

1

2 2 3

가

가

가

2003

가

가

가

가
(1-

가

3).

, 2001

가

가

가

가

가

가

가

가

¹

²

³가

2004 4 19

2004 5 31

(calibration), (maintenance),
(monitoring practice procedures),
가

:

가

가

(1 - 3),

. 2000
CT, MRI,

2002

X -

가

(6 - 10). , 2002

MRI, CT,

가

(11 - 13), 2003

가

가 (14, 15).

2002

(16), 2003

(17).

1964 5

가

2000 “ 가

” 가

16,17

MRI

가 , 37, 38, 39 ‘ X - , X -

가

MRI

(4). 1953 4

2000

MRI

X -

CT 가 ,

가 가

1976 가

가

가

가 가

(18),

가 (4).

, 2001 3

1979 10

X -

가

가

X -

가

1980

2001

“

가

. 1995 “

”

”

가

, 2001 5

(4).

manual

,

(19), 2002

1999

(4).

2001

가

, 2001 5 31

. 1999 10

(5), 2000

“

”

가

2001 8

가

2000 7

CT, MRI

가

가

2002 6

()

()

1) 200 , 2)

, 3)

30%

(20). 1) , 2)

, 3)

2002 9

가

가 , 가

30%

2003 1 13 “

(21),

가 가 . 2003 12 “

가

(22). 1 2004

가

1

2004

가

American

College of Radiology (ACR)가

가

(high contrast), (high resolution)

Radiology (ACR) Committee on Mammography가

가 , 1980

(Food and Drug Administration,

FDA)

1985 Nationwide Evaluation of X-ray Trends(NEXT)

가 . 1987 ACR

(mammography accreditation program)

1990 ACR

1992 10

(Mammography Quality Standard Act, MQSA)

1993 12 FDA

(Interim Rules) , 1994

10 . 1997 10 FDA

MQSA: (Final rule) 1999 4

MQSA

rule ACR (accreditation program)

(7). MQSA

(4, 19, 24).

1980

, 1995 “

”

(4).

, 2001 1 186 “

”

1. 2. , 3.

, 4. 가

3

(4, 19).

2002 1

“

”

2003 1

CT, MRI

가

“ ”

(,)가 .

(21).

가

1 1

50% , 50%

4.2 cm
3.0 mGy

16 4 ,
3 10
(21, 22).

(medical audit) 가 .

가

가 가 .

가 가

1.

(8 2)

()
 ()
 ()
 ()

· · · ()

(3)

(3)

(6)

- (6)

(6)

(1)

(1)

(1)

(1)

(1)

(1)

(1)

(Beam quality) (1)

(1)

(1)

(1)

PACS

20.2% 5 1
 가 (25).
 24.0% 가 ,
 15.3% 가 가 , 가
 . 가 , , 가 가
 , , 가
 가
 가 1960

2.	가								
	가	(fatty breast),	가	(dense breast)			2		
	(,)						
	60								
	가								1
									3
		가	가	가					
	가								
	가								
		가			가 1 cm				
									5
									5
				가					5
									5
									5
		가		가					2
				(fog)					

가 ,

1998 ACR (American College of Radiology) 가
(Barium Enema Quality Control
Manual)

(26). . CT

가 , 가 , 가 .

2003 가 . 가 3 4 가 가 ,
가 , 가 50 , 50 30

가 2002 2003 5 (,
, 가 , ,)

179 , 2
182 .

가 , 가 , 가 5, 6, 7

3. 가 :

가			
1.			6
2. X-ray beam penetration	(density)	(contrast)	3
3.	patch coating, precipitation, flaking		3
4. centering			3
5.	Esophagus, cardia, fundus, body, angle, antrum, proximal duodenum, distal duodenum 가 .		12
6.	compression, mucosal relief, double contrast, prone 가		18
7. mucosal coating	(grayness),	(area gastricae), (mucosal folds)	5
			50

4. 가 :

가			
1.			7
2. X-ray beam penetration	(density)	(contrast)	5
3.			5
4.	patch coating, precipitation, flaking		5
5. centering			4
6.	overhead		5
7. projection	overhead , ,		14
8. mucosal coating	(white barium line),	(grayness), (innominate groove)가	5
			50

(17).

가

CDRH phantom (Center for Devices and Radiological Health phantom, model 07 - 649) , 38% , 3%, 18% , 42%,

ACR
4 (mesh pattern)
4% (75 - 100 kVp)
5)
5 3% (75 - 100 kVp)
6)
(22).

가 가 feedback
34 77
19 44
11 29 , 3 4
(8) (17).

(17).

5.

가

	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 100
(n = 41)		1	8	11	9	12
(n = 26)			7	10	4	5
(n = 70)		2	12	13	21	22
(n = 20)	1	1	2	2	7	7
(n = 22)		1	6	8	4	3

6.

가

	11 - 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 100
(n = 40)			6	2	8	7	17
(n = 52)			6	9	14	13	10
(n = 54)		3	8	15	13	9	6
(n = 22)	1	1	4	7	3	2	4
(n = 17)	1		2	6	5	2	1

7.

(%)

2% (1/41)	15% (6/40)
0% (0/26)	12% (6/52)
3% (2/70)	20% (11/54)
10% (2/20)	27% (6/22)
5% (1/22)	18% (3/17)
3% (6/179)	17% (32/185)

8.

가

(n = 44)	27% (12)	48% (21)
(n = 29)	55% (16)	34% (10)
(n = 4)	25% (1)	25% (1)
(n = 77)	23% (29)	42% (32)

(artifact),

가

가

가

가

CT (76 - 410, Nuclear Associates LTD., Carle Place, NY) 48 cm

50 cm (scan FOV: field of view) 25 cm

display FOV , 120 kVp , 230 mAs

10 mm

option 가

가

가 2 single slice scan

10 CT 가 11

protocol

가

가

(21, 22).

가

가 2 CT

2002

가

X

가

(13).

가

30 70 100

60

가

10.

CT 0 ± 10 HU 8 HU 4 HU

1.0 mm 가

10 mm 가

(5 mm 10 mm) ± 1 mm

± 5.0 mm

Multidetector CT guideline

(22).

11.	:	
	가	1
	Scanogram 가 (image number, scan time). (Scaler)가 가	2
	kVp mAs (, ,).	1
	()	2
		3
	(iliac crest) 가 80%	5
	가	5
	.(가 가?)	5
	가 75% . (50% 3)	5
	CT 10mm 10 mm	5
	[3]	

가 가
MR
가
(American Association of
Physicists in Medicine)
가
(Resonance frequency),
(Signal to noise ratio), (Image uniformity),
(Spatial linearity), (High
contrast spatial resolution), (Slice thickness),
(Slice position/ separation),
(Image artifacts) 8가
(28, 29).

가

가

가

가.

1 , 1
(21).

200 (21).

가

“

”

:

,

,

가.

가

,

,

,

,

,

,

.

:

,

,

가

.

.

3 :

6 :

1 : scout localization view() ,
가,

(21)

가

가

가가

(geometric accuracy),

(high contrast spatial resolution),

(slice thickness accuracy),

(slice

position accuracy),

(image intensity

uniformity),

(percent signal

ghosting),

(low contrast object

detectability) 가 가 .

가

12, 13 .

MRI

90%

PACS

MR

가 (21).

가

가 가

가

:

가

가

PACS

12.

1.	가	2
2.	가	
(30) + (70) = 100		
60	2가	60

13.

가	1
---	---

MR

2

TR/TE/

(scout)	2
scaler	
3	2

4

10

:

layout 80%

:

1

:

10

:

T2

T2

T2

:

T2

T1

: Menisci

Cruciate ligaments

Collateral ligaments

10

:

5 mm

2 mm

:

1.2 mm

:

5 mm

4 mm

1.5 mm

1 mm

:

4 mm

4 mm

1 mm

1 mm

PACS

가 . PACS

가

가가

가

가

(Gradient echo technique)

가

(Maximal 가

intensity projection)

(MR cholangiopancreatography, MR

angiography).

MR

MR

가가

ACR

가

가

가

가 ,

가 ,

가

가

” ,

가 2006

가

, 2006

가

가

가

가

가

가

가

가

1. . In , 2001
2. . (CT) . In , 2001
3. . MRI . In , 2001
4. . , 2002
5. . , 1999
6. . , 2001
7. . , 2001
8. . MRI , 2001
9. . , 2002
10. . , 2002
11. . (MRI) 가 . , 2002
12. . X- 가 . , 2002
13. . X- 가 . , 2002
14. . X . , 2003
15. . X 가 . , 2003
16. . , 2003;49(5):421-425
17. . X- . 2003
18. . , 2000
19. . 2001. , 2001
20. . , 2002
21. . , 2003
22. . , 2003
23. American college of radiology. *ACR Mammography quality control manual*. American college of radiology, 1998
24. . In , 2002
25. . 2002. , 2003
26. American college of radiology. *ACR Barium enema quality control manual*. American college of radiology, 1998
27. . , 2003
28. Och JG, Clarke GD, Sobol WT, Rosen CW, Mun SK. Acceptance testing of magnetic resonance imaging systems: report of AAPM Nuclear Magnetic Resonance Task Group No. 6. *Med Phys* 1992; 19(1):217-229
29. Price RR, Axel L, Morgan T, et al. Quality assurance methods and phantoms for magnetic resonance imaging: report of the AAPM Nuclear Magnetic Resonance Task Group No. 1. *Med Phys* 1990;17(2):287-295

Quality Control of Medical Imaging¹

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Medical imaging is the one of the most important diagnostic tools of modern medical science and quality control of the medical imaging is already systemized in the advanced countries. However, in Korea, quality control of medical imaging has not been properly performed until now and low quality examinations have been done without any regulation. The Korean Radiological Society, as society of supervision of medical imaging, has emphasized the importance of quality control and in 2003, the law for the quality control of medical imaging was made. In conformity of the law, the regulation of the quality control of medical imaging will commence, but this is just the beginning and there are still many tasks left for settling down and expanding the range of the quality control of the medical imaging. We reviewed the history of the quality control of medical imaging in Korea and explained the particulars of mammography, fluoroscopy, computed tomography and magnetic resonance imaging. We also looked into future prospect and tasks of the quality control of medical imaging.

Index words : Breast radiography, quality assurance
Fluoroscopy, quality assurance
Computed tomography (CT), quality assurance
Magnetic resonance (MR), quality assurance

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