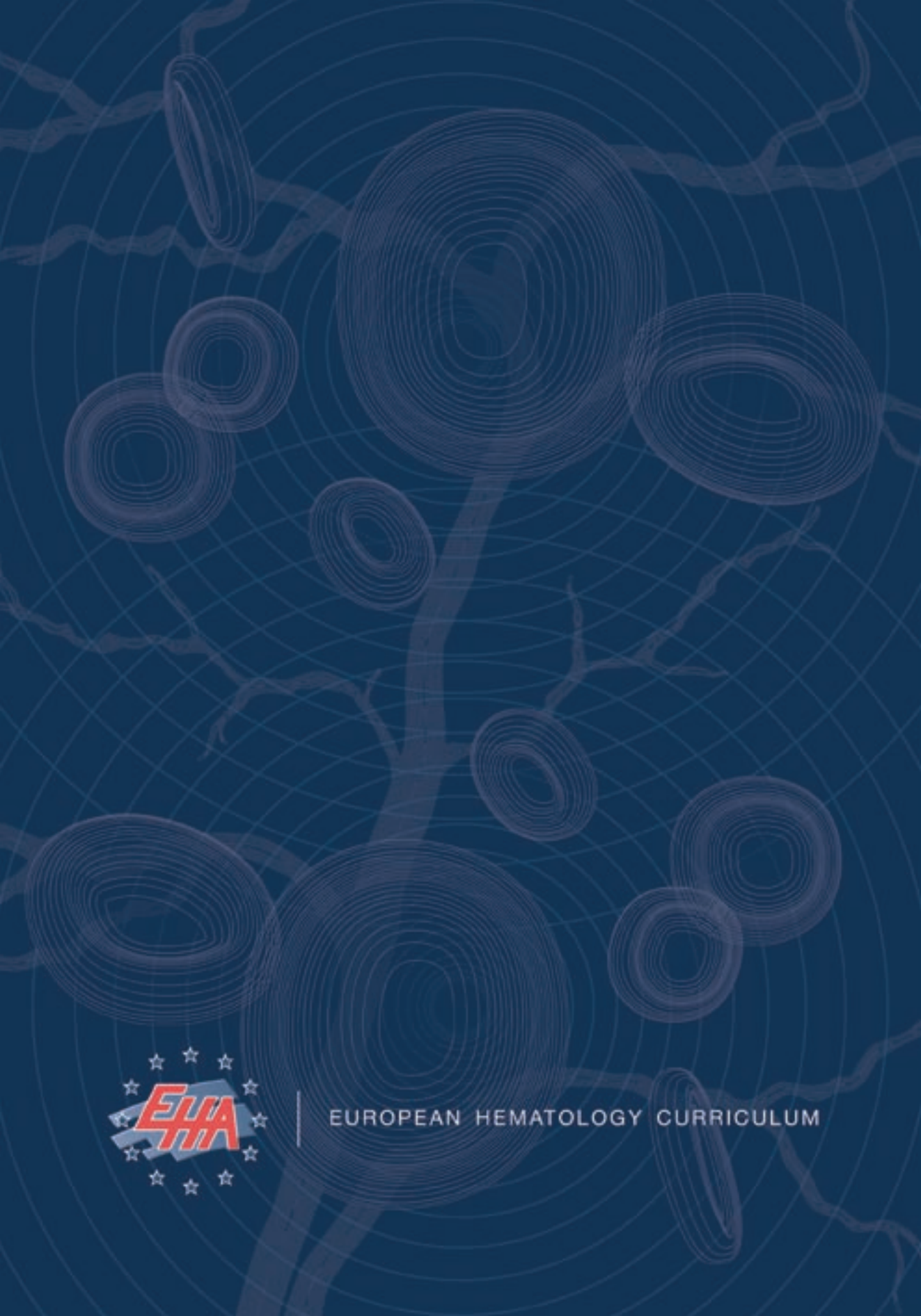
EHA
EUROPEAN HEMATOLOGY CURRICULUM

The European Hematology Curriculum was made possible by a grant from the European Commission's Leonardo Da Vinci Programme (EUR/02/C/F/TH-84902) in partnership with the European Hematology Association, The European School of Haematology, and National Societies of Hematology throughout Europe.

The CV is a living document and will be updated regularly.

If you have questions or comments regarding the passport, please contact:

EHA Executive Offices
Westblaak 71, 3012 KE Rotterdam, The Netherlands
+31 (0)10 404 5621
education@ehaweb.org

PASSPORT HOLDER

name

date of birth

number

institute

country

EUROPEAN HEMATOLOGY CURRICULUM

INTRODUCTION

EUROPEAN HEMATOLOGY ASSOCIATION

The European Hematology Association (EHA) is a scientific society aiming to support and promote education, clinical practice, and research in hematology. For EHA, as well as for the American Society of Hematology (ASH), "a hematologist is a physician who specializes in the diagnosis, treatment, prevention, and/or investigation of disorders of the hematopoietic, hemostatic, and lymphatic systems, and disorders of the interaction between blood and blood vessel wall". Thus, hematology contains both clinical and laboratory competences.

EHA EDUCATION COMMITTEE

The EHA Education Committee was appointed in 2001. Its first task was to conduct a European survey of hematological specialist education and European systems for continuous medical education (CME); the subsequent projects were developed based on the results of this investigation. In 2003, EHA and the European school of hematology, ESH, acquired a European Commission Grant to promote continuing medical education, harmonization of curriculum and professional mobility in hematology. The ECAH project (European Committee for Accreditation in Hematology) has two main subprojects; the European Hematology CME System (EHA-CME) and the Curriculum project presented here. Other EHA Education projects include European Hematology Training on line (EHATol) (supported by another EC grant), scientific workshops and lobbying activities.

EHA CURRICULUM PROJECT

The Curriculum Committee was founded to develop a harmonized European curriculum in hematology. The committee's activity is developed in close relation with the EHA Board, EHA Members and national hematology societies throughout Europe. The committee consists of a broad spectrum of physicians involved in various aspects of clinical and diagnostic hematology, including a group of young specialists. The committee is divided into five subgroups, each directed by a vice project leader.

The European Curriculum for Hematology is the result of a 3-day workshop in September 2005, followed by discussions during 2005 with the ECAH partners, and the National Societies for Hematology in Europe. The final version was approved at the final ECAH partner meeting in November 2005.

FOR A UNIFIED EUROPE

The European survey made clear that there is substantial heterogeneity within Europe, both with regard to the content of the training in hematology, the length of training and the presence of existing CME systems and formal exams. The difference is not only obvious between EC and non-EC countries, but also within the EC and non-EC regions. Some differences are due to historical reasons, others to geographical differences, such as e.g. the incidence of thalassemia and the role of transfusion medicine in Northern and Southern Europe. Another important difference is the role of hematopathology, which in some countries is regarded as part of hematology, while other countries separate clinical hematology and hematopathology into two lines of specialization. It was therefore a challenge to develop a proposal for a European curriculum that would be regarded as neither too restrictive nor too broad. The solution was to describe the various areas of competence with a range from Awareness to Competence rather than creating a uniform obligatory system for hematological training. We have clearly defined the skill level required within each area, but accepted that the definition and the profile of a "hematologist" will differ between European countries.

HARMONIZED CURRICULUM AND "THE HEMATOLOGY PASSPORT"

The Curriculum Committee employs the term "Passport" to demonstrate that its program is intended to promote both harmonization of the speciality, and professional mobility within the European community. The passport aims to improve the quality of patient care and translational research in hematology. It describes the skills and competences of a junior specialist in hematology, and should be considered as a recommendation. It is in many aspects compatible with the American Society for Hematology training program. The passport focuses on hematology as a mono-specialty including clinical and diagnostic aspects. It also defines the amount of competence in internal medicine that is required to be a hematologist, but does not focus on the details of this specialty. Likewise, it does not discuss the non-hematological parts of the education in pediatric hematology. Finally, the passport includes general skills with relevance for hematological practice. It should be underlined that the passport defines the levels of competence for basic education in hematology (junior specialist). Continuous professional development, maintenance of competence, as well as sub-specialization will be addressed in future EHA Education projects. The recommended median time for training is built on the reported length of training observed in the European survey and on the relation between the defined required competences and the approximate time to

achieve these goals. Hence, the recommended median time for training for a European hematologist, 2 years of internal medicine and 4 years for hematology is the current European median value.

The curriculum will be reviewed periodically by the EHA Board and Education Committee, and by the national hematology associations throughout Europe. The next review will start during the latter part of 2008, and an updated version will be presented in 2009.

SECTIONS:

1. Clinical Hematology
(Red Cell Disorders, Bone Marrow Failure, Non-malignant white blood cell disorders, Hematological neoplastic disorders, Stem cell transplant, Platelet disorders, Treatment of hematological disorders, Supportive and Emergency (US) care, Miscellaneous, Pediatrics for general hematologists)

2. Diagnosis
(Morphology, Red blood cell laboratory techniques, Immunohematology, Flow cytometry immuno-phenotyping, Genetics and Molecular biology)

3. Thrombosis and Hemostasis
(Laboratory Management, Acquired bleeding disorders, Congenital bleeding disorders, Platelet disorders, Thrombophilia/Thrombosis, Anti-thrombotics)

4. Transfusion Medicine
(Blood Donation, Compatibility testing, Guidelines for use of red blood cells, Guidelines for platelet transfusion, Guidelines for plasma transfusion. Guidelines for specially processed blood components and derivatives, Administration of transfusion, Adverse reactions, Special patients, Histo-compatibility, Stem cell collection, Therapeutic Phlebotomy)

5. General Skills
(Pharmacovigilence, Clinical Trials, GCP, Evidence Based Medicine, Research Experience, Communication Skills, Psychosocial Issues, Ethics, End-of-life)

DEFINITIONS:

There are three main skill levels in the curriculum. Individual training programs are expected to provide the tools necessary for the physician to care for patients with hematological disorders. The varying frequency in Europe of some hematological diseases (such as thalassemias) makes it necessary to weigh some of the passport's items accordingly.

Awareness (A): basic notions

Knowledge (K): updated concepts on patho-physiology, epidemiology, diagnosis, prognosis, and different therapeutic approaches.
Competence (C): adequate understanding and practical integration of knowledge and skills for optimal diagnosis and treatment of the patients at any phase of their disease. In the Competence column:

- **T** stands for Technical knowledge of the procedure,
- **I** stands for Interpretation of the results
- **TC** stands for Technical Competence: which is defined as the ability to carry out specific laboratory tests independently.

In the Diagnosis and Transfusion Medicine sections, competence is subdivided in Technical Competence (TC) which is the knowledge of the procedure and ability to carry out specific laboratory tests independently and Interpretation Competence (IC) which is the ability to interpret results.
Curriculum: program of education for a trainee
Passport: level of competence recommended for both professional mobilization and harmonization in Europe.
Trainee: junior specialist in hematology, (after or in paralel with internal medicine training). A Trainee could have several mentors during his education
Mentor: confirmed hematologist who personally educates, supervises, and guides a trainee
Head of department: person who is responsible for hematology in the institution giving the guarantee of the mentor's competence and the accuracy of the contents of the passport document

INDIVIDUAL USE OF THE PASSPORT

The Curriculum contains the BASIC LEVEL of hematology required by a trainee. Furthermore, the way in which the passport compliments hematology training in different countries is currently under discussion with the national societies. EHA therefore requests that the present English version be kept intact and unchanged.

An individual undergoing training in Hematology may download a pdf version of the passport, or ask for a printed version from their National Society of Hematology. Each item is divided into three boxes: Awareness, Knowledge, and Competence. The passport recommendation is in grey. At the end of the training period, the mentor should fill in the box corresponding to the trainee's current assessment. A working version could be used during training. The first signature page should contain signatures by the mentor(s), and the person in charge of the training center (e.g. head of department, or equivalent) with full address and contact information as well as the signature of the trainee. The mentor specifies the section and subsections he/she supervised.

1 CLINICAL HEMATOLOGY

We recommend that hematology-specialization encompass previous training in internal medicine equivalent to at least two years.

1A: RED CELL DISORDERS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Anemias due to deficiency (iron, B12, folate) or chronic disease	○	○	●
b) Pure red cell aplasia, Parvovirus B19 infection and sideroblastic anemia	○	●	○
c) Thalassemia and sickle cell disease **Some countries adopt "Competence" and others "Knowledge", depending on the prevalence of these diseases.*	○	●*	●*
d) Spherocytosis and deficiency of G6PD	○	○	●
e) Other congenital hemolytic anemias	●	○	○
f) Acquired hemolytic anemias	○	○	●
g) Erythrocytosis	○	○	●

Mentor	*Trainee*	*Department / Institute*
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1B: BONE MARROW FAILURE

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Fanconi's anemia	○	●	○
b) Acquired aplastic anemia	○	○	●
c) Paroxysmal Nocturnal Hemoglobinuria	○	○	●

Mentor	*Trainee*	*Department / Institute*
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1C: NON MALIGNANT WHITE BLOOD CELL DISORDERS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Granulocyte dysfunction disorders	●	○	○
b) Granulocytopenia	○	○	●
c) Lymphopenia and lymphocyte dysfunction syndromes	○	●	○
d) Leukocytosis	○	○	●

Mentor	*Trainee*	*Department / Institute*
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1D: HEMATOLOGICAL NEOPLASTIC DISORDERS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Chronic myeloid leukemia	○	○	●
b) Polycythemia Vera	○	○	●
c) Chronic idiopathic Myelofibrosis	○	○	●
d) Hypereosinophilic syndrome	○	●	○
e) Mastocytosis	○	●	○
f) Essential thrombocythemia	○	○	●
g) Acute leukemias/ lymphoblastic lymphomas	○	○	●
h) MDS	○	○	●
i) B-cell lymphomas (Follicular, large-cell, marginal zone, mantle-cell, lymphoplasmacytic, Burkitt)	○	○	●
j) B-cell lymphomas (other subtypes, including post-transplant EBV-related lymphomas)	○	●	○
k) Hodgkin's disease	○	○	●
l) Peripheral T-cell lymphomas	○	○	●
m) Other T-cell and natural killer lymphoproliferative disorders	○	●	○
n) Histiocytic neoplasm	○	●	○
o) Dendritic cell neoplasm	●	○	○
p) B-CLL, hairy-cell leukemia, and prolymphocytic leukemia	○	○	●
q) Multiple myeloma, plasmacytoma and monoclonal gammapathy of unknown significance	○	○	●
r) Amyloidosis	○	●	○
s) Castleman's disease	○	●	○

Mentor	*Trainee*	*Department / Institute*
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1E: STEM CELL TRANSPLANTATION

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Indications, risks and benefits of autologous and allogeneic transplants	○	○	●
b) Intensity of conditioning regimen	○	●	○
c) Cell source and donor selection	●	○	○
d) Managing autologous transplant patients	○	○	●
e) Managing allogeneic transplant patients	○	●	○
f) Mobilization of Peripheral Blood Progenitor Cells (PBPC) and harvesting of BM progenitors	○	●	○
g) Collection and manipulation of progenitor cells	○	●	○

	Awareness	Knowledge	Competence
h) Prevention & management of complications of autologous transplant	○	○	○
i) Prevention & management of complications of allogeneic transplant	○	○	○

Mentor	Trainee	Department / Institute
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1F: PLATELET DISORDERS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Acquired platelet function disorders	○	○	○
b) Immune thrombocytopenia	○	○	○
c) Other peripheral thrombocytopenia	○	○	○
d) Inherited Platelet Disorders (Detailed in Section 3D)	○	○	○

Mentor	Trainee	Department / Institute
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1G: TREATMENT OF HEMATOLOGICAL DISORDERS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Chemotherapy (mechanism of action, pharmacology, drug resistance)	○	○	○
b) Radiotherapy (mechanism of action, interactions, resistance)	○	○	○
c) Monoclonal antibodies	○	○	○
d) Immunosuppressive agents	○	○	○
e) Growth factors	○	○	○
f) Gene therapy	○	○	○
g) Novel therapeutic developments	○	○	○
h) Short and long-term complications of treatment of hematological disorders (infertility, secondary neoplasias)	○	○	○
i) Management of hematological malignancies in pregnancy	○	○	○

Mentor	Trainee	Department / Institute
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1H: SUPPORTIVE AND EMERGENCY CARE

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Tumor lysis syndrome	○	○	○
b) Spinal cord compression	○	○	○

	Awareness	Knowledge	Competence
c) Disseminated Intravascular Coagulation	○	○	○
d) Thrombotic thrombocytopenic purpura and microangiopathic disorders	○	○	○
e) Hyperleukocytosis	○	○	○
f) Hyperviscosity	○	○	○
g) Superior vena cava syndrome	○	○	○
h) Prevention, diagnosis and treatment of infectious complications	○	○	○
i) Transfusion (indications, potential benefits and complications)	○	○	○
j) Mucositis	○	○	○
k) Vomiting	○	○	○
l) Neurological and psychiatric disturbances	○	○	○
m) Pain	○	○	○
n) Nutrition (enteral and parenteral)	○	○	○
o) Venous access management	○	○	○
p) Palliative and end-of-life care	○	○	○

Mentor	*Trainee*	*Department / Institute*
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1I: MISCELLANEOUS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Splenomegaly	○	○	○
b) Lymph node enlargement	○	○	○
c) Numerical abnormalities of blood cells, including pancytopenia	○	○	○
d) Dysglobulinemia	○	○	○
e) Iron overload	○	○	○
f) Hematological manifestations of congenital metabolism disorders	○	○	○
g) Hematological changes in pregnancy	○	○	○
h) Hematological changes associated with HIV /other infectious diseases	○	○	○
i) Interpretation of results of genetic and molecular biology tests for diagnosis, prognosis and assessment of minimal residual disease	○	○	○

Mentor	*Trainee*	*Department / Institute*
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1J: PEDIATRICS FOR GENERAL HEMATOLOGISTS

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Basic principles of inheritance of hematological disorders	○	○	○
b) Genetic polymorphisms	○	○	○
c) Genetic counseling	○	○	○
d) Embryonic and fetal hematopoiesis. Post natal changes	○	○	○
e) Neonatal alloimmune thrombocytopenia	○	○	○
f) Acquired and inherited bleeding disorders (See section 3B and 3C)	○	○	○
g) Hemolytic disease of the newborn	○	○	○
h) Normal hematological values	○	○	○
i) Juvenile myelomonocytic leukemia	○	○	○
j) Hemophagocytic lymphohistiocytosis	○	○	○
k) Fetal Transfusion	○	○	○
l) Neonatal Transfusion	○	○	○
m) Transfusion in Children	○	○	○

Mentor	*Trainee*	*Department / Institute*
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SIGNATURES to be signed after the completion of this section

Date: ..... Date: ..... Date: .....

Mentor Signature: Trainee Signature: Head of Dept Signature:

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Institute and department *(if different from that on the identity-page)*

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2 DIAGNOSIS

2A: MORPHOLOGY

From their experience during hematology training, fellows will understand the sensitivity, specificity, indications, limitations and costs of laboratory studies. They will also be able to report results accurately.

The trainee is able to understand/perform:

	Awareness	Knowledge	Competence
a) Basic techniques for the measurement of hemoglobin concentration, packed cell volume, reticulocyte-, white blood cell- and platelet count.	○	●	○
b) Principles of operation of automated hematology counters; "flagging"; causes of inaccurate blood counts; assessment of blood counts in the light of clinical details (e.g., detection of erroneous blood counts by morphologic examination of a blood film).	○	○	T/I
c) Aspiration and biopsy of bone marrow, lumbar puncture and lymph node fine needle aspiration.	○	○	T
d) Preparation, fixation, staining (e.g., Wright-Giemsa, May-Grünwald, Pappenheim), examination of blood smears, bone marrow aspirates touch preparations, CSF and body cavity effusions in hematological malignancies, lymph node fine needle aspiration	○	○	T/I
e) Preparation, staining, and interpretation of special stains such as neutrophil alkaline phosphatase, myeloperoxidase, esterase, tartrate-resistant acid phosphatase, Prussian blue iron stains of blood and bone marrow smears	○	○	I
f) Examination of trephine bone marrow biopsy	○	●	○
g) Examination of lymph node biopsy	○	●	○
h) Lymph node, spleen, and thymus histology. Review of pathological lymph node and other tissue biopsies for lymphoma diagnosis with a pathologist	○	●	○
i) Preparation, staining, examination of immunocytochemistry in hematological malignancies (lymphoid-, myeloid-lineage and differentiation markers)	○	○	I

Mentor	*Trainee*	*Department / Institute*
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2B: RED BLOOD CELL LABORATORY TECHNIQUES

The trainee is able to understand/perform:

	Awareness	Knowledge	Competence
a) Hemoglobin electrophoresis	○	●	○
b) Sickling process	○	●	○
c) Oxygen affinity	●	○	○
d) Examination of blood and bone marrow smears for RBC parasites	○	○	T/I
e) Osmotic fragility	○	●	○
f) Red blood cell enzyme assays	○	●	○
g) Parameters of iron metabolism (e.g., iron, transferrin, transferrin saturation, soluble transferrin receptors, and ferritin)	○	○	I
h) Laboratory approach to the diagnosis of nutritional deficiencies (e.g., vitamin B12, folic acid)	○	○	I

	Awareness	Knowledge	Competence
i) Laboratory approach to the diagnosis of primary hemochromatosis (e.g., HFE mutations)	○	○	I

Mentor	Trainee	Department / Institute
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2C: IMMUNOHEMATOLOGY

The trainee is able to understand/perform:

	Awareness	Knowledge	Competence
a) Indications and processes of assays typically performed in a Blood Bank. These should include cross matching, direct antiglobulin tests (direct Coomb's test), antibody screen (indirect Coomb's test), ABO and Rh typing of red blood cells, other antibody identification procedures, as well as HLA typing and anti-HLA antibodies. These topics are included in the Cell Therapy Section.	○	○	T/I
b) Laboratory approach to the detection of immunoglobulin abnormalities (i.e., serum / urine protein electrophoresis, serum / urine immunoelectrophoresis / immunofixation and cryoglobulin detection).	○	○	I

Mentor	Trainee	Department / Institute
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2D: IMMUNOPHENOTYPING BY FLOW CYTOMETRY

During hematology training, the fellow will become familiar with several interrelated stages of multi-parameter flow cytometry (FCM), from the initial medical decision regarding which benign and neoplastic hematological conditions are appropriate for FCM assay, to the final step of diagnosis whereby FCM data is correlated with relevant clinical and laboratory information.

The trainee is able to understand/perform:

	Awareness	Knowledge	Competence
a) General aspects of the methodologies for the following steps of Flow Cytometry testing:			
1. Pre-analytical phase (e.g., specimen processing, antibody choice, antibody staining, surface versus intracytoplasmic staining)	○	○	○
2. Analytical phase (e.g., acquiring data, gating strategies)			
3. Post-analytical phase (e.g., data analysis and interpretation, taking into consideration morphology, cytochemistry, cytogenetics and molecular analyses)	○	○	I
b) Use of the essential cellular markers commonly applied to the benign hematological conditions and hematological malignancies which can be broadly categorized into the following groups:			
1. B-cell, T-cell, natural killer-cell			
2. Myeloid lineage (i.e. granulocytic, monocytic, erythroid, megakaryocytic cells)	○	○	○
3. Progenitor-cell- and non-lineage-associated markers			
c) General principles of disease-oriented antibody panels designed to optimize detection and characterization of critical cells for determining:			
1. the lineage of the cells of interest			
2. the clonality, where appropriate, and	○	○	I
3. the specific subtype of hematopoietic malignancy			

	Awareness	Knowledge	Competence
d) Assessment of the utility, diagnostic applications, limitations and prognostic impact of immunophenotyping by flow cytometry in the following conditions:			
1. distinction between neoplastic and benign hematological disorders	○	○	●
2. diagnosis of paroxysmal nocturnal hemoglobinuria			
3. diagnosis and classification of lymphomas, leukemias and plasma cell dyscrasias			
4. detection and quantification of minimal residual disease in hematologic malignancies			
5. CD34 count for stem cell quantification			

Mentor	*Trainee*	*Department / Institute*
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2E: GENETICS AND MOLECULAR BIOLOGY

The trainee is able to understand/perform:

	Awareness	Knowledge	Competence
a) Chromosome and gene structure	○	●	○
b) The role of deoxyribonucleic acid (DNA), ribonucleic acid (RNA) and proteins in normal cellular processes	○	●	○
c) Basic concepts of transcription and translation as well as the normal cellular processes, such as signal transduction, cell cycle regulation and apoptosis	○	●	○
d) Use and limits of conventional cytogenetics (i.e., banding techniques) and fluorescence in situ hybridization as well as definition of chromosomal changes according to the International Nomenclature of aberrations (e.g. reciprocal translocation, deletion, inversion, monosomy, trisomy, etc.)	○	●	○
e) Standard techniques to evaluate cellular processes at the DNA, RNA and protein level by understanding, in general terms, the laboratory procedures of Northern blot, Southern blot, Western blot, polymerase chain reaction (reverse transcription-polymerase chain reaction, qualitative and quantitative) and microarrays	○	●	○
f) Major genetic features occurring in hematological diseases (e.g., structural and numerical chromosomal changes, gene mutations) for understanding molecular events and clonality, diagnosis, definition of biologic and prognostic subgroups, and detection of minimal residual disease	○	○	●

Mentor	*Trainee*	*Department / Institute*
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SIGNATURES to be signed after the completion of this section

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Mentor Signature:	Trainee Signature:	Head of Dept Signature:
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3 THROMBOSIS AND HEMOSTASIS

The practice of clinical hemostasis and thrombosis requires a combination of diagnostic laboratory and clinical expertise. As in other areas of clinical hematology there is a major overlap with general internal medicine. Many patients with bleeding and thrombosis do so for reasons other than disease of the blood and bone marrow; equally a wide range of systemic diseases may influence haemostatic mechanisms, blood coagulation and fibrinolysis. Therefore a holistic approach to disease management requires adequate training in general internal medicine as well as hemostasis and thrombosis. In this section recommended levels of training outcomes in hemostasis and thrombosis for the general hematologist are described in relation to coagulation laboratory management, acquired and congenital bleeding disorders, platelet disorders, thrombophilia and thrombosis and anti-thrombotic therapy.

3A: LABORATORY MANAGEMENT

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Techniques for assessing blood coagulation and its inhibition, fibrinolysis, primary hemostasis and platelet function, including automation	○	●	○
b) Instruments and methods and their pitfalls	○	●	○
c) Principles of laboratory management	○	●	○
d) Familiarity setting of ranges, quality assurance, laboratory computing	○	○	●
e) Familiarity with staff performance management and appraisal	○	●	○

Mentor	*Trainee*	*Department / Institute*
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3B: ACQUIRED BLEEDING DISORDERS

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Mechanisms of bleeding in: Iatrogenic bleeding Surgical bleeding (including cardiopulmonary bypass) Obstetric bleeding Disseminated intravascular coagulation Massive transfusion Renal disease Liver disease F VIII and vWF inhibitors	○	●	○
b) Interpret laboratory tests accurately, in the clinical context, formulate an appropriate management plan, and liaise with other specialists	○	○	●
c) Less common bleeding disorders (amyloidosis and very rare inhibitors)	●	○	○
d) Available treatments, including management of underlying disease, blood products, recombinant VIIa and immunosuppression, and their side-effects	○	○	●
e) Advise on use of blood products and other therapies, including appropriate use of vitamin K and protamine	○	○	●

Mentor	*Trainee*	*Department / Institute*
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3C: CONGENITAL BLEEDING DISORDERS

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Coagulation factors and current understanding of coagulation mechanisms	○	○	○
b) Natural history, presentation and complications of congenital coagulation disorders including hemophilia A & B, von Willebrand's disease + subtypes	○	○	○
c) Taking a relevant history, including previous challenges and family history, conducting a focused clinical examination to assess for abnormal bleeding	○	○	○
d) Ability to formulate a comprehensive differential diagnosis and management plan	○	○	○
e) Less prevalent factor deficiencies such as XI, X, VII, V and II and a/dysfibrinogenaemia	○	○	○
f) Rare, easily overlooked deficiencies: factor XIII, antiplasmin	○	○	○
g) Diagnostic methods incl. screening tests, specific factor and inhibitor assays	○	○	○
h) Interpret laboratory results accurately, and in light of clinical background	○	○	○
i) Use of molecular biological techniques to identify genetic disorders	○	○	○
j) Advise on use of molecular biological techniques in diagnosis	○	○	○
k) Use of molecular biological techniques in prenatal and family testing	○	○	○
l) Appropriate use of therapeutic materials: recombinant products, blood products and adjuvant therapies, including desmopressin and antifibrinolytics, their indications and safety profiles	○	○	○

Mentor	*Trainee*	*Department / Institute*
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3D: PLATELET DISORDERS

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Platelet structure and function	○	○	○
b) Platelet-vessel wall interactions	○	○	○
c) Measurement of platelet numbers by automated counters	○	○	○
d) Interpretation of laboratory data and awareness of pitfalls	○	○	○
e) Diagnosis and management of thrombocytopenias, including Immune Thrombocytopenic Purpura	○	○	○ Refer to Section 1f
f) Choice of treatment in Idiopathic Thrombocytopenic Purpura, including observation, immunosuppression, splenectomy and pregnancy management	○	○	○
g) The performance of screening tests of primary hemostasis, and tests of platelet aggregation and release	○	○	○
h) The interpretation of screening tests of primary hemostasis, and tests of platelet aggregation and release	○	○	○
i) Diagnosis of inherited congenital platelet disorders, including thrombasthenia, Bernard-Soulier disease, storage pool disorders and enzymopathies	○	○	○
j) Management of rare congenital platelet disorders	○	○	○
k) Diagnosis and management of acquired platelet disorders, including myeloproliferative diseases	○	○	○
l) The mechanisms, classification and diagnosis of Thrombotic Thrombocytopenic Purpura and other microangiopathic disorders	○	○	○

	Awareness	Knowledge	Competence
m) Management, including supportive treatment and plasma therapy in Thrombotic Thrombocytopenic Purpura and related disorders	○	○	●
n) Diagnosis and management of thrombocytopenia in pregnancy	○	○	●
o) Novel investigations, such as Platelet Function Analyzer 100	●	○	○

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3E: THROMBOPHILIA/THROMBOSIS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Physiological coagulation inhibitors including epidemiology and molecular basis of heritable thrombophilia, including V Leiden, II G20210A and anticoagulant deficiencies	○	●	○
b) Appropriate use of clinical and laboratory methods to reach a diagnosis, including family history, bioassays, immunoassays and molecular methods	○	○	●
c) Skill in genetic counseling	○	○	●
d) Mechanisms of acquired thrombotic disease, incl. antiphospholipid syndrome, Paroxysmal Nocturnal Hemoglobinuria, myeloproliferative diseases	○	●	○
e) Use of appropriate clinical and laboratory methods, including tests for antiphospholipid antibodies	○	○	●
f) Appreciation of gene-environment interaction in thrombosis, incl. the role of acquired risk factors such as pregnancy, hormone use and immobility	○	●	○
g) Accurate assessment of risk factors and risk of recurrence from clinical assessment	○	○	●
h) The natural history, presentations and complications of heritable and acquired thrombophilia	○	●	○
i) Advising on prophylaxis and treatment of thrombophilia	○	○	●
j) Management protocols for pregnancy complications in antiphospholipid syndrome	●	○	○
k) The role of heritable thrombophilias in pregnancy failure	●	○	○
l) Post-thrombotic syndrome	●	○	○
m) Diagnostic methods for thrombosis	○	●	○
n) Use of appropriate diagnostic methods incl. D-dimer assay and imaging	○	○	●

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3F: ANTI-THROMBOTICS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Pharmacology, including mechanism of action, pharmacokinetics and indications for heparins, other anti-thrombins, oral anticoagulants and thrombolytic agents	○	●	○

	Awareness	*Knowledge*	*Competence*
b) Indications for prophylaxis, including in malignancy	○	○	○
c) Initiation and laboratory monitoring and dosing of anticoagulants and thrombolytics	○	○	○
d) Use of anticoagulants and thrombolytics in pregnancy	○	○	○
e) Management of anticoagulant-related bleeding	○	○	○
f) New anti-thrombotics	○	○	○
g) Appropriate tests for anticoagulant control and familiarity with different models of anticoagulant management, including computerized systems and implementation of multi-professional delivery of anticoagulant control	○	○	○
h) Advise on the follow-up of patients receiving anticoagulants, incl. advice on duration and intensity of therapy	○	○	○
i) Additional interventions and their indications, incl. caval filters and surgery	○	○	○
j) Side-effects of anticoagulants	○	○	○
k) Management of over-anticoagulation and bleeding	○	○	○
l) Diagnosis and management of HIT, including interpretation of bio- and immunoassays and use of alternative anticoagulants	○	○	○
m) Mechanisms of antiplatelet agents	○	○	○
n) Advise on selection and use of antiplatelet agents	○	○	○

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4 TRANSFUSION MEDICINE

4A: BLOOD DONATION

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Council of Europe and National laws for donor eligibility	○	●	○
b) Epidemiology of infectious diseases in the area	●	○	○
c) Donor preparation; venesection	○	○	(T)
d) Donation screening	○	●	○
e) Donation-associated side effects	○	●	○
f) Preparation and preservation of standard and special blood components: Whole Blood; Red cells; Plasma; Platelets. Cryoprecipitate; irradiated; leukocyte depleted; washed; filtered; Pediatric Units	○	●	○
g) Viral inactivation and quarantine	○	●	○

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4B: COMPATIBILITY TESTING

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Blood Antigens and Antibodies	○	●	○
b) Blood Grouping: ABO and D grouping, Complete Phenotype, Rhesus and Kell testing, Antibody screening, Cross-match	○	○	(T)

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4C: GUIDELINES AND NATIONAL LAWS FOR USE OF BLOOD AND BLOOD COMPONENTS

The trainee has received specialized training in:

	Awareness	*Knowledge*	*Competence*
a) Whole Blood	○	●	○
b) Red Cells	○	●	○
c) Alternatives to allogeneic blood transfusion	●	○	○
d) Autologous blood; use of r-huEPO, iron etc.	○	○	○

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4D: GUIDELINES AND NATIONAL LAWS FOR THE USE OF PLATELETS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Volume; Number of required platelets	○	○	○
b) Quality testing; management of refractoriness	○	○	○

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4E: GUIDELINES AND NATIONAL LAWS FOR THE USE OF PLASMA

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Fresh Frozen Plasma	○	○	○

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4F: GUIDELINES AND NATIONAL LAWS FOR THE USE OF SPECIALLY PROCESSED BLOOD COMPONENTS AND DERIVATIVES

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Cryoprecipitate	○	○	○
b) Factors VII, VIII and IX; Fibrinogen	○	○	○
c) Immunoglobulins	○	○	○

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4G: ADMINISTRATION OF THE TRANSFUSION

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
d) Information for the patient	○	○	○
e) Routine vs. emergency transfusions	○	○	○
f) Proper identification of the recipient	○	○	○
g) Rate and conditions of administration and monitoring	○	○	○

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4H: ADVERSE REACTIONS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Identification of transfusion reactions	○	○	○
b) Investigation and reporting	○	○	○
c) Management	○	○	○

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4I: SPECIAL PATIENTS

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Hemolytic disease of the newborn	○	○	○
b) Neonatal thrombocytopenia	○	○	○
c) Laboratory work-up of the autoimmune hemolytic anemias	○	○	T
d) Apheresis	○	○	○
e) Therapeutic apheresis	○	○	○
f) Plasmapheresis	○	○	○
g) Red cell exchange	○	○	○
h) Plateletpheresis	○	○	○
i) Leucapheresis (therapeutic)	○	○	○
j) Donation by apheresis	○	○	○
k) Platelets, red cells, leucocytes, lymphocytes, granulocytes	○	○	○
l) Multi-component	○	○	○

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4J: HISTO-COMPATIBILITY AND THE HL-A SYSTEM

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Principles of testing and matching	○	○	○

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4K: STEM CELL COLLECTION

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Mobilization, collection and preservation	○	○	○
b) Autologous vs. allogeneic stem cells	○	○	○
c) Number of collected cells; identification and probably should be 'selection' rather than concentration of progenitors	○	○	○

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4L: THERAPEUTIC PHLEBOTOMY

The trainee has received specialized training in:

	Awareness	Knowledge	Competence
a) Therapeutic phlebotomy	○	○	(T)

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5 GENERAL SKILLS

For any specialty, the acquisition of general skills is an important part of training. We have listed here skills and competencies that we consider essential for a specialist in hematology. Naturally, there are other general skills which are not listed here.

5A: CLINICAL TRIALS / GOOD CLINICAL PRACTICE

Trainees should have the opportunity to actively participate in the clinical trial process. Junior doctors should have attended at least one course in good clinical practice and national legislation. The aspects described below also include an understanding of appropriate statistical analysis.

The trainee is able to:

	Awareness	*Knowledge*	*Competence*
a) understand the process of randomization and is able to explain it in simple language to patients	○	○	●
b) explain study aims and objectives to patients with different language skills and different social or cultural backgrounds	○	○	●
c) treat and manage patients according to protocol requirements and know when to diverge from protocol	○	○	●
d) understand and explain different regulations about giving information and obtaining informed consent, including from minors or incapacitated adults	○	○	●
e) define, recognize and report Self Assessment Exercises done by patients, as well as suspected/unexpected severe adverse reactions	○	○	●
f) identify the different phases, types and purposes of clinical trials	○	●	○
g) identify and understand the significant differences, advantages or disadvantages between: single centre / multi-centre and pharmaceutical / academic clinical trials	○	●	○
h) identify and understand the principles of patient selection and recruitment	○	●	○
i) deal with study data	●	○	○
j) identify and understand the current versions of clinical trial related guidelines and legislation, such as: International Conference on Harmonization-Good Clinical Practice guidelines, European Union Directive on clinical trials, European Commission Directive on Good Clinical Practice and World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects. This includes awareness of national regulatory authorities and their function	○	●	○
k) define and understand the role of principal investigator and co-investigator	●	○	○
l) use and interpret major quality of life instruments	○	●	○

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5B: PHARMACOVIGILANCE

Trainees should understand the activities involved in the detection, assessment, understanding, and prevention of adverse effects or any other drug-related problems.

The trainee is able to:

	Awareness	*Knowledge*	*Competence*
a) define and understand terms relevant to drug-related harm (adverse event, adverse drug reaction, adverse drug event, medication error, side effect)	○	○	●
b) recognize and treat adverse drug events	○	○	●

	Awareness	Knowledge	Competence
c) document adverse drug events, incl. the severity of the event, the causal association between use of the drug and the event, and dosing variables	○	○	●
d) understand and adhere to national and EU legislation regarding pharmacovigilance systems and to identify such systems operating in accordance with national and EU legislation.	○	●	○
e) Understand the different activities involved in reporting of serious, unexpected adverse drug reactions to national pharmacovigilance centers, pharmaceutical industry, and national as well as European regulatory agencies.	○	●	○

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5C: EVIDENCE BASED MEDICINE / CRITICAL APPRAISAL

A doctor in training should have access to a computer with internet access. It is recommended that during training a doctor actively participates in a journal club, either locally of via the internet. The parts recommended below also include understanding of appropriate statistics. It is essential that a junior specialist can read and understand research data, and draw appropriate conclusions.

The trainee is able to:

	Awareness	Knowledge	Competence
a) use of computer and relevant applications	○	○	●
b) use search engines to find information on the internet (medical libraries)	○	○	●
c) understand the use of medical databases in clinical decision making from a single case point of view	○	○	●
d) read scientific literature and critically evaluate information	○	○	●
e) understand the principles of evidence based medicine	○	●	○
f) comprehend the basic function of simple electronic databases	○	●	○

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5D: COMMUNICATION SKILLS

A trainee should demonstrate skills appropriate and necessary to provide professional communication.
If available, we recommend participation in a training course.

The trainee is able to:

	Awareness	Knowledge	Competence
a) identify the principles of personnel management	○	●	○
b) effectively communicate within a multi-disciplinary team	○	○	●
c) communicate hematological diagnosis and treatment	○	○	●
d) deal with strong emotions	○	○	●
e) communicate with patients with different cultural backgrounds	○	○	●
f) use patient- and doctor-centered communication techniques	○	○	●
g) identify when involvement of psychosocial specialist resources are required	○	●	○

	Awareness	Knowledge	Competence
h) discuss with patients and their families changes in goals during the course of the disease	○	○	●
i) offer support for the consequences of the various phases of the disease	○	○	●

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5E: PSYCHOSOCIAL ISSUES

The trainee should be offered opportunities to experience and integrate the psychosocial aspects of hematology. This may include specific training courses.

The trainee is able to:

	Awareness	Knowledge	Competence
a) comprehend the impact of hematological disorders in patients and their families and consequently be able to deal with normal psychological reactions to these diseases	○	●	○
b) recognize and manage psychological distress and provide for the appropriate counseling of patients	○	○	●
c) identify available resources for psychosocial/psychiatric support/treatment	●	○	○
d) appropriately address social and economic needs and resources based on solid practical experience	○	○	●
e) identify patients rights according to national legislation	●	○	○
f) provide appropriate responses to specific needs of patients of different cultural origins, and their families	○	○	●

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5F: ETHICS

Ethical competence is an essential component of the specialty of hematology

The trainee is able to:

	Awareness	Knowledge	Competence
a) demonstrate a practical understanding of the ethical issues that confront patients, their families and caregivers within the context of disease management options and outcome	○	○	●
b) identify duties to patients in dealing with unintended harm	○	●	○
c) participate in and initiate multi-professional discussion about ethical dilemmas and conflict of interest	○	○	●
d) understand principles of medical ethics, such as primacy of patient welfare, respect of patient autonomy, promotion of social justice	○	●	○
e) understand principles of moral reasoning	○	●	○
f) comprehend the relationship between healthcare providers and the pharmaceutical industries, including guidelines and legislation	○	●	○
g) comprehend the relationship between healthcare providers and national and European authorities, tissue banks, insurance companies, incl. legislation	○	●	○

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5G: END OF LIFE

A trainee should be familiar with the fact that the threat of death and dying is an integral part of hematology in all patients.

The trainee is able to:	*Awareness*	*Knowledge*	*Competence*
a) communicate with patients and family about death and dying	○	○	●
b) deal with patients approaching death based on experience with medical and psychosocial care	○	●	○
c) address quality of life issues in patients approaching death	○	○	●
d) collaborate with the multi-professional team to enhance patient and family understanding and cooperation	○	○	●
e) use effective symptomatic treatment for patients approaching death	○	○	●
f) inform and counsel patients and families about palliative and hospice facilities available	○	○	●
g) meet and communicate with family members after death of the patient	○	○	●

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5H: RESEARCH EXPERIENCE

The opportunity to acquire research experience varies between different departments and countries. As part of the training in hematology, many European universities recommend a specified period allocated to research while other countries separate clinical training from research education.

The following recommendations should be considered as a minimum requirement for a specialist in hematology

1. A hematologist should have a basic understanding of clinical research methods including relevant knowledge of biostatistics. Junior doctors should have attended at least one course in good clinical practice and national legislation (see specific recommendations under clinical trials, above) If national courses are not available, a course at the European level should be considered.

2. A hematologist should have a basic understanding of laboratory research concepts and methods. Junior doctors should have attended at least two courses with relevance for this subject.

3. A hematologist should have participated in at least two international hematological conferences (at least one on general hematology)

RESEARCH EXPERIENCE:

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INTERNATIONAL CONFERENCES IN HEMATOLOGY:

PUBLICATIONS:

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PARTNERS:

Albania: Albanian Society of Hematology & Blood Transfusion

Austria: Österreichische Gesellschaft für Hämatologie und Onkologie

Belgium: Belgian Hematology Society

Bulgaria: Bulgarian Society of Clinical and Transfusion Hematology

Croatia: Croatian Hematology and Blood Transfusion Society

Czech Republic: Czech Hematology Assosiation

Denmark: Danish Society of Hematology

Finland: Finnish Association of Hematology

France: Société Française d'Hématologie (SFH)

Germany: Deutsche Gesellschaft für Hamatologie und Onkologie

Greece: Hellenic Society of Haematology

Hungary: Hungarian Hematological Society

Iceland: Hematological Society of Iceland

Ireland: Haematology Association of Ireland

Israel: Israeli Society of Hematology

Italy: Italian Society of Hematology (SIE)

Latvia: Latvian Hematology Society

Lithuania: Lithuanian Society of Hematology

The Netherlands: Nederlandse Vereniging voor Haematologie

Norway: Norwegian Society of Hematology

Poland: Polish Society of Hematology and Transfusion Medicine

Portugal: Sociedade Portuguese de Hematologia

Romania: Romanian Society of Hematology

Serbia: The hematological section of Serbian Medical Association

Slovakia: Slovakian Society of Hematology and Transfusiology

Slovenia: Slovenian Society of Hematology

Spain: Asociación Española de Hematología y Hemoterapia (AEHH)

Sweden: Swedish Society of Hematology

Switzerland: Schweizerische Gesellschaft für Hämatologie

Turkey: Turkish Society of Hematology (Türk Hematoloji Dernegi)

United Kingdom: British Society of Hematology