

1 **ACGME Program Requirements for Graduate Medical Education**
2 **in Nuclear Radiology**

3
4 **Common Program Requirements are in BOLD**
5 *General Subspecialty Requirements are in ITALICS*

6
7 *Effective: January, 2005*
8

9 In addition to complying with the Program Requirements for Graduate Medical Education in the
10 Subspecialties of Diagnostic Radiology, programs must comply with the following requirements,
11 which may in some cases exceed the common requirements.
12

13 I. Introduction

14 I.A. Definition and Scope of the Specialty

15
16 Nuclear radiology is defined as a clinical subspecialty of radiology involving the
17 diagnostic and therapeutic use of radioactive materials using unsealed sources.
18 The three basic applications include:
19

20
21 I.A.1. diagnostic imaging by external detection of radionuclides and/or bio-
22 distribution by external detection of radionuclides in the body;
23

24 I.A.2. diagnostic in vivo or combination in vivo/in vitro procedures that involve
25 the administration and detection of radioactivity by non-imaging methods;
26

27 I.A.3. Therapeutic administration of radionuclides (excluding sealed sources).
28

29 **Introduction**

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

35
36 The specialty education of physicians to practice independently is
37 experiential, and necessarily occurs within the context of the health care
38 delivery system. Developing the skills, knowledge, and attitudes leading to
39 proficiency in all the domains of clinical competency requires the resident
40 and fellow physician to assume personal responsibility for the care of
41 individual patients. For the resident and fellow, the essential learning
42 activity is interaction with patients under the guidance and supervision of
43 faculty members who give value, context, and meaning to those
44 interactions. As residents and fellows gain experience and demonstrate
45 growth in their ability to care for patients, they assume roles that permit
46 them to exercise those skills with greater independence. This concept—
47 graded and progressive responsibility—is one of the core tenets of
48 American graduate medical education. Supervision in the setting of
49 graduate medical education has the goals of assuring the provision of safe
50 and effective care to the individual patient; assuring each resident's and
51 fellow's development of the skills, knowledge, and attitudes required to

52 **enter the unsupervised practice of medicine; and establishing a foundation**
53 **for continued professional growth.**

54
55 I.B. ~~Duration and Scope of Education~~

56
57 ~~The program shall offer 1 year of graduate medical education in nuclear~~
58 ~~radiology.~~

59
60 I.B. ~~Definition and Scope of Fellowship~~

61
62 ~~*A fellowship program in a subspecialty of diagnostic radiology is an educational*~~
63 ~~*experience of at least one year designed to develop advanced knowledge and*~~
64 ~~*skills in a specific clinical area. The program design and/or structure must be*~~
65 ~~*approved by the Review Committee as part of the regular review process.*~~

66
67 I.C. ~~Prerequisite Training~~

68
69 ~~The year of nuclear medicine training should follow successful completion of a~~
70 ~~diagnostic radiology residency accredited by the Accreditation Council for~~
71 ~~Graduate Medical Education (ACGME) or the Royal College of Physicians and~~
72 ~~Surgeons of Canada (RCPSC) or other training judged suitable by the program~~
73 ~~director.~~

74
75 Int.B. Nuclear radiology is defined as a clinical subspecialty of radiology involving the
76 diagnostic and therapeutic use of radioactive materials using unsealed sources.
77 Radiologists select, interpret, and perform procedures, including diagnostic
78 imaging by external detection of radionuclides, diagnostic in vivo or combination
79 in vivo/in vitro procedures that involve the administration and detection of
80 radioactivity by non-imaging means, and therapeutic administration of
81 radionuclides.

82
83 Int.C. The educational program in nuclear radiology must be 12 months in length.

84
85 II. ~~Institutional Organization~~

86
87 II.A. ~~A training program in nuclear radiology will be accredited only in those~~
88 ~~institutions that have an accredited training program in diagnostic radiology.~~

89
90 II.B. ~~The nuclear radiology program will be reviewed and accredited in conjunction~~
91 ~~with the review and accreditation of the residency program in diagnostic~~
92 ~~radiology.~~

93
94 II.C. ~~Those aspects of institutional support that pertain to residencies in diagnostic~~
95 ~~radiology shall also apply to programs in nuclear radiology; e.g., administrative~~
96 ~~support, facilities, and clinical resources.~~

97
98 **I. Institutions**

99
100 **I.A. Sponsoring Institution**

101
102 **One sponsoring institution must assume ultimate responsibility for the**

103 program, as described in the Institutional Requirements, and this
104 responsibility extends to fellow assignments at all participating sites.
105

106 The sponsoring institution and the program must ensure that the program
107 director has sufficient protected time and financial support for his or her
108 educational and administrative responsibilities to the program.
109

110 I.A.1. The sponsoring institution must also sponsor an ACGME-accredited
111 program in diagnostic radiology.
112

113 **I.B. Participating Sites**
114

115 **I.B.1. There must be a program letter of agreement (PLA) between the**
116 **program and each participating site providing a required**
117 **assignment. The PLA must be renewed at least every five years.**
118

119 The PLA should:
120

121 **I.B.1.a) identify the faculty who will assume both educational and**
122 **supervisory responsibilities for fellows;**
123

124 **I.B.1.b) specify their responsibilities for teaching, supervision, and**
125 **formal evaluation of fellows, as specified later in this**
126 **document;**
127

128 **I.B.1.c) specify the duration and content of the educational**
129 **experience; and,**
130

131 **I.B.1.d) state the policies and procedures that will govern fellow**
132 **education during the assignment.**
133

134 **I.B.2. The program director must submit any additions or deletions of**
135 **participating sites routinely providing an educational experience,**
136 **required for all fellows, of one month full time equivalent (FTE) or**
137 **more through the Accreditation Council for Graduate Medical**
138 **Education (ACGME) Accreditation Data System (ADS).**
139

140 ~~I.B.3. The program should be based at a primary hospital. A program using~~
141 ~~multiple sites must ensure the provision of a unified educational~~
142 ~~experience for the residents. Each participating site must offer significant~~
143 ~~educational opportunities to the overall program. Service responsibility~~
144 ~~alone at a participating site is not a suitable educational experience.~~
145

146 ~~I.B.4. Programs should avoid affiliations with sites at such distances from the~~
147 ~~primary hospital as to make resident attendance at rounds and~~
148 ~~conferences impractical, unless there is a comparable educational~~
149 ~~experience at the site.~~
150

151 **II. Program Personnel and Resources**
152

153 **II.A. Program Director**

- 154
155 **II.A.1.** **There must be a single program director with authority and**
156 **accountability for the operation of the program. The sponsoring**
157 **institution’s GMEC must approve a change in program director.**
158 **After approval, the program director must submit this change to the**
159 **ACGME via the ADS.**
160
161 *II.A.1.a) The program director should spend at least 80% of his or her*
162 *professional time in the subspecialty, and devote sufficient time (at*
163 *a minimum 10%) to fulfill all responsibilities inherent in meeting*
164 *the educational goals of the program.*
165
166 **II.A.2. Qualifications of the program director must include:**
167
168 **II.A.2.a) requisite specialty expertise and documented educational**
169 **and administrative experience acceptable to the Review**
170 **Committee;**
171
172 **II.A.2.b) current certification in the subspecialty by the American**
173 **Board of Radiology or subspecialty qualifications that are**
174 **acceptable to the Review Committee;**
175
176 *II.A.2.b).(1) In lieu of subspecialty certification by the American Board*
177 *of Radiology, the Review Committee only accepts current*
178 *certification by the American Board of Nuclear Medicine.*
179
180 **II.A.2.c) current medical licensure and appropriate medical staff**
181 **appointment; and,**
182
183 *II.A.2.d) post-residency experience in nuclear radiology, including*
184 *fellowship education.*
185
186 **II.A.3. The program director must administer and maintain an educational**
187 **environment conducive to educating the fellows in each of the**
188 **ACGME competency areas. The program director must:**
189
190 **II.A.3.a) prepare and submit all information required and requested by**
191 **the ACGME;**
192
193 **II.A.3.b) be familiar with and oversee compliance with ACGME and**
194 **Review Committee policies and procedures as outlined in the**
195 **ACGME Manual of Policies and Procedures;**
196
197 **II.A.3.c) obtain review and approval of the sponsoring institution’s**
198 **GMEC/DIO before submitting to the ACGME information or**
199 **requests for the following:**
200
201 **II.A.3.c).(1) all applications for ACGME accreditation of new**
202 **programs;**
203
204 **II.A.3.c).(2) changes in fellow complement;**

- 205
206 **II.A.3.c).(3)** major changes in program structure or length of
207 training;
208
- 209 **II.A.3.c).(4)** progress reports requested by the Review Committee;
210
- 211 **II.A.3.c).(5)** responses to all proposed adverse actions;
212
- 213 **II.A.3.c).(6)** requests for increases or any change to fellow duty
214 hours;
215
- 216 **II.A.3.c).(7)** voluntary withdrawals of ACGME-accredited
217 programs;
218
- 219 **II.A.3.c).(8)** requests for appeal of an adverse action; and,
220
- 221 **II.A.3.c).(9)** appeal presentations to a Board of Appeal or the
222 ACGME.
223
- 224 **II.A.3.d)** obtain DIO review and co-signature on all program
225 information forms, as well as any correspondence or
226 document submitted to the ACGME that addresses:
227
- 228 **II.A.3.d).(1)** program citations, and/or
229
- 230 **II.A.3.d).(2)** request for changes in the program that would have
231 significant impact, including financial, on the program
232 or institution.
233
- 234 **II.A.3.e)** develop and implement a supervision policy that specifies lines of
235 responsibility for program faculty members and fellows that is
236 consistent with the supervision policy for diagnostic radiology
237 residents.
238
- 239 **III.—— Faculty Qualifications and Responsibilities**
240
- 241 **III.A.——** ~~The program director is responsible for the instructional program and for~~
242 ~~supervision of the nuclear radiology fellows.~~
243
- 244 **III.B.——** ~~The program director shall be certified by the American Board of Radiology in~~
245 ~~Diagnostic Radiology or Radiology and have subspecialty certification (CAQ) in~~
246 ~~Nuclear Radiology; or shall be certified by the American Board of Nuclear~~
247 ~~Medicine; or possess qualifications judged acceptable by the RRC for Diagnostic~~
248 ~~Radiology.~~
249
- 250 **III.C.——** ~~It is desirable that faculty members be certified in boards appropriate to those~~
251 ~~areas in which they are assigned to instruct and supervise fellows.~~
252
- 253 **III.D.——** ~~They must contribute sufficient time to the program to provide adequate~~
254 ~~instruction and supervision.~~
255

256 ~~III.E. A faculty (nuclear medicine physician) to fellow ratio of 1:2 should adequately~~
257 ~~provide for teaching and supervisory responsibilities.~~

258
259 **II.B. Faculty**

260
261 **II.B.1. There must be a sufficient number of faculty with documented**
262 **qualifications to instruct and supervise all fellows.**

263
264 II.B.1.a) In addition to the program director, the program must include at
265 least one other FTE faculty member experienced in nuclear
266 radiology.

267
268 II.B.1.b) To ensure adequate supervision and evaluation of fellows'
269 academic progress, there must be at least one FTE faculty
270 member for each fellow.

271
272 **II.B.2. The faculty must devote sufficient time to the educational program**
273 **to fulfill their supervisory and teaching responsibilities and**
274 **demonstrate a strong interest in the education of fellows.**

275
276 **II.B.3. The physician faculty must have current certification in the**
277 **subspecialty by the American Board of Radiology or possess**
278 **qualifications acceptable to the Review Committee.**

279
280 II.B.3.a) In addition, faculty members must be certified either by the
281 American Board of Radiology in diagnostic radiology or radiology
282 or by the American Board of Nuclear Medicine, or possess
283 qualifications acceptable to the Review Committee.

284
285 **II.B.4. The physician faculty must possess current medical licensure and**
286 **appropriate medical staff appointment.**

287
288 II.B.5. Faculty members outside the specialties of diagnostic radiology and
289 nuclear medicine should be certified by the appropriate ABMS boards.

290
291 **II.C. Other Program Personnel**

292
293 **The institution and the program must jointly ensure the availability of all**
294 **necessary professional, technical, and clerical personnel for the effective**
295 **administration of the program.**

296
297 II.C.1. *A program coordinator must devote sufficient time to support the*
298 *administration and educational conduct of the program.*

299
300 ~~IV. Facilities and Resources~~

301
302 ~~State-of-the-art nuclear imaging, including positron emission tomography (PET) and~~
303 ~~radiation detection equipment, should be available for instructional purposes.~~

304
305 **II.D. Resources**

306

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

310
311 II.D.1. *The program must have facilities and space for the education of the*
312 *fellows. There must be study space, conference space, and access to*
313 *computers.*

314
315 II.D.2. State-of-the-art nuclear imaging equipment, including Single Photon
316 Emission Computed Tomography (SPECT) and Positron Emission
317 Tomography/Computed Tomography (PET/CT), must be available for
318 instructional purposes.

319
320 **II.E. Medical Information Access**

321
322 **Fellows must have ready access to specialty-specific and other appropriate**
323 **reference material in print or electronic format. Electronic medical literature**
324 **databases with search capabilities should be available.**

325
326 **III. Fellow Appointments**

327
328 **III.A. Eligibility Criteria**

329
330 **Each fellow must successfully complete an ACGME-accredited specialty**
331 **program and/or meet other eligibility criteria as specified by the Review**
332 **Committee. The program must document that each fellow has met the**
333 **eligibility criteria.**

334
335 III.A.1. *Prerequisite education for entry into the fellowship program should*
336 *include the satisfactory completion of a diagnostic radiology residency*
337 *program accredited by the ACGME or the Royal College of Physicians*
338 *and Surgeons of Canada (RCPSC).*

339
340 **III.B. Number of Fellows**

341
342 **The program director may not appoint more fellows than approved by the**
343 **Review Committee, unless otherwise stated in the specialty-specific**
344 **requirements. The program's educational resources must be adequate to**
345 **support the number of fellows appointed to the program.**

346
347 III.B.1. *The presence of other learners in the program, {including, but not limited*
348 *to residents from other specialties, subspecialty fellows, PhD students,*
349 *and nurse practitioners}, must not interfere with the appointed fellows'*
350 *education.*

351
352 ~~V. Educational Program~~

353
354 ~~The educational program must provide for well-balanced and progressive participation of~~
355 ~~the fellow through examination of a diverse patient population, with continuous teaching~~
356 ~~and an active research effort in nuclear radiology.~~

357

358 **IV. Educational Program**
359
360 **IV.A. The curriculum must contain the following educational components:**
361
362 **IV.A.1. Skills and competencies the fellow will be able to demonstrate at the**
363 **conclusion of the program. The program must distribute these skills**
364 **and competencies to fellows and faculty annually, in either written**
365 **or electronic form. These skills and competencies should be**
366 **reviewed by the fellow at the start of each rotation;**
367
368 IV.A.1.a) Competency-based goals and objectives for each rotation must be
369 made available annually to fellows and faculty members.
370
371 ~~V.A. Clinical Component~~
372
373 ~~V.A.1. The training program shall include graduated study, experience, and~~
374 ~~responsibility in all facets of nuclear radiological diagnosis and therapy,~~
375 ~~medical nuclear and diagnostic radiological physics, radiobiology, health~~
376 ~~physics and protection, nuclear medical instrumentation,~~
377 ~~radiopharmaceutical chemistry and instrumentation, clinical applications~~
378 ~~of nuclear radiology, and pathology.~~
379
380 ~~V.A.2. The program must provide adequate opportunity for a fellow to participate~~
381 ~~in and personally perform a broad range of nuclear radiological~~
382 ~~procedures, including PET scanning.~~
383
384 **IV.A.2. ACGME Competencies**
385
386 **The program must integrate the following ACGME competencies**
387 **into the curriculum:**
388
389 **IV.A.2.a) Patient Care**
390
391 **Fellows must be able to provide patient care that is**
392 **compassionate, appropriate, and effective for the treatment of**
393 **health problems and the promotion of health. Fellows:**
394
395 IV.A.2.a).(1) *must have the opportunity to provide consultation with*
396 *referring physicians or services;*
397
398 IV.A.2.a).(2) *should have a clearly defined role in educating diagnostic*
399 *radiology residents, and if appropriate, medical students*
400 *and other professional personnel in the care and*
401 *management of patients;*
402
403 IV.A.2.a).(3) *must follow standards of care for practicing in a safe*
404 *environment, attempt to reduce errors, and improve patient*
405 *outcomes;*
406
407 IV.A.2.a).(4) *must apply low-dose radiation techniques in both adults*
408 *and children;*

409		
410	IV.A.2.a).(5)	<i>must have the opportunity to perform and interpret all</i>
411		<i>specified exams and/or invasive studies under close,</i>
412		<i>graded responsibility and supervision;</i>
413		
414	IV.A.2.a).(6)	<u>must demonstrate competence interpreting the following:</u>
415		
416	IV.A.2.a).(6).(a)	<u>cardiac imaging, including:</u>
417		
418	IV.A.2.a).(6).(a).(i)	<u>myocardial perfusion imaging procedures</u>
419		<u>performed with radioactive perfusion agents</u>
420		<u>in association with treadmill and</u>
421		<u>pharmacologic stress (planar and</u>
422		<u>tomographic, including gated tomographic</u>
423		<u>imaging); and,</u>
424		
425	IV.A.2.a).(6).(a).(ii)	<u>radionuclide ventriculography performed</u>
426		<u>with electrocardiogram (ECG) gating for</u>
427		<u>evaluation of ventricular performance.</u>
428		
429	IV.A.2.a).(6).(b)	<u>endocrinologic studies, including thyroid and</u>
430		<u>parathyroid imaging, as well as octreotide and other</u>
431		<u>receptor-based imaging studies;</u>
432		
433	IV.A.2.a).(6).(c)	<u>gastrointestinal studies of the salivary glands,</u>
434		<u>esophagus, stomach, and liver, both</u>
435		<u>reticuloendothelial function and the biliary system,</u>
436		<u>also to include studies of gastrointestinal bleeding</u>
437		<u>and Meckel diverticulum;</u>
438		
439	IV.A.2.a).(6).(d)	<u>genitourinary track studies, including renal</u>
440		<u>perfusion and function procedures, renal</u>
441		<u>scintigraphy with pharmacologic interventions, renal</u>
442		<u>transplant evaluation, and vesicoureteral reflux;</u>
443		
444	IV.A.2.a).(6).(e)	<u>musculoskeletal studies, including bone scanning</u>
445		<u>for benign and malignant disease,</u>
446		
447	IV.A.2.a).(6).(f)	<u>neurologic studies, including cerebral perfusion with</u>
448		<u>both SPECT and/or PET, cisternography and</u>
449		<u>Cerebral Spinal Fluid (CSF) flow studies;</u>
450		
451	IV.A.2.a).(6).(g)	<u>oncology studies, including sentinel node</u>
452		<u>localization, fluorodeoxyglucose (FDG), adrenal,</u>
453		<u>somatostatin-receptor imaging, and other agents as</u>
454		<u>they become available;</u>
455		
456	IV.A.2.a).(6).(h)	<u>PET imaging, including:</u>
457		
458	IV.A.2.a).(6).(h).(i)	<u>the brain, to include studies of dementia,</u>
459		<u>epilepsy, and brain tumors;</u>

460		
461	IV.A.2.a).(6).(h).(ii)	<u>myocardial perfusion studies; and,</u>
462		
463	IV.A.2.a).(6).(h).(iii)	<u>oncology, to include studies of tumors of the</u>
464		<u>lung, head and neck, esophagus, colon,</u>
465		<u>thyroid, and breast, as well as melanoma,</u>
466		<u>lymphoma, and other tumors as the</u>
467		<u>indications become established.</u>
468		
469	IV.A.2.a).(6).(i)	<u>pulmonary studies of perfusion and ventilation</u>
470		<u>performed with radiolabeled macroaggregates and</u>
471		<u>radioactive gas or aerosols, for both diagnostic and</u>
472		<u>quantitative assessment of perfusion and</u>
473		<u>ventilation.</u>
474		
475	IV.A.2.a).(7)	<u>must participate in therapeutic administration of</u>
476		<u>radiopharmaceuticals, including patient selection, informed</u>
477		<u>consent, understanding and calculating of the administered</u>
478		<u>dose, counseling of patients and their families on radiation</u>
479		<u>safety issues, and patient follow up after therapy.</u>
480		
481	IV.A.2.a).(7).(a)	<u>Specific applications should include:</u>
482		
483	IV.A.2.a).(7).(a).(i)	<u>documentation of participation in a minimum</u>
484		<u>of 10 cases of oral administration of less</u>
485		<u>than or equal to 1.22 gigabecquerels (33</u>
486		<u>millicuries) of sodium iodine I-131, for which</u>
487		<u>a written directive is required;</u>
488		
489	IV.A.2.a).(7).(a).(ii)	<u>documentation of participation in a minimum</u>
490		<u>of five cases of oral administration of</u>
491		<u>greater than 1.22 gigabecquerels (33</u>
492		<u>millicuries) of sodium iodine-I-131, for which</u>
493		<u>a written directive is required; and,</u>
494		
495	IV.A.2.a).(7).(a).(iii)	<u>documentation of participation in a minimum</u>
496		<u>of five cases of parenteral administration of</u>
497		<u>any beta emitter, or a photon-emitting</u>
498		<u>radionuclide with a photon energy less than</u>
499		<u>150 KeV, for which a written directive is</u>
500		<u>required, and/or parenteral administration of</u>
501		<u>any other radionuclide, for which a written</u>
502		<u>directive is required.</u>
503		
504	IV.A.2.a).(8)	<u>must demonstrate competence in performing pediatric</u>
505		<u>nuclear radiology cases (a minimum of 100 cases must be</u>
506		<u>performed); and,</u>
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508	IV.A.2.a).(9)	<u>must maintain current basic life support certification.</u>
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510	IV.A.2.b)	Medical Knowledge

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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.2.b).(1) *must demonstrate a level of expertise in the knowledge of those areas appropriate for a nuclear radiology specialist. This must include:*

IV.A.2.b).(1).(a) radiation safety rules and regulations, including those set by the Nuclear Radiology Commission (NRC) and/or other agreements stating rules, local regulations, and the ALARA (as low as reasonably achievable) principles, as well as personnel occupational radiation exposure and radiation protection.

IV.A.2.b).(2) *must be educated in low dose radiation techniques in both adults and children, and learn how to prevent and/or treat complications of contrast administration;*

IV.A.2.b).(3) *should develop skills in preparing and presenting educational material for medical students, graduate medical staff, and allied health personnel;*

IV.A.2.b).(4) must demonstrate a level of expertise in the knowledge of the following didactic curricular topics:

IV.A.2.b).(5) Diagnostic Imaging and Non-imaging Nuclear Radiology Application and Therapeutic Applications, including:

IV.A.2.b).(5).(a) diagnostic use of radiopharmaceuticals, to include clinical indications, technical performance, and interpretation of in vivo imaging of the body organs and systems, and using external detectors and scintillation cameras, including SPECT and PET;

IV.A.2.b).(5).(b) exercise and pharmacologic stress testing, to include the pharmacology of cardioactive drugs and physiologic gating techniques;

IV.A.2.b).(5).(c) non-imaging studies: application of a variety of non-imaging procedures, including instruction in the principles of radioimmunology, preparation of radiolabeled antibodies, uptake measurements, and in-vitro studies;

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563	IV.A.2.b).(5).(d)	<u>techniques and applications of molecular imaging and fusion imaging.</u>
564		
565		
566	IV.A.2.b).(5).(e)	<u>therapeutic uses of unsealed radiopharmaceuticals, to include: patient selection and management, including dose administration and dosimetry, radiation toxicity, and radiation protection considerations in the treatment of metastatic cancer and bone pain, primary neoplasms, solid tumors, and malignant effusions; and the treatment of hematologic, endocrine, and metabolic disorders.</u>
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577	IV.A.2.b).(6)	<u>Instrumentation: principles of instrumentation used in detection, measurement, and imaging of radioactivity with special emphasis on gamma cameras, including SPECT and PET devices, as well as software image fusion methodologies;</u>
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583	IV.A.2.b).(7)	<u>Physics: structure of matter, modes of radioactive decay, particle and photon emissions, and interactions of radiation with matter;</u>
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587	IV.A.2.b).(8)	<u>Radiation Biology and Protection: biological effects of ionizing radiation, means of reducing radiation exposure, calculation of the radiation dose, evaluation of radiation overexposure, medical management of persons overexposed to ionizing radiation management and disposal of radioactive substances, and establishment of radiation safety programs in accordance with federal and state regulations; and;</u>
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597	IV.A.2.b).(9)	<u>Radiopharmaceuticals: reactor, cyclotron, and generator production of radionuclides, radiochemistry, pharmacokinetics, and formulation of radiopharmaceuticals.</u>
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602	IV.A.2.c)	Practice-based Learning and Improvement
603		
604		Fellows are expected to develop skills and habits to be able to meet the following goals:
605		
606		
607	IV.A.2.c).(1)	systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement,
608		
609		
610		
611	IV.A.2.c).(2)	locate, appraise, and assimilate evidence from scientific studies related to their patients' health
612		

613 **problems, and,**
614
615 IV.A.2.c).(3) use quality control (QC) procedures for imaging devices,
616 laboratory instrumentation, and radiopharmaceuticals.
617

618 **IV.A.2.d) Interpersonal and Communication Skills**
619

620 **Fellows must demonstrate interpersonal and communication**
621 **skills that result in the effective exchange of information and**
622 **collaboration with patients, their families, and health**
623 **professionals.**
624

625 IV.A.2.d).(1) *Fellows must communicate effectively with patients,*
626 *colleagues, referring physicians, and other members of the*
627 *health care team, concerning imaging and procedure*
628 *appropriateness, informed consent, safety issues, and the*
629 *results of imaging tests or procedures. Competence in oral*
630 *communication must be judged through direct observation.*
631 *Competence in written communication must be judged on*
632 *the basis of the quality and timeliness of dictated reports.*
633

634 **IV.A.2.e) Professionalism**
635

636 **Fellows must demonstrate a commitment to carrying out**
637 **professional responsibilities and an adherence to ethical**
638 **principles.**
639

640 *Fellows must demonstrate:*

641
642 IV.A.2.e).(1) *compassion, integrity, and respect for others;*
643

644 IV.A.2.e).(2) *responsiveness to patient needs;*
645

646 IV.A.2.e).(3) *respect for patient privacy and autonomy;*
647

648 IV.A.2.e).(4) *accountability to patients, society and the profession;*
649

650 IV.A.2.e).(5) *sensitivity and responsiveness to a diverse patient*
651 *population, including but not limited to diversity in gender,*
652 *age, culture, race, religion, disabilities, and sexual*
653 *orientation; and,*
654

655 IV.A.2.e).(6) *compliance with institutional and departmental policies*
656 *(HIPAA, the Joint Commission, patient safety, infection*
657 *control, etc).*
658

659 **IV.A.2.f) Systems-based Practice**
660

661 **Fellows must demonstrate an awareness of and**
662 **responsiveness to the larger context and system of health**
663 **care, as well as the ability to call effectively on other**

664 **resources in the system to provide optimal health care.**

665

666

Fellows must:

667

668 *IV.A.2.f).(1) work in interprofessional teams to enhance patient safety*
669 *and improve patient care quality; and,*

670

671 *IV.A.2.f).(2) participate in identifying system errors and implementing*
672 *potential systems solutions.*

673

674 ~~V.B. Didactic Components~~

675

676 ~~V.B.1. Formal instruction is required in:~~

677

678 ~~V.B.1.a) diagnostic radiologic and medical nuclear physics;~~

679

680 ~~V.B.1.b) instrumentation;~~

681

682 ~~V.B.1.c) radiation protection and safety;~~

683

684 ~~V.B.1.d) radiobiology;~~

685

686 ~~V.B.1.e) conventional radionuclide imaging;~~

687

688 ~~V.B.1.f) molecular imaging;~~

689

690 ~~V.B.1.g) fusion imaging;~~

691

692 ~~V.B.1.h) diagnostic in vivo or combination in vivo/in vitro procedures;~~

693

694 ~~V.B.1.i) therapeutic administration of radionuclides; and~~

695

696 ~~V.B.1.j) radiopharmaceutical chemistry.~~

697

698 ~~V.B.2. Appropriate emphasis must be placed on the educational value of~~
699 ~~teaching rounds and conferences. In addition, there should be frequent~~
700 ~~correlative and interdepartmental teaching conferences.~~

701

702 IV.A.3. Curriculum Organization and Fellow Experiences

703

704 *IV.A.3.a) Fellows must participate on a regular basis in scheduled*
705 *conferences. Conferences must provide for progressive fellow*
706 *participation. These should include:*

707

708 *IV.A.3.a).(1) intradepartmental conferences;*

709

710 *IV.A.3.a).(2) departmental grand rounds;*

711

712 *IV.A.3.a).(3) at least one interdisciplinary conference per week; and,*

713

714 *IV.A.3.a).(4) peer-review case conferences and/or morbidity and*

715 mortality conferences.
716
717 IV.A.3.b) *Fellows should attend and participate in local conferences and at*
718 *least one national meeting or post-graduate course in nuclear*
719 *radiology while in the program. Reasonable expenses should be*
720 *reimbursed.*

721
722 IV.A.3.c) *Fellows must attend didactic conferences directed to the*
723 *educational level of the fellow that provides formal review of the*
724 *topics in the subspecialty curriculum. These conferences should*
725 *occur at least twice a month.*

726
727 ~~V.C. Research~~

728
729 ~~V.C.1. The program should provide an environment in which the fellow is~~
730 ~~encouraged to engage in investigative work with appropriate faculty~~
731 ~~supervision.~~

732
733 ~~V.C.2. Documentation of this environment should be made in the application and~~
734 ~~indicated by papers published by fellows and/or clinical faculty.~~

735
736 **IV.B. Fellows' Scholarly Activities**

737
738 IV.B.1. *The program must provide instruction in the fundamentals of research*
739 *principles including experimental design, performance of, and*
740 *interpretation of results.*

741
742 IV.B.2. *All fellows must engage in a scholarly project. Projects may take the form*
743 *of laboratory research, clinical research, analysis of disease processes,*
744 *imaging techniques, or practice management issues. The results of such*
745 *projects must be submitted for publication or presented at local, regional,*
746 *national, or international meetings.*

747
748 **V. Evaluation**

749
750 **V.A. Fellow Evaluation**

751
752 **V.A.1. Formative Evaluation**

753
754 **V.A.1.a) The faculty must evaluate fellow performance in a timely**
755 **manner.**

756
757 **V.A.1.b) The program must:**

758
759 **V.A.1.b).(1) provide objective assessments of competence in**
760 **patient care, medical knowledge, practice-based**
761 **learning and improvement, interpersonal and**
762 **communication skills, professionalism, and systems-**
763 **based practice;**

764
765 **V.A.1.b).(2) use multiple evaluators (e.g., faculty, peers, patients,**

- 766 self, and other professional staff); and,
767
768 **V.A.1.b).(3)** provide each fellow with documented semiannual
769 evaluation of performance with feedback.
770
771 *V.A.1.b).(3).(a)* The program must ensure that there is at least a
772 quarterly review which should include:
773
774 *V.A.1.b).(3).(a).(i)* review of faculty members' evaluations of
775 the fellow; and,
776
777 *V.A.1.b).(3).(a).(ii)* documentation of compliance with
778 institutional and departmental policies
779 (HIPAA, the Joint Commission, patient
780 safety, infection control, etc).
781
782 **V.A.1.c)** The evaluations of fellow performance must be accessible for
783 review by the fellow, in accordance with institutional policy.
784
785 **V.A.2. Summative Evaluation**
786
787 The program director must provide a summative evaluation for each
788 fellow upon completion of the program. This evaluation must
789 become part of the fellow's permanent record maintained by the
790 institution, and must be accessible for review by the fellow in
791 accordance with institutional policy. This evaluation must:
792
793 **V.A.2.a)** document the fellow's performance during their education,
794 and
795
796 **V.A.2.b)** verify that the fellow has demonstrated sufficient competence
797 to enter practice without direct supervision.
798
799 **V.B. Faculty Evaluation**
800
801 **V.B.1.** At least annually, the program must evaluate faculty performance as
802 it relates to the educational program.
803
804 **V.B.2.** These evaluations should include a review of the faculty's clinical
805 teaching abilities, commitment to the educational program, clinical
806 knowledge, professionalism, and scholarly activities.
807
808 **V.B.3.** *These evaluations must include a written confidential evaluation by the*
809 *fellows. Faculty members must receive annual feedback from these*
810 *evaluations.*
811
812 **V.C. Program Evaluation and Improvement**
813
814 **V.C.1.** The program must document formal, systematic evaluation of the
815 curriculum at least annually. The program must monitor and track
816 each of the following areas:

- 817
818 **V.C.1.a)** fellow performance, and
819
820 **V.C.1.b)** faculty development
821
822 **V.C.2.** If deficiencies are found, the program should prepare a written plan
823 of action to document initiatives to improve performance in the
824 areas listed in section V.C.1. The action plan should be reviewed
825 and approved by the teaching faculty and documented in meeting
826 minutes.
827
828 ~~V.D. Teaching File~~
829
830 A teaching file of images referable to all applicable aspects of nuclear radiology
831 must be available for use by fellows. This file should be indexed, coded, and
832 regularly maintained.
833
834 **VI. Fellow Duty Hours in the Learning and Working Environment**
835
836 **VI.A. Professionalism, Personal Responsibility, and Patient Safety**
837
838 **VI.A.1.** Programs and sponsoring institutions must educate fellows and
839 faculty members concerning the professional responsibilities of
840 physicians to appear for duty appropriately rested and fit to provide
841 the services required by their patients.
842
843 **VI.A.2.** The program must be committed to and responsible for promoting
844 patient safety and fellow well-being in a supportive educational
845 environment.
846
847 **VI.A.3.** The program director must ensure that fellows are integrated and
848 actively participate in interdisciplinary clinical quality improvement
849 and patient safety programs.
850
851 **VI.A.4.** The learning objectives of the program must:
852
853 **VI.A.4.a)** be accomplished through an appropriate blend of supervised
854 patient care responsibilities, clinical teaching, and didactic
855 educational events; and,
856
857 **VI.A.4.b)** not be compromised by excessive reliance on fellows to fulfill
858 non-physician service obligations.
859
860 **VI.A.5.** The program director and sponsoring institution must ensure a
861 culture of professionalism that supports patient safety and personal
862 responsibility. Fellows and faculty members must demonstrate an
863 understanding and acceptance of their personal role in the
864 following:
865
866 **VI.A.5.a)** assurance of the safety and welfare of patients entrusted to
867 their care;

- 868
869 **VI.A.5.b)** provision of patient- and family-centered care;
870
871 **VI.A.5.c)** assurance of their fitness for duty;
872
873 **VI.A.5.d)** management of their time before, during, and after clinical
874 assignments;
875
876 **VI.A.5.e)** recognition of impairment, including illness and fatigue, in
877 themselves and in their peers;
878
879 **VI.A.5.f)** attention to lifelong learning;
880
881 **VI.A.5.g)** the monitoring of their patient care performance improvement
882 indicators; and,
883
884 **VI.A.5.h)** honest and accurate reporting of duty hours, patient
885 outcomes, and clinical experience data.
886
887 **VI.A.6.** All fellows and faculty members must demonstrate responsiveness
888 to patient needs that supersedes self-interest. Physicians must
889 recognize that under certain circumstances, the best interests of the
890 patient may be served by transitioning that patient's care to another
891 qualified and rested provider.
892
- 893 **VI.B. Transitions of Care**
894
- 895 **VI.B.1.** Programs must design clinical assignments to minimize the number
896 of transitions in patient care.
897
- 898 **VI.B.2.** Sponsoring institutions and programs must ensure and monitor
899 effective, structured hand-over processes to facilitate both
900 continuity of care and patient safety.
901
- 902 **VI.B.3.** Programs must ensure that fellows are competent in communicating
903 with team members in the hand-over process.
904
- 905 **VI.B.4.** The sponsoring institution must ensure the availability of schedules
906 that inform all members of the health care team of attending
907 physicians and fellows currently responsible for each patient's care.
908
- 909 **VI.C. Alertness Management/Fatigue Mitigation**
910
- 911 **VI.C.1.** The program must:
912
- 913 **VI.C.1.a)** educate all faculty members and fellows to recognize the
914 signs of fatigue and sleep deprivation;
915
- 916 **VI.C.1.b)** educate all faculty members and fellows in alertness
917 management and fatigue mitigation processes; and,
918

919 VI.C.1.c) adopt fatigue mitigation processes to manage the potential
920 negative effects of fatigue on patient care and learning, such
921 as naps or back-up call schedules.
922

923 VI.C.2. Each program must have a process to ensure continuity of patient
924 care in the event that a fellow may be unable to perform his/her
925 patient care duties.
926

927 VI.C.3. The sponsoring institution must provide adequate sleep facilities
928 and/or safe transportation options for fellows who may be too
929 fatigued to safely return home.
930

931
932 ~~V.E. Supervision~~
933

934 ~~The responsibility or independence given to fellows should depend on their~~
935 ~~knowledge, skills, and experience. Additional personnel must be available within~~
936 ~~an appropriate time interval to perform or to supervise procedures.~~
937

938 VI.D. Supervision of Fellows
939

940 VI.D.1. In the clinical learning environment, each patient must have an
941 identifiable, appropriately-credentialed and privileged attending
942 physician (or licensed independent practitioner as approved by each
943 Review Committee) who is ultimately responsible for that patient's
944 care.
945

946 VI.D.1.a) This information should be available to fellows, faculty
947 members, and patients.
948

949 VI.D.1.b) Fellows and faculty members should inform patients of their
950 respective roles in each patient's care.
951

952 VI.D.2. The program must demonstrate that the appropriate level of
953 supervision is in place for all fellows who care for patients.
954

955 Supervision may be exercised through a variety of methods. Some
956 activities require the physical presence of the supervising faculty
957 member. For many aspects of patient care, the supervising
958 physician may be a more advanced fellow. Other portions of care
959 provided by the fellow can be adequately supervised by the
960 immediate availability of the supervising faculty member or fellow
961 physician, either in the institution, or by means of telephonic and/or
962 electronic modalities. In some circumstances, supervision may
963 include post-hoc review of fellow-delivered care with feedback as to
964 the appropriateness of that care.
965

966 VI.D.3. Levels of Supervision
967

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

- 970 supervision:
- 971
- 972 **VI.D.3.a) Direct Supervision – the supervising physician is physically**
- 973 **present with the fellow and patient.**
- 974
- 975 **VI.D.3.b) Indirect Supervision:**
- 976
- 977 **VI.D.3.b).(1) with direct supervision immediately available – the**
- 978 **supervising physician is physically within the hospital**
- 979 **or other site of patient care, and is immediately**
- 980 **available to provide Direct Supervision.**
- 981
- 982 **VI.D.3.b).(2) with direct supervision available – the supervising**
- 983 **physician is not physically present within the hospital**
- 984 **or other site of patient care, but is immediately**
- 985 **available by means of telephonic and/or electronic**
- 986 **modalities, and is available to provide Direct**
- 987 **Supervision.**
- 988
- 989 **VI.D.3.c) Oversight – The supervising physician is available to provide**
- 990 **review of procedures/encounters with feedback provided**
- 991 **after care is delivered.**
- 992
- 993 **VI.D.4. The privilege of progressive authority and responsibility, conditional**
- 994 **independence, and a supervisory role in patient care delegated to**
- 995 **each fellow must be assigned by the program director and faculty**
- 996 **members.**
- 997
- 998 **VI.D.4.a) The program director must evaluate each fellow’s abilities**
- 999 **based on specific criteria. When available, evaluation should**
- 1000 **be guided by specific national standards-based criteria.**
- 1001
- 1002 **VI.D.4.b) Faculty members functioning as supervising physicians**
- 1003 **should delegate portions of care to fellows, based on the**
- 1004 **needs of the patient and the skills of the fellows.**
- 1005
- 1006 **VI.D.4.c) Fellows should serve in a supervisory role of residents or**
- 1007 **junior fellows in recognition of their progress toward**
- 1008 **independence, based on the needs of each patient and the**
- 1009 **skills of the individual fellow.**
- 1010
- 1011 **VI.D.5. Programs must set guidelines for circumstances and events in**
- 1012 **which fellows must communicate with appropriate supervising**
- 1013 **faculty members, such as the transfer of a patient to an intensive**
- 1014 **care unit, or end-of-life decisions.**
- 1015
- 1016 **VI.D.5.a) Each fellow must know the limits of his/her scope of**
- 1017 **authority, and the circumstances under which he/she is**
- 1018 **permitted to act with conditional independence.**
- 1019
- 1020 **VI.D.6. Faculty supervision assignments should be of sufficient duration to**

1021		assess the knowledge and skills of each fellow and delegate to
1022		him/her the appropriate level of patient care authority and
1023		responsibility.
1024		
1025	VI.E.	Clinical Responsibilities
1026		
1027		The clinical responsibilities for each fellow must be based on PGY-level,
1028		patient safety, fellow education, severity and complexity of patient
1029		illness/condition and available support services.
1030		
1031	VI.F.	Teamwork
1032		
1033		Fellows must care for patients in an environment that maximizes effective
1034		communication. This must include the opportunity to work as a member of
1035		effective interprofessional teams that are appropriate to the delivery of care
1036		in the specialty.
1037		
1038	V.E.1.	Duty Hours and Conditions of Work
1039		
1040		(See Program Requirements for Graduate Medical Education in the
1041		Subspecialties of Diagnostic Radiology for details concerning duty hour
1042		requirements.)
1043		
1044	VI.G.	Fellow Duty Hours
1045		
1046	VI.G.1.	Maximum Hours of Work per Week
1047		
1048		Duty hours must be limited to 80 hours per week, averaged over a
1049		four-week period, inclusive of all in-house call activities and all
1050		moonlighting.
1051		
1052	VI.G.1.a)	Duty Hour Exceptions
1053		
1054		A Review Committee may grant exceptions for up to 10% or a
1055		maximum of 88 hours to individual programs based on a
1056		sound educational rationale.
1057		
1058		<u>The Review Committee for Diagnostic Radiology will not consider</u>
1059		<u>requests for exceptions to the 80-hour limit to the fellows' work</u>
1060		<u>week.</u>
1061		
1062	VI.G.1.a).(1)	In preparing a request for an exception the program
1063		director must follow the duty hour exception policy
1064		from the ACGME Manual on Policies and Procedures.
1065		
1066	VI.G.1.a).(2)	Prior to submitting the request to the Review
1067		Committee, the program director must obtain approval
1068		of the institution's GMEC and DIO.
1069		
1070	VI.G.2.	Moonlighting
1071		

1072 **VI.G.2.a)** Moonlighting must not interfere with the ability of the fellow
1073 to achieve the goals and objectives of the educational
1074 program.
1075

1076 **VI.G.2.b)** Time spent by fellows in Internal and External Moonlighting
1077 (as defined in the ACGME Glossary of Terms) must be
1078 counted towards the 80-hour Maximum Weekly Hour Limit.
1079

1080 **VI.G.3.** **Mandatory Time Free of Duty**
1081
1082 Fellows must be scheduled for a minimum of one day free of duty
1083 every week (when averaged over four weeks). At-home call cannot
1084 be assigned on these free days.
1085

1086 **VI.G.4.** **Maximum Duty Period Length**
1087
1088 Duty periods of fellows may be scheduled to a maximum of 24 hours
1089 of continuous duty in the hospital. Programs must encourage
1090 fellows to use alertness management strategies in the context of
1091 patient care responsibilities. Strategic napping, especially after 16
1092 hours of continuous duty and between the hours of 10:00 p.m. and
1093 8:00 a.m., is strongly suggested.
1094

1095 **VI.G.4.a)** It is essential for patient safety and fellow education that
1096 effective transitions in care occur. Fellows may be allowed to
1097 remain on-site in order to accomplish these tasks; however,
1098 this period of time must be no longer than an additional four
1099 hours.
1100

1101 **VI.G.4.b)** Fellows must not be assigned additional clinical
1102 responsibilities after 24 hours of continuous in-house duty.
1103

1104 **VI.G.4.c)** In unusual circumstances, fellows, on their own initiative,
1105 may remain beyond their scheduled period of duty to
1106 continue to provide care to a single patient. Justifications for
1107 such extensions of duty are limited to reasons of required
1108 continuity for a severely ill or unstable patient, academic
1109 importance of the events transpiring, or humanistic attention
1110 to the needs of a patient or family.
1111

1112 **VI.G.4.c).(1)** Under those circumstances, the fellow must:
1113

1114 **VI.G.4.c).(1).(a)** appropriately hand over the care of all other
1115 patients to the team responsible for their
1116 continuing care; and,
1117

1118 **VI.G.4.c).(1).(b)** document the reasons for remaining to care for
1119 the patient in question and submit that
1120 documentation in every circumstance to the
1121 program director.
1122

1123	VI.G.4.c).(2)	The program director must review each submission of additional service, and track both individual fellow and program-wide episodes of additional duty.
1124		
1125		
1126		
1127	VI.G.5.	Minimum Time Off between Scheduled Duty Periods
1128		
1129	VI.G.5.a)	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.
1130		
1131		
1132		
1133		<u>Nuclear radiology fellows are considered to be in the final years of education.</u>
1134		
1135		
1136	VI.G.5.a).(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.
1137		
1138		
1139		
1140		
1141		
1142		
1143		
1144		
1145	VI.G.5.a).(1).(a)	Circumstances of return-to-hospital activities with fewer than eight hours away from the hospital by fellows in their final years of education must be monitored by the program director.
1146		
1147		
1148		
1149		
1150		
1151	VI.G.6.	Maximum Frequency of In-House Night Float
1152		
1153		Fellows must not be scheduled for more than six consecutive nights of night float.
1154		
1155		
1156	VI.G.7.	Maximum In-House On-Call Frequency
1157		
1158		Fellows must be scheduled for in-house call no more frequently than every-third-night (when averaged over a four-week period).
1159		
1160		
1161	VI.G.8.	At-Home Call
1162		
1163	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.
1164		
1165		
1166		
1167		
1168		
1169	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.
1170		
1171		
1172		
1173	VI.G.8.b)	Fellows are permitted to return to the hospital while on at-

1174 home call to care for new or established patients. Each
1175 episode of this type of care, while it must be included in the
1176 80-hour weekly maximum, will not initiate a new “off-duty
1177 period”
1178

1179 VII. *Experimentation and Innovation*
1180

1181 *Requests for experimentation or innovative projects that may deviate from the*
1182 *institutional, common, and specialty-specific program requirements must be approved in*
1183 *advance by the Review Committee. In preparing requests, the program director must*
1184 *follow Procedures for Approving Proposals for Experimentation or Innovative Projects*
1185 *located in the ACGME Manual on Policies and Procedures. Once a Review Committee*
1186 *approves a project, the sponsoring institution and program are jointly responsible for the*
1187 *quality of education offered to residents for the duration of such a project.*
1188

1189 ~~VI. Evaluation~~
1190

1191 ~~(See Program Requirements for Graduate Medical Education in the Subspecialties of~~
1192 ~~Diagnostic Radiology for details concerning evaluation requirements.)~~
1193

1194 ***