

## BODY FLUID CASES

### Case Study #2

A 21-year-old male is seen in the emergency room with a cough, abdominal pain and chest pain. On physical examination, the physician detects the presence of ascites. She has blood drawn from the patient for a CBC with differential. She also performs a paracentesis and sends the body fluid to the laboratory for a cell count and differential.

1. What fluid type is obtained from the abdominal cavity?

Helen, a Clinical Laboratory Scientist, performs the testing on the serous fluid. She records the following:

Volume: 60.0 cc  
Color: yellow  
Turbidity: cloudy

Helen performs the cell count using a hemocytometer, and obtains a WBC count of 3,000/uL and a RBC count of <10,000/uL. Based on the turbidity, she prepares cytospin slides using a 1:5 dilution of the fluid using 0.9% saline. Helen scans the stained slides on the microscope.

2. What objective should be used to scan the entire cytospin slide? What is the magnification?

On scanning, Helen sees some unidentified cells. She performs a 100-cell differential and results obtained are:

PMN: 7%  
Lymphocyte: 40%  
Macrophage: 45%  
Mesothelial: 2%  
Unidentified: 6%

The unidentified cells are large, have a high N:C ratio and dark blue vacuolated cytoplasm. See Colorplate A. Helen sends the slide for a pathologist review. The pathologist wants to know as much information as possible to aid in his interpretation. Helen looks in the computer and notices chemistry tests have been added on to the original orders. Results obtained are:

	<u>Blood Chemistry Results</u>	<u>Fluid Chemistry Results</u>
Total protein	6.8 g/dL	4.4 g/dL
Lactate dehydrogenase	555 U/L	370 U/L

3. Calculate the following ratios for the pathologist:

- a. Fluid-to-serum total protein ratio
- b. Fluid-to-serum lactate dehydrogenase ratio

4. Why is it important for the physician to determine if a body fluid is a transudate or an exudate?
  
5. What results provided so far are **most helpful** in differentiating a transudate from an exudate?
  
6. Is the effusion in this 21-year-old man a transudate or an exudate? Justify your answer.
  
7. What two factors that control fluid formation could be compromised in this patient, resulting in a 60cc effusion?
  
8. Name four conditions that are known to cause this type of effusion.

While Helen is processing the serous fluid on the patient, her coworker Hank is processing the CBC with differential. The following results are obtained:

WBC:	9.2 K/uL
RBC:	4.50 M/uL
Hgb:	13.5 g/dL
Hct:	40.5 %
MCV:	90.0 fL
Platelets:	250 K/uL

The differential results are normal; however, Hank observes two abnormal cells while scanning the blood smear. He brings the patient's blood smear to the pathologist for review. The pathologist reviews the slide and notes the presence of large blue highly vacuolated cells similar to those cells Helen was seeing in the fluid. See Colorplate B. He suspects the patient has lymphoma, non-Hodgkin's type. He orders flow cytometry and cytogenetic studies to be performed on the peritoneal fluid, then calls the physician in the emergency room to alert him of the situation. Results obtained are:

Flow cytometry: An IgM kappa light chain population is detected that immunophenotypes for CD10, CD19, CD20, CD24

Cytogenetics: t(8;14)

9. Is the immunophenotyping consistent with the pathologist's suspicion of lymphoma? Based on the markers present and the appearance of the cells, what type is most likely? Why?

10. How do the cytogenetic results aid in a definitive diagnosis?

The next day, the oncologist performed a bone marrow biopsy. The bone marrow exam showed that normal precursor cells were adequate, but occasional aggregates of lymphoma cells were found.

11. Name the classic triad of blood findings commonly found in patients with acute leukemia at diagnosis and explain why this occurs. Why does this patient have normal CBC parameters even though lymphoma cells were found in his bone marrow?

A spinal tap was also performed, and the cerebrospinal fluid was sent to the lab. Helen performed the testing with results as follows:

Color: colorless	Leukocyte count: 4/uL
Turbidity: clear	Differential:
	Monocytes: 40%
	Lymphocytes: 60%
	Unidentified: 0%
	RBC count: 0/uL

12. Identify any abnormal results in the cerebrospinal fluid.

13. Of what value was the spinal tap and bone marrow biopsy in the treatment plan for this patient?

14. This lymphoma is similar to what acute leukemia? Include FAB in your answer.

15. Is it unusual that this patient's first presenting symptom was abdominal pain and the presence of ascites? Explain.

16. Cells seen in body fluids can be important clues to specific disease states, as shown in this case. Identify the disease state associated with the cells seen in the pleural fluid shown in Colorplate C.