

ACGME Program Requirements for Graduate Medical Education in Hematology

Common Program Requirements are in BOLD

Effective: July 1, 2007

Introduction

Int.A. Residency and fellowship programs are essential dimensions of the transformation of the medical student to the independent practitioner along the continuum of medical education. They are physically, emotionally, and intellectually demanding, and require longitudinally-concentrated effort on the part of the resident or fellow.

The specialty education of physicians to practice independently is experiential, and necessarily occurs within the context of the health care delivery system. Developing the skills, knowledge, and attitudes leading to proficiency in all the domains of clinical competency requires the resident and fellow physician to assume personal responsibility for the care of individual patients. For the resident and fellow, the essential learning activity is interaction with patients under the guidance and supervision of faculty members who give value, context, and meaning to those interactions. As residents and fellows gain experience and demonstrate growth in their ability to care for patients, they assume roles that permit them to exercise those skills with greater independence. This concept—graded and progressive responsibility—is one of the core tenets of American graduate medical education. Supervision in the setting of graduate medical education has the goals of assuring the provision of safe and effective care to the individual patient; assuring each resident's and fellow's development of the skills, knowledge, and attitudes required to enter the unsupervised practice of medicine; and establishing a foundation for continued professional growth.

I. Institutions

I.A. Sponsoring Institution

One sponsoring institution must assume the ultimate responsibility for the program, as described in the Institutional Requirements, and this responsibility extends to fellow assignments at all participating sites.

The sponsoring institution and program must ensure that the program director has sufficient protected time and financial support for his or her educational and administrative responsibilities to the program.

I.A.1. The sponsoring institution must:

I.A.1.a) demonstrate a commitment to education and research sufficient to support the fellowship program;

- I.A.1.b) establish the internal medicine subspecialty fellowship within a department of internal medicine or an administrative unit whose primary mission is the advancement of internal medicine education and patient care;
- I.A.1.c) provide fellow compensation and benefits, faculty, facilities, and resources for education, clinical care, and research required for accreditation;
- I.A.1.d) ensure that adequate salary support is provided to the program director for the administrative activities of the internal medicine subspecialty program. The program director must not be required to generate clinical or other income to provide this administrative support. It is suggested that this support be 25-50% of the program director's salary, depending on the size of the program. (See Section III.A.4.f)); and,
- I.A.1.e) notify the Review Committee within 60 days of changes in institutional governance, affiliation, or resources that affect the educational program.
- I.A.2. Graduate education in the subspecialties of internal medicine requires a major commitment to education by the sponsoring institution. Evidence of such a commitment includes each of the following:
 - I.A.2.a) The minimum number of fellowship positions supported by the institution in each training program must not be less than the number of accredited training years in the program.
 - I.A.2.b) The institution must ensure significant research in each subspecialty for which it sponsors a training program.

I.B. Participating Sites

Participating sites include both the primary training site and other training sites. The primary training site is defined as the health-care facility that provides the required training resources, should be the location of the program director's major activity, the location where the fellow spends the majority of their clinical training time, and the primary location of the core program in internal medicine.

I.B.1. There must be a program letter of agreement (PLA) between the program and each participating site providing a required assignment. The PLA must be renewed at least every five years.

The PLA should:

- I.B.1.a) identify the faculty who will assume both educational and supervisory responsibilities for fellows;**
- I.B.1.b) specify their responsibilities for teaching, supervision, and formal evaluation of fellows, as specified later in this**

- document;**
- I.B.1.c) specify the duration and content of the educational experience; and,**
- I.B.1.d) state the policies and procedures that will govern fellow education during the assignment.**
- I.B.2. The program director must submit any additions or deletions of participating sites routinely providing an educational experience, required for all fellows, of one month full time equivalent (FTE) or more through the Accreditation Council for Graduate Medical Education (ACGME) Accreditation Data System (ADS).**
- I.B.3. The Review Committee must give prior approval for participation by any site providing three months or more of training in a 12 or 24 month program, or six months or more of training in a 36 month program.**
- I.B.4. Assignments at participating sites must be of sufficient length to ensure a quality educational experience and should provide sufficient opportunity for continuity of care. Although the number of participating sites may vary with the various specialties' needs, all participating sites must demonstrate the ability to promote the program goals and educational and peer activities. Exceptions must be justified and prior-approved by the Review Committee.**

II. Program Personnel and Resources

II.A. Program Director

- II.A.1. There must be a single program director with authority and accountability for the operation of the program. The sponsoring institution's GMEC must approve a change in program director. After approval, the program director must submit this change to the ACGME via the ADS.**
- II.A.2. The program director should continue in his or her position for a length of time adequate to maintain continuity of leadership and program stability.**
- II.A.3. Qualifications of the program director must include:**
 - II.A.3.a) requisite specialty expertise and documented educational and administrative experience acceptable to the Review Committee;**
 - II.A.3.b) current certification in the subspecialty by the American Board of Internal Medicine, or specialty qualifications acceptable to the Review Committee; and,**
 - II.A.3.c) current medical licensure and appropriate medical staff**

appointment.

- II.A.3.d) at least five years of participation as an active faculty member in an ACGME-accredited internal medicine subspecialty fellowship program.
- II.A.4. The program director must administer and maintain an educational environment conducive to educating the fellows in each of the ACGME competency areas. The program director must:**
- II.A.4.a) oversee and ensure the quality of didactic and clinical education in all sites that participate in the program;**
- II.A.4.b) approve a local director at each participating site who is accountable for fellow education;**
- II.A.4.c) approve the selection of program faculty as appropriate;**
- II.A.4.d) evaluate program faculty and approve the continued participation of program faculty based on evaluation;**
- II.A.4.e) monitor fellow supervision at all participating sites;**
- II.A.4.f) prepare and submit all information requested by the ACGME, including but not limited to the program information forms and annual program fellow updates to the ADS, and ensure that the information submitted is accurate and complete;**
- II.A.4.g) provide each fellow with documented semiannual evaluation of performance with feedback;**
- II.A.4.h) ensure compliance with grievance and due process procedures, as set forth in the Institutional Requirements and implemented by the sponsoring institution;**
- II.A.4.h).(1) In the event of an adverse annual evaluation, a fellow must be offered an opportunity to address a judgment of academic deficiencies or misconduct before a formally constituted clinical competence committee.
- II.A.4.h).(2) There must be a written policy that ensures that academic due process is provided.
- II.A.4.i) provide verification of fellowship education for all fellows, including those who leave the program prior to completion;**
- II.A.4.j) implement policies and procedures consistent with the institutional and program requirements for fellow duty hours and the working environment, including moonlighting, and, to that end, must:**

- II.A.4.j).(1)** distribute these policies and procedures to the fellows and faculty;
- II.A.4.j).(2)** monitor fellow duty hours, according to sponsoring institutional policies, with a frequency sufficient to ensure compliance with ACGME requirements;
- II.A.4.j).(3)** adjust schedules as necessary to mitigate excessive service demands and/or fatigue; and,
- II.A.4.j).(4)** if applicable, monitor the demands of at-home call and adjust schedules as necessary to mitigate excessive service demands and/or fatigue.
- II.A.4.j).(4).(a)** Fellows must not be required to provide routine intravenous, phlebotomy, or messenger/transporter services.
- II.A.4.j).(4).(b)** Fellows' service responsibilities must be limited to patients for whom the teaching service has diagnostic and therapeutic responsibility.
- II.A.4.j).(4).(c)** The admission and continuing care of patients by fellows must be limited to those patients on the teaching service.
- II.A.4.k)** monitor the need for and ensure the provision of back up support systems when patient care responsibilities are unusually difficult or prolonged;
- II.A.4.l)** comply with the sponsoring institution's written policies and procedures, including those specified in compliance with the Institutional Requirements, for selection, evaluation and promotion of fellows, disciplinary action, and supervision of fellows;
- II.A.4.m)** be familiar with and comply with ACGME and Review Committee policies and procedures as outlined in the ACGME Manual of Policies and Procedures;
- II.A.4.n)** obtain review and approval of the sponsoring institution's GMEC/DIO before submitting to the ACGME information or requests for the following:
- II.A.4.n).(1)** all applications for ACGME accreditation of new programs;
- II.A.4.n).(2)** changes in fellow complement;
- II.A.4.n).(3)** major changes in program structure or length of training;

- II.A.4.n).(4) **progress reports requested by the Review Committee;**
- II.A.4.n).(5) **responses to all proposed adverse actions;**
- II.A.4.n).(6) **requests for increases or any change to fellow duty hours;**
- II.A.4.n).(7) **voluntary withdrawals of ACGME-accredited programs;**
- II.A.4.n).(8) **requests for appeal of an adverse action;**
- II.A.4.n).(9) **appeal presentations to a Board of Appeal or the ACGME; and,**
- II.A.4.n).(10) **proposals to ACGME for approval of innovative educational approaches.**

- II.A.4.o) **obtain DIO review and co-signature on all program information forms, as well as any correspondence or document submitted to the ACGME that addresses:**
 - II.A.4.o).(1) **program citations, and/or**
 - II.A.4.o).(2) **request for changes in the program that would have significant impact, including financial, on the program or institution.**

- II.A.4.p) seek the prior approval of the Review Committee for any changes in the program that may significantly alter the educational experience of the fellows.

- II.A.4.q) be responsible for monitoring fellow stress, including mental or emotional conditions inhibiting performance or learning, and drug- or alcohol-related dysfunction. Both the program director and faculty should be sensitive to the need for timely provision of confidential counseling and psychological support services to fellows. Situations that demand excessive service or that consistently produce undesirable stress on fellows must be evaluated and modified.

- II.A.4.r) dedicate an average of 20 hours per week of his or her professional effort to the internal medicine subspecialty educational program, with sufficient time for administration of the program, and receive institutional support for that administrative time.

- II.A.4.s) participate in academic societies and in educational programs designed to enhance his or her educational and administrative skills.

II.A.4.t) implement a program of continuous quality improvement in medical education for the faculty, especially as it pertains to the teaching and evaluation of the ACGME Competencies (as outlined in Section IV of this document).

II.A.4.u) be located at the principal clinical training site.

II.B. Faculty

II.B.1. At each participating site, there must be a sufficient number of faculty with documented qualifications to instruct and supervise all fellows at that location.

The faculty must:

II.B.1.a) devote sufficient time to the educational program to fulfill their supervisory and teaching responsibilities; and to demonstrate a strong interest in the education of fellows; and,

II.B.1.b) administer and maintain an educational environment conducive to educating fellows in each of the ACGME competency areas.

II.B.2. The physician faculty must have current certification in the subspecialty by the American Board of Internal Medicine, or possess qualifications judged to be acceptable by the Review Committee.

II.B.3. The physician faculty must possess current medical licensure and appropriate medical staff appointment.

II.B.3.a) The physician faculty must meet professional standards of ethical behavior.

II.B.4. The nonphysician faculty must have appropriate qualifications in their field and hold appropriate institutional appointments.

II.B.5. The faculty must establish and maintain an environment of inquiry and scholarship with an active research component.

II.B.5.a) The faculty must regularly participate in organized clinical discussions, rounds, journal clubs, and conferences.

II.B.5.b) Some members of the faculty should also demonstrate scholarship by one or more of the following:

II.B.5.b).(1) peer-reviewed funding;

II.B.5.b).(2) publication of original research or review articles in peer-reviewed journals or chapters in textbooks;

II.B.5.b).(3) publication or presentation of case reports or clinical series at local, regional, or national professional and scientific society meetings; or,

II.B.5.b).(4) participation in national committees or educational organizations.

II.B.5.c) Faculty should encourage and support fellows in scholarly activities.

II.B.5.d) The majority of faculty must be involved in scholarship as defined in II.B.5.b.(1), (2), or (3) above.

II.B.5.e) The majority of key clinical faculty must demonstrate evidence of productivity in the scholarship as defined in II.B.5.b.(1), or (2) above.

II.B.5.f) At least one faculty member must be active in the scholarship defined in II.B.5.b.(1) above.

II.C. Other Program Personnel

The institution and the program must jointly ensure the availability of all necessary professional, technical, and clerical personnel for the effective administration the program.

II.C.1. Key Clinical Faculty

In addition to the program director, each program must have two key clinical faculty. Key clinical faculty are attending physicians who dedicate, on average, 10 hours per week throughout the year to the training program. For programs with more than five fellows enrolled during the accredited portion of the training program, a ratio of key clinical faculty to fellows of at least 1:1.5 must be maintained. (N.B.: The required number of key clinical faculty may vary by subspecialty.)

II.C.1.a) Qualifications:

The key clinical faculty must:

II.C.1.a).(1) be active clinicians with broad knowledge of, experience with, and commitment to the internal medicine subspecialty as a discipline, and

II.C.1.a).(2) have current certification in the subspecialty by the American Board of Internal Medicine or possess qualifications judged by the Review Committee to be acceptable.

II.C.1.b) Responsibilities for the key clinical faculty include:

In addition to the responsibilities of all individual faculty, the key clinical faculty with the program director, are responsible for the planning, implementation, monitoring and evaluation of the fellows' clinical and research training.

II.C.2. All clinical faculty members should participate in prescribed faculty development programs designed to enhance the effectiveness of their teaching.

II.D. Resources

The institution and the program must jointly ensure the availability of adequate resources for fellow education, as defined in the specialty program requirements.

II.D.1. Fellows must have clinical experiences in efficient, effective ambulatory and inpatient care settings.

II.D.1.a) Space and equipment

There must be space and equipment for the educational program, including meeting rooms, classrooms, examination rooms, computers, visual and other educational aids, and work/study space.

II.D.1.b) Facilities

II.D.1.b).(1) Fellows must have lounge and food facilities during assigned duty hours.

II.D.1.b).(2) When fellows are assigned night duty in the hospital or called in from home, they must be provided with on-call facilities that are convenient and that afford privacy, safety, and a restful environment with a secure space for their belongings.

II.D.2. Medical Records

Clinical records that document both inpatient and ambulatory care must be readily available at all times. (See Institutional Requirements, Section II.D.3.d))

II.D.3. Patient Population

II.D.3.a) The inpatient and ambulatory care population must provide experience with patients whose illnesses are encompassed by, and help to define, the subspecialty.

II.D.3.b) There must be patients of both sexes, with a broad age range, including geriatric patients.

II.D.3.c) A sufficient number of patients must be available to ensure adequate inpatient and ambulatory experience for each subspecialty fellow.

II.D.4. Death Reviews and Autopsies

II.D.4.a) All deaths of patients who received care by fellows must be reviewed and autopsies performed whenever possible.

II.D.4.b) Fellows must receive autopsy reports after autopsies are completed on their patients.

II.D.5. Support Services

II.D.5.a) Administrative support must include adequate secretarial and administrative staff and technology to support the program director.

II.D.5.b) Inpatient clinical support services must be available on a 24-hour basis to meet reasonable and expected demands, including intravenous services, phlebotomy services, messenger/transporter services, and laboratory and radiologic information retrieval systems that allow prompt access to results.

II.D.5.c) Consultations from other clinical services in the hospital must be available in a timely manner. All consultations should be performed by or under the supervision of a qualified specialist.

II.E. Medical Information Access

Fellows must have ready access to specialty-specific and other appropriate reference material in print or electronic format. Electronic medical literature databases with search capabilities should be available.

III. Fellow Appointment

III.A. Eligibility Criteria

The program director must comply with the criteria for fellow eligibility as specified in the Institutional Requirements.

III.B. Number of Fellows

The program director may not appoint more fellows than approved by the Review Committee, unless otherwise stated in the specialty-specific requirements. The program's educational resources must be adequate to support the number of fellows appointed to the program.

III.C. Fellow Transfer

III.C.1. Before accepting a fellow who is transferring from another program, the program director must obtain written or electronic verification of previous educational experiences and a summative competency-based performance evaluation of the transferring fellow.

III.C.2. A program director must provide timely verification of fellowship education and summative performance evaluations for fellows who leave the program prior to completion.

III.D. Appointment of Fellows and Other Students

The presence of other learners (including, but not limited to, residents from other specialties, subspecialty fellows, PhD students, and nurse practitioners) in the program must not interfere with the appointed fellows' education. The program director must report the presence of other learners to the DIO and GMEC in accordance with sponsoring institution guidelines.

III.E. Fellows responsibilities and professional relationships

Fellows must have clearly defined written lines of responsibility for all clinical experiences.

III.F. When averaged over any five-year period, a minimum of 75% of fellows in each subspecialty training program must be graduates of an ACGME accredited internal medicine training program. Non-ACGME internal medicine trained fellows must have at least three years of internal medicine training prior to starting fellowship. Prior to appointment, the program director must inform non-ACGME trained applicants in writing of the ABIM policies and procedures that may affect the fellow's eligibility for ABIM certification. (N.B.: Fellows in the subspecialty of geriatric medicine may be graduates of an ACGME-accredited family medicine training program.)

IV. Educational Program

IV.A. The curriculum must contain the following educational components:

IV.A.1. Overall educational goals for the program, which the program must distribute to fellows and faculty annually;

IV.A.2. Competency-based goals and objectives for each assignment at each educational level, which the program must distribute to fellows and faculty annually, in either written or electronic form. These should be reviewed by the fellow at the start of each rotation;

IV.A.2.a) for each rotation or major learning experience, the written goals and objectives:

IV.A.2.a).(1) should include the educational purpose; teaching methods; the mix of diseases, patient characteristics, and types of clinical encounters, procedures, and services; reading lists, pathological material, and other educational resources to

be used; and the method for evaluation of fellows' competence;

IV.A.2.a).(2) must define the level of fellows' supervision by faculty members in all patient-care activities; and,

IV.A.2.a).(3) should be reviewed and revised at least every three years by faculty members and fellows' to keep the goals and objectives current and relevant.

IV.A.3. Regularly scheduled didactic sessions; and,

IV.A.4. Delineation of fellow responsibilities for patient care, progressive responsibility for patient management, and supervision of fellows over the continuum of the program.

IV.A.5. ACGME Competencies

The program must integrate the following ACGME competencies into the curriculum:

IV.A.5.a) Patient Care

Fellows must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. Fellows:

IV.A.5.a).(1) are expected to learn the practice of health promotion, disease prevention, diagnosis, care, and treatment of men and women from adolescence to old age, during health and all stages of illness.

IV.A.5.b) Medical Knowledge

Fellows must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care. Fellows:

IV.A.5.b).(1) are expected to learn the scientific method of problem solving, evidence-based decision making, a commitment to lifelong learning, and an attitude of caring that is derived from humanistic and professional values.

IV.A.5.c) Practice-based Learning and Improvement

Fellows must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning. Fellows are expected to develop skills and habits to be able

to meet the following goals:

- IV.A.5.c).(1)** identify strengths, deficiencies, and limits in one's knowledge and expertise;
- IV.A.5.c).(2)** set learning and improvement goals;
- IV.A.5.c).(3)** identify and perform appropriate learning activities;
- IV.A.5.c).(4)** systematically analyze practice, using quality improvement methods, and implement changes with the goal of practice improvement;
- IV.A.5.c).(5)** incorporate formative evaluation feedback into daily practice;
- IV.A.5.c).(6)** locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems;
- IV.A.5.c).(7)** use information technology to optimize learning; and,
- IV.A.5.c).(8)** participate in the education of patients, families, students, fellows and other health professionals.

IV.A.5.d) Interpersonal and Communication Skills

Fellows must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals. Fellows are expected to:

- IV.A.5.d).(1)** communicate effectively with patients, families, and the public, as appropriate, across a broad range of socioeconomic and cultural backgrounds;
- IV.A.5.d).(2)** communicate effectively with physicians, other health professionals, and health related agencies;
- IV.A.5.d).(3)** work effectively as a member or leader of a health care team or other professional group;
- IV.A.5.d).(4)** act in a consultative role to other physicians and health professionals; and,
- IV.A.5.d).(5)** maintain comprehensive, timely, and legible medical records, if applicable.

IV.A.5.e) Professionalism

Fellows must demonstrate a commitment to carrying out

IV.B.2. Fellows should participate in scholarly activity.

IV.B.2.a) Participation in an active research program is an essential component for fellows enrolled in subspecialty fellowship training programs of 24 months or greater duration.

IV.B.2.a).(1) The program must ensure a meaningful, supervised research experience with appropriate protected time for each fellow—either in blocks or concurrent with clinical rotations—while maintaining the essential clinical experience.

IV.B.2.a).(2) Fellows must be advised and supervised by qualified faculty members in the conduct of research.

IV.B.2.a).(3) Fellows must learn the standards of ethical conduct of research, design and interpretation of research studies, responsible use of informed consent, research methodology, and interpretation of data.

IV.B.2.a).(4) The majority of fellows must demonstrate evidence of recent research productivity through:

IV.B.2.a).(4).(a) publication (manuscripts or abstracts) in peer-reviewed journals, or

IV.B.2.a).(4).(b) abstracts presented at national specialty meetings

(N.B.: Training programs in one-year critical care medicine and internal medicine-geriatric medicine are exempt from this requirement relative to research productivity by fellows.)

IV.B.3. The sponsoring institution and program should allocate adequate educational resources to facilitate fellow involvement in scholarly activities.

IV.C. Definition and Scope of Specialty

IV.C.1. Subspecialty training in internal medicine is a voluntary component in the continuum of the educational process; such training should take place after satisfactory completion of an accredited program in internal medicine.

IV.C.2. To be eligible for accreditation, a subspecialty program must function as an integral part of an accredited residency program in internal medicine.

IV.C.3. There must be a reporting relationship, to ensure compliance with the ACGME accreditation standards, from the program director of the subspecialty program to the program director of the parent internal

medicine residency program.

IV.C.4. The discipline must be one for which a certificate or a certificate of added qualifications is offered by the American Board of Internal Medicine. (For editorial purposes, the term subspecialty is used throughout the document for both types of training programs.)

IV.C.5. Subspecialty programs must provide advanced training to allow the fellow to acquire competency in the subspecialty with sufficient expertise to act as a consultant.

IV.D. Didactics

IV.D.1. Inpatient and Consultation Teaching

IV.D.1.a) Teaching and management rounds are usually combined in subspecialty training programs. These rounds must be patient-based sessions in which current cases are presented as a basis for discussion of such points as interpretation of clinical data, pathophysiology, differential diagnosis, specific management of the patient, the appropriate use of technology, the incorporation of evidence and patient values in clinical decision making, and disease prevention.

IV.D.1.b) The total teaching time spent in combined management and teaching rounds must exceed by a minimum of five hours per week the time required to supervise the care of patients.

IV.D.2. Conferences and Seminars

IV.D.2.a) Conferences must be conducted regularly as scheduled and must be attended by faculty and fellows. At a minimum, these must include:

IV.D.2.a).(1) at least one clinical conference weekly,

IV.D.2.a).(2) one literature review conference (journal club) monthly,

IV.D.2.a).(3) one research conference monthly; and,

IV.D.2.a).(4) at least one core curriculum conference weekly, when averaged over one year.

IV.D.2.a).(4).(a) The core curriculum conference series must include the basic sciences relevant to the subspecialty;

IV.D.2.a).(4).(b) The core curriculum conference series must cover the major clinical topics in the subspecialty; and,

IV.D.2.a).(4).(c) The core curriculum conference series must repeat often enough, or be made available for review on

tape or electronically, to afford each fellow an opportunity to attend or review most of the core conference topics.

IV.D.2.b) Fellows must participate in formal review of gross and microscopic pathological material from patients who have been under their care.

IV.D.2.c) Fellows must participate in planning and in conducting conferences.

IV.D.3. Interdisciplinary Topics

IV.D.3.a) Fellows should become proficient in the critical assessment of medical literature, medical informatics, clinical epidemiology, and biostatistics.

IV.D.3.b) Educational experiences should include instruction in the following: clinical ethics, medical genetics, quality assessment, quality improvement, patient safety, risk management, preventive medicine, pain management, end-of-life care, and physician impairment.

IV.E. Clinical

IV.E.1. Ambulatory medicine

IV.E.1.a) There must be on-site faculty whose primary responsibilities must include the supervision and teaching of fellows.

IV.E.1.b) Fellows must be able to obtain appropriate and timely consultation from other specialties for their ambulatory patients.

IV.E.1.c) There should be services available from other health-care professionals such as nurses, social workers, language interpreters, and dietitians.

IV.E.2. Experience with continuity ambulatory patients

IV.E.2.a) Fellows must have a continuity ambulatory clinic experience a half day each week to develop a continuous healing relationship with patients for whom they provide subspecialty care. This continuity experience should expose fellows to the breadth and depth of the subspecialty. (N.B.: May vary by subspecialty.)

This may be accomplished by either:

IV.E.2.a).(1) A single continuity clinic for the length of the accredited fellowship, or

IV.E.2.a).(2) Blocks of at least six months duration for the length of the accredited fellowship.

- IV.E.2.b) Each fellow should, on average, be responsible for four to eight patients during each half day session.
- IV.E.2.c) Over the course of accredited training, each fellow's panel of patients must include at least 25% of patients from each gender.
- IV.E.2.d) Each fellow's clinical experiences with ambulatory patients must provide fellows the opportunity to observe and to learn the course of disease.
- IV.E.2.e) The continuing patient-care experience should not be interrupted by more than one month, excluding a fellow's vacation.
- IV.E.2.f) During the continuity experience, arrangements should be made to minimize interruptions of the experience by fellows' duties on inpatient and consultation services.
- IV.E.2.g) It is suggested that fellows should be informed of the status of their continuity patients when they are hospitalized so the fellow can make appropriate arrangements to maintain continuity of care.

IV.E.3. Procedures

- IV.E.3.a) Fellows must develop a comprehensive understanding of indications, contraindications, limitations, complications, techniques, and interpretation of results of those diagnostic and therapeutic procedures integral to the discipline.
- IV.E.3.b) Fellows must acquire knowledge of and skill in educating patients about the rationale, technique, and complications of procedures and in obtaining procedure-specific informed consent.
- IV.E.3.c) Faculty supervision of procedures performed by each fellow must occur until proficiency has been acquired and documented by the program director.
- IV.E.3.d) Each program must:
 - IV.E.3.d).(1) identify key procedures;
 - IV.E.3.d).(2) define a standard for proficiency; and,
 - IV.E.3.d).(3) document achievement of proficiency.

V. Evaluation

V.A. Fellow

V.A.1. Formative Evaluation

were evaluated in writing and their performance reviewed with them verbally on completion of each rotation period.

V.A.1.d).(4)

The record of evaluation should document that fellows were evaluated in writing and their performance in continuity clinic reviewed with them verbally on at least a semiannual basis.

V.A.2. Summative Evaluation

The program director must provide a summative evaluation for each fellow upon completion of the program. This evaluation must become part of the fellow's permanent record maintained by the institution, and must be accessible for review by the fellow in accordance with institutional policy. This evaluation must:

V.A.2.a) document the fellow's performance during the final period of education, and

V.A.2.b) verify that the fellow has demonstrated sufficient competence to enter practice without direct supervision.

V.A.2.b).(1) The program director must also prepare annually a written summative evaluation of the clinical competence of each fellow. (N.B.: This summative evaluation is in addition to the completion of the ABIM tracking form.)

V.A.2.b).(2) The summative evaluation must stipulate the degree to which the fellow has achieved the level of performance expected in each Competency (i.e., patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice).

V.B. Faculty

V.B.1. At least annually, the program must evaluate faculty performance as it relates to the educational program.

V.B.2. These evaluations should include a review of the faculty's clinical teaching abilities, commitment to the educational program, clinical knowledge, professionalism, and scholarly activities.

V.B.3. This evaluation must include at least annual written confidential evaluations by fellows.

V.B.4. Provision must be made for fellows to confidentially provide written evaluations of each teaching attending at the end of a rotation, and for the evaluations to be reviewed annually with faculty.

V.B.5. Fellows should evaluate the faculty's effectiveness as teachers; fellows

must also evaluate the effectiveness of rotation or assignment in achieving the goals and objectives identified in the curriculum for that rotation or assignment.

- V.B.6. The fellows must have the opportunity to assess formally the effectiveness of ambulatory teaching on an ongoing basis.
- V.B.7. The results of the evaluations must be used for faculty-member counseling and for selecting faculty members for specific teaching assignments.

V.C. Program Evaluation and Improvement

V.C.1. The program must document formal, systematic evaluation of the curriculum at least annually. The program must monitor and track each of the following areas:

- V.C.1.a) fellow performance;**
- V.C.1.b) faculty development;**
- V.C.1.c) graduate performance, including performance of program graduates on the certification examination; and,**
 - V.C.1.c).(1) At least 80% of those eligible to take an ABIM subspecialty certifying examination upon completion of their training for the most recent five year period must have taken an ABIM subspecialty certifying examination. (Note: Five-year rolling pass rate for first time takers of the ABIM certifying examination will be examined at each program review).
- V.C.1.d) program quality. Specifically:**
 - V.C.1.d).(1) Fellows and faculty must have the opportunity to evaluate the program confidentially and in writing at least annually, and**
 - V.C.1.d).(2) The program must use the results of fellows' assessments of the program together with other program evaluation results to improve the program.**
- V.C.2. If deficiencies are found, the program should prepare a written plan of action to document initiatives to improve performance in the areas listed in section V.C.1. The action plan should be reviewed and approved by the teaching faculty and documented in meeting minutes.**

VI. Fellow Duty Hours in the Learning and Working Environment

VI.A. Professionalism, Personal Responsibility, and Patient Safety

- VI.A.1.** Programs and sponsoring institutions must educate fellows and faculty members concerning the professional responsibilities of physicians to appear for duty appropriately rested and fit to provide the services required by their patients.
- VI.A.2.** The program must be committed to and responsible for promoting patient safety and fellow well-being in a supportive educational environment.
- VI.A.3.** The program director must ensure that fellows are integrated and actively participate in interdisciplinary clinical quality improvement and patient safety programs.
- VI.A.4.** The learning objectives of the program must:
- VI.A.4.a)** be accomplished through an appropriate blend of supervised patient care responsibilities, clinical teaching, and didactic educational events; and,
 - VI.A.4.b)** not be compromised by excessive reliance on fellows to fulfill non-physician service obligations.
- VI.A.5.** The program director and institution must ensure a culture of professionalism that supports patient safety and personal responsibility. Fellows and faculty members must demonstrate an understanding and acceptance of their personal role in the following:
- VI.A.5.a)** assurance of the safety and welfare of patients entrusted to their care;
 - VI.A.5.b)** provision of patient- and family-centered care;
 - VI.A.5.c)** assurance of their fitness for duty;
 - VI.A.5.d)** management of their time before, during, and after clinical assignments;
 - VI.A.5.e)** recognition of impairment, including illness and fatigue, in themselves and in their peers;
 - VI.A.5.f)** attention to lifelong learning;
 - VI.A.5.g)** the monitoring of their patient care performance improvement indicators; and,
 - VI.A.5.h)** honest and accurate reporting of duty hours, patient outcomes, and clinical experience data.
- VI.A.6.** All fellows and faculty members must demonstrate responsiveness to patient needs that supersedes self-interest. Physicians must

recognize that under certain circumstances, the best interests of the patient may be served by transitioning that patient's care to another qualified and rested provider.

VI.B. Transitions of Care

VI.B.1. Programs must design clinical assignments to minimize the number of transitions in patient care.

VI.B.2. Sponsoring institutions and programs must ensure and monitor effective, structured hand-over processes to facilitate both continuity of care and patient safety.

VI.B.3. Programs must ensure that fellows are competent in communicating with team members in the hand-over process.

VI.B.4. The sponsoring institution must ensure the availability of schedules that inform all members of the health care team of attending physicians and fellows currently responsible for each patient's care.

VI.C. Alertness Management/Fatigue Mitigation

VI.C.1. The program must:

VI.C.1.a) educate all faculty members and fellows to recognize the signs of fatigue and sleep deprivation;

VI.C.1.b) educate all faculty members and fellows in alertness management and fatigue mitigation processes; and,

VI.C.1.c) adopt fatigue mitigation processes to manage the potential negative effects of fatigue on patient care and learning, such as naps or back-up call schedules.

VI.C.2. Each program must have a process to ensure continuity of patient care in the event that a fellow may be unable to perform his/her patient care duties.

VI.C.3. The sponsoring institution must provide adequate sleep facilities and/or safe transportation options for fellows who may be too fatigued to safely return home.

VI.D. Supervision of Fellows

VI.D.1. In the clinical learning environment, each patient must have an identifiable, appropriately-credentialed and privileged attending physician (or licensed independent practitioner as approved by each Review Committee) who is ultimately responsible for that patient's care.

VI.D.1.a) This information should be available to fellows, faculty

members, and patients.

VI.D.1.b) Fellows and faculty members should inform patients of their respective roles in each patient's care.

VI.D.2. The program must demonstrate that the appropriate level of supervision is in place for all fellows who care for patients.

Supervision may be exercised through a variety of methods. Some activities require the physical presence of the supervising faculty member. For many aspects of patient care, the supervising physician may be a more advanced resident or fellow. Other portions of care provided by the fellow can be adequately supervised by the immediate availability of the supervising faculty member or fellow physician, either in the institution, or by means of telephonic and/or electronic modalities. In some circumstances, supervision may include post-hoc review of fellow-delivered care with feedback as to the appropriateness of that care.

VI.D.3. Levels of Supervision

To ensure oversight of fellow supervision and graded authority and responsibility, the program must use the following classification of supervision:

VI.D.3.a) Direct Supervision – the supervising physician is physically present with the fellow and patient.

VI.D.3.b) Indirect Supervision:

VI.D.3.b).(1) with direct supervision immediately available – the supervising physician is physically within the hospital or other site of patient care, and is immediately available to provide Direct Supervision.

VI.D.3.b).(2) with direct supervision available – the supervising physician is not physically present within the hospital or other site of patient care, but is immediately available by means of telephonic and/or electronic modalities, and is available to provide Direct Supervision.

VI.D.3.c) Oversight – the supervising physician is available to provide review of procedures/encounters with feedback provided after care is delivered.

VI.D.4. The privilege of progressive authority and responsibility, conditional independence, and a supervisory role in patient care delegated to each fellow must be assigned by the program director and faculty members.

- VI.D.4.a)** The program director must evaluate each fellow's abilities based on specific criteria. When available, evaluation should be guided by specific national standards-based criteria.
- VI.D.4.b)** Faculty members functioning as supervising physicians should delegate portions of care to fellows, based on the needs of the patient and the skills of the fellows.
- VI.D.4.c)** Senior residents or fellows should serve in a supervisory role of junior residents in recognition of their progress toward independence, based on the needs of each patient and the skills of the individual resident or fellow.
- VI.D.5.** Programs must set guidelines for circumstances and events in which fellows must communicate with appropriate supervising faculty members, such as the transfer of a patient to an intensive care unit, or end-of-life decisions.
- VI.D.5.a)** Each fellow must know the limits of his/her scope of authority, and the circumstances under which he/she is permitted to act with conditional independence.
- VI.D.5.a).(1)** In particular, PGY-1 residents should be supervised either directly or indirectly with direct supervision immediately available.
- VI.D.6.** Faculty supervision assignments should be of sufficient duration to assess the knowledge and skills of each fellow and delegate to him/her the appropriate level of patient care authority and responsibility.
- VI.E. Clinical Responsibilities**
- The clinical responsibilities for each fellow must be based on PGY-level, patient safety, fellow education, severity and complexity of patient illness/condition and available support services.
- VI.F. Teamwork**
- Fellows must care for patients in an environment that maximizes effective communication. This must include the opportunity to work as a member of effective interprofessional teams that are appropriate to the delivery of care in the specialty.
- VI.G. Fellow Duty Hours**
- VI.G.1. Maximum Hours of Work per Week**
- Duty hours must be limited to 80 hours per week, averaged over a four-week period, inclusive of all in-house call activities and all moonlighting.

VI.G.1.a) Duty Hour Exceptions

A Review Committee may grant exceptions for up to 10% or a maximum of 88 hours to individual programs based on a sound educational rationale.

The Review Committee for Internal Medicine will not consider requests for exceptions to the 80-hour limit to the fellows' work week.

VI.G.1.a).(1) In preparing a request for an exception the program director must follow the duty hour exception policy from the ACGME Manual on Policies and Procedures.

VI.G.1.a).(2) Prior to submitting the request to the Review Committee, the program director must obtain approval of the institution's GMEC and DIO.

VI.G.2. Moonlighting

VI.G.2.a) Moonlighting must not interfere with the ability of the fellow to achieve the goals and objectives of the educational program.

VI.G.2.b) Time spent by fellows in Internal and External Moonlighting (as defined in the ACGME Glossary of Terms) must be counted towards the 80-hour Maximum Weekly Hour Limit.

VI.G.2.c) PGY-1 residents are not permitted to moonlight.

VI.G.3. Mandatory Time Free of Duty

Fellows must be scheduled for a minimum of one day free of duty every week (when averaged over four weeks). At-home call cannot be assigned on these free days.

VI.G.4. Maximum Duty Period Length

VI.G.4.a) Duty periods of PGY-1 residents must not exceed 16 hours in duration.

VI.G.4.b) Duty periods of PGY-2 residents and above may be scheduled to a maximum of 24 hours of continuous duty in the hospital. Programs must encourage fellows to use alertness management strategies in the context of patient care responsibilities. Strategic napping, especially after 16 hours of continuous duty and between the hours of 10:00 p.m. and 8:00 a.m., is strongly suggested.

VI.G.4.b).(1) It is essential for patient safety and fellow education

that effective transitions in care occur. Fellows may be allowed to remain on-site in order to accomplish these tasks; however, this period of time must be no longer than an additional four hours.

VI.G.4.b).(2)

Fellows must not be assigned additional clinical responsibilities after 24 hours of continuous in-house duty.

VI.G.4.b).(3)

In unusual circumstances, fellows, on their own initiative, may remain beyond their scheduled period of duty to continue to provide care to a single patient. Justifications for such extensions of duty are limited to reasons of required continuity for a severely ill or unstable patient, academic importance of the events transpiring, or humanistic attention to the needs of a patient or family.

VI.G.4.b).(3).(a)

Under those circumstances, the fellow must:

VI.G.4.b).(3).(a).(i)

appropriately hand over the care of all other patients to the team responsible for their continuing care; and,

VI.G.4.b).(3).(a).(ii)

document the reasons for remaining to care for the patient in question and submit that documentation in every circumstance to the program director.

VI.G.4.b).(3).(b)

The program director must review each submission of additional service, and track both individual fellow and program-wide episodes of additional duty.

VI.G.5.

Minimum Time Off between Scheduled Duty Periods

VI.G.5.a)

PGY-1 residents should have 10 hours, and must have eight hours, free of duty between scheduled duty periods.

VI.G.5.b)

Intermediate-level should have 10 hours free of duty, and must have eight hours between scheduled duty periods. They must have at least 14 hours free of duty after 24 hours of in-house duty.

VI.G.5.c)

Residents in the final years of education must be prepared to enter the unsupervised practice of medicine and care for patients over irregular or extended periods.

Internal medicine subspecialty fellows are considered to be in the final years of education.

VI.G.5.c).(1) This preparation must occur within the context of the 80-hour, maximum duty period length, and one-day-off-in-seven standards. While it is desirable that fellows in their final years of education have eight hours free of duty between scheduled duty periods, there may be circumstances when these fellows must stay on duty to care for their patients or return to the hospital with fewer than eight hours free of duty.

VI.G.5.c).(1).(a) Circumstances of return-to-hospital activities with fewer than eight hours away from the hospital by residents in their final years of education must be monitored by the program director.

VI.G.5.c).(1).(b) In unusual circumstances, fellows may remain beyond their scheduled period of duty or return after their scheduled period of duty to provide care to a single patient. Justifications for such extensions of duty are limited to reasons of required continuity of care for a severely ill or unstable patient, academic importance of the events transpiring, or humanistic attention to the needs of the patient or family. Such episodes should be rare, must be of the fellows' own initiative, and need not initiate a new 'off-duty period' nor require a change in the scheduled 'off-duty period.'

VI.G.5.c).(1).(c) Under such circumstances, the fellow must appropriately hand over care of all other patients to the team responsible for their continuing care, and document the reasons for remaining or returning to care for the patient in question and submit that documentation to the program director.

VI.G.5.c).(1).(d) The program director must review each submission of additional service and track both individual fellows' and program-wide episodes of additional duty.

VI.G.6. Maximum Frequency of In-House Night Float

Fellows must not be scheduled for more than six consecutive nights of night float.

VI.G.7. Maximum In-House On-Call Frequency

PGY-2 residents and above must be scheduled for in-house call no more frequently than every-third-night (when averaged over a four-week period).

VI.G.7.a) Internal Medicine fellowships must not average in-house call over a four-week period.

VI.G.8. At-Home Call

VI.G.8.a) Time spent in the hospital by fellows on at-home call must count towards the 80-hour maximum weekly hour limit. The frequency of at-home call is not subject to the every-third-night limitation, but must satisfy the requirement for one-day-in-seven free of duty, when averaged over four weeks.

VI.G.8.a).(1) At-home call must not be so frequent or taxing as to preclude rest or reasonable personal time for each fellow.

VI.G.8.b) Fellows are permitted to return to the hospital while on at-home call to care for new or established patients. Each episode of this type of care, while it must be included in the 80-hour weekly maximum, will not initiate a new “off-duty period”.

VII. Innovative Projects

Requests for innovative projects that may deviate from the institutional, common and/or specialty specific program requirements must be approved in advance by the Review Committee. In preparing requests, the program director must follow Procedures for Approving Proposals for Innovative Projects located in the ACGME Manual on Policies and Procedures. Once a Review Committee approves a project, the sponsoring institution and program are jointly responsible for the quality of education offered to fellows for the duration of such a project.

VII.A. Performance Improvement Process

VII.A.1. The program should identify and participate in at least one ongoing performance improvement activity which relates to the competencies.

VII.A.2. The performance improvement activities must involve both fellows and faculty members in planning and implementing.

VII.A.3. The performance improvement activities should result in measurable improvements in patient care or fellowship education.

VIII. Educational Program

VIII.A. A subspecialty educational program in hematology must be organized to provide training and supervised experience at a level sufficient for the fellow to acquire the competency of a specialist in the field.

VIII.B. The training program must be 2 years in duration.

- VIII.C. At least 12 months of the program must be devoted to clinical training.
- VIII.D. The program should provide at least 1 month of clinical experienced in autologous and allogeneic bone marrow transplantation.
- VIII.E. Ambulatory Clinics
 - VIII.E.1. The program must provide fellows with continuity experiences of at least 6 months in duration in an ambulatory care setting at least 1/2 day each week over the 24 months of training.
 - VIII.E.2. In addition to continuity clinic, at least 10% of the required 12 months of clinical training must be spent in an ambulatory setting (i.e., the equivalent of 48 half-day sessions).

IX. Faculty

See Program Requirements for Graduate Medical Education in the Subspecialties of Internal Medicine.

X. Facilities and Resources

In addition to the facilities and resources outlined in the Program Requirements for Graduate Medical Education in the Subspecialties of Internal Medicine, each of the following must be present at the primary training site:

- X.A. Diagnostic Laboratory Services
 - X.A.1. hematology laboratory;
 - X.A.2. access to a specialized coagulation laboratory (N.B.: These may be located at institutions other than the primary training site.).
- X.B. Radiology and Imaging
 - X.B.1. nuclear medicine imaging;
 - X.B.2. radiation oncology facilities.
- X.C. Surgery and Pathology
 - X.C.1. advanced pathology services, including
 - X.C.1.a) immunopathology resources;
 - X.C.1.b) blood banking (N.B.: These may be located at institutions other than the primary training site.);
 - X.C.1.c) transfusion and apheresis facilities.
 - X.C.2. general surgery and surgical specialties.

X.D. Other Facilities, Resources, or Support Services

X.D.1. Faculty members who are subspecialty certified by the American Board of Internal Medicine in their respective disciplines in infectious disease, pulmonary disease, endocrinology, gastroenterology, and oncology must be available to participate in the education of fellows in hematology.

X.D.2. The program must also participate in a multidisciplinary case management or tumor conference that includes discussion of neoplastic blood disorders and hematologic-oncology protocol studies.

X.D.3. There should be a medical oncology clinical program with which hematology fellows may interact formally in an educational experience.

X.D.4. So that the fellow may see the role of other specialties in the total care of patients with hematologic and/or neoplastic diseases, the program should have the support of:

X.D.4.a) nursing;

X.D.4.b) rehabilitation medicine;

X.D.4.c) pain management;

X.D.4.d) dietetics; and

X.D.4.e) social services.

X.E. Patient Population

See Program Requirements for Graduate Medical Education in the Subspecialties of Internal Medicine.

XI. Specific Program Content

XI.A. Clinical Experience

XI.A.1. Fellows must have formal instruction, clinical experience, or opportunities to acquire knowledge and demonstrate competence in the prevention, evaluation, and management of:

XI.A.1.a) acquired and congenital disorders of red cells, white cells, platelets and stem cells;

XI.A.1.b) hematopoietic and lymphopoietic malignancies, including disorders of plasma cells;

XI.A.1.c) congenital and acquired disorders of hemostasis and thrombosis, including the use of antithrombotic therapy;

- XI.A.1.d) transfusion medicine, including the evaluation of antibodies, blood compatibility, and the indications for and complications of blood component therapy and apheresis procedures;
- XI.A.1.e) effects of systemic disorders and drugs on the blood, blood-forming organs, and lymphatic tissues;
- XI.A.1.f) chemotherapeutic drugs, biologic products, and growth factors and their mechanisms of action; pharmacokinetics, clinical indications, and their limitations, including their effects, toxicity, and interactions;
- XI.A.1.g) management and care of indwelling venous access catheters;
- XI.A.1.h) correlation of clinical information with cytology, histology, and immunodiagnostic imaging techniques;
- XI.A.1.i) principles and application of radiation medicine to hematopoietic and lymphopoietic malignancies;
- XI.A.1.j) management of the neutropenic and the immunocompromised patient;
- XI.A.1.k) treatment of patients with disorders of hemostasis and the biochemistry and pharmacology of coagulation factor replacement therapy;
- XI.A.1.l) indications and application of imaging techniques in patients with blood disorders;
- XI.A.1.m) personal development, attitudes, and coping skills of physicians and other health-care professionals who care for critically ill patients;
- XI.A.1.n) pain management in patients with blood disorders;
- XI.A.1.o) rehabilitation and psychosocial aspects of clinical management of patients with hematologic disorders;
- XI.A.1.p) palliative care, including hospice and home care;
- XI.A.1.q) recognition and management of paraneoplastic disorders;
- XI.A.1.r) participation in a multidisciplinary case management conference or discussion;
- XI.A.1.s) human immunodeficiency virus-related malignancies;
- XI.A.1.t) care and management of geriatric patients with hematologic disorders;

- XI.A.1.u) principles of, indications for, and complications of autologous and allogeneic bone marrow or peripheral blood stem cell transplantation and peripheral stem cell harvests, including the management of posttransplant complications; and
- XI.A.1.v) concepts of supportive care, including hematologic, infectious disease, and nutrition.
- XI.A.2. Hematology consultation with other physicians.
- XI.A.3. Other Experiences

Fellows must have experiences in the use of chemotherapeutic agents and biological products through all therapeutic routes.
- XI.B. Technical and Other Skills
- XI.B.1. Fellows must demonstrate competence in the performance and/or (where applicable) interpretation of the following:
 - XI.B.1.a) bone marrow aspiration and biopsy;
 - XI.B.1.b) preparation, staining, and interpretation of blood smears, bone marrow aspirates, and touch preparations as well as interpretation of bone marrow biopsies; and
 - XI.B.1.c) complete blood count, including platelets and white cell differential, by means of automated or manual techniques, with appropriate quality control.
- XI.B.2. The program should provide formal instruction and clinical experience of the following:
 - XI.B.2.a) apheresis procedures
 - XI.B.2.b) performance and interpretation of partial thromboplastin time, prothrombin time, platelet aggregation, and bleeding time, as well as other standard coagulation assays;
 - XI.B.2.c) blood banking and current blood bank practice;
 - XI.B.2.d) clinical experience in bone marrow or peripheral stem cell harvest for transplantation;
 - XI.B.2.e) formal instruction and at least one month of clinical experience in allogeneic and autologous bone marrow or peripheral blood stem cell transplantation, and in the nature and management of posttransplant complications; and,
 - XI.B.2.f) test of hemostasis.

XI.C. Formal Instruction

The training program must provide formal instruction for the fellows to acquire knowledge of the following content areas:

- XI.C.1. Pathogenesis, diagnosis and treatment of disease.
 - XI.C.1.a) basic molecular and pathophysiologic mechanisms, diagnosis, and therapy of diseases of the blood, including anemias, diseases of white blood cells and stem cells, and disorders of hemostasis and thrombosis, and
 - XI.C.1.b) etiology, epidemiology, natural history, diagnosis, pathology, staging, and management of neoplastic diseases of the blood, blood-forming organs, and lymphatic tissues.
- XI.C.2. Genetics and developmental biology
 - XI.C.2.a) molecular genetics;
 - XI.C.2.b) prenatal diagnosis;
 - XI.C.2.c) the nature of oncogenes and their products; and
 - XI.C.2.d) cytogenetics.
- XI.C.3. Physiology and pathophysiology
 - XI.C.3.a) cell and molecular biology;
 - XI.C.3.b) hematopoiesis;
 - XI.C.3.c) principles of oncogenesis;
 - XI.C.3.d) tumor immunology;
 - XI.C.3.e) molecular mechanisms of hematopoietic and lymphopoietic malignancies;
 - XI.C.3.f) basic and clinical pharmacology, pharmacokinetics, toxicity; and
 - XI.C.3.g) pathophysiology and patterns of tumor metastases.
- XI.C.4. Clinical epidemiology and biostatistics
 - XI.C.4.a) clinical epidemiology and medical statistics; and
 - XI.C.4.b) clinical study and experimental protocol design, data collection, and analysis.
- XI.C.5. Basic principles of laboratory and clinical testing, quality control, quality

assurance and proficiency standards.

- XI.C.6. Immune markers, immunophenotyping, flow cytometry, cytochemical studies, and cytogenetic and DNA analysis of neoplastic disorders.
- XI.C.7. Malignant and hematologic complications of organ transplantation.
- XI.C.8. Gene therapy.

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