Name of Block	Block 1
Name of Elective	Pancytopenia Evaluation
Location of hospital Lab or research facility	Clinical Pathology Laboratory, Department of Pathology
Name of internal preceptor(s)	Dr. Sumit Grover
Name of external preceptor (if applicable)	-
Learning objectives of elective	1. 1. To enumerate causes of and understand pathogenesis of pancytopenia 2. To discuss peripheral blood and bone marrow findings in pancytopenia 3. To understand indications and procedure of bone marrow aspiration 4. To observe and assist bone marrow aspiration 5. To learn to stain and perform staining of bone marrow aspiration slides 6. To find out cause of pancytopenia looking at bone marrow aspiration smears 7. To correlate findings with flowcytometry wherever applicable
Number of students that can be accommodated in this elective	4
Prerequisites for elective	Universal precautions and Good laboratory practice Knowledge of basics of pancytopenia and bone marrow examination
Learning resources for students	1. Robbins and Cotran Pathological basis of disease, Tenth edition 2. Bone Marrow Pathology, Fourth Edition Barbara. J. Bain, D. M. Clark andB. S. Wilkins
List of activities of student participation	1. Obtain history for patients directly or from HIS whose blood samples show pancytopenia on hemogram 2. Understand the SOP for bone marrow aspiration procedure and staining 3. Assist and perform bone marrow aspirations 4. Assist and stain bone marrow aspiration smears 5. To learn to examine a bone marrow aspiration slide 7. To learn to interpret a flowcytometry histogram 8. Work with supervisor in making observations, collect data and documents as per protocol 9. Document details in excel worksheet 10. Write report of work done 11. Assessment
Portfolio entries required	1. No of cases worked up. 2. Summary of the results of the entire one month data analysis 3. Steps of procedure of the tests observed and performed during elective period
Log book entry required	Completion of posting signed by preceptor with a “meets expectation ‘(M)’ grade”
Assessment	**Formative:** **1)** Attendance (minimum 75%) **2)** Day-to-day participation in laboratory activity **3)** No of cases satisfactorily worked up **4)** Completion of objectives of elective posting topic
Other comments	-

Logbook-cum-Portfolio

Elective Module: Pancytopenia evaluation

Pancytopenia refers to decreases in all peripheral blood lineages.

●Red blood cells – Hemoglobin <12 g/dL for non-pregnant women and <13 g/dL for men

●White blood cells – low white blood cells (leukopenia) manifest as neutropenia, Absolute neutrophil count (ANC) <1800/microL

●Platelets – Platelet count <150,000/microL

Hematopoiesis (blood cell production) in the healthy adult takes place in the bone marrow. A balance between blood cell production, distribution in other organs, and ongoing cellular destruction (eg, white blood cells fighting infections, platelet consumption in blood clots, cellular senescence) determines the levels of circulating blood cells.

Causes of pancytopenia

●Bone marrow infiltration/replacement – hematologic malignancies (eg, leukemia, lymphoma, multiple myeloma, myelodysplastic syndromes), metastatic cancer, myelofibrosis, and infectious diseases (eg, miliary tuberculosis, fungal infections).

●Bone marrow aplasia – Nutritional disorders (eg, deficiencies of vitamin B12 or folate), aplastic anemia, infectious diseases (eg, HIV, viral hepatitis, parvovirus B19), immune destruction, and medications

●Blood cell destruction or sequestration – disseminated intravascular coagulation, thrombotic thrombocytopenia purpura, and ineffective hematopoiesis (eg, myelodysplastic syndromes, megaloblastic disorders), while excessive sequestration may be due to hypersplenism (eg, from liver cirrhosis, storage diseases, lymphoma, or autoimmune disorders).

Thus evaluation of pancytopenia requires a multipronged approach of which Bone Marrow examination plays a very important role.

Hence in this elective module, students will observe and assist in procedure of Bone marrow aspiration and staining of Bone marrow smear slides. They will learn to examine a bone marrow smear and diagnose the marrow related causes of Pancytopenia.