Case Study 1:

Case Scenario:

A 22-year-old female presents to the clinic with complaints of fatigue, palpitations, and shortness of breath for the past 2 months. She reports heavy menstrual periods lasting 7-8 days. On examination, she appears pale, and her nails show signs of koilonychia (spoon-shaped nails). Her hemoglobin level is 8 g/dL (normal: 12-16 g/dL), mean corpuscular volume (MCV) is 70 fL (normal: 80-100 fL), and serum ferritin is 10 ng/mL (normal: 15-200 ng/mL). A peripheral blood smear reveals microcytic, hypochromic red blood cells.

Questions:

1. What is the most likely diagnosis in this patient?
2. Explain the role of ferritin and its significance in this case.
3. What dietary recommendations would you suggest to this patient to improve?

Case Study 2:

Case Scenario:

A 28-year-old pregnant woman, G2P1 (Gravida 2, Para 1), is in her second trimester and has an Rh-negative blood group. Her first child was Rh-positive, and she did not receive anti-D immunoglobulin after her first pregnancy. During her current pregnancy, a routine blood test shows that she has developed antibodies against the Rh antigen. The obstetrician suspects Rh incompatibility and explains the risk of hemolytic disease of the newborn (HDN).

Questions:

1. What is Rh incompatibility, and how does it affect the fetus in this case?
2. Why is the development of Rh antibodies a concern in subsequent pregnancies?
3. What is hemolytic disease of the newborn (HDN), and what are its possible complications?
4. How can Rh incompatibility be prevented in future pregnancies?

Case Study 3:

Case Scenario:

A 45-year-old male is admitted to the hospital for surgery and requires a blood transfusion. He is blood group A-positive and is mistakenly transfused with group B-positive blood. Shortly after the transfusion begins, he develops chills, fever, back pain, and dark-colored urine. The transfusion is immediately stopped, and the patient is treated for a suspected acute hemolytic transfusion reaction.

Questions:

1. What is the most likely cause of the patient's symptoms following the transfusion?
2. Explain the mechanism of an acute hemolytic transfusion reaction due to ABO blood group incompatibility.
3. What are the immediate steps to manage a patient with a suspected transfusion reaction?
4. Why does blood group mismatch lead to hemolysis in this case?
5. What laboratory tests would you perform to confirm the diagnosis of an acute hemolytic transfusion reaction?

Case Study 4:

Case Scenario:

A 10-year-old boy presents to the clinic with complaints of fatigue, recurrent infections, and easy bruising over the past few weeks. On examination, he has pale skin, swollen lymph nodes, and a mildly enlarged spleen. Blood tests reveal a white blood cell (WBC) count of 150,000/µL (normal: 4,000-11,000/µL), hemoglobin of 7 g/dL (normal: 12-16 g/dL), and a platelet count of 30,000/µL (normal: 150,000-400,000/µL). A bone marrow biopsy confirms the diagnosis of acute lymphoblastic leukemia (ALL).

Questions:

1. How does leukemia affect normal blood cell production?
2. What is the significance of the elevated WBC count in this case?
3. Describe the complications associated with acute lymphoblastic leukemia (ALL).

Case Study 5:

Case Scenario:

A 7-year-old boy is brought to the emergency department with prolonged bleeding after a minor cut on his knee. His parents report a history of frequent nosebleeds and bruising with minimal trauma. On examination, there is swelling around the knee joint with signs of joint bleeding (hemarthrosis). Laboratory investigations reveal a normal platelet count, but an extended activated partial thromboplastin time (aPTT). The boy's family history shows that his maternal uncle also had a similar condition. The doctor suspects hemophilia.

Questions:

1. What is the genetic inheritance pattern of hemophilia?
2. Explain why patients with hemophilia have prolonged aPTT but a normal platelet count.
3. What is hemarthrosis, and why is it common in patients with hemophilia?

Case Study 6:

Case Scenario:

A 60-year-old female presents with pain, swelling, and redness in her left calf that developed over the past few days. She has a history of prolonged immobilization following recent hip surgery. On examination, her left leg is swollen and tender, with a positive Homan's sign (pain on dorsiflexion of the foot). Doppler ultrasound confirms the presence of a deep vein thrombosis (DVT) in the left leg. Blood tests reveal an elevated D-dimer level.

Questions:

1. What are the common risk factors for developing DVT, particularly in this patient's case?
2. What complications can arise if a DVT is left untreated?
3. How is DVT managed, and what are the options for preventing future clotting events in high-risk individuals?