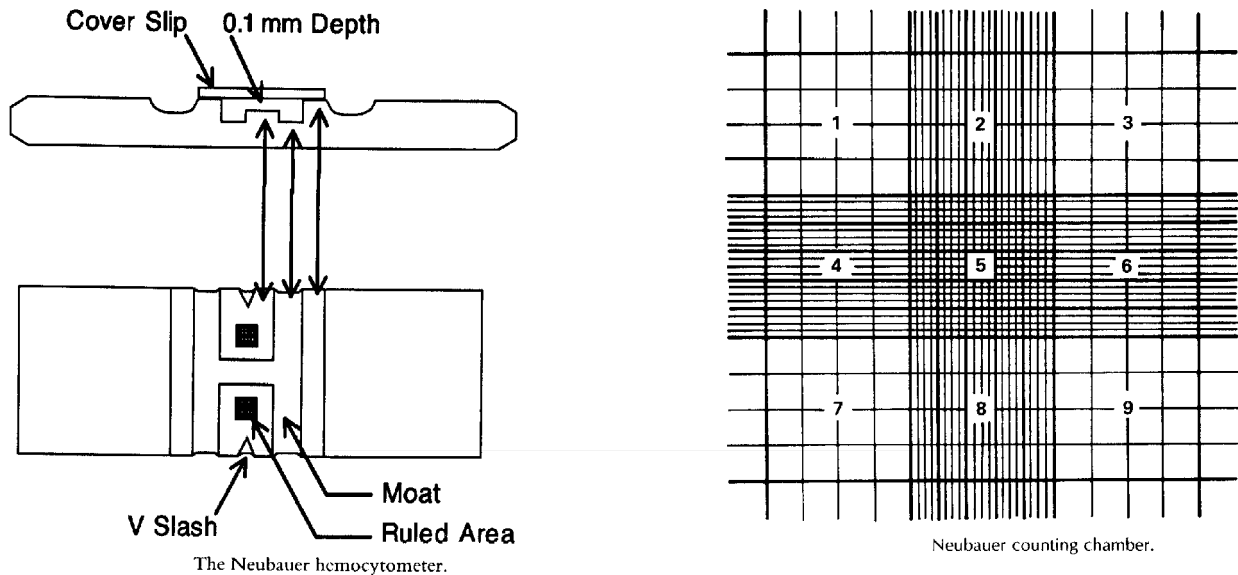
**Principle:** Body fluid specimens are usually collected in three sterile tubes and labeled 1, 2, and 3 in the order in which they are drawn. Tube 1 is used for chemical and serological tests. Tube 2 is used for microbiological tests. Tube 3 is used for cell counts and differentials. In rare cases, four tubes may be drawn in which case Tube 1 may not be used. All body fluid testing should be performed immediately upon specimen receipt as deterioration of specimen components can occur rather quickly.

The appearance of body fluids can provide valuable diagnostic information about a patient's condition. Both color and clarity must be recorded on the report form. Refer to your lecture study guide on how to report color and clarity.

WBC and RBC cell counts provide extremely important information for the diagnosis and treatment of diseases involving CSF, serous, and synovial cavities. Infections, hemorrhages, and malignancies are of primary concern.

Most body fluids specimens do not need to be diluted prior to plating on the hemacytometer since they normally do not contain many, if any, cells. Should a dilution be necessary due to a high cell count, *normal saline* is the diluent of choice. See listed

references for additional directions on use of the hemacytometer and performance of cell counts.



Basic formula for calculation of manual cell counts

$$\frac{\text{ave. \# cells counted} \times \text{dilution}}{\text{\# squares counted} \times \text{volume of each square}}$$

- Procedure:
1. Thoroughly mix body fluid specimen.
  2. Record color and clarity.
  3. Clean hemacytometer and coverslip and prepare for plating. When finished with your count be sure and clean the hemacytometer with alcohol.
  4. Using capillary pipet, carefully draw body fluid specimen up into the pipet until approximately 3/4 full. Hold fingertip on the end of the pipet so fluid doesn't run back out.
  5. To plate the fluid onto the hemacytometer, touch the end of the filled capillary pipet to the "V Slash" area on the hemacytometer beneath the coverslip. (Release fingertip from the end of the pipet.) Due to capillary action, fluid will flow from the pipet onto the hemacytometer. Be sure there are no bubbles and that the hemacytometer is neither under-filled nor over-filled.
  6. Place hemacytometer in a covered petri dish along with a dampened cotton ball. This will keep the dish humid and avoid drying of the specimen.

7. Let set for five (5) minutes for all of the cells to settle onto one plane in the fluid.
8. Remove hemacytometer from the petri dish and carefully wipe any moisture from the bottom of the chamber.
9. Place on the microscope stage and focus initially on 10X. The background light in the field should be kept relatively low, as the cells will stand out better. Too bright of light will make the cells difficult to see.
10. For our specimens today we will probably use all nine (9) large squares – the entire grid – for our cell counts. Locate the upper left square.
11. Carefully switch the objective of the microscope to 40X and begin your count. You may or may not be able to count WBC and RBC simultaneously. Remember, there is no set squares to use for body fluid cell counts. You must decide based on the number of cells that appear to be present. For instance, if there are very few cells, count the entire hemacytometer. If the fluid is loaded with cells, you may only want to count the one center square. Then calculate your result accordingly.
12. As you move from square to square you must *continuously* but gently focus up and down using the fine adjustment knob on the microscope. This will allow you to see the details of each cell to judge whether it is an RBC, WBC, or junk.
  - a. **RBC** – will have a smooth, shiny surface, will be highly refractile, and may have a yellowish or reddish tinge to it. It may be a round shape or may be crenated (spiky) but its surface will still be smooth and shiny.
  - b. **WBC** – will have a rough or grainy surface, will not be very refractile, and may have more of a grayish or bluish tinge to it. Its shape is generally round, but may have rougher or more irregular outer edges.
  - c. **Junk** – is usually very refractile and has indistinct shapes and sizes.
13. After finishing the count on one side of the hemacytometer, check to make sure your specimen is not drying up under the coverslip. If it is, replate it. Otherwise count the cells on the other side of the hemacytometer. If your two sides are in close enough agreement, use the basic hemacytometer formula for calculating your WBC and RBC count.
14. Results are reported out in whole numbers per  $\mu\text{L}$ . For example: 21 WBC/ $\mu\text{L}$ ; 17 RBC/ $\mu\text{L}$

Name \_\_\_\_\_

Date \_\_\_\_\_

## Body Fluid Cell Counts

	Body Fluid #1	Body Fluid #2
Patient Name		
ID Number		
Type of Fluid		
Color		
Clarity		
WBC*		
RBC*		

\* Write the formula used to calculate the RBC & WBC counts. Show your calculations used to determine the WBC & RBC counts.

Name \_\_\_\_\_

Date \_\_\_\_\_

**Body Fluids Study Questions & Case Studies I**

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

7. Complete the following table.

Tube number	Lab Department to which it should go for analysis.
Tube 1	
Tube 2	
Tube 3	

8. True or False? CSF and other body fluids can be allowed to sit for up to four (4) hours before laboratory testing takes place. Briefly explain your answer.

9. Give the basic hemacytometer formula for calculating manual cell counts.

10. Using the following information, calculate the body fluid cell count. Report your result in the space provided using correct units. No dilution was used. (2 pts)

WBC: All 9 large squares were used for the count

Side 1 = 14 WBC

Side 2 = 20 WBC

RBC: 5 of the 25 small squares were used for the count

Side 1 = 33

Side 2 = 41

WBC = \_\_\_\_\_

RBC = \_\_\_\_\_

11. Complete the following table. (3pts)

Type of fluid	Normal color	Normal clarity
CSF		
serous		
synovial		

12. List five (5) reasons for performing a CSF analysis. (5 pts)

1.
2.
3.
4.
5.

13. Define xanthochromia.

14. State four (4) ways a traumatic tap can be distinguished from a cerebral hemorrhage in CSF analysis by stating the characteristic and whether it is seen in a traumatic tap or CNS hemorrhage. (2 pts)

Characteristic	Indicate which. Traumatic tap / seen in CNS hemorrhage?
1.	
2.	
3.	
4.	

15. List the CSF normal values for the following. Be sure to use correct units. (2 pts total)

- a. protein - \_\_\_\_\_
- b. glucose - \_\_\_\_\_
- c. WBC - \_\_\_\_\_
- d. RBC - \_\_\_\_\_

16. List the most common types of CSF infections seen in the following: (2 pts total)

- a. newborns - \_\_\_\_\_
- b. children - \_\_\_\_\_
- c. adults - \_\_\_\_\_
- d. immunocompromised patients - \_\_\_\_\_

## CASE STUDY (5 pts)

Relatives bring a 78 year old woman to the emergency room. The family reports that she is confused and disoriented for several hours. Patient temperature and other basic vital signs appear normal. No stiffness of neck seen. Spinal column pressure is within normal range and three tubes of CSF showing an even distribution of blood are sent to the lab. Test results are as follows:

Glucose	75 mg/dL	
Protein	165 mg/dL	
Gram Stain	No organisms seen.	
WBC Count	713 / $\mu$ L	
RBC Count	2600 / $\mu$ L	
Differential	Segs	70 %
	Lymphs	25 %
	Monos	4 %
	Eos	1 %
	Basos	----
	Others	Numerous erythrophages seen.

17. What is the most probable cause for the results in this patient? Give at least two (2) reasons for your conclusion.
18. Is there significance in the distribution of cells in the differential?
19. Explain the increase in the WBC count and protein level.
20. What CSF enzyme would be increased.
21. If the blood was unevenly distributed and no erythrophages were seen, what would your evaluation be?