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Letter to the Editor and Reply

Subclinical tuberculosis

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We read with great interest the article "Tuberculosis: Important lessons from AOCR 2023, Bangkok, Thailand" by Pakkal M, et al., published in The ASEAN Journal of Radiology (2023; 24(2): 180-198). We congratulate and thank the authors for their insightful summary of the current state and imaging advancements in tuberculosis (TB) across various societies. Here, we would like to make some contributions and expand on the discussion by sharing our viewpoints on the emerging TB continuum concept and the crucial role of imaging in TB control.

First and foremost, the article's discussion on the new concept of the TB spectrum, including subclinical TB, is highly commendable. Subclinical TB is a significant concern as it may be a major contributor to TB transmission due to its asymptomatic nature and potential for spreading the pathogen [1]. Most individuals with subclinical TB are detected through screening approaches, particularly chest X-rays (CXR). For example, recent work at a university hospital in Bangkok, Thailand, showed that the majority (69.2%) of healthcare workers with pulmonary TB from 2018-2022 were subclinical and mainly detected through routine health checks [2]. Additionally, data from the same hospital found that 22.2% to 29.8% of such cases had positive culture results, implying that roughly a quarter of individuals with subclinical TB may be contagious [2,3]. Importantly, diagnosing subclinical TB enables early treatment initiation, preventing further TB transmission within the community.

Second, we would like to address the use of the term "incipient TB" in Figure 6, which is intended to depict the radiologic progression of TB. Incipient TB refers to a transitional stage of TB infection that precedes subclinical and active TB disease. However, there is currently no clear diagnostic method for identifying incipient TB, and its definition remains ambiguous. According to Drain PK et al., incipient TB does not show radiographic abnormalities or microbiologic evidence [4]. In this case, a small nodule observed on CT (Figure 6C) may be retrospectively

considered incipient TB, which later progressed to subclinical TB, as depicted in Figure 6D. Noteworthily, Yoon et al. provided an interesting visualization of this new concept of the TB spectrum [5].

Third, subclinical TB, an early stage of the disease, often presents less severe radiologic abnormalities [6]. We agree with the article's endorsement of computer-aided diagnosis (CAD) as a valuable tool for TB screening and triage. However, it is important to note that deep learning models developed using data from one population may perform differently in another [7]. Furthermore, the proportion of subclinical TB cases in the training dataset may still be uncertain. As a result, including subclinical TB cases, particularly from local populations, in the training dataset is necessary for effectively developing deep-learning models for TB screening.

Fourth, we found the article's reference to various imaging modalities for TB diagnosis particularly compelling. From our experience, LDCT facilitates earlier TB diagnosis, especially in subclinical cases. Low-dose CT (LDCT) improves diagnostic accuracy while offering lower radiation exposure compared to conventional-dose CT. At our center, individuals typically undergo CXR as part of routine health checks, and those with abnormal findings are referred to chest physicians within the health check service. Patients with equivocal radiographic findings often receive an LDCT scan on the same day to aid in diagnosis as appropriate. Given the availability of CT, we support utilizing LDCT in such cases to reduce diagnostic delays.

In conclusion, emphasizing the modern concept of the TB spectrum in symposia underscores the commitment to the end-TB movement. Indeed, radiology plays a key role in diagnosing TB disease. We advocate that prioritizing subclinical TB is immensely important for TB control, and detecting and treating TB at this stage could be highly beneficial. In addition, we thereby believe it is crucial to revisit the policy on using CXR for widespread TB screening in countries with high burdens of TB. Research and collaborative efforts among clinical, radiology, and public health sectors are vital for tackling the TB epidemic and ultimately achieving its eradication.

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Conflict of Interest

None declared.

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The author replies:

I read with great interest the Letter to the Editor by Chansaengpetch and Dumavibhat regarding my publication "Tuberculosis: Important lessons from AOCR 2023, Bangkok, Thailand."

One of the main goals of my presentation was to discuss the situation and the role of radiology in tuberculosis.

First, I agree that most individuals with asymptomatic TB are detected through screening tools, especially chest X-ray (CXR). I commend the authors' finding that among healthcare workers who developed pulmonary tuberculosis from 2018 to 2022, the majority (69.2%) had subclinical tuberculosis. We also showed that 97 of the 8,044 cohort participants experienced spontaneous healing from latent tuberculosis, as confirmed by chest X-ray (CXR) [1].

Second, as noted in the commentary by Chansaengpetch and Dumavibhat, it is known that patients diagnosed with incipient TB may benefit from early intervention to prevent progression to active tuberculosis [2]. Indeed, incipient TB is an ambiguous concept as it encompasses a spectrum of different stages that may or may not progress to active TB. Incipient TB does not show radiographic abnormalities or microbiologic evidence. CT stands out as a more sensitive imaging modality compared to CXR when it comes to identifying parenchymal lesions associated with incipient TB. Yoon et al. noted that advanced imaging tools such as CT and 18-fluorodeoxyglucose PET may help further stratify individuals intensely exposed to M. tuberculosis on a continuous spectrum from latent tuberculosis to incipient, subclinical, and active tuberculosis [3].

Third, I fully agree with the opinion that including subclinical TB cases, especially those from local populations, in training datasets is essential for effectively developing deep learning models for TB screening.

Fourth, CT is significantly superior to CXR in consistently identifying TB, especially subclinical TB. Low-dose CT could be used as an alternative to standard-dose CT for the detection of latent TB. Digital tomosynthesis (DTS) can offer a reasonable option for detecting lung lesions in individuals who have had contact with TB patients [4]. The imaging modalities for screening ITB or latent TB may vary depending on the circumstances of each country. For example, since the cost of DTS is lower than that of CT, DTS may be preferred over CT in some cases.

Overall, we appreciate and concur with Chansaengpetch and Dumavibhat's opinion. Additionally, further prospective studies are needed to better define incipient tuberculosis.

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