Blood & Lymphoreticular/Immune Systems

United States Medical Licensing Examination (USMLE) Step 1

5 to 10% of Step 2 CK · 9 sections · content outline and specifications

This system covers the blood and the immune system as a doctor in training meets them: anemias, bleeding and clotting problems, transfusion, leukemias, lymphomas and plasma cell disorders, immunodeficiency, allergy and anaphylaxis, and vaccines for people with weak immune systems. It is a mid-sized system on Step 2 CK. Most questions give a patient with a blood count, a smear or a pattern of infections. You decide the most likely diagnosis, the best next test, the first treatment or the safest next step. Learn each disorder as a short chain: who gets it, the test that proves it, the treatment that comes first, and the danger to prevent.

You should be able to: After this guide, a learner should be able to name the likely blood or immune disorder from a short vignette and choose the best next test, the first treatment and the key prevention step, including safe transfusion and vaccination of immunocompromised patients.

Every section: the key point and the trap

1 Microcytic anemia: iron deficiency and its look-alikes

Start every anemia with the MCV and the reticulocyte count; a low MCV means a problem making hemoglobin.

Trap: Treating iron deficiency in an older adult with iron alone and never looking for the bleeding source, which may be colon cancer.

2 Macrocytic and nutritional anemias

B12 deficiency and folate deficiency both cause a high MCV and hypersegmented neutrophils.

Trap: Calling a macrocytic anemia with nerve signs folate deficiency because the patient drinks alcohol, and missing B12 deficiency.

3 Hemolytic anemia and sickle cell disease

Hemolysis: high reticulocytes, high LDH, high indirect bilirubin and low haptoglobin.

Trap: Sending home a febrile child with sickle cell disease on oral antibiotics because the child looks well.

4 Platelet disorders and thrombotic microangiopathy

Isolated thrombocytopenia in a well child after a viral illness is ITP; observe if bleeding is absent or only in the skin.

Trap: Switching from unfractionated heparin to enoxaparin in HIT, or starting warfarin alone before platelets recover.

5 Bleeding and clotting factor disorders, and anticoagulants

Mucosal bleeding (nose, gums, heavy periods) points to a platelet-type problem; joint and muscle bleeding points to a factor deficiency.

Trap: Giving fresh frozen plasma or oral vitamin K first for a warfarin brain bleed, when prothrombin complex concentrate works faster.

6 Transfusion medicine

In stable hospital patients, transfuse red cells at a hemoglobin below 7 g/dL (below 8 g/dL with heart disease or major surgery).

Trap: Mixing up TRALI and TACO: high blood pressure, full neck veins and a response to diuretics point to TACO.

7 Leukemias, lymphomas and plasma cell disorders

Acute leukemia: blasts on the smear and low counts of other cells; confirm with bone marrow and flow cytometry.

Trap: Ordering a technetium bone scan for suspected myeloma; myeloma lesions often do not show on it.

8 Immunodeficiency and vaccines for the immunocompromised

Repeated sinus, ear and lung infections with encapsulated bacteria suggest an antibody defect; start with IgG, IgA and IgM levels and vaccine titers.

Trap: Giving a live vaccine to a patient on high-dose glucocorticoids, chemotherapy or a biologic drug.

9 Allergy and anaphylaxis

Anaphylaxis: sudden skin or mucosal signs with breathing problems, low blood pressure or gut symptoms after an exposure.

Trap: Choosing intravenous diphenhydramine or a glucocorticoid as the first drug in anaphylaxis; epinephrine always comes first.

Key terms

Reticulocyte: A young red cell; a high count means the marrow is replacing lost or destroyed cells.

Haptoglobin: A blood protein that binds free hemoglobin; it falls in hemolysis.

Schistocyte: A broken red cell fragment seen when small vessels are blocked by clots.

Thrombotic microangiopathy: Clots in small vessels that break red cells and use up platelets.

Flow cytometry: A test that reads markers on single cells to show their type and whether they come from one clone.

Monoclonal protein: A single type of antibody made in large amounts by one clone of plasma cells.

Live attenuated vaccine: A vaccine made from a weakened germ that can still multiply in the body.

Biphasic anaphylaxis: A second wave of anaphylaxis hours after the first has settled.

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