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Highlight

- Original Article
- Perspectives
- ASEAN Movement in Radiology
- Letter to the Editor
- Acknowledgement of Reviewers

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CONTENTS

03 From The Editor

08 Original Article

Capability of constructive interference in steady state sequence versus postcontrast T1-weighted imaging in cerebellopontine angle and internal auditory canal masses
Vorawan Charoonratana, M.D.
Nuttha Sanghan, M.D.
Siriporn Hirunpat, M.D.
Kornpen Rattanaprueksachart, M.D.

24 Perspectives

Another loss of radioactive material in Thailand highlights the need for effective risk communication
Kwan Hoong Ng, Ph.D., DABMP

32 ASEAN Movement in Radiology

Post-COVID-19 lung diseases: A short note from AOCR 2023, Bangkok, Thailand
Yutthaphan Wannasopha M.D.
Thitiporn Suwatanapongched, M.D.
Yeon Joo Jeong, M.D.
Bushra Johari, M.D.
Noriyuki Tomiyama, M.D.
Wiwatana Tanomkiat, M.D.

44 **Report from the 2022 annual meeting of thoracic radiologists in Thailand: National HRCT Protocol and its applications in 10 major institutes**
Chayaporn Kaewsathorn, M.D.
Phakphoom Thiravit, M.D.
Thanisa Tongbai, M.D.
Wariya Chintanapakdee, M.D.
Itthi Itthisawatpan, M.D.
Warawut Sukkasem, M.D.
Krisna Dissaneevate, M.D.
Juntima Euathrongchit, M.D.
Panaya Tumsatan, M.D.
Amolchaya Kwankua, M.D.
Pisit Wattanaruangkowit, M.D.
Watanya Jaidee, M.D.
Nitra Piyavisetpat, M.D.
Wiwatana Tanomkiat, M.D.

59 **A historic event - The 21st Asian Oceanian Congress of Radiology, Bangkok, Thailand, February 9th-12th, 2023**
Evelyn Lai Ming Ho, MBBS, MMed.

62 **A summary from AOCR2023, Bangkok, Thailand**
Wiwatana Tanomkiat, M.D.

70 Letter to the Editor

A visit to Songklanagarind Hospital, Prince of Songkla University
Utit Pitaktong, M.D.

74 Acknowledgement of Reviewers

From The Editor

China's reopening border, AOCR2023 in Bangkok, and Songkran

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The exciting first quarter of 2023 started with that, after three years of absence due to COVID-19 pandemic, the first group of Chinese tourists from Xiamen arrived in Bangkok, Thailand, on Monday 9th January just a day after China abandoned zero-COVID policies and reopened its border on Sunday 8th January. Asian countries treated Chinese tourists after China reopened border differently. With the evidence that most Thai and Chinese residents had been vaccinated and COVID-19 had been categorized as an endemic in both countries, Chinese tourists were welcomed and under the same regulations as those from other countries. The first day of China's reopened border was managed closely by three ministries: the Ministry of Public Health, the Ministry of Tourism and Sports, and the Ministry of Transportation, mainly to balance between safety from another COVID-19 outbreak and the flow of the tourism industry.

During 9th-12th February, the Royal College of Radiologists of Thailand (RCRT) and the Radiological Society of Thailand (RST) hosted the 21th Asian Oceanian Congress of Radiology (AOCR), 40 years after they last hosted the 4th AOCR in 1983. Leaders in Radiology from Asian Oceanian countries united and exchanged their experiences and opinions on various topics. This issue takes core messages from Asian Symposia in AOCR on post COVID lung disease. Other hot topics from AOCR will be addressed in the next issues.

Leaders in radiology from Asian Oceanian countries appear with their national costumes in the AOCR Gala Dinner.

Then, the unspecified amount of Caesium-137 radioactive material, contained in a steel tube; about 5 inches wide, 12 inches long and 25 kilograms heavy; went missing from a steam power plant in Prachin Buri Province, Thailand, on 23rd February. The company was aware of this missing during the routine check on 10th March. Local officials and those from Thailand's Office of Atoms for Peace have launched searches and a 50,000 baht reward has been offered for information which leads to the recovery by the company. Residents in all districts of Prachin Buri were asked to alert authorities if they came across any steel tube matching the description and to stay away from it. On 20th March, the Office of Atoms for Peace (OAP) officials' hand held geiger counters detected traces of Caesium-137 at a steel recycling plant. The OAP's officials were told that the cylinder and its radioactive content had already been melted in the furnace with other metal scraps. Residues of the cylinder and its contents, after the melting process, remained within the closed melting system. A day later, it was officially announced that the missing ceasium-137 has already been melted, along with other metallic scrap at the facility. The OAP experts conducted radiation checks at the foundry and in its surrounding areas and detected radiation outside the compound of the foundry. Medical physicists explained that the level of radiation emitted by the missing Cesium-137 cylinder was estimated to be just 41.4mCi (millicurie). That figure was 57.76 million times lower than the radiation emitted at Chernobyl and 11 million times less than at Fukushima. RCRT together with the Medical Council of Thailand took this opportunity to educate people on radiation hazards. However, Emeritus Professor Kwan Hoong Ng from the department of Biomedical Imaging, Faculty of Medicine, Universiti Malaya, Kuala Lumpur, Malaysia calls for effective risk communication on this issue, in order to deal with future disaster.

In April 2023, Thailand's Ministry of Public Health reported that the average new COVID-19 cases and deaths from COVID-19 per day were 24 and lower than one, respectively [1]. The end of wearing masks and social distancing due to the pandemic was officially marked on Songkran, the water splashing festival which is Thailand's traditional new year, in 2023. It was the first since pre-pandemic days marked the end of wearing masks and social distancing due to the pandemic as people, both local and visitors from around the world, as many as over 100, 000, gathered in one famous place [2]. After Songkran, Bangkok's daily number of Covid-19 cases has experienced a significant spike to 700. However, the majority of new cases appear to involve older sub-variants of the virus rather than the emerging Omicron sub-variant XBB.1.16, which has registered 27 reported instances so far [3].

More than 100,000 locals and visitors from around the world gather at the heart of Kon Kaen, one of the biggest cities in the northeastern region of Thailand, to cerebrate Songkran [2].

Songkran is celebrated every April usually during 13th-15th, a time when Thais traditionally reunited with their families, visited a temple and poured scented water to Buddha images, monks and senior relatives in the morning and gathered with buckets full of water at city landmarks to dance, sing and splash water in the afternoon. Songkran celebrations were kept to a minimum during 2020-2022 during the outbreak. Water splashing festivals to mark new year like Songkran in Thailand are also seen in other continental ASEAN countries such as Myanmar, Laos, Cambodia and southern China.

Meanwhile, Songkran is also known as a time for accidents and fatalities on Thailand's roads. According to the government spokesperson, there were 1,324 deaths and 110,152 injuries during the Songkran Festival from 2018 to 2022, with most accidents involving individuals aged 15-19. The data collected from April 11th to 16th showed that there were 17,775 injuries, which increased by 19.26% from the previous year. There were also 236 deaths, which decreased by 26.81% from the previous year. Among those injured, 3,814 people had to be hospitalized, which increased by 81.84% [4]. The most common causes of accidents and fatalities were speeding, drunk driving, neglecting seat belts, and violating traffic laws [4, 5].

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References

1. Reliefweb [Internet]. c2023 [cited 2023 Apr 24]. Thailand COVID-19 WHO Thailand Weekly Situation Update No. 261 - 11 April 2023. Available from: https://reliefweb.int/report/thailand/covid-19-who-thailand-weekly-situation-update-no-261-11-april-2023.

2. ไทยรัฐออนไลน์ [Internet]. กรุงเทพ: ไทยรัฐ [cited 2023 Apr 24] สงกรานต์ขอนแก่นวันที่ 2 ถนนข้าวเหนียวคนกว่าแสนร่วมทำคลื่นมนุษย์ไร้แอลกอฮอล์,14 เม.ย.2566. Available from: https://www.thairath.co.th/news/local/northeast/2680188. Thai.

3. The Thaiger [Internet]. Bangkok: TThaiger; C2023 [cited 2023 Apr 24]. Daily Covid-19 cases in Bangkok spike. Available from: https://thethaiger.com/coronavirus/covid-cases-in-bangkok-experience-a-daily-spike.

4. Thai PBS World [Internet]. Bangkok: Thai Public Broadcasting Service; 2018 [cited 2023 Apr 24]. 236 people dead, 2,005 injured in six days of Songkran celebrations; April 17, 2023. Available from: https://www.thaipbsworld.com/236-people-dead-2005-injured-in-six-days-of-songkran-celebrations/.

5. National News Bueau of Thailand [Internet]. Bangkok: NNT; c2021 [cited 2023 Apr 24]. Songkran Travelers Warned to Avoid Drinking and Driving, 11 Apr 2023. Available from: https://thainews.prd.go.th/en/news/detail/TCATG230411122346004

Original Article

Capability of constructive interference in steady state sequence versus postcontrast T1-weighted imaging in cerebellopontine angle and internal auditory canal masses

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Abstract

Background: The tumor size is one of the main factors in the treatment of cerebellopontine angle (CPA) tumors, and magnetic resonance imaging (MRI) with gadolinium-based contrast agent (GBCA) provides the best evaluation. However, administration of the gadolinium is time consuming and increasing in cost. There is a risk of nephrogenic systemic fibrosis in patients with renal failure and liver or renal transplantation.

Objective: The purpose of this study was to assess the capability of constructive interference in steady state (CISS) sequence in measuring the tumor size of the CPA and internal auditory canal (IAC) masses compared to postcontrast T1-weighted images (T1-WI).

Materials and Methods: The 118 MR studies with both CISS sequence and postcontrast T1-WI of 45 patients with CPA and IAC masses were retrospectively reviewed.

Results: There was no significant difference between CISS and postcontrast T1-WI in measuring size in transverse diameter of the masses ($p = 0.051-0.06$). The longitudinal diameter measurement revealed a significant difference ($p < 0.001$) and the measured size on postcontrast T1-WI was slightly larger than the CISS image. The difference in median measurement between two sequences was less than 0.9 mm. and Bland-Altman plots revealed that differences between the two sequences in longitudinal and transverse diameters of the masses were within the limits of agreement. Interobserver agreement showed excellent correlation ($r = 0.994-0.999$, $p < 0.001$ by Pearson's product-moment correlation).

Conclusion: The CISS sequence may be sufficient for assessing the size of CPA and IAC masses, which can be used interchangeably with postcontrast T1-weighted image as a contrast-free option, especially in follow-up studies and vulnerable settings of gadolinium administration.

Keywords: CISS sequence, CPA tumor, IAC mass, Magnetic resonance imaging, Tumor size.

Introduction

Cerebellopontine angle (CPA) tumors account for 5%-10% of intracranial tumors in adults and 1% of all pediatric intracranial tumors [1]. The vast majority of CPA and internal auditory canal (IAC) masses are vestibular schwannomas (VSs), 80%-90% [2-3]. For VSs, magnetic resonance imaging (MRI) provides high sensitivity and specificity, up to 100% and 92.8% respectively [4]. Regarding natural history, 66% of VSs show no progression and 23% spontaneously regress [4-5]. Meningiomas are the most common intracranial extra-axial tumors in adults and the second most frequent lesions in the CPA cistern after VSs, 10%–15% [6]. They can extend into the IAC and are mostly slow growing. For CPA-IAC tumors, treatments and surgical approaches are based on multiple factors. The tumor size is one of the main factors and MRI provides the best evaluation [7-9]. MRI with gadolinium-based contrast agent (GBCA) is a non-invasive tool to identify the site and extension of the lesions, characteristic signal intensity, monitor disease progression, and pre-operative and post-operative assessments [4, 10]. A follow-up interval is variable and dependent on clinical consideration because 58.6% of patients had an annual tumor growth rate of less than 1 mm/year [11]. According to a meta-analysis study [12], the average length of imaging follow-up was 3.2 years.

However, administration of the GBCA is time consuming and increasing in cost. In addition, there are associations of GBCA and nephrogenic systemic fibrosis (NSF) in patients who had renal failure and liver or renal transplantation [13]. Furthermore, intravenous GBCA exposure and multiple GBCA administrations are associated with neuronal tissue deposition [14-15]. Avoiding GBCA exposure by using non-gadolinium based study is preferable in patients who tend to have long-term imaging follow-up for slow growing lesions. The constructive interference in steady state (CISS) sequence is a balanced steady-state free precession (bSSFP), which is a heavily fluid-weighted 3D sequence used with isotropic or near isotropic spatial encoding. The bSSFP technique has been shown to be useful in screening and evaluation for vestibular schwannomas, with a sensitivity of 94% and a specificity of 97% [16-18]. This study assumed that it could be applied to the other CPA and IAC tumors as well as schwannomas [19]. For this reason, this study aimed to determine whether it is possible to use the CISS sequence as a gadolinium-free alternative tool in measuring the tumor size of the CPA-IAC masses.

Materials and methods

Study design and target population

This retrospective review of patients who had CPA-IAC masses and MRI studies with IAC protocol from January 2011 to December 2015, was approved by an institutional review board. The inclusion criteria required the MRI, which provided CISS and postcontrast T1-weighted images (T1-WI), on the same date. Patients less than 15 years of age were excluded according to different incidences of diseases. A patient who had an epidermoid cyst was also excluded because it did not typically enhance.

The total of 45 patients were enrolled in our study, 26 females and 19 males with the mean age of 54 years (range: 24-78 years). Among them, 22 patients (48%) underwent operations. The patients had follow-up studies ranging from 1-7 times. The follow-up interval was from three months up to two years. The total of 118 MRI studies, including initial and follow-up images, met the criteria. There were 58 post-operative studies and 60 non-operative images.

Most patients had a solitary IAC-CPA mass. Two patients were diagnosed with neurofibromatosis type 2, one had bilateral vestibular schwannomas and the other had a left vestibular schwannoma with bilateral trigeminal schwannomas. Thus, overall, 46 masses were detected in CPA-IAC regions; 42 were vestibular schwannomas, and 4 were meningiomas by a provisional diagnosis with 22 pathological diagnoses. Regarding tumor locations, 25 masses had only intracanalicular portions. Four masses were located only in the CPA cisterns without IAC involvement, and the rest occupied both intracanalicular and cisternal portions.

Image acquisition

The MRI studies were performed with either a 3.0-Tesla (T) (AchievaR, Philips) or a 1.5T scanner (IngeniaR, Philips) with a standard head coil. The protocol included the whole brain axial fluid attenuation inversion recovery (FLAIR), diffusion weighted imaging (DWI) and postcontrast T1-WI in 3 views, and thin slice of temporal bone consisting of T1-WI, T2-weighted image (T2-WI), DWI and CISS in the axial plane, T1-WI and T2-WI in the coronal plane and postcontrast T1-WI with fat suppression in axial and coronal views. The axial CISS 3D images were performed with the following parameters: repetition time (TR)/ echo time (TE) 1500 ms/180 ms, with 1 mm section thickness, NEX 2, Matrix 127x256. The axial spin-echo T1W of the temporal bone was obtained following the parameters: TR/TE 500 ms/10 ms, with 2 mm section thickness, NEX 4, Matrix 180x252. The post-contrast images were obtained after injection of 0.1 mmol/kg of GBCA (Gadobutrol).

Reader assessment method

Two neuroradiologists (with 5 and 2 years of experience), independently interpreted MRI studies (initial scans and follow-up studies) of the 45 patients. The tumors were identified and a provisional diagnosis was made by a standard protocol in the case of initial scans. The tumor was divided into two parts, intracanalicular and CPA cisternal portions by using porus acusticus as a cut point. Each portion was assessed and measured separately as follows:

The intracanalicular portion was measured in parallel and perpendicular plane to the IAC as longitudinal and transverse diameters, respectively (Figure 1).

The CPA cisternal portion was measured in the parallel and perpendicular plane to the petrous part of the temporal bone and defined as longitudinal and transverse diameters, respectively (Figure 2). The measurement was made according to the suggestion of Walsh et al. [20], who revealed that the tumor grows along the axis of the canal.

The diameters of the CPA-IAC tumors were obtained only in the axial plane on the CISS and postcontrast T1-WI because the standard protocol in our institute does not provide CISS in coronal and sagittal planes.

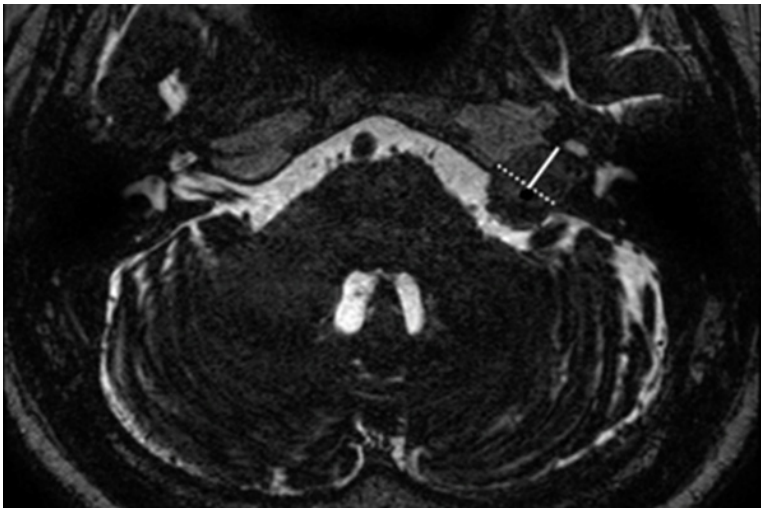

Figure 1. *Axial 3D-constructive interference in a steady state (CISS) image shows a tumor occupying in the left internal auditory canal (IAC) and cerebellopontine angle (CPA) cistern. The longitudinal diameter (solid line) and transverse diameter (dotted line) of IAC portion are parallel and perpendicular to the IAC. Porus acusticus (opening of the IAC) is a borderline between the CPA and IAC portions.*

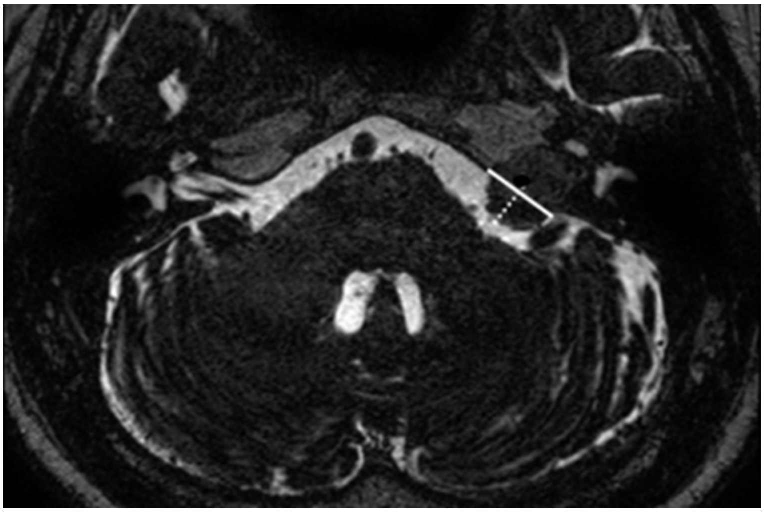

Figure 2. *Axial 3D-constructive interference in a steady state (CISS) image shows a tumor occupying in the left internal auditory canal (IAC) and cerebellopontine angle (CPA) cistern. The longitudinal diameter (solid line) and transverse diameter (dotted line) of CPA cisternal portion are parallel and perpendicular to the petrous part of the temporal bone.*

Statistical analysis

The data distribution was analyzed with the Shapiro-Wilks Normality Test. A statistical evaluation of the measurement was performed with paired Wilcoxon signed rank test in data that did not fit normal distribution and a paired t-test was used in normally distributed data. A p-value < 0.05 indicated a statistically significant difference. Bland-Altman plots were constructed to assess the measures of agreement between the two sequences by studying the mean difference and constructing limits of agreement. Interobserver correlation was evaluated using Pearson product-moment correlation coefficient (Pearson's correlation).

Results

No significant differences between the CISS and postcontrast T1-WI in measuring the tumor size except the longitudinal diameter in both CPA and IAC portions, ($p < 0.001$), and transverse diameter obtained by reader 2 ($p = 0.04$), are detailed in Table 1. The difference in median diameter on CISS and postcontrast T1-WI in both diameters of CPA cisternal and IAC portions ranged from 0.1-0.9 mm. The measured size on postcontrast T1-WI were slightly larger than on CISS images in all diameters except the longitudinal diameter of the IAC portion, obtained from reader 1, which is summarized in Table 1.

Table 1. *Comparison of measurement in longitudinal and transverse diameters in IAC and CPA portions of each reader.*

		CPA				**IAC**			
		Reader 1		**Reader 2**		**Reader 1**		**Reader 2**	
		Median (Q1,Q3)	**p-value**	**Median (Q1,Q3)**	**p-value**	**Median (Q1,Q3)**	**p-value**	**Median (Q1,Q3)**	**p-value**
Longitudinal diameter	CISS	12.92 (11.04,17.32)	<0.001	12.90 (11.05,17.36)	<0.001	9.43 (6.01,11.40)	<0.001	9.43 (6.00,11.48)	<0.001
	contrast	13.72 (11.60,17.88)		13.76 (11.55,17.80)		9.30 (6.13,11.74)		9.53 (6.14,11.72)	
Transverse diameter	CISS	9.87 (7.12,14.23)	0.06	9.85 (7.13,14.12)	0.052	9.38 (7.48,13.39)	0.051	9.25 (7.50,13.40)	0.04
	contrast	10.59 (7.30,14.20)		10.55 (7.30,14.05)		9.68 (7.52,13.26)		9.70 (7.51,13.26)	

A subgroup analysis was summarized in Table 2. Regarding tumor locations, six patients (5.08%) found the tumors confined only to the CPA cisterns, tumor size measurement in longitudinal and transverse diameters showed no significant difference between CISS and postcontrast T1-WI (p = 0.06-0.16). While only the IAC was occupied by the tumors in 67 patients (56.78%), there was a significant difference in longitudinal and transverse diameters (p < 0.05). From 58 post-operative studies, the results showed that measurements in all diameters were not significantly different (P = 0.11-0.03). While conservative or non-operative tumors were not significantly different in the transverse diameter of IAC measurement (p = 0.18).

Table 2. *P value of subgroup categorizations, comparing each diameter measurement in CPA and IAC portion on CISS and postcontrast T1-weighted images obtained by both readers.*

		CPA				IAC			
		Reader 1		Reader 2		Reader 1		Reader 2	
	Total (n=118)	Longitudinal	transverse	longitudinal	transverse	longitudinal	transverse	longitudinal	transverse
Tumor confined in CPA	6	0.06	0.16	0.06	0.15	N/A	N/A	N/A	N/A
Tumor confined in IAC	67	N/A	N/A	N/A	N/A	<0.001	0.03	0.001	0.03
Post-operative tumor	58	0.29	0.31	0.23	0.33	0.11	0.11	0.14	0.10
Conservative tumor	60	<0.001	0.02	<0.001	0.01	0.001	0.18	0.001	0.18

Bland-Altman plots (Figures 3 and 4) were also used to assess agreement between measurements in both sequences for longitudinal and transverse diameters of each CPA and intracanalicular portions. The plots revealed that differences between the two sequences in longitudinal and transverse diameters of CPA and IAC were within the limits of agreement; therefore, both sequences could be used interchangeably.

Interobserver agreement ranged between 0.994-0.999 ($p < 0.001$), by Pearson's product-moment correlation, for measurement in all diameters of both CPA and intracanalicular portions on CISS and postcontrast T1-WI. The results implied an excellent correlation between two readers.

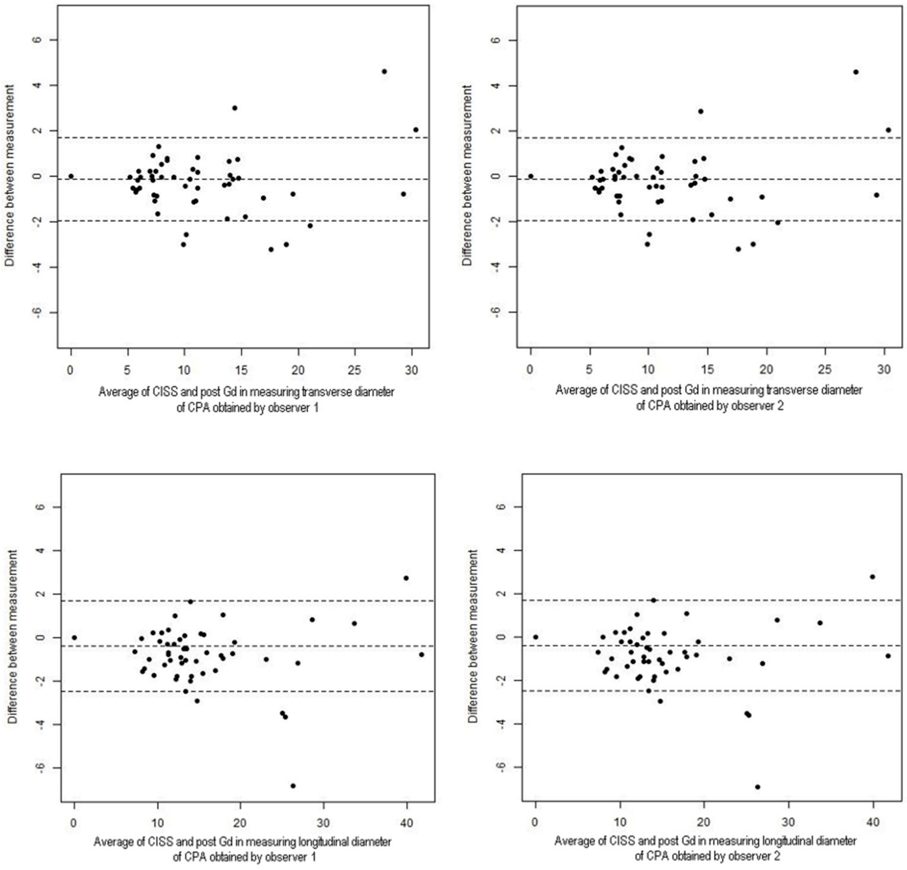

Figure 3. *Bland-Altman plots revealed the difference and average values of tumor measurement in CISS and postcontrast T1-weighted images in the cerebellopontine (CPA) portion.*

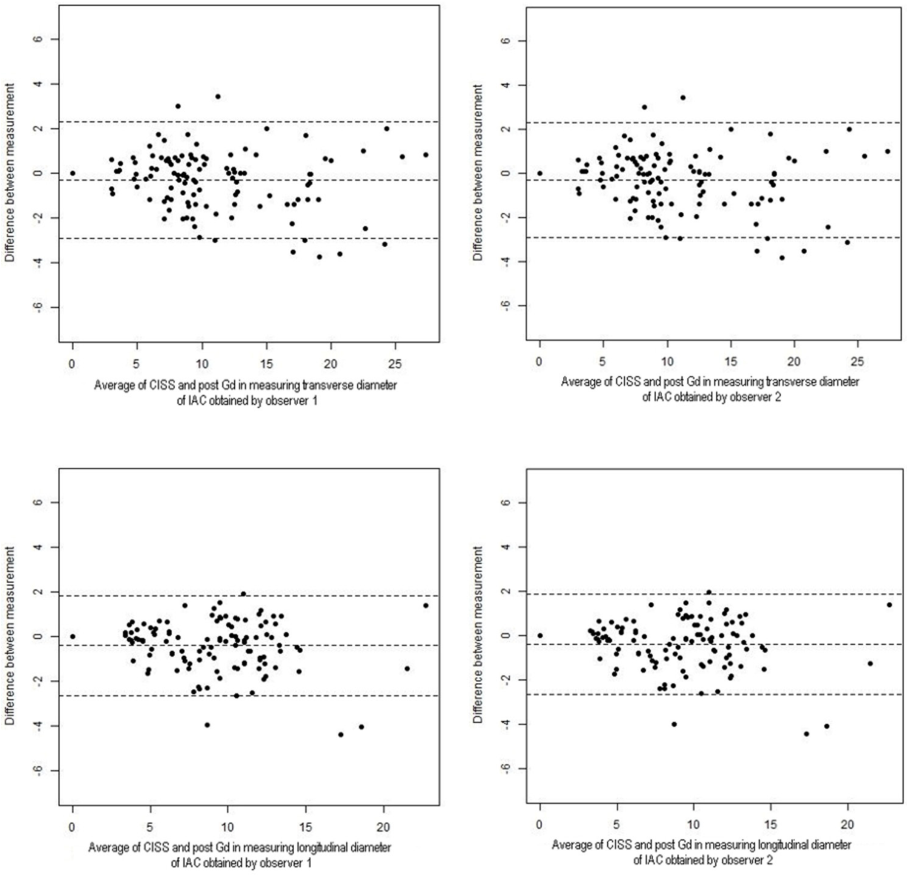

Figure 4. *Bland-Altman plots revealed the difference and average values of tumor measurement in CISS and postcontrast T1-weighted images in the internal auditory canal (IAC) portion.*

Discussion

The goal of this study was to assess the capability of CISS sequence in measuring the tumor size of CPA-IAC masses as an effective tool compared to postcontrast T1-WI. The overall difference of both sequences in each median diameter was acceptable, less than 0.9 mm, and Bland-Altman plots also showed data was within the limits of agreement. However, a statistically significant difference in longitudinal diameter of CPA cisternal and IAC portions of both readers in addition to transverse diameter of IAC portion of reader 2 could be affected by several factors.

According to tumor locations, our study included many large IAC tumors. Most of them totally occupied the IACs and partially extended into the temporal bones. Thus, the tumor margins were hardly outlined and distinguished from the adjacent structures in CISS image (Figure 5). Additionally, signal changes in the perilymphatic fluids of the inner ear as a result of elevated protein concentration attributed to blood-inner ear barrier disruption in VSs could reveal decreased signal intensity in the ipsilateral cochlea and vestibule on CISS image [21]. For this reason, gadolinium-enhanced image was necessary to evaluate inner ear extension in particular extensive tumors whereas most small IAC lesions were clearly depicted in CISS sequence due to high signal of the cerebrospinal fluid (CSF) outlining as natural contrast. Similarly, the measurement of CPA tumor showed no difference in both sequences because the CPA tumors were clearly depicted due to high signal contrast between the tumor margin and CSF in the CPA cistern. Even though a large tumor compressed upon the cerebellar hemisphere, there was a thin CSF cleft to delineate the tumor margin.

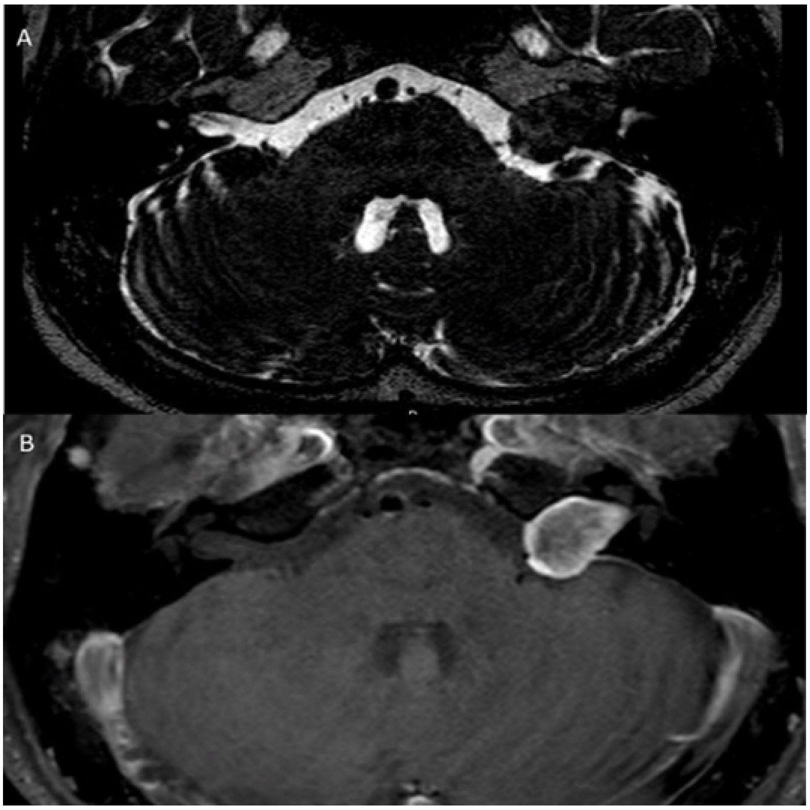

Figure 5. *(A) Axial CISS image shows the tumor totally occupied and expanded to the left internal auditory canal (IAC). Its margin is inaccurately separable from the left temporal bone and inner ear structures without CSF signal outlining. (B) Axial postcontrast T1-weighted image clearly depicts the well-defined tumor.*

The post-operative groups showed no significant difference in both CISS and contrast-enhanced sequences in all diameter measurements. However, some post-operative residual tumors showed a heterogeneous signal (cystic changes, necrotic portion) combined with the distortion of the surrounding structures. CISS occasionally could not clearly depict the outline of tumors. Conversely, some tumors showed false positive findings on contrast-enhanced images due to enhancement of the surrounding structures from post-operative changes, post-inflammation, or clustering of the internal auditory canal nerve and vascular complex [16, 22, 23]. Therefore, post-operative evaluation with CISS sequence alone should be carefully performed in some patients.

Considering tumor types, vestibular schwannomas were the main population influencing the overall data. The prior studies [16-18, 22] reported high accuracy of CISS in detection and follow-up tumor size of VSs but the large tumors or neurofibromatosis type 2 was not included. In this study, the measurement of some large tumors and multiple schwannomas in patients who had neurofibromatosis type 2 was variable and differed between CISS and postcontrast T1-WI. The range of mean difference varied from 1-7 mm in those large tumors. Thus, in these particular cases of large intracanalicular portions or extensive involvement into the temporal bone, a follow-up of the contrast studies was suggested. Regarding meningioma, it revealed no significant difference in measurement of CPA and transverse diameter in IAC portion. Most meningiomas provided a sharp boundary to the tumors, so CISS can be used as an alternative sequence to measure tumor size. However, this study had a limited number of meningiomas. In any future study, larger numbers would be required.

The limitation of this study was invariable tumor types and the difference of slice thickness between axial CISS and postcontrast T1-WI. Regarding a retrospective review, CISS sequence was performed routinely in cases of temporal bone and cranial nerve studies in our institute. Thus, other possibilities such as cases of meningiomas or metastases did not have this sequence and thus, were not enrolled in the study.

Conclusion

In conclusion, the constructive interference in a steady state sequence may be sufficient for assessing the size of cerebellopontine angle and internal auditory canal masses, which can be used interchangeably with postcontrast T1-weighted images as a contrast-free option, especially in follow-up studies and vulnerable settings of gadolinium administration.

References

1. Yilmaz C, Altinors N, Sonmez E, Gulsen S, Caner H. Rare lesions of the cerebellopontine angle. Turk Neurosurg 2010;20:390–7. doi: 10.5137/1019-5149.JTN.2961-10.0.

2. Kankane VK, Warade AC, Misra BK. Nonvestibular schwannoma tumors in the cerebellopontine angle: A single-surgeon experience. Asian J Neurosurg 2019;14:154-61. doi: 10.4103/ajns.AJNS_335_17.

3. Springborg JB, Poulsgaard L, Thomsen J. Nonvestibular schwannoma tumors in the cerebellopontine angle: a structured approach and management guidelines. Skull Base 2008;18:217–28. doi: 10.1055/s-2007-1016959.

4. Singh K, Singh MP, Thukral C, Rao K, Singh K, Singh A. Role of magnetic resonance imaging in evaluation of cerebellopontine angle schwannomas. Indian J Otolaryngol Head Neck Surg 2015;67:21–7. doi: 10.1007/s12070-014-0736-0.

5. Cavada MN, Lee MF, Jufas NE, Harvey RJ, Patel NP. Intracanalicular vestibular schwannoma: a systematic review and meta-analysis of therapeutics outcomes. Otol Neurotol 2021;42:351-62. doi: 10.1097/MAO.0000000000002979.

6. Bonneville F, Savatovsky J, Chiras J. Imaging of cerebellopontine angle lesions: an update. Part 1: enhancing extra-axial lesions. Eur Radiol 2007;17:2472–82. doi: 10.1007/s00330-007-0679-x.

7. Lin EP, Crane BT. The management and imaging of vestibular schwannomas. AJNR Am J Neuroradiol 2017;38:2034-43. doi: 10.3174/ajnr.A5213.

8. Silk PS, Lane JI, Driscoll CL. Surgical approaches to vestibular schwannomas: what the radiologist needs to know. Radiographics 2009;29:1955–70. doi: 10.1148/rg.297095713.

9. Hentschel M, Rovers M, Markodimitraki L, Steens S, Kunst H. An international comparison of diagnostic and management strategies for vestibular schwannoma. Eur Arch Otorhinolaryngol 2019;276:71-8. doi: 10.1007/s00405-018-5199-6.

10. Hentschel MA, Kunst HPM, Rovers MM, Steens SCA. Diagnostic accuracy of high-resolution T2-weighted MRI vs contrast-enhanced T1-weighted MRI to screen for cerebellopontine angle lesions in symptomatic patients. Clin Otolaryngol 2018;43:805-11. doi: 10.1111/coa.13051.

11. Bakkouri WE, Kania RE, Guichard JP, Lot G, Herman P, Huy PT. Conservative management of 386 cases of unilateral vestibular schwannoma: tumor growth and consequences for treatment. J Neurosurg 2009;110:662–9. doi: 10.3171/2007.5.16836.

12. Smouha EE, Yoo M, Mohr K, Davis RP. Conservative management of acoustic neuroma: a meta-analysis and proposed treatment algorithm. Laryngoscope 2005;115:450–4. doi: 10.1097/00005537-200503000-00011.

13. Perez-Rodriguez J, Lai S, Ehst BD, Fine DM, Bluemke DA. Nephrogenic systemic fibrosis: incidence, associations, and effect of risk factor assessment--report of 33 cases. Radiology 2009;250:371–7. doi: 10.1148/radiol.2502080498.

14. McDonald RJ, McDonald JS, Kallmes DF, Jentoft ME, Murray DL, Thielen KR, et al. Intracranial gadolinium deposition after contrast-enhanced MR imaging. Radiology 2015;275:772–82. doi: 10.1148/radiol.15150025.

15. Ramalho J, Semelka RC, Ramalho M, Nunes RH, AlObaidy M, Castillo M. Gadolinium-based contrast agent accumulation and toxicity: an update. AJNR Am J Neuroradiol 2016;37:1192–8. doi:10.3174/ajnr.A4615.

16. Forgues M, Mehta R, Anderson D, Morel C, Miller L, Sevy A, et al. Non-contrast magnetic resonance imaging for monitoring patients with acoustic neuroma. J Laryngol Otol 2018;132:780-5. doi: 10.1017/S0022215118001342.

17. Bayraktaroğlu S, Pabuçcu E, Ceylan N, Duman S, Savaş R, Alper H. Evaluation of the necessity of contrast in the follow-up MRI of schwannomas. Diagn Interv Radiol 2011;17:209–15. doi: 10.4261/1305-3825.DIR.3786-10.1.

18. Abele TA, Besachio DA, Quigley EP, Gurgel RK, Shelton C, Harnsberger HR, et al. Diagnostic accuracy of screening MR imaging using unenhanced axial CISS and coronal T2WI for detection of small internal auditory canal lesions. AJNR Am J Neuroradiol 2014 ;35:2366-70. doi: 10.3174/ajnr.A4041.

19. Ozgen B, Oguz B, Dolgun A. Diagnostic accuracy of the constructive interference in steady state sequence alone for follow-up imaging of vestibular schwannomas. AJNR Am J Neuroradiol 2009;30:985–91. doi: 10.3174/ajnr.A1472.

20. Walsh RM, Bath AP, Bance ML, Keller A, Rutka JA. Comparison of two radiologic methods for measuring the size and growth rate of extracanalicular vestibular schwannomas. Am J Otol 2000;21:716–21.

21. Zou J, Hirvonen T. “Wait and scan” management of patients with vestibular schwannoma and the relevance of non-contrast MRI in the follow-up. J Otol 2017;12:174–84. doi: 10.1016/j.joto.2017.08.002.

22. Pizzini FB, Sarno A, Galazzo IB, Fiorino F, Aragno AMR, Ciceri E, et al. Usefulness of high resolution T2-weighted images in the evaluation and surveillance of vestibular schwannoma? Is gadolinium needed?. Otol Neurotol 2020;41:e103-10. doi: 10.1097/MAO.0000000000002436.

23. Lawson McLean AC, McLean AL, Rosahl SK. Evaluating vestibular schwannoma size and volume on magnetic resonance imaging: an inter- and intra- rater agreement study. Clin Neurol Neurosurg 2016;145:68-73. doi: 10.1016/j.clineuro.2016.04.010.

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Perspectives

Another loss of radioactive material in Thailand highlights the need for effective risk communication

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Abstract

On March 10th 2023, a cylinder containing caesium-137 was found missing from a power plant near Bangkok, Thailand. This generated lots of fear and anxiety, fuelled by social media and inadequate statements from the authorities. Later it was discovered in a foundry, compressed and partially melted. It is clear from this incident that risk communication was inadequate.

Two case studies from Southeast Asia, the 2004 Asian Earthquake and Tsunami in Banda Aceh, Indonesia, and the COVID-19 pandemic illustrate the significance of effective risk communication in crisis management and public policy.

This incident in Thailand serves as a "wake-up call" for other countries in Southeast Asia and beyond, urging them to ensure the safe management of radioactive materials as well as to pay attention to their own investments in creating efficient risk communication frameworks to deal with future disasters.

Keywords: Missing caesium-137, Radiation safety, Radioactive materials, Risk communication, Safety and security, Thailand.

Common sense dictates that we must never assume that there are no crocodiles when crossing a calm river, lest it ends up costing us an arm or leg. And when it comes to the handling of radiological materials, we should never take it for granted and allow it to become routine with inadequate safety and security. This is especially true in Southeast Asian countries, where applications in nuclear technology are increasing; where awareness is not a priority; and where knowledge is privy only to a few stakeholders.

On March 10th 2023, Thailand was unwittingly thrust into the "international spotlight" when a cylinder used to store radioactive caesium-137 went missing from a power plant near Bangkok. News of this incident received coverage in the New York Times [1], CNN [2] and some regional news agencies, but the response was mostly sensational in the local media such as the Bangkok Post [3] and The Nation [4]. Understandably, many Thai citizens were gripped by panic and expressed anger towards authorities, despite a statement from the Thai Office of Atoms for Peace [5] to clarify the situation.

A few days later, the authorities found the caesium source, compressed and being melted along with other metals, in a steel foundry in Prachinburi Province [6]. They cordoned off the area and carried out health surveillance. Meanwhile fear and speculation continued.

The Samut Prakarn incident in January 2000, still fresh in the memory of the Thai public, in which 10 scavengers suffered radiation injury after opening a canister containing cobalt-60 that had been improperly disposed of at a hospital, eventually led to the loss of three lives. Although the casualties were considered few, thousands of people living around the affected area may have been inadvertently exposed to varying degrees of radiation. Till today, the effects on their lives are not fully known [7].

This image, provided by the Prachinburi Provincial Public Relations Office, shows the missing radioactive cylinder as part of a steel tube.

Importance of Effective Risk Communication

The latest incident has once again reinforced concerns about the safety and security of radioactive materials in International Atomic Energy Agency (IAEA) member states [8]. The competency of authorities in handling radiological crises has been called into question, and highlighted people's tendency to react with "radiation phobia" — a term used to describe irrational fear of radiation. While it is important to take radiation safety seriously, it is also vital to understand its nature and role in our lives [9,10]. Disasters in the peaceful application of nuclear energy, such as those in Chernobyl (1986) and Fukushima (2011), have further fuelled our aversion towards radiation. Yet, it is important to remember that the health risks from the current situation are significantly lower than those of the previous nuclear power mishaps.

Hence, effective risk communication, including through social media, is key to managing risks in a radiological crisis [9,11]. The most important objective is to promote appropriate protective behaviour among those to whom information is directed. The primary goal of disaster communication is to inform people or communities about the risks they face in a timely and transparent manner, and protect them from impending hazards with the ultimate goal of reducing injuries and fatalities [12].

Thus, authorities have a responsibility to provide accurate, timely and easy-to-understand information. This may include information about the science of radiation and what to do if a crisis occurs. In the modern era, social media may become a bane of communication if misinformation and disinformation start to dominate discussions on the Internet. As a double-edged sword, social media can be easily used to quickly disseminate fact or fiction to a large audience — with systematic order a result of the former and panic arising from the latter. Therefore, it is important for authorities to monitor prominent communication channels and choose wise responses to refute misinformation.

It is natural for people in a crisis to feel angry and frustrated, especially when it is repeatedly due to lack of diligence. The latest slip-up in Thailand was no exception. However, choosing to engage in a blame-game will not be of benefit, and instead may result in a breakdown of communication and response measures. For authorities to build trust, they have to show the public that they are taking the initiative in addressing the situation. Then people will respond positively by being more cooperative and less likely to believe in conspiracy theories.

Examples of Other Southeast Asian Disasters

Perhaps what is more important is how policymakers and governments choose to handle risk communication. Good leadership will significantly reduce casualties and negative perceptions. To understand scenarios in Southeast Asia, there are two major incidents that may be used as case studies to assess the responsiveness of policymakers. The first example is the 2004 Asian Earthquake and Tsunami, where Adella *et al.* [12] explored the issues and challenges in implementing disaster risk reduction and communication efforts in Banda Aceh, Indonesia. The responsibility eventually fell on the north Sumatran city's Regional Disaster Management Agency (BPBD) which engaged local grassroots at the district level. However, 15 years after the disaster, the authors noted that lack of funding had become a main challenge in implementing programmes, so much so that drills and simulations, which are important to ensure preparedness, could not be carried out. This was followed by a lack of walkie-talkies and short-wave radios needed to facilitate communications in the event of a real disaster when handphone reception and Internet connection would be cut off. Finally, they describe a lack of capacity and skilled personnel to execute programmes. Consequently, the authors stated that these challenges had hampered the efficiency of the Banda Aceh BPBD in realising its disaster risk communication goals. Therefore, the case study indicates that risk communication is an extensive effort that requires "disciplined" investment which persists longer than the initial rescue and rehabilitation work.

The second example is the COVID-19 pandemic, where hoarding was a clear consequence of poor communication and heightened risk perception, resulting in a shortage of medicine and personal protective equipment in the early stages of the outbreak [13]. Pandemics may increase vulnerability to disasters, undermine the welfare of societies and threaten the stability of states. This was especially evident in the ASEAN nations whose leaders had downplayed or delayed taking action in controlling COVID-19. On contrast, nations like Vietnam, Singapore and Malaysia, which made efforts to quarantine their outbreaks and vaccinate their citizens, saw low fatality rates and less-burdened healthcare systems despite spikes in infections. Differences in terminology and countermeasures between these domains also often result in competing objectives, and resource inefficiencies that limit preparedness and slow responses [14]. In this aspect, the effective use of risk communication and engagement tools allowed community-oriented approaches and multi-stakeholder cooperation to flourish in dealing with COVID-19 [13]. These tools, when operated in native languages, can raise awareness, correct misperceptions and direct preventive measures. They may alleviate fear and stigma, enhance community response and solidarity, and allow for evidence-based interventions.

Conclusion

In conclusion, the recent Thai incident is a "wake-up call" for other nations in Southeast Asia and beyond to ensure the safe handling of radioactive materials. It is a reminder to pay heed to their respective investments in building an effective risk communication framework to cope with the future disasters which will inevitably arise.

References

1. Suhartono M, Yoon J. Search intensifies for radioactive canister missing for weeks in Thailand. The New York Times [Internet]. 2023 Mar 17 [cited 2023 Apr 18]. Available from: https://www.nytimes.com/2023/03/17/world/asia/thailand-radioactive-canister-lost.html.

2. Cable News Network [Internet]. Atlanta: CNN; c2023 [updated 2023 Mar 16; cited 2023 Apr 18]. Olarn K, Chen H. A radioactive cylinder has gone missing in Thailand. Authorities are now scrambling to find it. Available from: https://www.cnn.com/2023/03/15/asia/missing-lost-radioactive-cylinder-thailand-search-intl-hnk/index.html

3. Sanubboon M. Radioactive caesium missing from power plant. Bangkok Post [Internet]. 2023 Mar 14 [cited 2023 Apr 18]; AT 17:40. Available from: https://www.bangkokpost.com/thailand/general/2527661/radioactive-caesium-missing-from-power-plant.

4. Hunt for missing radioactive caesium intensifies in Prachinburi as health worries grow. The Nation Thailand [Internet]. 2023 Mar 15 [cited 2023 Apr 18]. Available from: https://www.nationthailand.com/thailand/general/40025715.

5. Office of Atoms for Peace [Internet]. Bangkok: OAP; c2016 [cited 2023 Apr 18]. Situation report and investigation of the missing radioactive material cesium-137, Si Maha Phot District Prachinburi Province. Available from: https://www.oap.go.th/resources/148-media-library/publications/category-other-multimedia/9130-137

6. Caesium-137 found at steel-melting plant during research for missing cylinder.The Nation Thailand [Internet]. 2023 Mar 16 [cited 2023 Apr 18]. Available from: https://www.nationthailand.com/thailand/general/40025846.

7. International Atomic Energy Agency [Internet]. Vienna: IAEA; c1998-2023 [cited 2023 Apr 18]. The Radiological Accident in Samut Prakarn 2002 STI/PUB/1124. Available from: https://www.iaea.org/publications/6375/the-radiological-accident-in-samut-prakarn

8. International Atomic Energy Agency [Internet]. Vienna: IAEA; c1998-2023 [cited 2023 Apr 18]. Security of nuclear and other radioactive material. Available from: https://www.iaea.org/topics/security-of-nuclear-and-other-radioactive-material

9. Ng KH. Radiation exposure and the need for effective risk communication: lessons following the 2011 Fukushima nuclear power plant accident. Med Phys Intern J 2018 [Internet]. 6:163-7 [cited 2023 Apr 18]. Available from: http://www.mpijournal.org/pdf/2018-01/MPI-2018-01-p163.pdf.

10. International Atomic Energy Agency [Internet]. Vienna: IAE; c1998-2023 [cited 2023 Apr 18]. Safety and security culture. Available from: https://www.iaea.org/topics/safety-and-security-culture

11. TWENTYTWO13.my [Internet]. Kuala Lumpur: Professional Storytellers PLT; c2018-2003 [cited 2023 Apr18]. Ng KH, Gong J. Dealing with ‘radiation phobia’ – if it occurs. Available from: https://twentytwo13.my/opinion/dealing-with-radiation-phobia-if-it-occurs.

12. Adella S, Nur MF, Nisa N, Putra AT, Ramadhana FR, Maiyani F, et al. Disaster risk communication issues and challenges: lessons learned from the Disaster Management Agency of Banda Aceh City. IOP Conf Ser: Earth Environ Sci 2019; 273: 012041. Doi: 10.1088/1755-1315/273/1/012041.

13. Abrams EM, Greenhawt M. Risk communication during Covid-19. J Allergy Clin Imunol Pract 2020 8:1791-4. doi: 10.1016/j.jaip.2020.04.012.

14. Lowy Institute [Internet]. Sydney: The Institute; c2023 [cited 2023 Apr 18]. Trias APL, Cooke ADB. Post-Covid disaster governance in Southeast Asia. Available from: https://www.lowyinstitute.org/the-interpreter/post-covid-disaster-governance-southeast-asia

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ASEAN Movement in Radiology

Post-COVID-19 lung diseases: A short note from AOCR 2023, Bangkok, Thailand

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Abstract

The Asian Symposia II: Post-COVID Lung Diseases at the Asian Oceanian Congress of Radiology (AOCR) 2023, Bangkok, Thailand, discussed the current understanding regarding post-COVID-19 lung diseases, one of the topical health concerns. At the AOCR2023 Asian Symposia, representatives from South Korea, India, Malaysia, and Thailand presented different views, initiatives, and experiences in post-COVID-19 lung diseases.

Keywords: Post-COVID-19 lung disease, Asia, AOCR2023

Main messages:

- The definitions, terms, timelines, imaging findings, management, and outcomes of post-COVID-19 lung diseases remain inconclusive.
- It is essential for radiologists to be familiar with and able to identify imaging features of acute and post-COVID-19 pneumonia and consider the time frame and other related factors when interpreting chest imaging.
- Since residual lung abnormalities after COVID-19 pneumonia usually exist in the short follow-up period but gradually resolve over time, radiologists should avoid describing residual lung abnormalities as fibrosis at short-term follow-up CT.
- Radiologists should also be aware of rebound phenomena and other complications associated with COVID-19 pneumonia.

Introduction

The Asian Symposia was established by the Asian Oceanian Congress of Radiology (AOCR) Scientific Committee to discuss current topical health concerns in Asian countries. The symposia were held on 10th February, the second day of AOCR2023, in Bangkok, Thailand, and participation was by invitation only. The proposed topics discussed in the AOCR2023 Asian Symposia was *I: Situation and Imaging Innovation in Tuberculosis* and *II: Post-COVID-19 Lung Diseases.*

In the session of Post-COVID-19 Lung Diseases, the chairpersons were Noriyuki Tomiyama and Yutthaphan Wannasopha. The following societies provided representatives who presented and subsequently submitted a written report summarizing the perspectives of their countries: the Korean Society of Radiology (KSR), the Indian Radiological & Imaging Association (IRIA), the College of Radiology, Academy of Medicine of Malaysia (COR/AMM), and the Royal College of Radiologists of Thailand (RCRT).

The situation of post-COVID-19 lung diseases in Korea

Yeon Joo Jeong, presented on behalf of the KSR, elucidated that post-COVID-19 condition (PCC) is a condition that can occur following COVID-19 and is more common in females, hospitalized patients, and patients with underlying diseases [1, 2]. There are no specific tests to diagnose PCC, but it can be identified through symptoms, signs, and blood tests. Clinical work-up for PCC includes pulmonary function tests, chest radiography or CT, echocardiography, and non-invasive tests for severe COVID-19. These tests are recommended for patients with persistent respiratory distress or chest discomfort for three months after a COVID-19 diagnosis to differentiate from other diseases and detect early pulmonary fibrosis, pericarditis/myocarditis, and heart failure.

The imaging features of PCC are characterized by a typical evolution of COVID-19 pneumonia, with post-acute lung abnormalities showing gradual improvement over time. The incidence and morphology of chronic lung abnormalities in PCC are related to the severity of the initial COVID-19 pneumonia. Fibrotic-like lesions may be present, with bronchial dilatation, reticulation, parenchymal bands, architectural distortion, and ground-glass opacities. However, most residual lung abnormalities are mild, and fibrosis is uncommon except in severe pneumonia. Also, a progressive course is not typical [3-5]. Longitudinal CT imaging helps distinguish fibrosis from resolving or improving lesions, evaluating uncommon cases of persistent pulmonary fibrosis or interstitial lung disease (ILD) associated with COVID-19, and assessing the worsening of pre-existing ILD by COVID-19.

The Korean preliminary guidelines recommend evaluating patients with persistent symptoms beyond 12 weeks after COVID-19 diagnosis for the possibility of long COVID, excluding other underlying diseases or complications of COVID-19, and performing relevant tests as needed. Still, there is no specific test to diagnose long COVID and insufficient evidence to recommend specific medical treatments or steroid administration. Thromboprophylaxis should not be routinely administered, and respiratory rehabilitation can be considered in consultation with a specialist. COVID-19 vaccination does not increase the incidence of long COVID [6].

In conclusion, PCC is a complex syndrome with a wide range of physical and mental health consequences that can last for several weeks. Lung abnormalities in PCC represent a mixture of sequelae of direct viral damage, acute lung injury, and immune-mediated processes, with increased risk associated with the severity of infection, adult respiratory distress syndrome, duration of hospitalization and mechanical ventilation, older age, and the presence of inflammatory markers. While most residual CT findings improve or resolve over time, some patients may develop persistent fibrosis.

The situation of post-COVID-19 lung diseases in India

Hemant Patel, presented on behalf of the IRIA, discussed the importance of radiologically identifying post-COVID complications for better management of patients. Post-acute sequelae of COVID-19 (PASC) is defined as the persistence of symptoms for more than a month after the onset of COVID-19. Radiologists should identify the prevalence and significance of pulmonary CT abnormalities in PASC and apply appropriate descriptive terminology to CT findings. Risk factors for pulmonary abnormality at CT in PASC include the severity of illness, such as the need for admission, oxygen, and mechanical ventilation. Ventilator-induced lung injury can lead to pulmonary fibrosis, including hyaline membrane formation and alveolar collapse.

The typical CT findings of acute COVID-19 pneumonia include ground-glass opacities, the halo sign, and the reversed halo sign. Post-acute sequelae of COVID-19 can lead to air trapping, atoll sign, lung fibrosis, and pulmonary vascular disease. Fibrosis should be reserved only when CT features indicating fibrosis, such as traction bronchiectasis or bronchiolectasis, honeycombing, or architectural distortion, are present. Some uncommon complications associated with PACS, such as secondary infection, hydro-pneumothorax, pneumomediastinum, and cystic bronchiectatic changes with cavity formation, can be visualized. Radiologists should be able to identify the prevalence and significance of pulmonary CT abnormalities in PACS and apply appropriate descriptive terminology to CT findings in PACS. It remains essential to identify the risk factors for pulmonary abnormality at CT in PACS, such as the severity of illness and ventilator-induced lung injury.

To summarize, post-COVID lung diseases can cause dyspnea in patients who have recovered from acute COVID-19 pneumonia. The prevalence of these abnormalities varies depending on the severity of initial lung involvement and the time since infection. High-resolution CT (HRCT) can help diagnose the CT abnormalities associated with post-COVID lung diseases, such as ground-glass opacities, parenchymal bands, reticular abnormalities, traction bronchiectasis, mosaic attenuation, and fibrotic changes. Future research is required to investigate the long-term outcomes of COVID-19 and the clinical significance of CT findings.

The situation of post-COVID-19 lung diseases in Malaysia

Bushra Johari, presented on behalf of the COR/AMM, discussed the high-risk factors for post-acute COVID-19, including the severity of the primary infection and the need for ICU admission and mechanical ventilation. The CT protocol should include HRCT with a slice thickness of ≤ 1.5 mm, a high-spatial-frequency reconstruction algorithm for the lung parenchyma, and computed tomographic pulmonary angiography if pulmonary embolism is suspected [7]. Some also advocate for expiratory scans to detect air trapping.

In post-acute COVID-19, residual abnormalities on chest X-rays can be present for up to six months, with ground-glass opacities being the most common finding. Many patients also show residual ground glass and fibrotic-like changes on CT obtained three months after COVID-19. CT features at three months include low-attenuation ground-glass opacities, linear consolidation, perilobular opacities, reticulation, interstitial thickening, and mosaic attenuation pattern, while honeycombing is uncommon [8]. There is a debate about whether post-acute COVID imaging findings should be classified into "inflammatory" and "fibrotic" categories based on radiological patterns. However, the ambiguity of some features, the absence of histological correlates, uncertain trajectories, and the likelihood of reversibility make it difficult to classify these findings. Persistent ground-glass abnormalities may indicate immature fibrosis instead of inflammation, and fibrotic-like changes may be capable of regression and remodeling, albeit at a slower rate [9]. Further research is needed to determine the best approach to classify these findings.

The take-home messages from the discussed content are that Malaysia has established a comprehensive follow-up protocol for post-acute COVID-19 patients, and the role of radiologists in imaging these patients is crucial. There are many areas of uncertainty regarding the long-term effects of COVID-19 on lung health, such as the division of imaging findings into inflammatory and fibrotic categories, the interpretation of certain radiological features, and the likelihood of reversibility of imaging findings. Further research is required to address these uncertainties and improve patient care.

The situation of post-COVID-19 lung diseases inThailand

Thitiporn Suwatanapongched, on behalf of the RCRT, stated that as of January 2023, after facing multiple waves of COVID-19 during the pandemic, there were nearly 5 million confirmed COVID-19 cases with a mortality rate of less than 0.1% [10]. The two most problematic waves were the third and fourth waves when the Alpha and Delta variants hit Thailand, especially Bangkok, between April 2021 and October 2021 [11, 12]. A rapid rise in confirmed cases during these two waves overwhelmed the existing country’s healthcare facilities. In response to this COVID-19 crisis, multiple case-management strategies and guidelines were developed. One of them was setting up alternative healthcare facilities such as field hospitals and “hospitels” (the latter involving turning vacant hotels into temporary healthcare facilities) for accommodation, surveillance, and management of confirmed COVID-19 cases. For triaging and managing confirmed COVID-19 cases in these alternative healthcare facilities, chest X-rays obtained by a portable X-ray machine were used for an initial evaluation. Challenges faced at that time were issues regarding communication among staff of uneven experiences.

A cutting-edge and practical tool called Rama Co-RADs was developed to facilitate the timely communication, triage, diagnosis, management, and treatment of these patients [11, 12]. Rama Co-RADs is a categorical assessment regarding chest X-ray findings of pulmonary involvement in confirmed COVID-19 cases. It is designed based on the existing knowledge of the typical chest X-ray and CT features of COVID-19 pneumonia published in the literature and our experience during the first wave [11-13]. After using Rama Co-RADS, the healthcare team noticed improved communication, triage, management, and treatment of confirmed COVID-19 cases in the hospitels. This, in turn, led to a favorable clinical outcome for patients with relatively non-severe cases [14]. The modified version of Rama Co-RADS has been subsequently developed by providing additional categorical schemes to signify radiographic changes on follow-up chest X-rays in COVID-19 patients during admission and after discharge [15].

In addition, the RCRT initiated the RadioVolunteer project during the crisis. This innovative project combined social, technological, and management strategies, bringing together volunteers from government, private, and non-profit sectors to work on a digital platform. The project allowed radiologist volunteers from any part of Thailand to promptly read and report chest radiographs based on Rama Co-RADS for triage and managing COVID-19 cases in prisons and field hospitals across Thailand. Between June 2021 and December 2021, over 280,000 chest X-rays were served by 328 dedicated radiologist volunteers involved in this impressive and vital project [16].

Furthermore, the Department of Diagnostic and Therapeutic Radiology of the Faculty of Medicine, Ramathibodi Hospital at Mahidol University has launched an in-house AI system called RAMAAI (pronounced as "RA-MAI" or ระไม in Thai).

It assists with interpreting chest X-ray findings in COVID-19 cases and is available as a free service. RAMAAI can be integrated into portable chest X-ray machines or radiographic interpretation systems and is accessible through a web service or LineBot [17].

Due to various definitions and heterogeneous clinical courses of post-COVID-19 conditions, the exact number of COVID-19 survivors with post-COVID-19 lung disease is difficult to be estimated [18, 19]. There is no official consensus on management guidelines regarding the technique and duration of imaging follow-up in post-COVID-19 lung disease in Thailand. To wrap up the discussion, Thitiporn Suwatanapongched highlighted the existence, sequential pulmonary alterations, and an unusual phenomenon of post-COVID-19 lung diseases through a sample of cases.

Figure 1. *Authors in Asian Symposia I: The Situation of Post-COVID-19 Lung Diseases in Thailand on 10th April 2023 at the AOCR2023, Bangkok, Thailand.*

Conclusion

The Asian Symposia II in AOCR 2023, Bangkok, Thailand, was held to discuss topical health concerns in Asian countries and invited representatives from the KSR, IRIA, COR/AMM, and the RCRT to present their perspectives on post-COVID-19 lung diseases.

The KSR representative elucidated the PCC and shared the Korean preliminary guidelines for evaluating patients with persistent symptoms after COVID-19. The IRIA representative emphasized the importance of radiologically identifying post-COVID complications for better patient management. The COP/AMM representative provided high-risk factors for post-acute COVID-19 and shared Malaysia's established comprehensive follow-up protocol. The RCRT representative shared the Thailand COVID-19 situation, the national collaborative actions during the COVID-19 crisis, and interesting cases regarding various post-COVID-19 lung diseases. Nevertheless, the definitions, terms, timelines, imaging findings, management, and outcomes of post-COVID-19 lung diseases still need to be more conclusive; therefore, further research in these areas is mandatory.

Acknowledgments

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References

1. Kim Y, Kim SW, Chang HH, Kwon KT, Bae S, Hwang S. Significance and associated factors of long-term sequelae in patients after acute COVID-19 infection in Korea. Infect Chemother 2021;53:463-76. doi: 10.3947/ic.2021.0022.

2. Kim Y, Bitna-Ha, Kim SW, Chang HH, Kwon KT, Bae S, et al. Post-acute COVID-19 syndrome in patients after 12 months from COVID-19 infection in Korea. BMC Infect Dis 2022;22:93. doi: 10.1186/s12879-022-07062-6.

3. Jeong YJ, Wi YM, Park H, Lee JE, Kim SH, Lee KS. Current and emerging knowledge in COVID-19. Radiology 2023;306:e222462. doi: 10.1148/radiol.222462.

4. Lee JH, Koh J, Jeon YK, Goo JM, Yoon SH. An integrated radiologic-pathologic understanding of COVID-19 pneumonia. Radiology 2023;306:e222600. doi: 10.1148/radiol.222600.

5. Murphy MC, Little BP. Chronic pulmonary manifestations of COVID-19 infection: imaging evaluation. Radiology 2023;307:222379. doi: 10.1148/radiol.222379.

6. Kim Y, Kim SE, Kim T, Yun KW, Lee SH, Lee E, et al. Preliminary guidelines for the clinical evaluation and management of long COVID. Infect Chemother 2022;54:566-97. doi: 10.3947/ic.2022.0141.

7. Alarcón-Rodríguez J, Fernández-Velilla M, Ureña-Vacas A, Martín-Pinacho JJ, Rigual-Bobillo JA, Jaureguízar-Oriol A, et al. Radiological management and follow-up of post-COVID-19 patients. Radiologia (Engl Ed) 2021;63:258-69. doi: 10.1016/j.rx.2021.02.003.

8. Martini K, Larici AR, Revel MP, Ghaye B, Sverzellati N, Parkar AP, et al. COVID-19 pneumonia imaging follow-up: when and how? A proposition from ESTI and ESR. Eur Radiol 2022;32:2639-49. doi: 10.1007/s00330-021-08317-7.

9. Mehta P, Rosas IO, Singer M. Understanding post-COVID-19 interstitial lung disease (ILD): a new fibroinflammatory disease entity. Intensive Care Med 2022;48:1803-6. doi: 10.1007/s00134-022-06877-w.

10. The Johns Hopkins Coronavirus Resource Center [Internet]. California: CRC;c2023 [cited 2023 Apr 18]. Thailand COVID-19 overview. Available from: https://coronavirus.jhu.edu/region/thailand.

11. Litmanovich DE, Chung M, Kirkbride RR, Kicska G, Kanne JP. Review of chest radiograph findings of COVID-19 pneumonia and suggested reporting language. J Thorac Imaging 2020;35:354-60. doi:10.1097/RTI.0000000000000541.

12. Suwatanapongched T, Nitiwarangkul C, Sukkasem W, Phongkitkarun S. Rama Co-RADS: Categorical assessment scheme of chest radiographic findings for diagnosing pneumonia in patients with confirmed COVID-19. Rama Med J 2021;44(2):50 - 62. doi.org/10.33165/rmj.2021.44.2.251259. Thai.

13. Suwatanapongched T, Nitiwarangkul C, Arnuntasupakul V, Kiertiburanakul S. Rama Co-RADS: Cutting-edge tool for improved communication in management and treatment of COVID-19 patients in Thailand. ASEAN J Radiol 2021;22(2):29-49. doi:10.46475/aseanjr.v22i2.144.

14. Bruminhent J, Kaewsanga Y, Jiraaumpornpat W, Arnuntasupakul V, Suwatanapongched T, Kiertiburanakul S. Clinical course and outcomes among COVID-19 patients at the hospitel in Bangkok: A retrospective study. Trop Med Infect Dis 2022;7: 238. doi: 10.3390/tropicalmed7090238.

15. Suwatanapongched T, Nitiwarangkul C, Taweesakulvashra R, Chitrapazt N. Modified Rama Co-RADS and user guideline. Division of Diagnostic Radiology, Department of Diagnostic and Therapeutic Radiology, Faculty of Medicine Ramathibodi Hospital, Mahidol University.

16. The Royal College of Radiologists of Thailand [Internet]. Bangkok: RCRT [cited 2023 Apr 18]. RadioVolunteer project. Available from: https://www.rcrt.or.th/radiovolunteer/.

17. Faculty of Medicine Ramathibodi Hospital, Mahidol University [Internet]. Bangkok: The Faculty; c2015-2018 [cited 2023 Apr 18]. RAMAAI. Available from: https://www.rama.mahidol.ac.th/radiology/th/RAMAAI.

18. Fernández-de-Las-Peñas C, Palacios-Ceña D, Gómez-Mayordomo V, Cuadrado ML, Florencio LL. Defining post-COVID symptoms (post-acute COVID, long COVID, persistent post-COVID): An integrative classification. Int J Environ Res Public Health 2021;18:2621. doi: 10.3390/ijerph18052621.

19. Soriano JB, Murthy S, Marshall JC, Relan P, Diaz JV; WHO Clinical Case Definition Working Group on Post-COVID-19 Condition. Condition WHOCCDWGoP-C-. A clinical case definition of post-COVID-19 condition by a Delphi consensus. Lancet Infect Dis 2022;22:e102-7. doi: 10.1016/S1473-3099(21)00703-9.

ASEAN Movement in Radiology

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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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 thickness 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

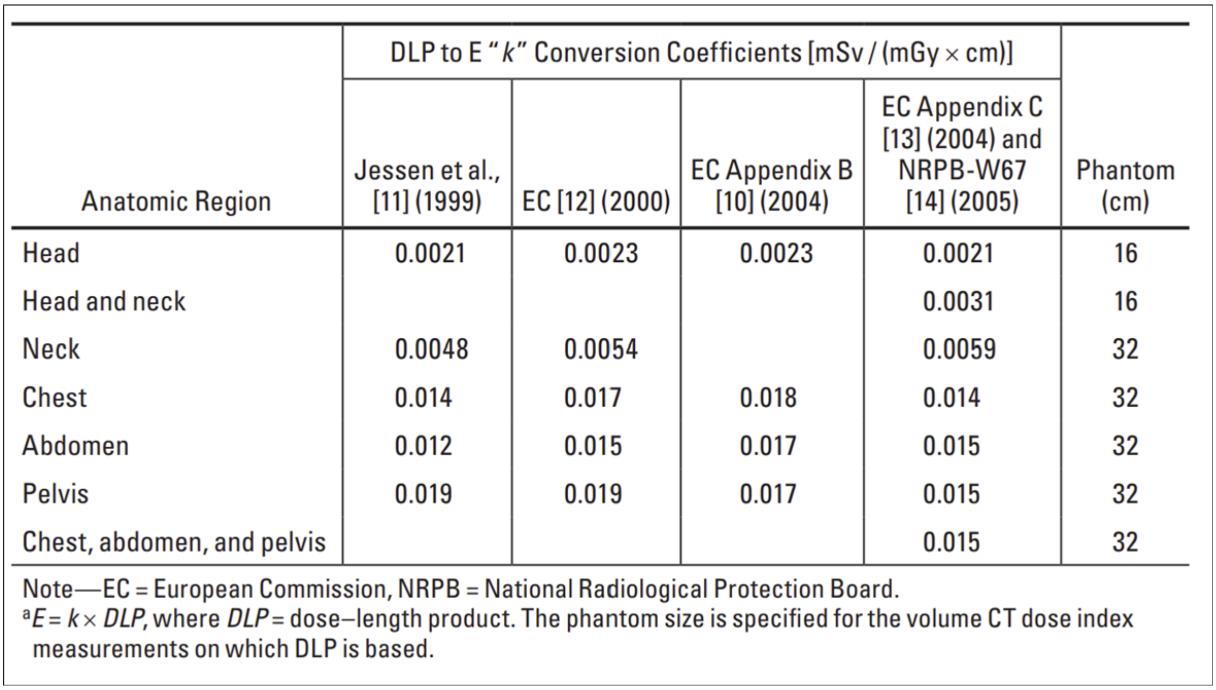
Watanya Jaidee Reported that the HRCT protocol showed different techniques that the volumetric scanning of the whole chest was performed in supine/expiration (instead of the sequential technique as recommended in the national protocol) and prone/inspiration (instead of limited ROI as recommended in the 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].



Anatomic Region	DLP to E "*k*" Conversion Coefficients [mSv / (mGy × cm)]				Phantom (cm)
	Jessen et al., [11] (1999)	EC [12] (2000)	EC Appendix B [10] (2004)	EC Appendix C [13] (2004) and NRPB-W67 [14] (2005)	
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] $E = k \times DLP$, 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.

References

1. Trisiripanit N, Suntornsawat S, Phokaew W. Standard national high-resolution computed tomography (HRCT) Protocol. a recommendation by The Royal College of Radiologists of Thailand (RCRT) and Thoracic Society of Thailand under Royal Patronage (T.S.T.). ASEAN J Radiol 2019; 20(1):35-39. doi: doi.org/10.46475/aseanjr.v20i1.38.

2. Christner JA, Kofler JM, McCollough CH. Estimating effective dose for CT using dose-length product compared with using organ doses: consequences of adopting International Commission on Radiological Protection publication 103 or dual-energy scanning. AJR Am J Roentgenol 2010;194:881-9. doi: 10.2214/AJR.09.3462.

3. McCollough CH, Bushberg JT, Fletcher JG, Eckel LJ. Answers to common questions about the use and safety of CT scans. Mayo Clin Proc. 2015; 90(10):1380-92. doi: 10.1016/j.mayocp.2015.07.011.

ASEAN Movement in Radiology

A historic event - The 21st Asian Oceanian Congress of Radiology, Bangkok, Thailand, February 9th-12th, 2023

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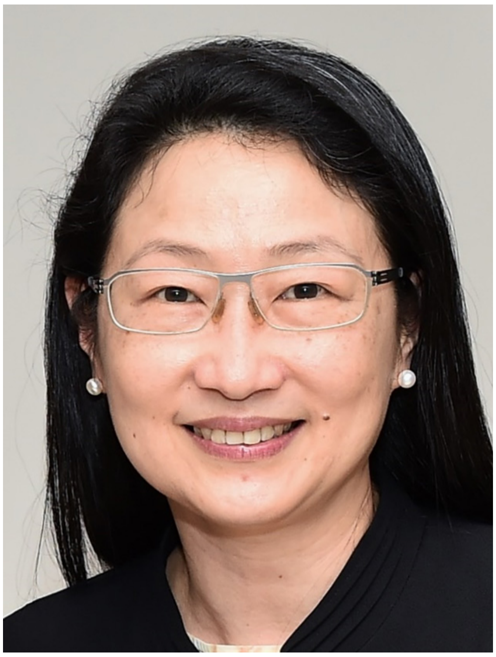

Evelyn Lai Ming Ho.
President (2021-2023),
Asian Oceanian Society of Radiology (AOSR)

There was a certain level of excitement about the 21st Asian Oceanian Congress of Radiology (AOCR) held in conjunction with the 59th Annual Scientific Meeting of the Radiological Society of Thailand and the Royal College of Radiologists of Thailand as it has been a long 40 years since the 4th AOCR in Bangkok in 1983. The 4th AOCR was the first Thai international congress and the largest AOCR since 1975 then.

In addition, there were other challenges, as the AOCRs are held according to the host organizer's best time of the year for meetings and the 20th AOCR in 2022 was just about 5 months ago in Seoul! This was the third year in a row that the AOCRs had become an annual event of the Asian

Oceanian Society of Radiology despite the Coronavirus disease (COVID-19) pandemic, testifying to the fact that collectively our allied professions are "Redefining the Possibilities in Medical Imaging" – in the way we make scientific exchanges, collaborate, train, teach and conduct research. In fact, close to this AOCR, there was a threat of COVID-19 surge that fortunately did not pose any issues for the on-site attendees.

AOCR2023 Binbakya Bidyabhed Lecture on "AOSR: Past, Present, Future" by the author as the president of AOSR.

As in true unmatchable Thai hospitality, the AOCR exuded an extra special welcoming atmosphere. Everyone I met exclaimed how enjoyable the congress/event was. There was something for everyone. There was thoughtful concession for registration fees for those from lower middle-income countries (LMIC) and ample awards to encourage poster and oral submissions including one set aside for the best researcher award relevant to SARS-CoV-2.

The author as the president of AOSR together with the Congress Chair, Assistant Professor Jarturon Tantivatana (President of the Radiological Society of Thailand), Scientific Chair, Associate Professor Wiwatana Tanomkiat (President of the Royal College of Radiologists of Thailand), Associate Professor Boontiang Sitisara (the First President of the Royal College of Radiologists of Thailand) and Dr. Chamaree Chuapetcharasopon (Former President of the Radiological Society of Thailand) open the exhibition at AOCR2023.

Heartiest congratulations to the Congress Chair, Assistant Professor Jarturon Tantivatana, President of the Radiological Society of Thailand and Scientific Chair, Associate Professor Wiwatana Tanomkiat, President of the Royal College of Radiologists of Thailand with Team Thailand for this successful hybrid meeting in a world class convention centre, the Centara Grand & Bangkok Convention Centre at CentralWorld, Bangkok.

I am grateful and appreciative of the challenges throughout the organization of an AOCR and have been privileged to preside over my final AOCR as President of the AOSR in the Land of Smiles, Thailand.

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ASEAN Movement in Radiology

A summary from AOCR2023, Bangkok, Thailand

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The Asian Oceanian Congress of Radiology (AOCR) was held in Bangkok, Thailand, by the Royal College of Radiologists of Thailand (RCRT) and the Radiological Society of Radiology of Thailand (RST) in a hybrid format, offering an opportunity for participants to attend the meeting virtually or in person and meet international colleagues face-to-face (Figure 1). It was well-attended by 1,162 participants from 29 countries around the world with 241 overseas participants and 921 local participants. There were 785 people attending the conference in person and 377 participating via the online channel. The countries with the highest number of participants included Thailand, South Korea, the Philippines, and Singapore, respectively (Table 1).

Figure 1. *The boards of directors from RCRT and RST at the AOCR2023.*

Table 1. *Participants of AOCR2023.*

NO.	COUNTRY	TOTAL	NO.	COUNTRY	TOTAL	NO.	COUNTRY	TOTAL
1	Australia	7	11	Japan	11	21	Serbia	1
2	Bhutan	1	12	Kazakhstan	4	22	Singapore	20
3	China	5	13	Kuwait	1	23	South Korea	76
4	Chinese Taipei	17	14	Malaysia	14	24	Switzerland	1
5	Finland	1	15	Nepal	5	25	Thailand	921
6	France	1	16	The Netherlands	1	26	Turkey	3
7	Hong Kong	4	17	Pakistan	1	27	United Kingdom	1
8	India	11	18	The Philippines	20	28	United States	4
9	Indonesia	15	19	Russia	1	29	Vietnam	11
10	Italy	2	20	Saudi Arabia	2			

The conference invited 139 speakers with exceptional expertise and experience in the radiological field from both Thailand and overseas countries to ensure that participants received an opportunity to explore new ideas and share knowledge in a welcoming and cordial atmosphere (Table 2). Furthermore, the organizing committee had carefully selected interesting and thought-provoking academic topics, which were organized into various sessions, for instance, 45 scientific sessions, an honorary lecture, a keynote lecture, three plenary sessions, AI Lectures and Workshop , an ultrasound workshop, 33 conjoint sessions and lunch symposia (Table 3).

Table 2. *Invited faculties of AOCR2023.*

NO.	COUNTRY	TOTAL
1	Australia	3
2	Austria	1
3	Canada	1
4	Chinese Taipei	5
5	India	5
6	Japan	3
7	Malaysia	5
8	Singapore	5
9	South Korea	11
10	Thailand	90
11	USA	9
12	Uzbekistan	1

Table 3. *Scientific sessions in AOCR2023.*

Scientific Program		
45 Scientific Sessions	8 Al Lectures	6 Lunch Symposiums
3 Plenary Sessions	1 Al Workshops	1 Honorary lecture
33 Conjoint sessions	2 Ultrasound Workshops	1 Keynote Lecture

In addition to various stimulating scientific sessions, the conference accepted a total of 221 abstracts submitted by our colleagues, with 46 being oral presentations and 165 as poster presentations (Table 4).

Table 4. *Accepted abstracts presented in AOCR2023.*

Category	Oral	Poster	Total
Domestic	11	31	42
Foreign	35	134	169

There were five categories of awards to the authors of selected abstracts, including The Best Oral Presentation Awards, The Best Poster Presentation Awards, The Best Young Researcher Awards, The Best ASEAN Researcher Awards and The Best Researcher Award Relevant to SARS-CoV-2.

Apart from the new knowledge and innovations to be presented, the 21st AOCR featured official programs with social functions, as the Opening Ceremony, the Welcome Reception, the Presidential Dinner, the Gala Dinner and the AOSR Banquet, for the radiology community to engage in meaningful conversations and forge new relationships among its members (Figure 2-4).

Figure 2. *The colors and smiles of Asia before the Gala Dinner.*

Figure 3. *International faculties of AOCR2023 dressed in national costumes in the Gala Dinner.*

Figure 4. *When it comes to party, Bangkok never disappoints her visitors.*

Visitors were welcomed to take a stroll around the Exhibition Hall for the many intriguing pieces of information and innovations at various exhibitions (Figure 5). AOCR2023 was supported by sponsors and exhibitors in a row as shown in Figure 6.

Figure 5. *There are not only latest technologies introduced in the area of exhibitions, but also contemporary performing art.*

Figure 6. *Sponsors and exhibitors of AOCR2023.*

Letter to the Editor

A visit to Songklanagarind Hospital, Prince of Songkla University

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In the period from 7-20 December 2022, I had an opportunity to visit the Department of Radiology of the Faculty of Medicine in Prince of Songkla University at Hatyai, Songkhla, Thailand for a short course training in cardiac computerized tomography.

Hatyai is a district in Songkhla province in the southern part of Thailand approximately 950 kilometers from Bangkok, the capital city of Thailand. Hatyai is well known for the people from nearby countries, i.e., Malaysia and Singapore, the ample number of restaurants and delectable food. The people from Malaysia and Singapore come to visit Hatyai during weekends regularly and usually stay 2-3 days. The visit from these tourists helps improve the economic status of the city and the financial condition of the local people at Hatyai.

Prince of Songkla University is the largest university in southern Thailand. The Faculty of Medicine recently celebrated its 50th anniversary in 2022. The university is located in the suburb of Hatyai, just a few kilometers away from downtown of Hatyai, making the lives of the people working and staying in the university quite comfortable and easy.

The Department of Radiology is located at the 1st and 2nd floors of the main building of the university hospital. There are 41 staff members in the department, 29 of which are in the section of diagnostic radiology, whereas 3 in the section of nuclear medicine section, and 11 in the radiation therapy section.

There are 3 CT scanners as follows:
- GE Revolution 512 slices
- Philips Brilliance ICT 256 slices.
- Toshiba Aquilion Prime 160 slices.

There is 1 MRI scanner: Philips Ingenia Ambition X 1.5 Tesla
There is 1 SPECT/CT machine: Siemen Symbia Pro.specta
There is 1 PET/CT scanner: Philips Vereos Digital
There is 1 Cyclotron: I.B.A. Cyclone KIUBE 18 MeV

During my 2-week training period, I attended daily morning conference and lectures, daily image viewing and read-out altogether with the resident rotating in the cardiovascular imaging section. There were 3-5 cases of coronary computed tomographic angiography (CCTA) per day. The daily CCTA case review and interpretation provides me a great number of practical points for interpretation of the CCTA, and how to operate and manage the post processing images.

There is a daily short teaching session in cardiovascular imaging taught by the attending staff-in-chief of the cardiovascular section, Dr. Ruedeekorn Suwannanon. This teaching session is very informative and valuable regarding various aspects of the cardiovascular imaging interpretation.

Dr. Ruedeekorn Suwannanon is my supervisor throughout this period. She is very knowledgeable, kind and enthusiastic in teaching in cardiovascular imaging which is her specialty. I received a great deal of knowledge and up-to-date information from her. I was also accompanied by Dr. Tanapol Jiwanun, the second year resident in his rotation period to the cardiovascular section. He is friendly, co-operative, enthusiastic and knowledgeable.

(upper left) Dr. Ruedeekorn Suwannanon. (upper right) The author with Dr. Tanapol Jiwanun, the second year resident. (lower) The author with the residents in training of the department.

I had an opportunity to discuss and exchange points of view and information in nuclear medicine (my second subspecialty) with Dr. Teerapon Premprabha, the Director of the Department of Radiology. He was kind enough to invite me to visit the PET scanner and the cyclotron. Our extensive discussion and idea exchange are thought ptovoking and impressive. The new and up-to-date information in the nuclear medicine society and regarding PET/CT imaging are very valuable to me.

Dr. Wiwatana Tanomkiat is another staff member that I had a chance to associate with. It appears to me that, besides his knowledgeability in radiology, his area of expertise extends to social science as well. Our discussion and idea exchanges are completely intriguing and informative.

I was greeted with a very warm and friendly welcome from all the staff members of the department and all residents in training of the department. I would like extend my gratitude to the Director of the Department of Radiology of the Faculty of Medicine at Prince of Songkla University, everyone in the section of Diagnostic Radiology for this great period of training. I would like to especially thank you Dr. Wiwatana Tanomkiat for the keen co-operation and assistance in attending this training course. Without his assistance, this training of mine would never have been possible.

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Acknowledgement of Reviewers

Reviewer acknowledgement, 2022

Wiwatana Tanomkiat, M.D.

Editor-in-Chief
The ASEAN Journal of Radiology

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