

PART

IV

참고자료

1. 연구원, 직원

1) 역대 연구원

연번	이름	근무기간	소속팀	학위(입학당시;진학;최종)
1	정재민	'82.03 ~ 현재	화학	학사;석사;박사
2	홍미경	'89.03 ~ 현재	화학	학사
3	한미경	'89.07 ~ '91	제3검사실	학사
4	황만용	'92.09 ~ '93	제3검사실	학사
5	김영주	'94.01 ~ 현재	화학	학사
6	이재성	'94.07 ~ 현재	물리	학사;석사;박사
7	황은경	'94.12 ~ '95.05	제3검사실	학사
8	박용우	'94.12 ~ '96	영상분석실	학사
9	이용진	'94.12 ~ '06.04	생물-중앙	석사;박사
10	김중길	'95.01 ~ ?	제3검사실	학사
11	김재균	'95.12 ~ '97.10	생물-중앙	박사
12	양묘근	'96.01 ~ '97.06	물리	학사
13	김경민	'96.01 ~ '99.11	물리	학사;석사;박사
14	안지영	'96.02 ~ '01.03	물리	학사
15	장영수	'96.02 ~ '08.06	화학	석사;박사
16	홍성현	'96.04 ~ '99.07	화학	학사;석사
17	이진	'97.01 ~ '99.05	물리	학사
18	이은경	'97.03 ~ '97.10	화학	석사
19	봉정균	'97.03 ~ '97.10	물리	학사
20	김보광	'98.01 ~ '00.02	생물-중앙	학사;석사
21	백미영	'98.01 ~ '00.02	물리	학사;석사
22	이윤상	'98.01 ~ 현재	화학	석사;박사
23	장명진	'98.09 ~ '02	물리	석사
24	정소현	'99.01 ~ '02	물리	학사;석사
25	최용운	'99.02 ~ '01.02	생물-중앙	학사;석사
26	서강준	'99.12 ~ '01.02	물리	학사;석사
27	강은주	'99.12 ~ '05.02	인지신경과학	연구교수
28	홍성민	'00.01 ~ '02	화학	학사;석사
29	김영애	'00.01 ~ '01.03	물리	학사
30	강혜진	'00.04 ~ 현재	인지신경과학	학사;석사;박사
31	염정열	'00.07 ~ '01.06	물리	학사;
32	조성일	'00.08 ~ '01.02	물리	학사
33	김준식	'00.08 ~ '01.02	물리	학사
34	김희정	'00.09 ~ '12.12	인지신경과학	학사;석사;박사
35	조현주	'00.11 ~ '00.11	물리	학사
36	문인섭	'00.11 ~ '03.02	PET센터	학사
37	신재훈	'00.11 ~ '03.02	생물-중앙	학사;석사
38	김진수	'00.12 ~ '07.09	물리	학사;석사;박사

39	김형우	'01.02 ~ '08.12	화학	석사;박사
40	최경목	'01.03 ~ '01.09	인지신경과학	학사
41	조상수	'01.03 ~ '06.02	인지신경과학	석사;박사
42	신희원	'01.07 ~ '03	물리	학사
43	이병일	'01.09 ~ '06	물리	석사;박사
44	강주현	'01.10 ~ '02.11	생물-종양	박사연구교수
45	윤현미	'01.12 ~ '02.09	물리	학사
46	오현정	'01.12 ~ '03.02	생물-종양	학사;석사
47	윤영현	'02.01 ~ '03.03	화학	석사;박사
48	김광일	'02.02 ~ '09.02	생물-종양	학사;석사;박사
49	김숙아	'02.03 ~ '03.03	인지신경과학	학사
50	김윤희	'02.04 ~ '06.04	생물-뇌과학	학사;석사
51	소민경	'02.11 ~ '08.12	생물-종양	학사;석사;박사
52	이현정	'03.02 ~ '03.03	인지신경과학	학사
53	서선영	'03.02 ~ '03	화학	학사;석사
54	김현승	'03.02 ~ '04.02	인지신경과학	학사;석사
55	배여울	'03.02 ~ '04.08	인지신경과학	학사
56	류정화	'03.02 ~ '03.08	화학	학사
57	전용현	'03.03 ~ '08.08	생물-종양	학사;석사;박사
58	황도원	'03.03 ~ '19.08	생물-뇌과학	학사;석사;박사
59	김성봉	'03.05 ~ '03.07	인지신경과학	석사
60	정우석	'03.05 ~ '06.08	생물-종양	학사
61	황수영	'03.08 ~ '04.08	인지신경과학	학사
62	조혜주	'03.09 ~ '03.12	인지신경과학	학사
63	윤미선	'03.09 ~ '04.02	인지신경과학	석사;박사
64	김정희	'03.09 ~ '04.08	인지신경과학	석사
65	손지연	'03.12 ~ 현재	전임상분자영상-분당	학사;석사
66	이윤상	'04.03 ~ '05.02	인지신경과학	학사
67	정인순	'04.04 ~ '15.01	신경화학-분당	석사
68	김정태	'04.05 ~ '04.08	인지신경과학	석사
69	Ganesha Rai	'04.07 ~ '05.12	화학	박사
70	김영남	'04.07 ~ '07.02	생물-종양	석사;박사
71	김중현	'04.07 ~ '12.08	물리	학사;석사;박사과정
72	윤현석	'04.07 ~ '15.12	물리	학사;석박통합과정
73	이태선	'04.09 ~ '04.12	인지신경과학	학사
74	김수진	'04.09 ~ '09.08	물리	학사;석사;박사
75	이학정	'04.09 ~ '14.04	화학	학사;석사;박사과정
76	조상수	'04.10 ~ 현재	인지신경과학-분당	박사
77	류창형	'04.10 ~ '05.03	인지신경과학-분당	학사;석사
78	김승후	'04.11 ~ '11.01	생물-종양	학사;석사;박사
79	염찬주	'04.11 ~ '11.02	생물-종양	학사;박사
80	김수미	'04.01 ~ '10.08	물리	학사;석사;박사
81	이은주	'05.02 ~ '06.02	인지신경과학-분당	석사
82	황지희	'05.02 ~ '06.02	인지신경과학-분당	학사;석사



83	박창수	'05.02 ~ '06.02	인지신경과학-분당	석사
84	박소연	'05.02 ~ 현재	신경화학-분당	석사
85	정혜경	'05.02 ~ '08.09	생물-중앙	석사;박사
86	이지영	'05.03 ~ '07.01	생물-뇌과학	학사;석사
87	김현주	'05.03 ~ '09.02	생물-중앙	학사;석사;박사
88	라민균	'05.03 ~ '05.08	물리	학사
89	오정수	'05.03 ~ '06.12	물리	박사
90	윤은진	'05.04 ~ '14.02	인지신경과학-분당	학사;석사;박사
91	박효진	'05.04 ~ '13.04	인지신경과학	학사;석박통합과정
92	한상희	'05.08 ~ '06.09	물리	학사
93	최기준	'05.11 ~ '06	물리	학사
94	김지선	'05.12 ~ '11.02	화학-분당	석사
95	김순학	'06.01 ~ '09.03	생물-뇌과학	연구교수
96	홍수경	'06.03 ~ '08.09	신경화학-분당	석사;박사
97	박민재	'06.03 ~ '10.05	물리	석사;박사
98	Prashant	'06.06 ~ '07.08	화학	박사
99	방성애	'06.07 ~ '16.02	인지신경과학-분당	석사;박사
100	Dinesh Shetty	'06.08 ~ '11.05	화학	석사;박사
101	이병철	'06.09 ~ 현재	화학-분당	박사
102	박상근	'06.09 ~ '10.12	물리	경기대 전자계산학과
103	박현수	'06.11 ~ 현재	영상분석-분당	석사;박사
104	권순일	'06.12 ~ '13.02	물리	학사;박사
105	김현희	'07.04 ~ '09.08	생물-중앙	학사;석사
106	임윤경	'07.04 ~ '11	인지신경과학	학사;석사과정
107	이애리	'07.07 ~ '07.12	생물-뇌과학	학사
108	고해영	'07.07 ~ '09.11	생물-중앙	학사;석사
109	김영하	'07.08 ~ '08.01	생물-뇌과학	학사
110	최재연	'07.11 ~ '11.07	화학	학사;석사과정
111	고미향	'07.12 ~ '09.03	생물-뇌과학	학사;석사
112	양보연	'08.01 ~ '14.02	화학	학사;박사
113	김영화	'08.01 ~ '13.12	생물-중앙	학사;박사
114	전영신	'08.03 ~ '09.04	화학-분당	석사
115	유경현	'08.03 ~ '10.06	생물-중앙	학사;석사
116	Lathika Hoigebazar	'08.03 ~ '11.02	화학	석사;박사
117	주창환	'08.04 ~ '09.12	화학	학사
118	윤혜원	'08.08 ~ '11.02	생물-중앙	박사
119	김은경	'08.09 ~ '09.08	인지신경과학	학사;석사과정
120	김수진	'08.10 ~ 현재	영상분석-분당	박사
121	문병석	'09.01 ~ '19.02	화학-분당	박사
122	이찬미	'09.01 ~ '10.12	인지신경과학	학사;석사
123	진연아	'09.01 ~ '11.08	생물-뇌과학	학사;석사
124	이또오 미끼꼬	'09.01 ~ '12.03	물리	학사;석사;박사
125	함자량	'09.01 ~ '15.09	인지신경과학	학사;석사;박사
126	김지후	'09.01 ~ '17.01	물리	학사;석사;박사

127	고근배	'09.01 ~ '17.04	물리	학사;박사
128	이지연	'09.01 ~ '19.01	화학	학사;석사;박사
129	조혜림	'09.03 ~ '09.05	물리	학사
130	이규입	'09.03 ~ '09.05	생물-뇌과학	학사
131	이혜경	'09.03 ~ 현재	인지신경과학	박사
132	이영경	'09.03 ~ '11.02	화학	학사;석사
133	이보은	'09.04 ~ '17.02	화학	석사;박사
134	한현정	'09.04 ~ '09.10	인지신경과학-분당	석사
135	장신정	'09.05 ~ '11.11	생물-종양	학사
136	오현정	'09.05 ~ '16.04	생물-뇌과학	학사;석사
137	송명근	'09.07 ~ 현재	생물-종양	석사;박사
138	손경일	'09.08 ~ '11.01	화학-분당	석사;박사과정
139	이 송	'09.09 ~ '13.03	생물-뇌과학	박사
140	장재호	'09.09 ~ '12.12	생물-뇌과학	학사;석사
141	나주리	'09.09 ~ '16.08	생물-종양	학사;석사;박사
142	임남희	'09.10 ~ '11.09	전임상분자영상-분당	학사
143	유은혜	'09.10 ~ '11.04	물리	학사
144	정재호	'09.11 ~ 현재	신경화학-분당	석사
145	김정환	'09.12 ~ 현재	화학-분당	학사
146	조은아	'10.02 ~ '17.03	화학	학사;석사;박사중퇴
147	유혜빈	'10.03 ~ '12.02	물리	
148	손정아	'10.09 ~ '13.08	물리	석사
149	Sudhakara Seelam	'10.08 ~ '17.01	화학	박사
150	방남영	'11.03 ~ '13.08	WCU	학사;석사
151	김은경	'11.03 ~ '17.03	인지	
152	정태문	'11.03 ~ '16.02	생물-종양	학사;석사;박사
153	문성현	'11.03 ~ '16.08	화학	학사;박사
154	김호영	'11.03 ~ '19.08	화학	학사;박사
155	장솔아	'11.09 ~ '13.08	종양	학사;석사
156	최재혁	'11.09 ~ '14.02	뇌과학	학사;석사
157	신성아	'12.03 ~ '19.02	물리	학사;석사;박사
158	안현준	'12.03 ~ '19.02	물리	학사;박사
159	함자랑	'12.03 ~ '15.02	인지	학사;박사
160	김경운	'12.03 ~ '17.04	물리	학사;박사
161	이철희	'12.03 ~ '18.08	종양	학사;박사
162	이민선	'12.03 ~ '19.02	물리	학사;박사
163	손정환	'12.03 ~ '19.02	물리	학사;박사
164	Vinay K. Banka	'12.03 ~ '19.02	화학	학사;박사
165	허영민	'12.09 ~ 현재	인지	학사;석사;박사
166	김한수	'13.02 ~ '14.12	뇌과학	석사연구원
167	원준연	'13.03 ~ '19.02	물리	학사;박사
168	박지용	'13.03 ~ 현재	화학	학사;석사;박사
169	김한영	'13.09 ~ '15.08		학사;석사
170	이영은	'13.09 ~ '16.02	종양	학사;석사



171	정석진	'14.03 ~ '19.02	종양	학사;박사
172	배성우	'14.03 ~ '16.01	종양	학사;석사
173	강승관	'14.03 ~ 현재	물리	학사;박사과정
174	박초룡	'14.03 ~ '19.12	종양	학사;석사;박사과정
175	M. K. Bakht	'14.09 ~ ?	종양- 핵의학	석사;박사과정
176	김경민	'14.09 ~ '20.02	종양	학사;박사과정
177	김아란	'14.08 ~ '17.01	전임상분자영상-분당	학사
178	신재환	'15.12 ~ 현재	화학	박사
179	조정환	'15.03 ~ '17.08	종양	학사;석사
180	박해욱	'15.03 ~ 현재	물리	학사;박사과정
181	Arun Gupta	'15.03 ~ '18.08	임상	석사;박사
182	김도현	'15.07 ~ '18.10	뇌과학	석사연구원
183	Nadeem A. Lodhi	'15.09 ~ '19.08	화학	석사;박사
184	황동휘	'15.09 ~ 현재	물리	학사;박사과정
185	박도담	'15.01 ~ '17.06	전임상실험-분당	학사
186	정유진	'15.07 ~ '17.06	방사화학-분당	학사
187	배성환	'16.12 ~ '20.07	종양	석사연구원
188	G. B. Borjigon	'16.03 ~ '18.02	임상	학사;석사
189	이은지	'16.03 ~ 현재	뇌과학	학사;석사;박사과정
190	오세라	'16.03 ~ 현재	종양	학사;박사과정
191	오호림	'16.03 ~ 현재	종양	학사;박사과정
192	정다이	'16.09 ~ '19.02	뇌과학	학사;석사
193	이승은	'16.09 ~ 현재	물리	학사;박사과정
194	김영낭	'16.03 ~ '19.05	전임상실험-분당	학사
195	임관미	'16.05 ~ 현재	임상실험-분당	학사
196	박기선	'16.06 ~ 현재	전임상분자영상-분당	학사
197	유정민	'16.10 ~ '17.02	방사화학-분당	학사
198	권준호	'17.01 ~ '19.02	종양	석사연구원
199	장근녕	'17.03 ~ '19.03	뇌과학	학사;석사
200	박준영	'17.03 ~ '19.02	물리	학사;석사
201	장혜정	'17.03 ~ '19.02	종양	학사;석사
202	Qaid A. Shagera	'17.03 ~ '19.02	임상	학사;석사
203	오진혜	'17.03 ~ 현재	뇌과학	학사;석사과정
204	윤지원	'17.09 ~ '19.02	뇌과학	석사편입-석사
205	기영욱	'17.09 ~ '19.08	뇌과학	박사편입
206	정은진	'17.09 ~ '19.08	종양	학사;석사
207	이석용	'17.09 ~ 현재	화학	학사;석사과정
208	강형근	'17.01 ~ '17.12	전임상분자영상-분당	학사
209	육영청	'17.03 ~ '18.12	방사화학-분당	석사
210	김유경	'17.07 ~ '18.08	전임상실험-분당	학사
211	송인호	'17.11 ~ 현재	전임상실험-분당	박사
212	이영선	'18.03 ~ '19.02	뇌과학	학사;석사
213	권용경	'18.03 ~ '20.08	화학	학사;석사과정
214	이현구	'18.07 ~ '19.08	종양	학사연구원

215	김효영	'18.07 ~ '19.08	종양	학사연구원
216	서혜연	'18.09 ~ 현재	화학	학사; 석사과정
217	이상현	'18.09 ~ '20.08	화학	학사; 석사과정
218	김지현	'18.08 ~ 현재	방사화학-분당	석사
219	이수아	'19.03 ~ '20.02	물리	학사; 석사과정
220	김 현	'19.09 ~ 현재	뇌과학	학사; 석사과정
221	권석준	'19.09 ~ 현재	뇌과학	학사; 석사과정
222	Azmal K. Sarker	'19.09 ~ 현재	임상	석사; 박사과정
223	서민지	'19.09 ~ 현재	물리	학사; 석사과정
224	이수정	'19.07 ~ 현재	전임상실험-분당	학사
225	황지희		인지신경과학-분당	학사; 석사
226	박창수		인지신경과학-분당	석사

2) 역대 직원 해외연수

연수기간	이름	연수국	연수기관	지도교수	연수내용
'78.03~05	서일택	일본	Kyoto University Hospital	Kanji Torizuka	방사면역측정기술
'78.12~'79.03	조규진	일본	Tokyo Metropolitan Geriatric Hospital	Masahiro Iio	촬영기술
'78.12~'79.03	김현주	일본	Bioorganic Chemistry College of Pharmacy, Shizuoka	Noboru Yanai-hara	방사면역측정기술
'80.02~05	박현숙	미국	Michael Reese Hospital	Steven Pinsky	컴퓨터응용기술
'80.06~09	동희초	홍콩	University of Hong Kong Robert Black College	J. Prestoy	방사면역측정기술
'80.10~'81.01	안순자	대만	Veterans General Hospital	Shin-Hwa Yeh	방사성의약품합성기술
'82.04~06	진광호	일본	Gunma University	Teruo Nagai	감마카메라정도관리
'82.12~'83.03	정윤영	대만	Veterans General Hospital	Shin-Hwa Yeh	방사면역측정법 정도관리
'83.06~08	유광열	일본	Kyoto University Hospital	Kanji Torizuka	컴퓨터응용기술
'85.02~07	조규진	미국	Michael Reese Hospital	Pinsky	촬영기술
'85.12~'86.03	전병길	일본	National Institute of Radiological Sciences	Toshiyaki Kumatory	방사성의약품정도관리
'87.01~04	이인원	일본	Osaka Cardio-vascular Center	Tsunehiko Nishimura	핵의학장비정도관리
'87.08~10	이재길	일본	Kyoto University Hospital	Kanji Kasagi	방사면역측정법 정도관리
'88.09~11	김문혜	일본	Kyoto University Hospital	Kanji Kasagi	핵의학 컴퓨터이용
'89.06~07	서일택	미국	George Washington University Medical Center	Chang H. Paik	방사수용체 검사 및 방사성의약품

'89.10	염미경	태국	IAEA/WHO/RCA program		IAEA/WHO/RCA Training Course
'90.02~04	조규진	호주	IAEA/WHO/RCA program Royal Prince Alfred Hospital	Brian Hitton	IAEA/WHO/RCA Training Course
'90.06~09	변대홍	일본	Kyoto University Hospital	Kanji Kasagi	SPECT 이용기술 습득
'92.03~04	김문혜	호주	IAEA/WHO/RCA program		감마카메라정도관리
'92.07~08	진광호	미국	University of Pennsylvania Hospital	Abass Alavi	SPECT 기술습득
'93.08~10	박은미	일본	Aging and Cencer, Tohoku University	Hiroshi Fukuda	방사수용체검사기술
'94.02~03	이인원	미국	Cleveland Metro Clinic	Batec	SPECT 도입에 따른 기술연수
'94.12	서일택	일본	Osaka City University	Hironobu Ochi,	중간관리자 교육
'94.12	김문혜	일본	Osaka Cardio-vascular Center	Tsunehiko Nishimura	PET 도입에 따른 연수
'95.09	정수옥	태국	IAEA/WHO/RCA program	IAEA	HBsAg 검사법
'95.09~10	김현주	일본	Kyoto University Hospital	Junji Konishi	RIA 정도관리
'96.10~11	노경운	영국	Hammersmith Hospital	Chapuman	RIA 정도관리
'98.06~07	임형태	미국	Royola Medical Center	Robert Henkin	영상검사기술
'99.10	조만익	일본	Daiichi Radioisotope Laboratory	Junzo Okuda	RIA 정도관리
'00.06~07	신성화	미국	Johns Hopkins Medical Institute	Zsolt Szabo	SPECT 기술연수
'02.05~06	김진의	미국	M.D. Anderson Cancer Center	Euishin E. Kim	심근SPECT 기술연수
'04.06~07	이홍재	미국	University of Pennsylvania	Abass Alavi	PET 선진기술
'05.09	장영수	미국	Winship Cancer Institute, Emory University	Jonathan W. Simons	방사성의약품 합성, 개발
'06.06	조규진	미국	M.D. Anderson Cancer Center	Euishin E. Kim	관리자 연수
'08.06	문일상	미국	M.D. Anderson Cancer Center	Euishin E. Kim	PET 영상 신기술
'12.08	신선영	싱가폴	Singapore General Hospital	Sidney Yu	체외검사 및 정도관리
'18.08	도용호	독일	Klinikum rechts der Isar	Wolfgang Weber	핵의학치료기술 습득

2. 진료통계

1) 서울대학교병원 본원

가. 진료량

영상검사 계열별 비율

단위 %

연도	갑상선	비뇨기계	소화기계	뇌신경계	순환기계	근골격계	PET	기타
1968	91.1	8.9						
1970	43.3	12.7	43.9	2.6	1.6			
1975	81.6	10.5	6.4	1.1	0.2			
1980	29.3	6.8	46.2	0.4	8.8	8.6		0.1
1985	21.8	5.9	43.2	0.4	10.7	17.3		0.8
1990	27.0	8.5	8.0	5.4	13.0	37.0		1.1
1995	25.7	6.9	3.0	6.6	15.4	39.3		3.0
2000	20.6	5.8	1.4	2.6	14.8	46.2		8.6
2005	18.5	3.3	1.2	3.6	20.2	41.3	9.3	2.5
2009	10.0	2.6	1.4	3.3	11.2	42.1	24.2	5.2
2010	8.9	2.6	2.1	3.5	10.7	40.9	26.8	4.5
2011	7.8	2.9	2.2	3.2	9.6	38.3	31.0	4.9
2012	7.4	2.7	2.2	2.9	9.0	41.7	29.8	4.3
2013	6.2	2.3	2.1	2.6	5.9	39.3	36.0	5.6
2014	5.7	2.6	1.8	2.2	5.6	37.6	39.0	5.4
2015	5.6	2.9	1.7	4.0	4.9	42.7	32.7	5.5
2016	4.4	3.3	1.6	3.7	9.5	42.8	30.9	3.9
2017	3.0	3.3	1.9	3.1	9.9	44.6	30.8	3.4
2018	3.4	3.1	2.0	3.0	10.3	45.8	28.9	3.5
2019	3.4	3.6	1.7	3.0	9.6	45.2	30.2	3.3

단반감기 동위원소 생산량

(단위: mCi)

	¹⁸ F	¹¹ C	¹⁵ O	¹³ N	⁶⁴ Cu	¹²⁴ I	합계
1995	26,634						26,634
1996	26,095						26,095
1997	23,116		1,920	98			25,134
1998	39,045	831	3,120	473			43,469
1999	31,536	476	2,220				34,232
2000	53,234	1,138					54,372
2001	52,735	632					53,367
2002	73,637	535					74,172
2003	203,868	1,198	5,340				210,406
2004	154,456	1,264	1,520				157,240
2005	120,091	1,680					121,771
2006	119,867	3,551	630				124,048
2007	89,160	2,411					91,571
2008	183,576	12,423	320				196,319
2009	154,209	9,245	5,760				169,214
2010	176,566	7,413	320				184,299
2011	358,787	7,675					366,462
2012	665,094	27,064		100	60		692,318
2013	677,427	34,827	10,800	30,600	390	5	754,049
2014	740,644	36,626		29,850	20		807,140
2015	614,919	50,354		26,250			691,523
2016	631,162	45,405	160	29,100			705,827
2017	719,139	25,598		12,300			757,037
2018	748,249	38,480	240	15,450			802,419
2019	835,650	48,050	480	16,260			900,440
계							

¹⁸F-FDG 생산량, 사용량, 판매량

(단위: mCi, 원)

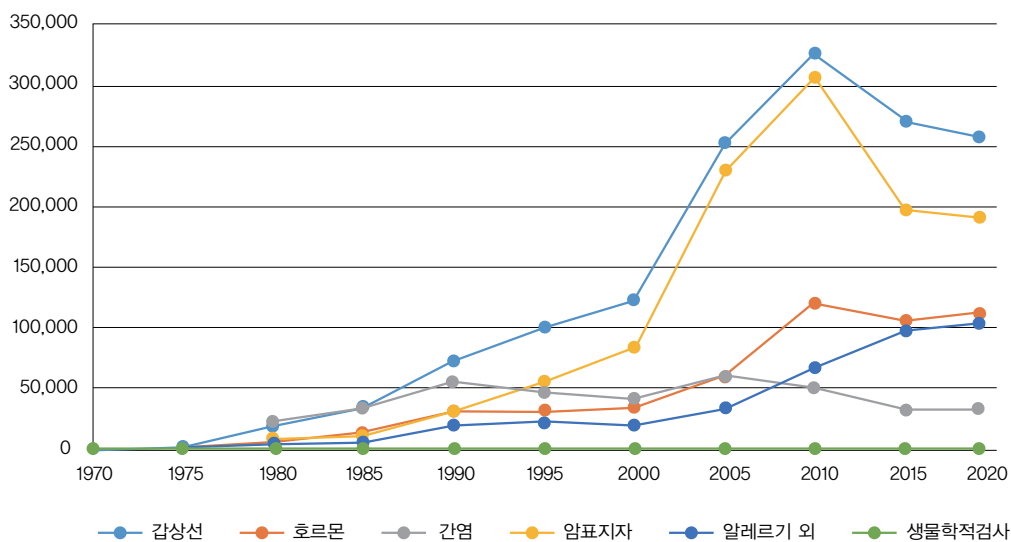
	생산량	사용량	판매량	판매금액
1995	26,634	4,460		
1997	23,116	7,190		
1998	39,045	8,940	66	1,650,000
1999	31,536	10,200	264	6,300,000
2001	52,735	13,180	8,429	248,805,700
2003	203,370	23,030	16,042	441,155,000
2005	113,845	28,340	2,592	71,280,000
2007	86,648	52,490	2,540	58,674,000
2009	152,593	58,165	0	
2010	176,566	81,170		
2011	358,787	91,920	520	12,012,000
2012	665,094	100,813		
2013	677,427	118,650		
2014	740,644	135,300	160	3,696,000
2015	614,919	101,160		
2016	631,162	98,580	280	12,320,000
2017	719,139	105,720	160	6,160,000
2018	739,949	95,710	570	25,080,000
2019	826,900	92,680	580	25,520,000



검체검사 계열별 건수

연도	갑상선	호르몬	간염	암표지자	알레르기 외	생물학적검사	합 계
1970	74					34	108
1975	2,192	589			39	18	2,838
1976	4,226	844		550	20	23	5,663
1977	5,874	2,168	227	860	153	30	9,312
1980	18,901	4,507	22,254	7,336	3,410	68	56,476
1985	34,579	14,405	33,855	10,936	6,034	37	102,729
1990	73,523	32,002	54,199	30,510	18,938	134	182,859
1995	100,547	31,057	47,022	55,345	21,605	73	255,649
2000	123,320	34,518	41,365	84,268	19,374	27	302,872
2005	253,065	58,412	60,704	230,167	32,894	134	635,376
2009	333,466	107,584	62,474	320,809	44,349	432	869,114
2010	326,005	120,847	51,234	308,277	67,055	469	873,887
2011	317,247	112,077	52,087	293,270	90,159	497	864,337
2012	352,409	112,994	49,094	302,442	96,880	335	914,154
2013	346,358	113,101	46,969	306,078	107,393	413	920,312
2014	319,921	106,636	30,304	288,735	103,224	266	849,086
2015	269,112	105,947	31,532	197,847	96,835	311	701,584
2016	263,228	112,754	34,310	193,312	110,055	329	713,988
2017	253,731	108,342	29,564	191,809	100,257	342	684,045
2018	251,811	118,516	32,292	195,654	99,812	398	698,483
2019	257,420	111,623	33,619	191,838	104,152	164	698,816

검체검사 건수 변화 (1970~2019)



나. 장비

(1) 영상검사 장비

설치년도	장비명	제조사	모델명
1961	Scintiscanner		
	Rate meter system 2 channel		
1965	Spectrophotometer	BECKMAN	DU-2400
1969	Curimeter	ALOKA	F 38-11
	Gamma Camera	Nuclear Chicago	PHO GAMMA III
1977	Color Scanner		
1978	Gamma Camera System		Gamma 11 System GM-11PE DISITAL
	Spectro scaler	PICKER	111A
	Gamma Camera Scintillation	Nuclear Chicago	PHO GAMMA III
1979	Radiochromatogram scanner		7201
	Gamma Camera System	Ohio Nuclear	SIGMA 420
	Gamma Camera System	Ohio Nuclear	SIGMA 410
	Gamma Camera System	PICKER	DYNA 4/15
	Color Scanner		500/D 63020-G
1982	Gamma Camera (Detector for scintillation)		MEDX-S37
1985	Multi format imager		6825
1986	Fluorospectrophotometer		Farrand 3
	Gamma Camera System	SIEMENS	LEM
	Gamma Camera System		ZLC 75 ROTA
	Data processing computer system		MAX DELTA
1988	Dichromatic bone densitometer		
1989	Gamma Camera system	SIEMENS	ZLC 750 Orbiter
1994	Gamma Camera Whole Body Scan	SIEMENS	Body Scan
	Gamma Camera (SPECT)	PICKER	PRISM 2000
1995	Hot Cell	CAPINTEC	
	Cyclotron (PET Radioisotope)	EBCO	TR-13
	PET(Positron emission tomography)	SIEMENS	EXACT 47
	Beta flow detector system	GILSON	
	UV/VIS Spectrophotometer	HP	HP 8452 A
	Personal contamination monitor	BERTHOLD	LB 1043BX0
	Gamma Camera (SPECT)	PICKER	PRISM 3000
1996	Gamma Camera	ADAC	Solus
	Gas Chromatography	HP	5890II PRUS
	High Performance Liquid Chromatography		
	FDG Chemistry for PET		

1997	High speed image processing comp		
	High speed image processing comp		
	SUN Workstation Comp	SIEMENS	Ultra60
2001	Double Hot Cell	HEXCO	SYSTEM
2002	Gamma Camera	SIEMENS	E.CAM
	Vertex Gamma Camera	ADAC	ultra high tier
	Automatic F-18 FDG Labelling Sys.	IBA	W/Taget
2003	Gamma Camera	ADAC	FORTE
	Dose Calibrator	CAPINTEC	CRC-15R
	Fusion PET scanner	PHILIPS	Gemini
2005	Gamma Camera	ADAC	Sky Light
	FDG Module	EBCO	
2006	Gamma Camera	SIEMENS	E.CAM
	Gamma Camera	SIEMENS	E.CAM
	Gamma Camera	SIEMENS	E.CAM
2007	HPLC System	GILSON	321
	Gamma Camera	SIEMENS	E.CAM
	PET-CT Scanner	SIEMENS	Biograph 40
2008	Cardiac Gamma Camera	PHILIPS	CardioMD
	Gamma Camera(3-head)	TRIONIX	TRIAD XLT-9
2010	Thyroid Uptake System		Captus 3000
	Defibrillator		M-Series
	Clean Bench[RI 분배용 제작]		180LFC
	Clean Bench[Generator 저장용 제작]		150LFC
2011	Cyclotron	GE	PETtrace 10
	PET-CT Scanner	SIEMENS	MCT40
	SPECT-CT Scanner	GE	Discovery NM/CT 670
2012	PET-CT Scanner	SIEMENS	MCT64
	SPECT-CT Scanner	GE	Discovery NM/CT 670
2013	PET-MRI Scanner	SIEMENS	mMR
	HPLC System	Gilson	381H4A014
2015	Radiopharmaceutical Synthes Module	GE	Tracelab FXCpro
	HPLC Systems	Gilson	381H4A014
2017	Gas Chromatography		Clarus 680 GC
	Automated Synthesis for Radiopharmaceuticals	GE	Fastlab 2
2018	Gamma Camera (SPECT)	Spectrum Dynamics	D-SPECT
2019	Dual Head Gamma Camera	GE	NM 830
2020	Dual Head Gamma Camera	Siemens	Symbia Evo Excel

(2) 검체검사 장비

설치년도	장비명	제조사	모델명
1970	Spectro Scaler, Gamma Counter	PICKER	
1979	Liquid scintillation Counter	PACKARD	B-3255
	Centrifuge(Refrigerated)	DUPONT	Rc-5B
1984	Centrifuge, Refrigerated	DAMON	DPR-6000
1986	Ultracentrifuge		OTB-75B(52960)
	Gamma Counter	PACKARD	Multi-PRiAS 5304
	Gamma Counter four Detector	PACKARD	PRIAS
1989	Liquid Scintillation Counter	PACKARD	TRI-CARB 2200CA
	Gamma Counter (auto multidetector)	PACKARD	COBRA 5010
1995	Table top Refrigerated Centrifuge	HANIL	UNION 32R
	Centrifuge(Large Capacity Refrigerated)	HANIL	UNION 5KR
	Bead Washer	ABBOTT	PROQUANTUM
1996	Gamma Counter (auto multidetector)	PACKARD	COBRA QUINTOM
	Autosampler	ML AT PLUS 2	ML AT PLUS 2
1997	Dynamic Incubator	ABBOTT	COMMANDER
2000	Automatic RIA System	STRATEC	RIA-MAT 280
2004	Gamma Counter		Wallac 1470
2005	Tube & Bead Washer	HOIL	Multi-Washer 50
2006	Autosampler	HAMILTON	Microlab AT Plus 2
2007	Ultra Refrigerated Centrifuge	KUBOTA	5930
	Autosampler	TECAN	Freedom EVO
	Shaking Water Bath		CYROMAX 929
2012	Gamma Counter		Gamma-10
	Refrigerated Centrifuge	KUBOTA	5930
	Auto washer		Multi-Washer 50
2013	Automation Radioimmunoassay Analyzer		GammaPro
2015	Auto sampler		DS8150
2016	Gamma Counter		DREAM GAMMA-10
	Auto washer		TW300
	Auto washer		Multi-Washer 50
2017	Refrigerated Centrifuge	KUBOTA	5930
	Refrigerated Centrifuge	KUBOTA	5930
	Refrigerated Centrifuge	KUBOTA	59360
2018	Auto Sampler		MASSIA DS 8150
	RI Hood		BH5 HEAVY
	Refrigerated Centrifuge		5930
2019	Automation Radioimmunoassay Analyzer		Dream Gamma 10
	TLC Scanner		AR-2000



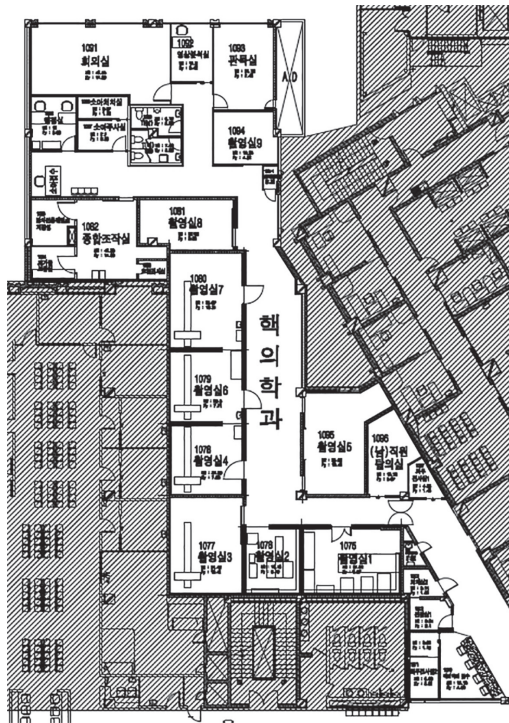
다. 시설

(1) (구)방사성동위원소진료실

별관 연구동 건물(현 어린이병원) 1층에 위치하였다.

(2) 체내검사실

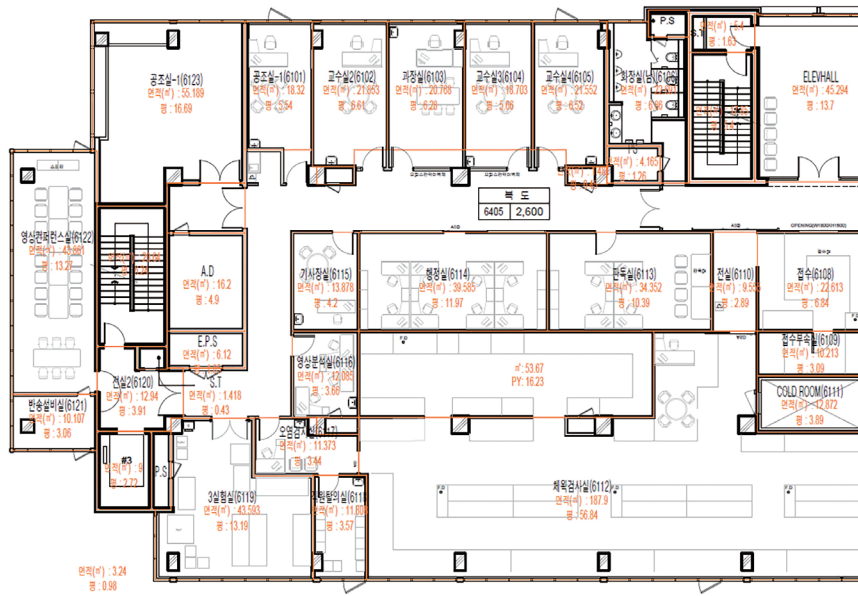
1979년 1월, 본원 1층 1파트로 이사 후 작은 시설변경이 있었으며 개보수를 위해 잠시 본원 지하 1층으로 옮겨 진료하였고 2000년 7월 현재 장소로 이전하였다. 면적은 207평이다. 2017년 11월에는 단계적 리모델링 공사를 거쳐 판독실, 영상분석실, 탈의실 등을 재배치하였다.



본관 1층 체내검사실 평면도 (2020)

(3) 체외검사실

1979년 1월, 설계당시 면적으로는 이전이 불가능하여 병실이었던 본원 3층 4파트로 이사하였고 핵의학동을 신축하여 1985년 12월, 본원 2층 8파트에 자리 잡았다. 개보수를 위해 2000년 8월 본원 지하 1층으로 옮겨 진료하였다가 과장실, 교수실을 포함하여 2001년 5월 다시 이전하였고 면적은 210평이었다. 부족한 교수실 2실은 13층에 위치하였다. 2017년 10월 교수실, 행정실, 체외검사실이 병원 본관 2층에서 의생명연구원 6층으로 이전하며 체외검사실이 기존 196평에서 206평으로 소폭 확장되어 보다 쾌적한 환경에서 핵의학 검체검사를 수행하고 있다.



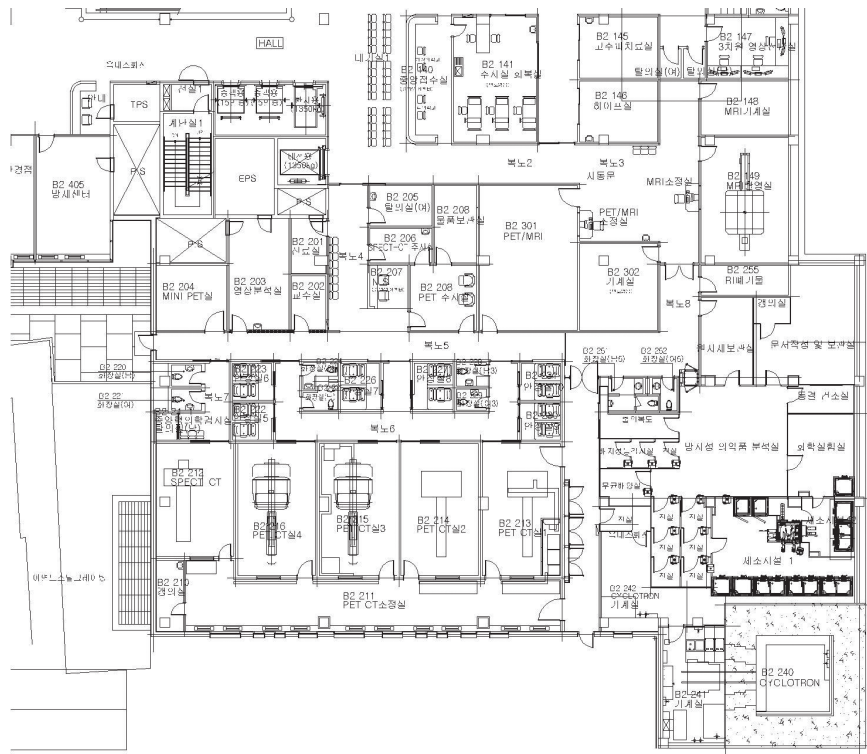
의생명연구원 6층 핵의학과 평면도 (2020)

(4) 소아핵의학검사실

1985년 소아병원 개원 시 지하 1층에 위치하였고 어린이병원 전체 개보수 계획에 의해 개보수 후 2009년 7월 4층으로 옮겼다. 면적은 47평이었다. 2017년 어린이병원의 공간부족 해소를 추진하는 병원에 협력하여 소아핵의학검사실은 본관 1층 핵의학과에 통합하였다.

(5) 중앙핵의학검사실 (구 PET 센터)

1994년 6월 본원-소아병원 연결복도 지하 1층에 위치하였으며 2007년 9월 신규장비 설치로 인해 대기실을 분리, 복도 건너편으로 이전하였다. 면적은 180평이었다. 2011년 암병원 개원으로 시설, 장비 등을 새로운 환경에 걸맞게 개편하였으며, 암병원 내에 영상의학과와 함께 개설한 중앙영상센터 중앙핵의학검사실로 변경하였으며, 새로운 영상장비와 사이클로트론을 도입하였다.



암병원 지하2층 중앙핵의학검사실 평면도 (2020)

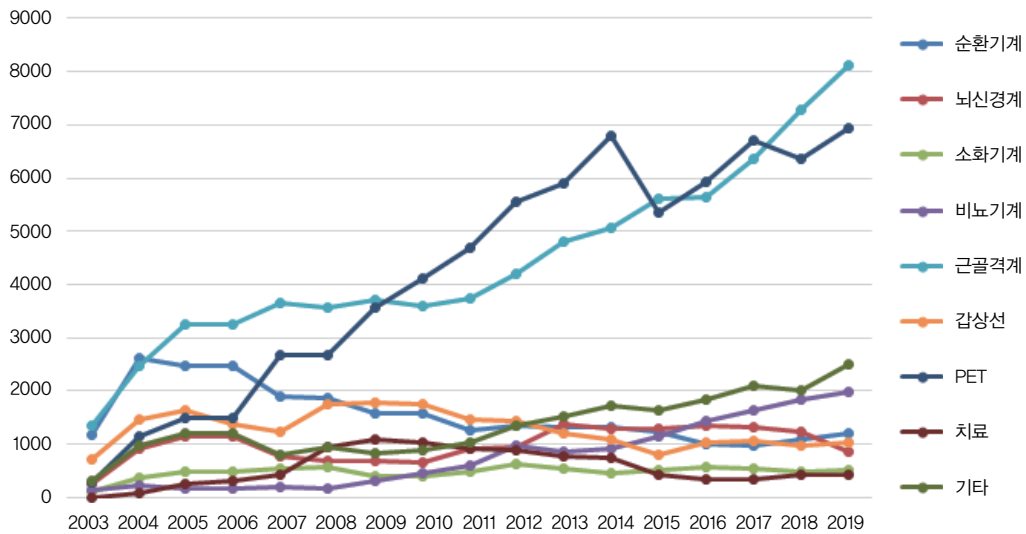
2) 분당서울대학교병원

가. 진료량

분당병원 전체 영상검사건수

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
순환기계	1,165	2,631	2,487	2,487	1,910	1,875	1,591	1,585	1,266	1,356	1,335	1,308	1,249	1,014	986	1,103	1,206
뇌신경계	265	927	1,135	1,135	783	696	684	651	931	945	1,387	1,300	1,296	1,365	1,318	1,224	868
소화기계	103	384	501	501	531	585	412	396	482	638	537	463	512	586	545	488	513
비뇨기계	153	237	164	164	203	180	326	463	600	976	851	905	1,145	1,448	1,627	1,845	1,972
근골격계	1,360	2,470	3,257	3,257	3,647	3,555	3,701	3,606	3,749	4,209	4,809	5,073	5,625	5,637	6,364	7,284	8,134
갑상선	704	1,463	1,626	1,374	1,246	1,745	1,780	1,760	1,458	1,424	1,197	1,091	814	1,038	1,050	983	1,040
PET	295	1,138	1,495	1,495	2,669	2,670	3,578	4,118	4,695	5,568	5,892	6,799	5,368	5,942	6,716	6,367	6,937
치료	2	86	252	321	437	945	1,083	1,021	917	896	789	750	424	348	355	423	418
기타	327	965	1,201	1,201	813	938	836	894	1,029	1,342	1,520	1,724	1,649	1,844	2,102	2,009	2,499
Total	4,374	10,301	12,118	11,935	12,239	13,189	13,991	14,494	15,127	17,354	18,317	19,413	18,082	19,222	21,063	21,726	23,587

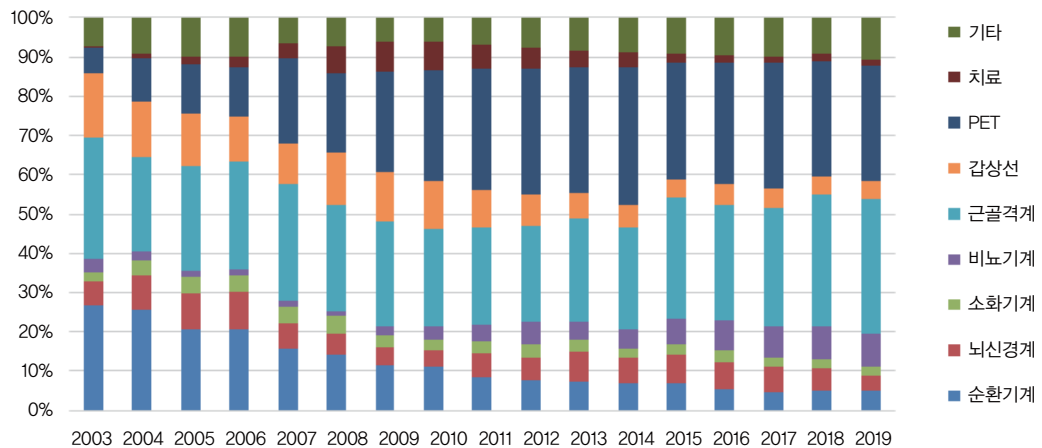
영상검사 건수 변화 (분당병원)



영상검사 계열별 비율

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
순환기계	27%	26%	21%	21%	16%	14%	11%	11%	8%	8%	7%	7%	7%	5%	5%	5%	5%
뇌신경계	6%	9%	9%	10%	6%	5%	5%	4%	6%	5%	8%	7%	7%	7%	6%	6%	4%
소화기계	2%	4%	4%	4%	4%	4%	3%	3%	3%	4%	3%	2%	3%	3%	3%	2%	2%
비뇨기계	3%	2%	1%	1%	2%	1%	2%	3%	4%	6%	5%	5%	6%	8%	8%	8%	8%
근골격계	31%	24%	27%	27%	30%	27%	26%	25%	25%	24%	26%	26%	31%	29%	30%	34%	34%
갑상선	16%	14%	13%	12%	10%	13%	13%	12%	10%	8%	7%	6%	5%	5%	5%	5%	4%
PET	7%	11%	12%	13%	22%	20%	26%	28%	31%	32%	32%	35%	30%	31%	32%	29%	29%
치료	0%	1%	2%	3%	4%	7%	8%	7%	6%	5%	4%	4%	2%	2%	2%	2%	2%
기타	7%	9%	10%	10%	7%	7%	6%	6%	7%	8%	8%	9%	9%	10%	10%	9%	11%

영상검사 계열별 비율 (분당병원)

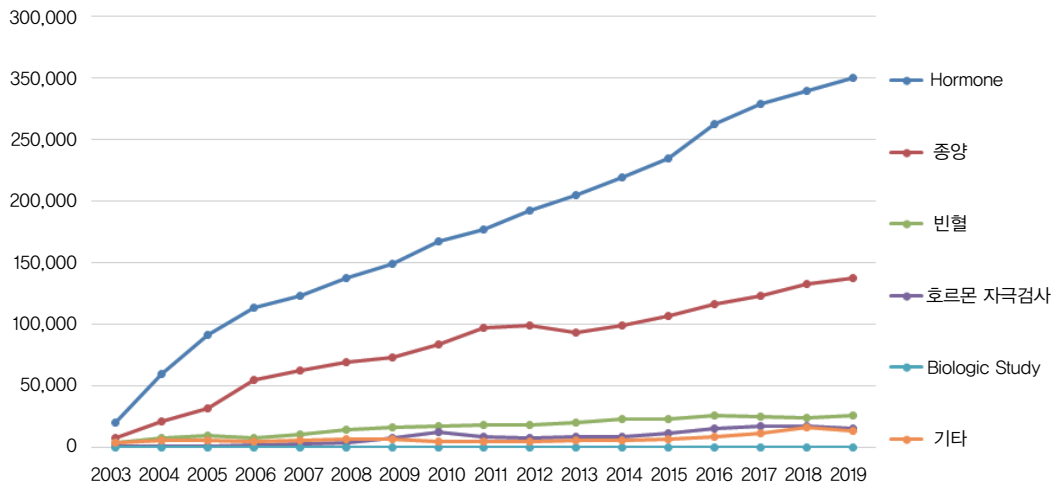


분당병원 검체검사 건수

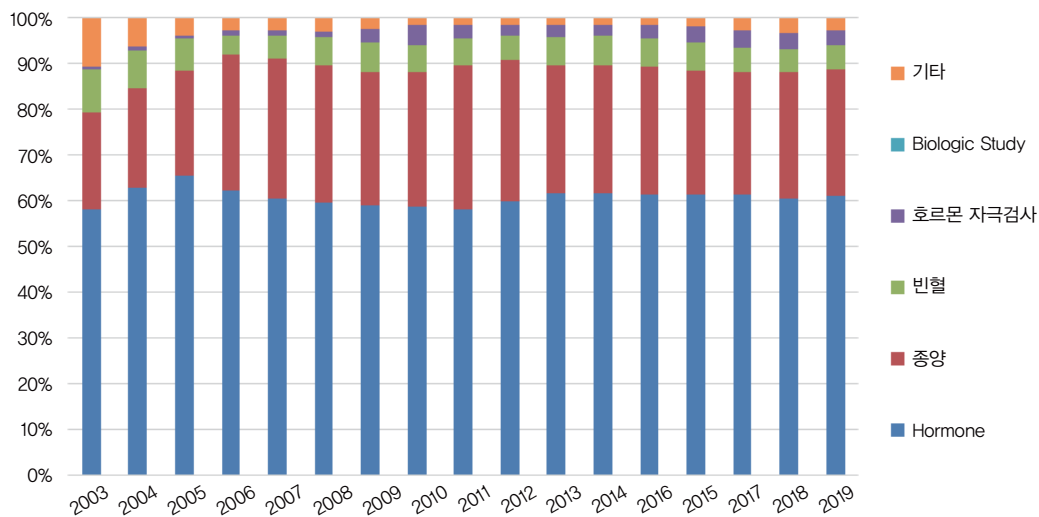
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Hormone	19,731	58,949	90,849	113,341	122,444	137,024	148,435	167,107	176,903
종양	7,260	20,442	31,779	54,026	61,887	69,249	72,912	83,706	96,476
빈혈	3,164	7,670	9,635	7,768	10,036	14,059	16,167	17,202	17,922
호르몬 자극검사	218	951	934	1,979	2,452	3,204	7,077	11,969	8,759
Biologic Study	0	1	0	0	19	41	46	0	0
기타	3,606	5,831	5,287	4,919	5,498	6,535	6,165	4,600	4,686
Total	33,979	93,844	138,484	182,033	202,336	230,112	250,802	284,584	304,746

	2012	2013	2014	2015	2016	2017	2018	2019
Hormone	191,862	204,297	219,221	234,514	262,693	278,569	289,706	299,633
종양	98,978	93,111	99,168	106,570	116,345	122,351	132,821	136,868
빈혈	17,669	20,268	22,927	22,867	25,925	24,384	23,662	25,794
호르몬 자극검사	7,155	8,748	8,635	11,100	14,933	17,360	16,563	15,396
Biologic Study	21	10	9	4	11	0	0	0
기타	4,889	5,288	5,071	6,041	7,959	11,563	16,259	13,544
Total	320,574	331,722	355,031	381,096	427,866	454,227	479,011	491,235

검체검사 건수 변화 (분당병원)



검체검사 계열별 변화 (분당병원)



¹⁸F-FDG 생산량, 사용량, 판매량

(단위: mCi, 원)

	생산량	사용량	판매량	판매금액
2008	115,106	15,750	70	1,617,000
2009	318,941	35,750	1,440	33,264,000
2010	275,544	40,910	3,150	72,765,000
2011	296,585	46,860	1,540	35,574,000
2012	364,162	55,550	620	14,322,000
2013	335,294	58,750		
2014	431,037	67,860		
2015	399,865	53,600		
2016	326,633	59,530		
2017	327,807	33,190		
2018	321,339	63,470		
2019	305,343	69,250		

동위원소 구입량

단위: mCi

	^{99m} Tc	¹³¹ I	²⁰¹ Tl	¹⁸ F	¹²⁵ I	¹²³ I	기타	계
2003	24,000	22	3,412	1,820	6.9	89	16	29,366
2004	54,250	2,213	7,095	5,780	16.7	891	28.3	70,274
2005	111,700	7,205	6,796	12,460	22.3	810	26.8	139,025
2006	132,900	9,443	4,978	18,955	38.2	1,441	41.3	167,797
2007	129,700	11,984	14	26,390	32.4	573	15.9	168,709
2008	136,810	45,783	5,384	11,350	52.4	10	43.3	199,433
2009	130,250	52,610	7,634	830	123.2	735	25.5	45,904
2010	120,766	50,377	5,860	400	115.4	1,230	470.9	179,223
2011	128,250	44,925	5,989	3,380	85	388	18	183,035
2012	131,250	43,828	4,354	2,770	77.6	585	33.6	182,898
2013	129,350	33,948	4,468	6,210	50.8	5,627	601	180,255
2014	126,000	33,745	4,147	12,850	87.6	5,287	13.2	182,131
2015	193,028	25,370	4,179	3,059	423	4,798	12.8	230,870
2016	360,584	24,598	4,024	5,126	265	5,327	12	399,937
2017	379,947	25,260	3,527	12,840	254	4,182	23.2	426,084
2018	410,806	28,313	4,291	8,453	146	2,236	867.7	455,113
2019	455,067	31,290	3,850	9,574	252	361	656	501,041

나. 장비

(1) 영상검사 장비

설치년도	장비명	제조사	모델명
2003	Single Head Gamma Camera	Philips	Argus
	Dual Head Gamma Camera	Philips	Vertex60
	Dual Head Gamma Camera	Philips	Forte
	PET	Philips	Allegro
	Thyroid Probe	세영엔디씨	koroid
2007	Triple Head Gamma Camera	Trionix	Triad XLT9
	Cyclotron	삼영유니텍	KIRAMS-13
2008	SPECT/CT	Bioscan	Nano SPECT/CT
2009	PET/CT	Ge Healthcare	Discovery VCT
	Module	GE	Tracelab FXCpro
	Module	GE	Tracelab FXFN
2011	PET/CT	Mediso	Nano PET/CT
2014	SPECT/CT	Ge Healthcare	Discovery NMCT 670
	Module	Ge Healthcare	Tracelab FXNpro

2015	PET/CT	Siemens	mCT FLOW
	Module	Syntra	Mel plus
	Module	Siemens	Explora One
2016	SPECT/CT	Ge Healthcare	Discovery NMCT 670 PRO
	HPLC	Agilent	G1311C
2017	Automated Synthesis for Radiopharmaceuticals	Ge Healthcare	Fastlab 2
2018	Ion Chromatograph System	Metrohm	Eco IC
2019	TLC Image Scanner	Brightspec	bSCAN
	Gas Chromatography	Perkin elmer	Clarus 690
	SPECT	Ge Healthcare	Discovery NM 630
	SPECT/CT	Ge Healthcare	Discovery NMCT 870 CZT

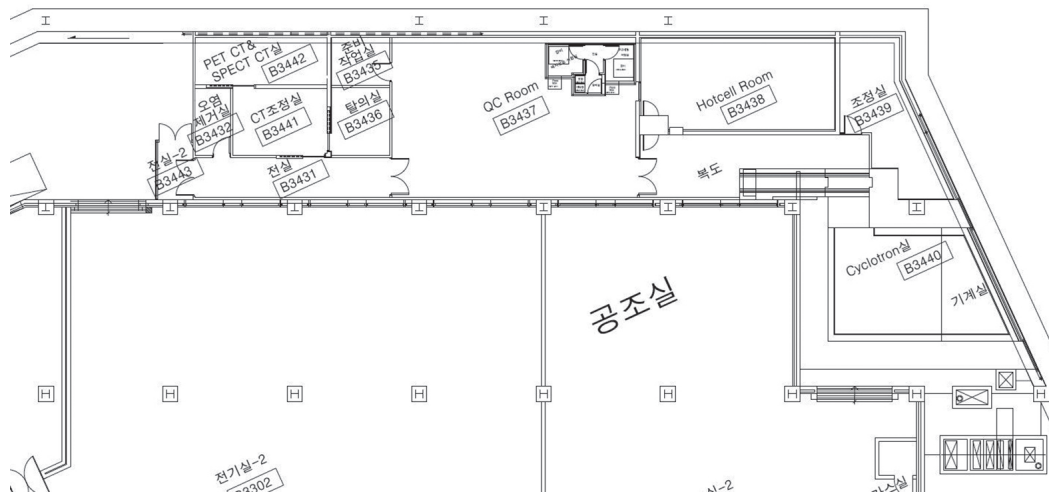
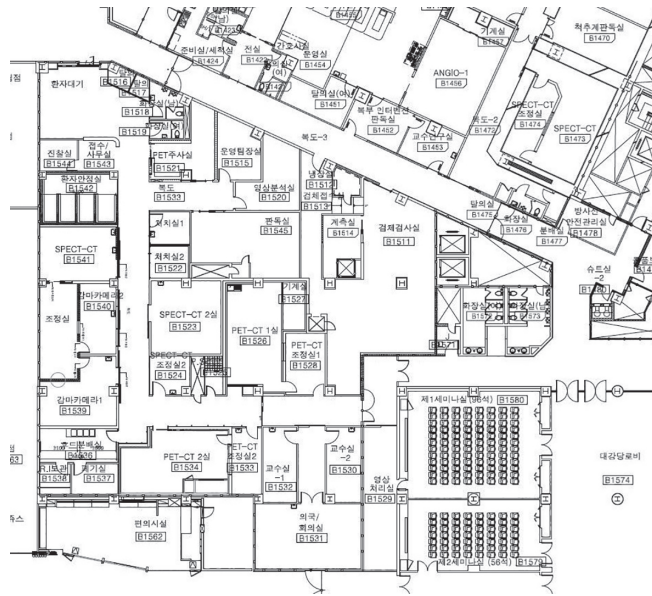
(2) 검체검사 장비

설치년도	장비명	제조사	모델명
2003	Centrifuge Table	한일과학	UNION 32R PLUS
	Centrifuge Refrigerated	한일과학	UNION 5KR
	Water Bath	비전과학	KMC-1205WP
	Auto Sampler	Hamilton	Microlab AT Plus 2
	Gamma counter	Packard	COBRA5010
2004	Eppendorf Centrifuge	Eppendorf	Centrifuge 5810R
2006	Washer BEAD & TUBE	호일 바이오메드	MULTI - Washer 50
2010	Water Purification System	하나사이언스	PURE CHEM II
	Washer BEAD & TUBE	호일 바이오메드	MULTI - Washer 50
2011	Gamma counter	신진 메딕스	GAMMA 10
	Auto Sampler	신진 메딕스	DS8150
2012	Washer TUBE AUTO	신진 메딕스	DREAM TW300
2014	Gamma counter	신진 메딕스	GAMMA 10
2017	Auto RIA System	호일 바이오메드	Gamma PRO
2019	Auto RIA System	호일 바이오메드	Gamma PRO

다. 시설

분당병원은 1996년 3월 기공식을 하여 2002년 12월 준공식을 하였고 핵의학과는 본관 지하 1층에 위치하였으며 면적은 280평이다. 2007년 7월 사이클로트론센터를 본관 지하3층 120평 규모에 설치하기 시작하여 2008년 5월 준공식을 가졌고, 2011년 경기전임상분자영상센터 설립 관련하여 140평 규모로 증축하였다. 2016년 10월 검체검사실을 50평 규모로 이전 확장하였고, 11월에는 SPECT-CT실을 추가 하면서 50평 규모로 확장하였다. 2019년 단계적 리모델

링 공사를 거쳐 체내검사실 조정실, 안정실, 탈의실 등을 재배치하였으며, 2020년 현재 핵의학과의 총 면적은 380평 규모이다.



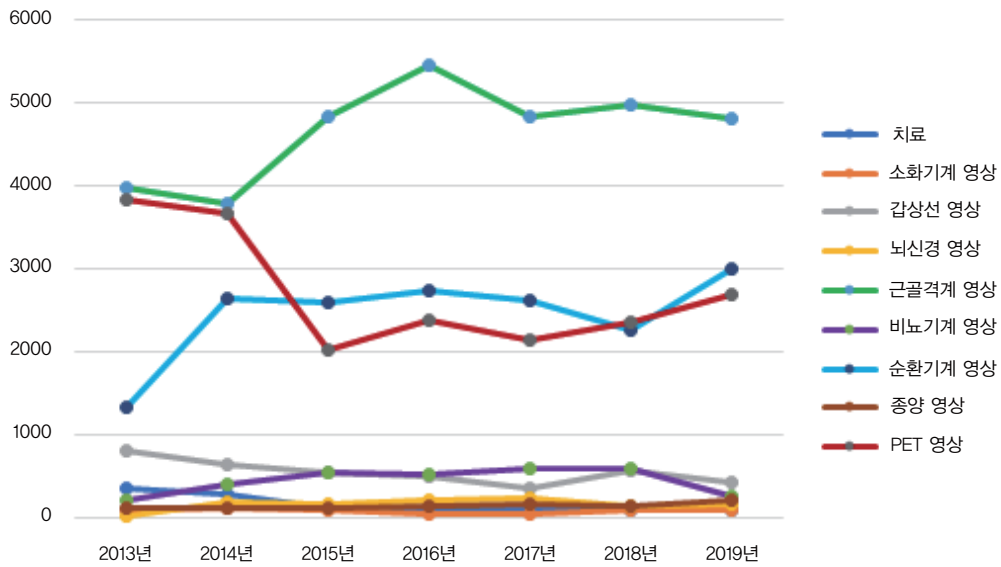
3) 서울특별시 보라매병원

가. 진료량

영상검사건수

구분	2013년	2014년	2015년	2016년	2017년	2018년	2019년
근골격계	3,966	3,778	4,831	5,439	4,833	4,979	4,806
비뇨기계	218	397	532	522	593	601	268
순환기계	1,328	2,633	2,588	2,740	2,623	2,254	2,997
소화기계	99	119	97	53	49	96	96
갑상선	808	632	539	489	363	565	413
뇌신경	8	187	170	207	228	137	171
종양	124	125	115	129	158	146	205
PET	3,819	3,665	2,027	2,377	2,137	2,362	2,676
치료	358	273	122	92	86	92	79
합계	10,370	11,536	10,899	11,956	10,984	11,140	11,711

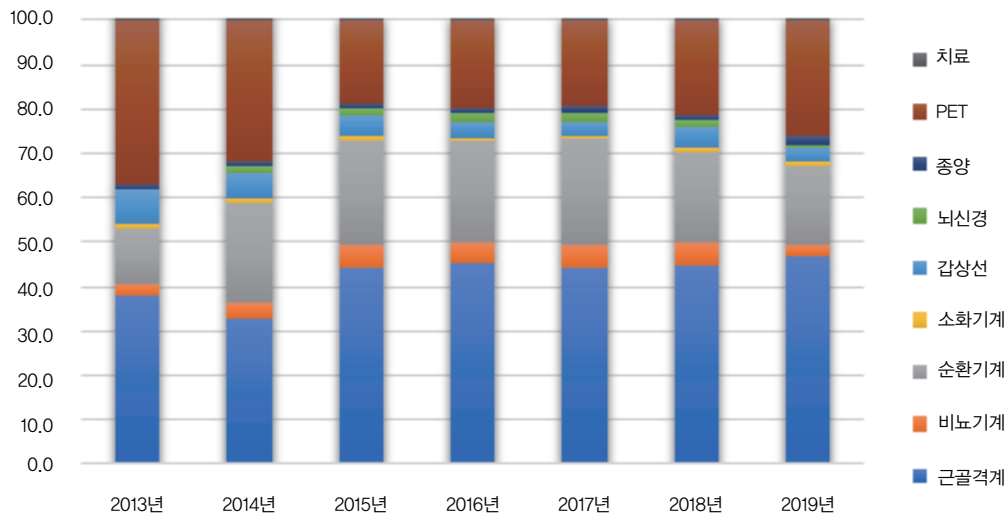
영상검사 건수 변화 (보라매병원)



영상검사 계열별 비율

구분	2013년	2014년	2015년	2016년	2017년	2018년	2019년
근골격계	38.2	32.7	44.3	45.5	44.0	44.7	47.0
비뇨기계	2.1	3.4	4.9	4.4	5.4	5.4	2.6
순환기계	12.8	22.8	23.7	22.9	23.9	20.2	17.6
소화기계	1.0	1.0	0.9	0.4	0.4	0.9	0.9
갑상선	7.8	5.5	4.9	4.1	3.3	5.1	3.0
뇌신경	0.1	1.6	1.6	1.7	2.1	1.2	0.9
종양	1.2	1.1	1.1	1.1	1.4	1.3	1.6
PET	36.8	31.8	18.6	19.9	19.5	21.2	26.3
치료	3.5	2.4	1.1	0.8	0.8	0.8	0.8

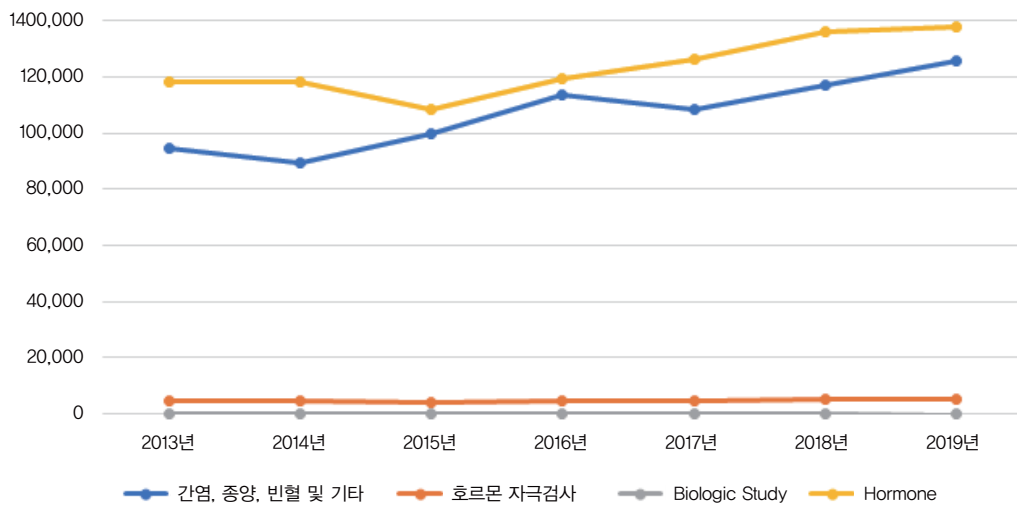
영상검사 계열별 변화 (보라매병원)



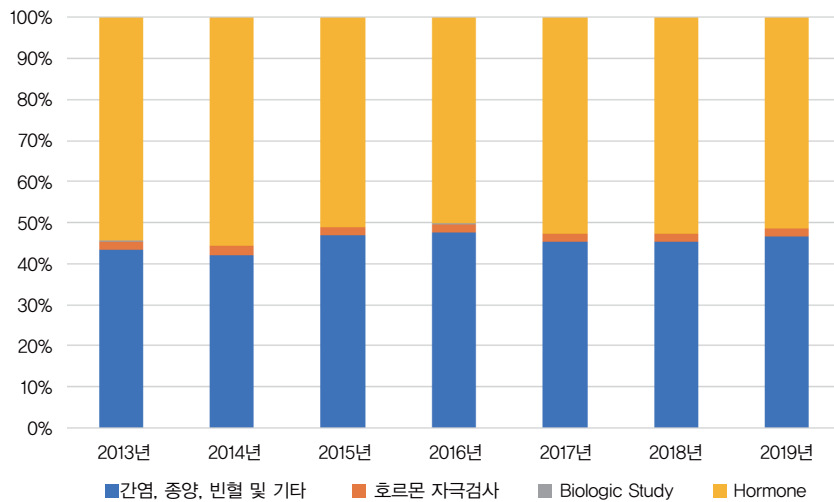
보라매병원 검체검사건수

	2013년	2014년	2015년	2016년	2017년	2018년	2019년
간염,종양,빈혈 및 기타	94,378	89,465	99,629	113,442	108,462	117,257	125,629
호르몬 자극검사	4,585	4,822	4,232	4,786	4,791	5,459	5,321
Biologic Study	208	231	125	96	83	86	0
Hormone	118,260	118,343	108,647	119,442	126,134	136,441	138,179
합계	217,431	222,136	212,633	237,766	239,470	259,243	269,129

검체검사 건수 변화



핵의학 체외검사 계열별 변화



나. 장비

(1) 영상검사 장비

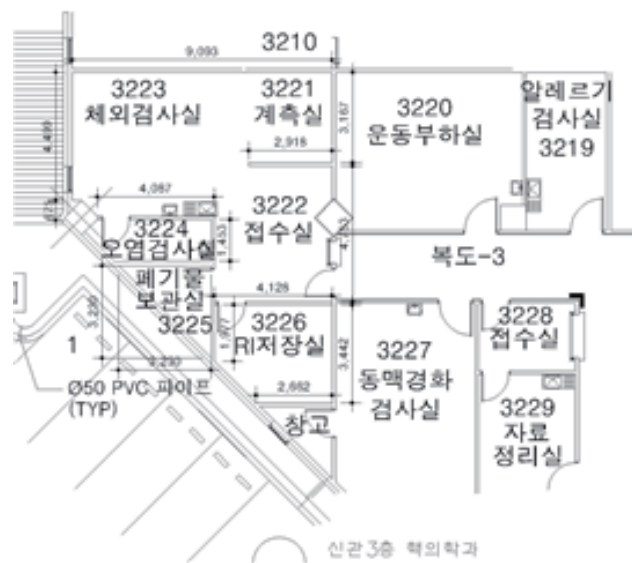
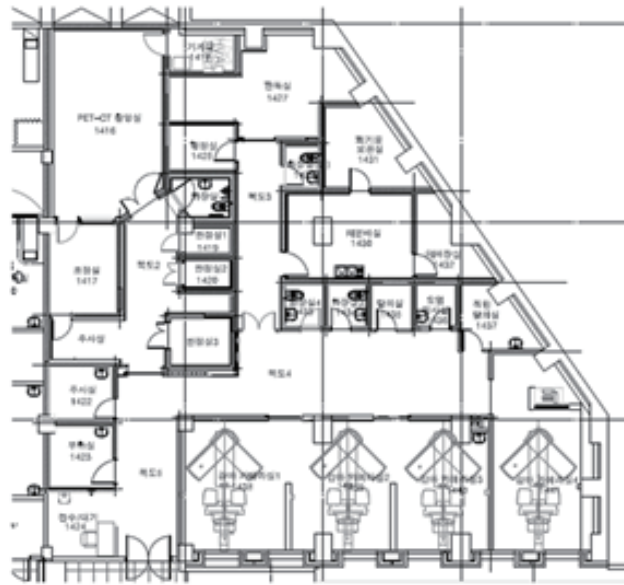
설치년도	장비명	제조사	모델명
2009	PET/CT Scanner	PHILIPS	Gemini TF64
	Gamma Camera (SPECT/CT)	GE	Hawkeye4
	Gamma Camera(3-head)	TRIONIX	TRIAD XLT9
	Gamma Camera	GE	INFINIA
	Gamma Camera	GE	INFINIA HE

(2) 검체검사 장비

설치년도	장비명	제조사	모델명
1997	Dynamic Incubator	ABBOTT	COMMANDER
1999	Gamma Counter	PACKARD	COBRA QUANTOM
2008	Autosampler	TECAN	Freedom EVO
	Tube & Bead Washer	HOIL	Multi-Washer 50
	Automatic RIA System	STRATEC	RIA-MAT 280

다. 시설

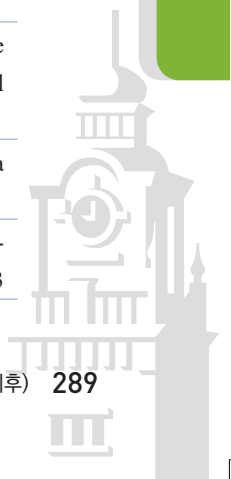
보라매병원은 1955년 서울특별시립영등포병원으로 출범하였고 1987년 본원에서 위, 수탁운 영계약을 하게 되었으며 핵의학 검체검사실은 1991년 10월 본관 1층에 면적 40평 규모로 시작하였다. 새 병원이 신축됨에 따라 검체검사실은 2008년 5월 신관 3층 40평 규모로 이전하였고 이후 검체검사실을 포함한 주위면적 110평을 우선 개보수하여 2009년 5월부터 영상장비를 설치하고 8월에 진료를 시작하였다. 2013년 1월에는 희망관 4층에 약 10평 규모의 옥소치료병실 2실을 개설하여 운영하고 있다.



3. 주요 논문(2010년 이후)

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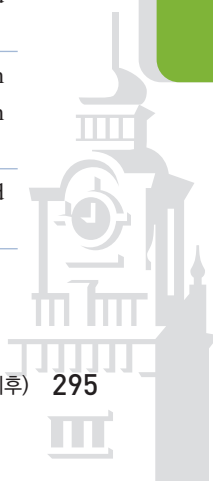
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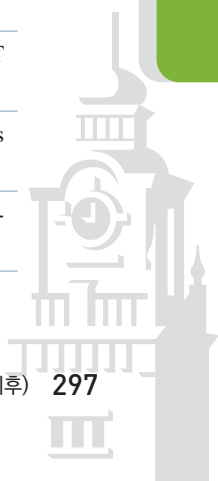


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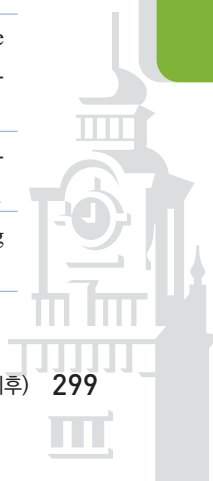
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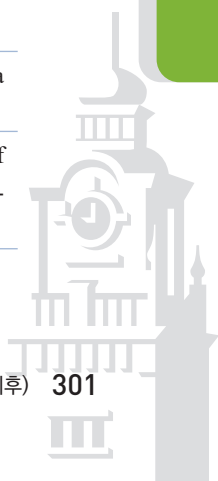


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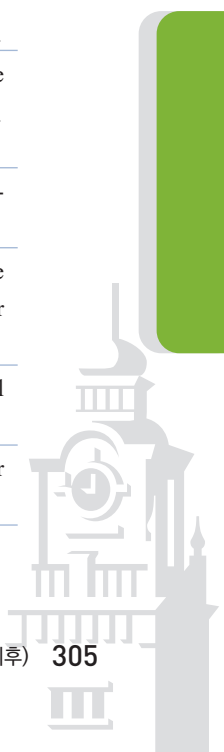
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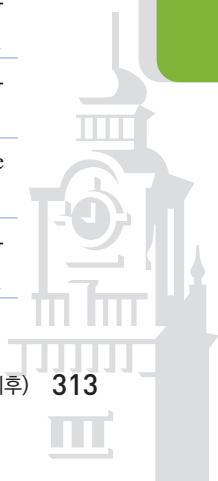


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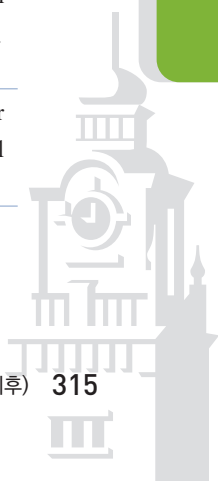
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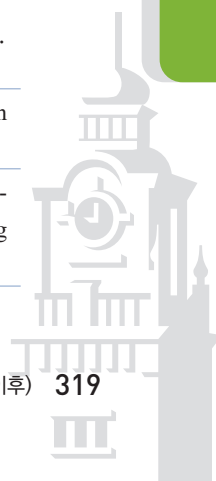
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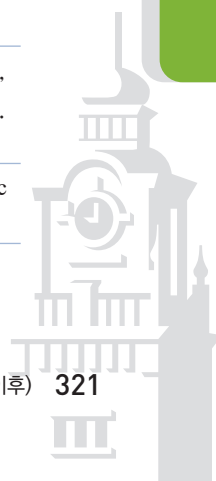
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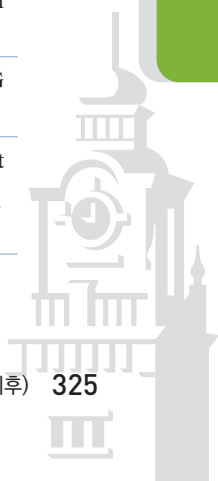
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