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Report from the 2022 annual meeting of thoracic radiologists in Thailand: National HRCT Protocol and its applications in 10 major institutes

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Abstract

The Royal College of Radiologists of Thailand (RCRT) and the Thoracic Society of Thailand Under Royal Patronage (T.S.T.) has established the standard national high-resolution computed tomography (HRCT) protocol for ILD in 2019 and announced the member to adopt the protocol. The Thoracic Society of Thailand Under Royal Patronage (T.S.T.) is required to evaluate whether this national protocol actually works in the real practice in many institutes across Thailand and monitor the problems, so the meeting among radiologists from various institutes in Thailand was held on September 2022 to update data and discuss the challenges of the current situation of the HRCT protocol in each institute. At the end of the meeting, we found that most institutes were able to adopt the national protocol. Although there were minor deviations from national protocols in a few institutes, only one institute demonstrated a significantly higher radiation dose than the recommendation in the national protocol. The institute will return to explore the cause, do a root cause analysis, and the matter will be discussed in the next meeting.

Keywords: HRCT, Thailand, Protocol, Thoracic radiologist, ILD.

Introduction

The Royal College of Radiologists of Thailand (RCRT) and the Thoracic Society of Thailand Under Royal Patronage (T.S.T.) developed the national standard HRCT protocol from a panel consisted of thoracic radiologist experts from all parts of Thailand in the meeting held on 11st January 2019 by Foundation of Orphan and Rare Lung Disease (FORLD) and Imaging Academic Outreach Center (iAOC). The national protocol, HRCT protocol for ILD; Version 1/2019, described scan coverage, techniques, collimation, rotation time, pitch, exposure parameters, radiation dose, and reconstruction images in Table 1.

Table 1. *HRCT protocol for ILD: Version.1/2019(1).*

	Supine/Inspiration (Mandatory in both initial and follow-up)	**Supine/Expiration (Mandatory in initial and optional in follow-up)**	**Prone/inspiration (Optional)**
Scan coverage	Whole chest[1]	Whole chest[1]	limited to region of interest[2] (eg. lower chest) or Whole chest[1]
Technique	Volumetric[3]	Recommended: sequential4 (every 10- 20 mm interval) at end expiration Optional: If breath holding is not adequate or tracheobronchomalacia is suspected, volumetric scan during forced expiration is recommended with ultralow radiation dose (*) and highest pitch[7]	Recommended: sequential[4] (every 10-20 mm interval) Optional: If breath holding is not adequate, volumetric scan at the region of interest[2] is recommended with lower radiation dose and highest pitch[7]
Collimation	Thinnest (<1.5 mm)[5]	Thinnest (<1.5 mm)[5]	Thinnest (<1.5 mm)[5]
Rotation time	Shortest (<0.5 s)[6]	Shortest (<0.5 s)[6]	Shortest (<0.5 s)[6]
Pitch	Highest (>1)[7]	-	-
Radiation dose	120 kVp, auto mAs[8] (1-3 mSv)	120 kVp, 20-60 mAs[8] *100 kVp, 40-60 mAs[8] (<1 mSv)	120 kVp, 40-80 mAs[8] (<1 mSv)
Reconstruction[12]	1. Axial, lung-window[9] (high-spatial algorithm) ≤1.5 mm thickness overlap (30-50%)[9] 2. Axial, mediastinal-window[10] (low-spatial algorithm) ≤1.5 mm thickness overlap (30-50%) 3. Coronal[11], mediastinal-window (low-spatial algorithm), ≤1.5 mm thickness contiguous	Axial, lung-window[9] (high-spatial algorithm), ≤1.5 mm thickness	Axial, lung-window[9] (high-spatial algorithm), ≤1.5 mm thickness

Note *WL/WW for lung-window setting: -450 to -600 HU/1450 to 1600 HU*
WL/WW for mediastinal-window setting: 30 to 50 HU/350 to 450 HU
TBM = tracheobronchomalacia

Appendix of table 1.

1,3	*In order to increase the rate of detection of even a small focal lesion, and to reformat multiplanar images for studying the vertical distribution*
2	*In order to decrease the radiation dose*
4	*In female and/or age < 45 year*
5	*Thinner than 1 mm is possible with an increased noise*
6,7	*In order that the images are motion-free (shortest rotation time and highest pitch result in scan time of the whole chest less than 5 seconds)*
8	*Automatic tube current modulation (ACTM) which is available in most CT machines will automatically adjust mA according to the thickness of the region/ Automatic exposure control with an indicated maximal dose or fixed low mA could be used in the follow-up. However, the ultralow dose is not recommended in supine inspiratory HRCT*
9	*For more sharpness*
10	*In order to demonstrate associated mediastinal or soft tissue findings*
11	*In order to study vertical distribution*
12	*Iterative reconstruction (IR) is recommended to decrease noise*

Materials and methods

The thoracic radiologists from 10 institutes from all parts of Thailand were invited to share their own protocols, experiences, solutions, and the points of view: Songklanagarind Hospital, Siriraj Hospital, Chulalongkorn Hospital, Ramathibodi Hospital, Rajavithi Hospital, Maharaj Nakorn Chiang Mai Hospital, Srinagarind hospital, Thammasat University Hospital, Burapha University Hospital, and MedPark Hospital (Figure 1).

Participant list:

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2.	Sitang Nirattisaikul	Songklanagarind Hospital, Prince of Songkla University
3.	Nantaka Kiranatawat	Songklanagarind Hospital, Prince of Songkla University
4.	Thitiporn Suwatanapongched	Ramathibodi Hospital, Mahidol University
5.	Warawut Sukkasem	Ramathibodi Hospital, Mahidol University
6.	Chayanin Nitiwarangkul	Ramathibodi Hospital, Mahidol University
7.	Nisa Muangman	Siriraj Hospital, Mahidol University
8.	Kanyarat Totanarungroj	Siriraj Hospital, Mahidol University
9.	Suwimon Wonglaksanapimon	Siriraj Hospital, Mahidol University
10.	Phakphoom Thiravit	Siriraj Hospital, Mahidol University
11.	Krittachat Butnian	Siriraj Hospital, Mahidol University
12.	Nitra Piyavisetpat	Medpark Hospital
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14.	Wariya Chintanapakdee	Chulalongkorn University and King Chulalongkorn Memorial Hospital, The Thai Red Cross Society
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16.	Amolchaya Kwankua	Thammasat University hospital, Thammasat University
17.	Juntima Euathrongchit	Maharaj Nakorn Chiang Mai Hospital, Chiang Mai University
18.	Pavarit Piyachon	Maharaj Nakorn Chiang Mai Hospital, Chiang Mai University
19.	Panaya Tumsatan	Srinagarind Hospital, Khon Kean University
20.	Watanya Jaidee	Burapha University Hospital, Burapha University
21.	Krisna Dissaneevate	Rajavithi Hospital, Ministry of Public Health

Figure 1. *The 2022 annual meeting of thoracic radiologists in Thailand.*

Results

The national protocol, HRCT protocol for ILD; Version 1/2019, and protocols of the 10 institutes were shown and compared in Table 2.

Table 2. *Summary of the protocols in ten institutes.*

	Position/ respiration	National protocol	Songklanagarind Hospital	Siriraj Hospital	Chulalongkorn Hospital	Ramathibodi Hospital
Scan coverage	Supine/Inspiration	Whole chest	Whole chest	Whole chest	Whole chest	Whole chest
	Supine/Expiration	Whole chest	Whole chest	Whole chest	Whole chest	Whole chest
	Prone/Inspiration	Optional Limit to ROI / whole chest	Optional Whole chest	Optional Whole chest	Optional Limit to ROI	Optional Limit to ROI
Technique	Supine/Inspiration	Volumetric	Volumetric	Volumetric	Volumetric and Sequential	Volumetric
	Supine/Expiration	Sequential / (optional) volumetric, ultralow dose ultralow dose	Sequential	Volumetric, dose not assessed	Sequential	Sequential / Volumetric, dose not assessed
	Prone/Inspiration	Sequential / (optional) volumetric at ROI, ultralow dose	Sequential / volumetric at whole chest, ultralow dose	Volumetric at whole chest, dose not assessed	Sequential	Sequential
Collimation	Supine/Inspiration	Thinnest (< 1.5 mm)	Thinnest (0.625 mm)	Thinnest (< 1.5 mm)	Thinnest (0.6 mm)	Thinnest (0.625 mm)
	Supine/Expiration					
	Prone/Inspiration					
Rotation time	Supine/Inspiration	Shortest (<0.5 s)	Shortest (0.33 s)	Shortest (<0.5 s)	Shortest (0.35 s)	Shortest (0.33 s)
	Supine/Expiration					
	Prone/Inspiration					
Pitch	Supine/Inspiration	Highest (>1)	Highest (>1)	0.992:1	1.2	1.234
	Supine/Expiration					
	Prone/Inspiration					
Radiation dose	Supine/Inspiration	120 kVp Auto mAs (1-3 mSv)	120 kVp Auto mAs (1-3 mSv)	120 kVp 75 mAs (dose not assessed)	120 kVp Volumetric Auto mAs Sequential 40-60 mAs (2-4 mSv)	120 kVp Auto mAs (dose not assessed)
	Supine/Expiration	120 kVp 20-60 mAs (<1mSv) *100 Kvp, 40-60 mAs (<1mSv)	120 kVp 60 mAs (<1mSv)	100 kVp 50 mAs (dose not assessed)	100 kVp 40-60 mAs (<1 mSv)	100 kVp 20-60 mAs (dose not assessed)
	Prone/Inspiration	120 kVp 40-80 mAs (<1mSv)	120-100 kVp Auto mAs (<1mSv)"	100 kVp 50 mAs (dose not assessed)"	100 kVp 60 mAs (<1 mSv)	120 kVp 40-50 mAs (dose not assessed)
Reconstruction	Supine/Inspiration	1. Axial, lung-window (high-spatial algorithm) ≤1.5 mm thickness overlap (30-50%) 2. Axial, mediastinal-window (low-spatial algorithm) ≤1.5 mm thickness overlap (30-50%) 3. Coronal, mediastinal window (low-spatial algorithm) ≤1.5 mm t hickness contiguous	1. Axial, lung-window (high-spatial algorithm) 1.0-1.5 mm thickness overlap (30-50%) 2. Coronal and sagittal, lung-window (high-spatial algorithm) 1.0-1.5 mm thickness overlap (30-50%) 3. Axial, mediastinal-window (low-spatial algorithm) 2.5-3 mm thickness 4. No coronal, mediastinal window	1. Axial, lung-window (high-spatial algorithm) Inspiration 0.625 mm Expiration 1.25 mm thickness overlap (30-50%) 2. Axial, mediastinal-window (low-spatial algorithm) 1.25 mm thickness 3. Coronal, mediastinal window (low-spatial algorithm) 5 mm thickness contiguous	1. Axial, lung-window (high-spatial algorithm) 1.0-1.25 mm thickness overlap (30-50%) 2. Axial, mediastinal-window (low-spatial algorithm) 1.0-1.25 mm thickness overlap (30-50%) 3. Coronal and sagittal, mediastinal window, 5 mm thickness, 3 mm increments	1. Axial, lung-window (high-spatial algorithm) 1.0 mm thickness overlap (30-50%) 2. Axial, mediastinal-window (low-spatial algorithm) 1.0 mm thickness 3.Additional sagittal, mediastinal window 4. Axial MIP, mediastinal window, 7 mm thickness, 3 mm increments 5. No coronal, mediastinal window

	Position/ respiration	Rajavithi Hospital	Maharaj Nakorn Chiang Mai Hospital	Srinagarind Hospital	Thammasat University Hospital	Burapha University Hospital	MedPark Hospital
Scan coverage	Supine/Inspiration	Whole chest	Whole chest	Whole chest	Whole chest	Whole chest	Whole chest
	Supine/Expiration	Whole chest	Whole chest	Whole chest	Whole chest	Whole chest	Whole chest
	Prone/Inspiration	Optional Whole chest	Optional Limit to ROI	Optional Whole chest	Optional Whole chest	Optional Whole chest	Optional Limit to ROI
Technique	Supine/Inspiration	Volumetric	Volumetric	Volumetric	Volumetric	Volumetric	Volumetric and Sequential
	Supine/Expiration	Volumetric, not ultralow dose	Volumetric, not ultralow dose	Volumetric, dose not assessed	Volumetric, not ultralow dose	Volumetric, not ultralow dose	Volumetric, ultralow dose
	Prone/Inspiration	Volumetric at whole chest, not ultralow dose	Volumetric at ROI, not ultralow dose	Volumetric at whole chest, dose not assessed	Volumetric at whole chest, not ultralow dose	Volumetric at whole chest, not ultralow dose	Volumetric at ROI, ultralow dose
Collimation	Supine/Inspiration	Thinnest (< 1.5 mm)	Thinnest (0.6 mm)	Thinnest (< 1.5 mm)	Thinnest (0.625 mm)	Thinnest (0.5 mm)	Thinnest (< 1.5 mm)
	Supine/Expiration						
	Prone/Inspiration						
Rotation time	Supine/Inspiration	Shortest (<0.5 s)	Shortest (<0.5 s)	Shortest (<0.5 s)	Shortest (<0.5 s)	Shortest (<0.5 s)	Shortest (<0.5 s)
	Supine/Expiration						
	Prone/Inspiration						
Pitch	Supine/Inspiration	1.2	1	1.2	1	1.4	1.2
	Supine/Expiration						
	Prone/Inspiration						
Radiation dose	Supine/Inspiration	120 kVp Auto mAs (3-4 mSv)	120 kVp 110 mAs (1-3 mSv)	120 kVp Auto mAs (dose not assessed)	120 kVp Auto mAs (4 mSv)	120 kVp Auto mAs (10 mSv)	120 kVp Volumetric Auto mAs Sequential 220 mAs (4.1 mSv)
	Supine/Expiration	120 kVp Auto mAs (2 mSv) "	120 kVp 65 mAs (1-2 mSv)	120 kVp Auto mAs (dose not assessed)	120 kVp Auto mAs (4 mSv)	120 kVp 150 mAs (5 mSv)	120 kVp Auto mAs (<1mSv)
	Prone/Inspiration	120 kVp Auto mAs (2 mSv) "	120-100 kVp 110 mAs, (1-3 mSv)	120 kVp Auto mAs (dose not assessed	120-100 kVp Auto mAs (4 mSv)	120 kVp 150 mAs (5 mSv)	120 kVp Auto mAs (<1mSv)
Reconstruction	Supine/Inspiration	1. Axial, lung-window (high-spatial algorithm) 2.0 mm thickness overlap (30-50%) 2. Axial, lung-window, (high-spatial algorithm) 1.0 mm, interval 10 mm. 3. Coronal and sagittal , lung-window, (high-spatial algorithm) 2.0 mm thickness 4. Axial, mediastinal-window (low-spatial algorithm) 2.0 mm thickness 5. No coronal, mediastinal window	1. Axial, lung-window (high-spatial algorithm) 0.7-1.0 mm thickness overlap (30-50%) 2. Coronal and sagittal, lung-window (high-spatial algorithm) 1-5 mm thickness 3. Axial, mediastinal-window (low-spatial algorithm) 1 mm thickness 4. No coronal, mediastinal window	1. Axial, lung-window (high-spatial algorithm) 0.6-1.0 mm thickness overlap (30-50%) 2. Coronal and sagittal, lung-window (high-spatial algorithm) 1 mm thickness 3. Axial, mediastinal-window (low-spatial algorithm) 2.0 mm thickness 4. No coronal, mediastinal window	1. Axial, lung-window (high-spatial algorithm) 1.0 mm thickness overlap (30-50%) 2. Coronal and sagittal, lung-window (high-spatial algorithm) 2.5 mm thickness 3. Axial, mediastinal-window (low-spatial algorithm) 2.5 mm thickness 4. No coronal, mediastinal window	1. Axial, lung-window (high-spatial algorithm) 1.0 mm thickness overlap (30-50%) 2. Coronal and sagittal, lung-window (high-spatial algorithm) 3 mm thickness 3. Axial, mediastinal-window (low-spatial algorithm) 2.0 mm thickness 4. No coronal, mediastinal window	1. Axial, lung-window (high-spatial algorithm) 1.0 mm thickness overlap (30-50%) 2. Coronal and sagittal, lung-window (high-spatial algorithm) 2 mm thickness 3. Axial, mediastinal-window (low-spatial algorithm) 1 mm thickness 4. Coronal and sagittal mediastinal window (thickness not provided)

The situation in Songklanagarind Hospital

Chayaporn Kaewsathorn reported that the HRCT protocol was the same as the national protocol in scan coverage, techniques, collimation, rotation time, pitch, exposure parameters, and radiation dose except for the prone position, in which the whole chest was performed instead of a limited region of interest (ROI) and the volumetric technique was performed in supine/expiration and prone/inspiration. Although the ATCM was set in supine/expiration and prone/inspiration, the radiation dose was less than 1mSV as expected in the national protocol. The reformat multiplanar reconstruction was performed into 1.0-1.5-mm-thick coronal and sagittal images in the lung window, without a coronal mediastinal window. The mediastinal window was reconstructed in 2.5-3.0-mm thickness.

The situation in Siriraj Hospital

Phakphoom Thiravit reported that the HRCT protocol was the same as the national protocol in scan coverage, techniques, collimation, rotation time, pitch, exposure parameters, and radiation dose except that the whole chest was performed instead of limiting ROI in the prone position and the volumetric technique was performed in supine/expiration and prone/inspiration. The reformat multiplanar reconstruction was performed into a 5.0-mm-thick coronal mediastinal window.

The situation in Chulalongkorn Hospital

Thanisa Tongbai, Wariya Chintanapakdee and Itthi Itthisawatpan reported that the HRCT protocol was the same as the national protocol in scan coverage, collimation, rotation time, and pitch, except the technique that a performed sequential analysis in supine/Inspiration. The tube current was set same as national protocol in supine/expiration and prone/inspiration. The radiation dose was less than 1mSv as suggested in the national protocol. The reformat multiplanar reconstruction was performed into a coronal and sagittal mediastinal window view in 5-mm thickness with 3-mm increments, without coronal and a sagittal lung window view. The mediastinal window was reconstructed in 1.0-1.25 mm thickness (low-spatial algorithm).

The situation in Ramathibodi Hospital

Warawut Sukkasem reported that the HRCT protocol was the same as the national protocol in scan coverage, collimation, rotation time, and pitch, except the technique that performed volumetric in supine/expiration. The reconstruction techniques were similar to the national protocols, except the additional sagittal mediastinal window.

The situation in Rajavithi Hospital

Krisna Dissaneevate reported that the HRCT protocol was the same as the national protocol in scan coverage, techniques, collimation, rotation time, and pitch except the prone position, in which the whole chest was performed instead of the limited ROI and volumetric technique in supine/expiration and prone/inspiration. The radiation dose is higher, about 2-4 mSv, in supine/inspiration, supine/expiration, and prone/inspiration. The reformat multiplanar reconstruction was performed into 2.0 mm coronal and sagittal lung window views, without a coronal mediastinal window. The mediastinal window was reconstructed in 2.0 mm thickness. An additional 1.0-mm-thick axial lung-window (high-spatial algorithm) with 10-mm interval was performed.

The situation in Maharaj Nakorn Chiang Mai Hospital

Juntima Euathrongchit reported that the HRCT protocol was the same as the national protocol in scan coverage, collimation, rotation time, and pitch, except the technique that performed volumetric in supine/expiration and prone/inspiration. The radiation dose is higher than the national protocol, about 1-3 mSv, in supine/expiration and prone/inspiration. The reformat multiplanar reconstruction was performed into a coronal and sagittal lung window in 1.0-5.0 mm in thickness without a coronal mediastinal window.

The situation in Srinagarind Hospital

Panaya Tumsatan reported that the HRCT protocol was the same as the national protocol in scan coverage, techniques, collimation, rotation time, pitch, exposure parameters, and radiation dose, except the prone position in which the whole chest was performed instead of limited ROI and the volumetric technique was done in supine/expiration and prone/inspiration. The reformat multiplanar reconstruction was performed into 1.0-mm-thick coronal and sagittal lung window views, without a coronal mediastinal window. The mediastinal window was reconstructed into 2.0-mm thickness.

The situation in Thammasat University Hospital

Amolchaya Kwankua and Pisit Wattanaruangkowit reported that the HRCT protocol was the same as the national protocol in scan coverage, techniques, collimation, rotation time, and pitch except the prone position, in which the whole chest was performed instead of limited ROI and the volumetric technique was done in supine/expiration and prone/inspiration. The radiation dose is higher than expected in the national protocol, about 4 mSv, in supine/inspiration, supine/expiration, and prone/inspiration. The reformat multiplanar reconstruction was performed into 2.5-mm-thick coronal and sagittal lung window views, without a coronal mediastinal window. The mediastinal window was reconstructed in 2.5 mm thickness.

The situation in Burapha University Hospital

Watanya Jaidee Reported that the HRCT protocol showed different techniques that the volumetric scanning of the whole chest was performed in supine/expiration (instead of the sequential technique as recommended in the national protocol) and prone/inspiration (instead of limited ROI as recommended in the national protocol). The radiation dose was high, 10 mSv in the automated tube current technique in supine/inspiration, and 5 mSv in the fixed tube current technique using 150 mAs in supine/expiration and prone/inspiration. The reformat multiplanar reconstruction was performed into 3.0-mm-thick coronal and sagittal lung window views, without a coronal mediastinal window. The mediastinal window was reconstructed in 2.0 mm thickness.

The situation in MedPark Hospital

Nitra Piyavisetpat reported that the HRCT protocol was the same as the national protocol in scan coverage, collimation, rotation time, and pitch, except the technique that performed volumetric in supine/expiration and prone/inspiration and sequential supine/Inspiration. The ATCM was applied in supine/expiration and prone/inspiration. However, the radiation dose was less than 1mSv which was not different from the national protocol. The reformat multiplanar reconstruction was performed into 2.0-cmm coronal and sagittal lung window views.

The effective dose calculation from the European Commission present in 2000, by this widely used shortcut method, the effective dose is calculated as follows: E = k × DLP, where the k coefficient (Table 3) is specific only to the anatomic region scanned[2] , which is 0.017 for chest CT.

Table 3. *Published DLP to E "k" Conversion Coefficients[2].*

	DLP to E "*k*" Conversion Coefficients [mSv / (mGy × cm)]				
Anatomic Region	Jessen et al., [11] (1999)	EC [12] (2000)	EC Appendix B [10] (2004)	EC Appendix C [13] (2004) and NRPB-W67 [14] (2005)	Phantom (cm)
Head	0.0021	0.0023	0.0023	0.0021	16
Head and neck				0.0031	16
Neck	0.0048	0.0054		0.0059	32
Chest	0.014	0.017	0.018	0.014	32
Abdomen	0.012	0.015	0.017	0.015	32
Pelvis	0.019	0.019	0.017	0.015	32
Chest, abdomen, and pelvis				0.015	32

Note—EC = European Commission, NRPB = National Radiological Protection Board.
[a] *E* = *k* × *DLP*, where *DLP* = dose–length product. The phantom size is specified for the volume CT dose index measurements on which DLP is based.

Summary

Regarding scan coverage, almost all institutes followed the national protocol in supine/inspiration and supine/expiration positions. However, in prone/inspiration, only half of the panel participants performed scan coverage limited to the region of interests. In part of techniques, each institute practiced variably. Almost 80% of participants performed the volume metric technique in supine/expiration and prone/inspiration, despite the national protocol suggesting that the sequential technique should be implemented in supine/expiration and prone/inspiration. The collimation, rotation time, and pitch were according to the national protocol in all institutes. The exposure parameters which are variable in many institutes showed that in the supine/inspiration position, the tube potential (in kVp) and current (in mAs) could be set as recommended in the national protocol. Unfortunately, the radiation doses in 4 out of 10 institutes were still higher than estimated in the national protocol, probably from the incorrect ATCM setup. In supine/expiration, the tube potential was set as suggested in the national protocol, but the tube currents were more than 60 mAs in a few institutes and auto ATCM was performed in 60% of participants. The reason of using auto mAs setting was due to the ability of adjusting mAs which required technologists' experiences. In prone/inspiration, the tube potentials of all institutes were set as recommended in the national protocol and some institutes decreased kVp from 120 to 100 kVp. Nevertheless, some hospitals showed that the tube currents were more than 60 mAs and ATCM was employed in 70% of institutes. A few institutes' data showed that the radiation dose reached over 1mSv, probably from tube currents that were higher than the recommendation. Regarding the radiation dose, all institutes showed a total radiation dose of lower than the FDA standard, below 7 mSv3, except that of one institute, which was over, 10 mSv. Lastly, the reconstruction in the axial lung window was ≤ 1.5 mm of thickness overlap (30-50%), which was the same determined in the national protocol.

In terms of the mediastinal window, some institutes performed axial images with more than 1.5-mm thickness, and almost 90% of all institutes did not perform the coronal mediastinal window. One institute performed the sagittal mediastinal window. Moreover, a few institutes added 1.0-mm reconstructed axial lung-window (high-spatial algorithm) with 10-mm interval in their protocols.

After adopting the national protocol, the evaluation of the image quality from various techniques of each institute has not been reported yet.

Therefore, each institute will be back to review the information, find out the problems of their own institutions, and assess the image quality to improve the national protocol in the next meeting.

Accordingly, in this meeting that invited only the radiologists, the comprehension was not sufficient, especially in terms of instruments, adjusting ATCM, and assessment of the image quality. The other experts including medical physicists and CT technologists will be invited to discuss the problems from various points of view in the next meeting.

Conclusion

The National HRCT protocol for ILD version 1/2019 was widely adopted by almost institutes across Thailand. There were minor deviations in a few institute protocols from the national protocol. However, only one institute demonstrated a significantly higher radiation dose than expectation. This meeting encouraged the members to implement their protocols as closely to the national guideline as possible. The next conference will focus on the updated data and problems after the national protocol installation to improve a substantial national protocol.

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