A 22-year-old female schoolteacher entered the emergency room with a 2-day history of headache and fever. On the day of admission the woman failed to come to school. When the woman's mother went to her apartment, she found her daughter in bed, confused, and highly agitated. When the patient arrived in the emergency room, she was comatose. Petechiae were present on her trunk and arms. Laboratory data was as follows:

**CSF analysis**
- Color/turbidity: Colorless and slightly cloudy
- Protein: 220 mg/dL
- Glucose: 28 mg/dL
- WBC: 380 cells/mm³
- Differential: 93% polymorphonuclear cells; 7% lymphocytes
- Gram stain: Moderate WBC; many gram-negative diplococci

**Coagulation**
- Protime: 45 sec
- PTT: 120 sec
- Platelet count: 20 K/uL
- Fibrinogen: 10 mg/dL
- D-dimer: Positive
- Antithrombin: 30%

The same organism was isolated from both blood and CSF. Despite prompt initiation of therapy with penicillin, the patient expired.

1. Evaluate the coagulation studies.
2. What do you suspect has developed and explain why?
3. If a thrombin time had been performed along with the other coagulation tests, what result would be expected? Give two reasons for your answer.
4. Based on the laboratory data, what type of meningitis is indicated in this patient? Explain.
5. Based on the Gram stain and clinical presentation, what is the most likely organism responsible for this fulminant disease? Explain your choice.

6. What safety precaution should be followed when working with this organism in the laboratory, as prescribed by CDC?

7. How would you confirm the identification of the suspected etiologic agent?

8. Is susceptibility testing usually performed on this organism? Why or why not?

9. Correlate the clinical presentation with the laboratory findings of this patient.

10. What virulence factors could be responsible for this disease?

11. What is the most likely source of this organism? What should be done for the students in contact with this teacher?

12. What mechanism is currently utilized to decrease the incidence of disease caused by this organism in high risk populations such as college students? What is the major problem with this intervention?