UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Hematology

2425-3-H4102D058-H4102D075M

Aims

At the end of the Clerkship the student has the knowledge to recognize and interpret the main diseases of the blood and lymphatic system.
In particular, the student is able to interpret the signs, symptoms and laboratory data that characterize:

- Myelopoiesis and the bone marrow niche
- Acute myeloid and lymphoid leukemias
- Myelodysplastic syndromes
- Chronic myeloid leukemia
- Chronic myeloproliferative neoplasms: Polycythemia Vera, Essential Thrombocythemia and Primary Myelofibrosis
- Indolent Non-Hodgkin lymphomas
- Aggressive Non-Hodgkin lymphomas
- Hodgkin Lymphoma
- Chronic lymphocytic leukemia
- Multiple Myeloma
- Monoclonal Gammopathies of Undetermined Significance (MGUS)
- Aplastic anemia and nocturnal paroxysmal hemoglobinuria (EPN)
- Anemia: general aspects
- Hemolytic anemias and other red blood cell disorders
- Hemoglobinopathies
- Idiopathic thrombocytopenic purpura (ITP)
- Thrombotic thrombocytopenic purpura (TTP)
- Disseminated intravascular coagulation (DIC)
- Thromboembolic disorders
- Congenital hemorrhagic disorders
- Basis of Transfusion Medicine
  Furthermore, the student has the knowledge to describe the main therapeutic treatments of the diseases described above, with particular attention to the methods of use of:

- autologous hematopoietic stem cell transplantation
- allogeneic transplantation of hematopoietic stem cells
- new immunotherapies (including CAR-T)
  The student is able to describe the principles of the morphological and molecular diagnostics of the hematological diseases and the basis of the Transfusion Medicine.

Contents

HEMATOLOGY I

1. Clinical approach to the ambulatory patient presenting with hemorrhagic symptoms
2. Clinical approach to the ambulatory patient presenting with thrombotic symptoms
3. Indication to anticoagulant treatment and management of the outpatient anticoagulation clinics
4. Laboratory diagnosis of coagulation disorders
5. Aphaeretic therapies
6. Clinical approach and treatment of thrombotic thrombocytopenic purpura (TTP)
7. Stem cell donors' evaluation
8. Autologous and allogeneic stem cell collection
9. Plasma donor evaluation and plasma donation
10. Blood transfusion therapy and principles of immunohematology
11. Clinical approach to hemoglobinopathies
12. Clinical approach and treatment of iron deficiency anemia
13. Clinical approach and treatment of iron overload
14. Therapeutic phlebotomy

HEMATOLOGY II

1. Introduction to hematopoiesis
2. Clinical and laboratory approach to Acute Leukemias
3. Clinical and laboratory approach to Myelodysplastic Syndromes
4. Clinical and laboratory approach to Chronic Myelogenous Leukemia
5. Clinical and laboratory approach to Polycythemia Vera, Essential Thrombocythemia, Myelofibrosis
6. Clinical, laboratory and radiology approach to indolent Non-Hodgkin Lymphomas
7. Clinical, laboratory and radiology approach to aggressive Non-Hodgkin Lymphomas
8. Clinical, laboratory and radiology approach to Hodgkin Lymphoma
9. Clinical, laboratory and radiology approach to Multiple Myeloma and AL amyloidosis
10. Clinical, laboratory, cardiology-nephrology-neurology approach to AL amyloidosis
11. Clinical, laboratory, cardiology-nephrology-neurology approach to Monoclonal gammopathies of Undetermined Significance (MGUS) and of Clinical Significance (MGCS)
12. Clinical and laboratory approach to aplastic anemia and nocturnal paroxysmal hemoglobinuria
13. Clinical approach to Autologous Hematopoietic stem cell transplantation
14. Clinical approach to Allogeneic hematopoietic stem cell transplantation
15. Clinical approach to New Immunotherapies (including CAR-T cells)
16. Clinical and laboratory approach to Immune Thrombocytopenic Purpura (ITP)
17. Approach to the morphologic diagnosis of hematologic diseases with principles of flow cytometry
18. Approach to the molecular diagnosis of hematologic diseases

Detailed program

HEMATOLOGY I

1. Clinical approach to the ambulatory patient presenting with hemorrhagic symptoms: Clinical evaluation (history, family history, bleeding assessment tools (BATs), physical examination); Laboratory evaluation (first line investigations: screening tests, second line investigations: confirmatory test, third line investigations: genetic workup) (*Thrombosis and Haemostasis Outpatient Clinics*)
2. Clinical approach to the ambulatory patient presenting with thrombotic symptoms: diagnosis of pulmonary embolism and superficial and deep vein thrombosis; thrombophilia testing; idiopathic vs secondary venous thromboembolism; cancer-associated thrombosis (*Thrombosis and Haemostasis Outpatient Clinics*)
3. Indication to anticoagulant treatment and management of the outpatient anticoagulation clinics: parenteral and oral anticoagulant agents; main indications and duration of anticoagulant treatment; management of patients on treatment with vitamin k antagonists and direct oral anticoagulants (*Thrombosis and Haemostasis Outpatient Clinics and Anticoagulant Center in the Carisma Clinics*)
4. Laboratory diagnosis of coagulation disorders: global coagulation tests, platelet functional tests, laboratory diagnosis of the principal primary and secondary hemostasis disorders. (*Thrombosis and Haemostasis Outpatient Clinics*)
5. Aphaeretic therapies: therapeutic plasma exchange; granulocyte apheresis; principal indications for aphaeretic therapies; management of adverse events. (*Apheresis Clinics*)
6. Clinical approach and treatment of thrombotic thrombocytopenic purpura (TTP): clinical and laboratory diagnosis of TTP; therapeutic approach; long term follow-up. (*Apheresis Clinics*)
7. Stem cell donors' evaluation: familial and unrelated stem cell donor evaluation and donation workup; long term monitoring of stem cell donor. Plasma donor evaluation and donation workup. (*Apheresis Clinics*)
8. Autologous and allogeneic stem collection: productive leukapheresis. (*Apheresis Clinics*)
9. Plasma donor evaluation and plasma donation: productive plasmapheresis. (*Apheresis and Transfusion Clinics, on Wednesday*)
10. Blood transfusion therapy and principles of immunohematology: thresholds for red blood cells and platelets transfusion; in-line filtration, irradiation, washing of hemocomponents; characteristics and management of transfusion reactions; identification of blood groups, compatibility testing and alloantibodies identification. (*Transfusion Outpatient Clinics*)
11. Clinical approach to hemoglobinopathies: diagnosis and treatment of thalassemia and sickle cell disease. (*Transfusion Outpatient Clinics*)
12. Clinical approach and treatment of iron deficiency anemia: diagnosis of iron deficiency anemia, oral and intravenous iron treatment, long term follow up. (*Transfusion Outpatient Clinics*)
13. Clinical approach and treatment of iron overload: diagnosis and treatment of hereditary hemochromatosis. (*Apheresis and Transfusion Clinics*)
14. Therapeutic phlebotomy: treatment of primary and secondary iron overload conditions; therapeutic phlebotomy in Polycythemia Vera patients. (*Apheresis and Transfusion Clinics*)

HEMATOLOGY II

1. Clinical approach to the ambulatory patient presenting with whole blood count abnormalities: Clinical evaluation (history, family history, physical examination); Laboratory evaluation (first line investigations: peripheral blood sampling for morphology; bone marrow sampling for morphology, immunophenotype and karyotype; second line investigations: peripheral blood sampling for molecular analysis) (*Hematology Outpatient Clinic*)
2. According to the results of point 1: clinical approach and treatment of Chronic Myelogenous Leukemia, Chronic Lymphocytic Leukemia, Polycythemia Vera, Essential Thrombocythemia, Myelofibrosis, Myelodysplastic Syndromes, Immune Thrombocytopenic Purpura and Nocturnal Paroxysmal Hemoglobinuria (*Specialized Hematology Outpatient Clinics*)
3. According to the results of point 1: clinical approach and treatment of Acute Leukemias and Aplastic Anemia (*Hematology Wards for Inpatients*)
4. Clinical approach to the ambulatory patient presenting with lympho-hepato- and/or splenomegaly: Clinical evaluation (history, family history, physical examination); request for a lymph node biopsy or excision or, less frequently, liver or spleen biopsy, for the anatomo-pathology analysis and diagnosis (*Hematology Outpatient Clinic*)

5. According to the results of point 4: clinical approach, laboratory and radiological staging and treatment of indolent Non-Hodgkin Lymphomas, aggressive Non-Hodgkin Lymphomas, Hodgkin Lymphoma (Specialized Hematology Outpatient Clinics). In some cases, the patient is hospitalized for treatment (*Hematology Wards for Inpatients*)
6. Clinical approach to the ambulatory patient presenting with a monoclonal component in blood and/or urine: Clinical evaluation (history, family history, physical examination); Laboratory evaluation (first line investigations: peripheral blood sampling for morphology; bone marrow sampling for morphology, immunophenotype and karyotype on selected plasma cells, bone marrow biopsy; second line investigations: fat aspirate), skeletal survey (*Hematology Outpatient Clinic*)
7. According to the results of point 6: clinical approach, cardiology evaluation (in some cases, nephrology and/or neurology or other specialistic evaluations are also necessary) and treatment of Multiple Myeloma, AL amyloidosis, MGCS. (*Specialized Hematology Outpatient Clinics*)
8. According to the results of point 6: clinical approach and follow-up of MGUS. (*Specialized Hematology Outpatient Clinics*)
9. Clinical approach and treatment of patients undergoing Autologous Hematopoietic Stem Cell Transplantation (*Hematology Wards for Inpatients*)
10. Clinical approach and treatment of patients undergoing Allogeneic Hematopoietic Stem Cell Transplantation (*Hematology Wards for Inpatients*)
11. Clinical approach and treatment of patients suffering from Graft-Versus-Host Disease following Allogeneic Hematopoietic Stem Cell Transplantation (*Hematology Wards for Inpatients*)
12. Clinical approach and treatment of patients undergoing new Immunotherapies (including CAR-T cells, bispecific antibodies) (Hematology Wards for Inpatients, followed by Specialized Hematology Outpatient Clinics)
13. Approach to the laboratory diagnosis of hematologic diseases by morphology, flow cytometry and molecular tests (“Paolo Belli” Ultraspecialized Laboratory)
14.

Prerequisites

Basic Clinical Skills course

Teaching form

Practical guided observation activities with briefings and debriefings by hospital tutors.
Students will be divided into groups to be able to attend the outpatients’ clinics with tutors in a 1:1 ratio.
The student will attend the department of Immunohematology and Transfusion Medicine for a total of 20-25 hours. The student will support the doctor/tutor in the apheresis, transfusion medicine, hemostasis and thrombosis outpatient clinics at the hospital headquarters and the Anticoagulant Center in the Carisma Clinic, in via Monte Gleno, 49 Bergamo.
The student will attend the department of Hematology for a total of 2025 hours. The student will support the doctor/tutor in the different Outpatient Clinics, in the Wards for inpatients and in the Ultraspecialized Laboratory at the hospital headquarters.
The student will be able to complete the guided observation part with briefing and debriefing by the hospital tutors. The remaining hours will be of individual study of the topics covered in the internship.

Textbook and teaching resource

TO BE DEFINED

Semester

SECOND TERM

Assessment method

Practical skills observation and rating scale assessment
The student will have to follow the internship according to the scheduled calendar and timetable. The tutor will certify that attendance has taken place.
Internship attendance in each department of Clerkship 5 will allow the student to achieve the completion of the planned activity.

Office hours

APPOINTMENT BY EMAIL

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY