

Clinical Significance of Compressed Breast Thickness in Mammography and Breast Cancer: Considerations for Reconstructing Breast Cancer Screening in Japan

Megumi Kuchiki¹⁾, Atsuko Oda, Tamami Shirakawa¹⁾,
Yusaku Yokoyama, Yasuhiro Sugai, Masafumi Kanoto²⁾

1) Department of Radiology, Tohoku Central Hospital of the Mutual Aid Association of Public School Teacher
2) Department of Diagnostic Radiology, Yamagata University Faculty of Medicine

Introduction

- Breast cancer in Japan
Most common cancer in females
Highest incidence in late 40s and late 60s
- Breast cancer screening in Japan
Offered every other year (age ≥ 40 years)
Not as effective as in Western countries
→ Rising mortality rate^{1) 2)}

Japanese women tend to have smaller breasts, with a high proportion being dense breasts

→ Shift toward promoting "breast awareness"³⁾ + screenings

Hypothesis

Even in dense breasts, lesions may be palpable during self-examination if the breasts are small.
Compression breast thickness (CBT) in mammography may be used to provide an objective measure of breast size.

Purpose

To clarify the clinical significance of CBT in mammography in Japanese women

- Examine the relationship between CT breast thickness, CBT, and mammographic breast composition in healthy women
- Examine the relationship between CBT, mammographic breast composition, and clinical factors in breast cancer patients

Subjects and Methods 1

Subjects: 670 healthy women

Image analysis: (Fig. 1, 2)

- CT breast thickness: A vertical line was drawn from the nipple-level breast skin to the chest wall, and the distance was measured manually
- CBT: MLO images and CBT values were recorded



Fig. 1

Fig. 2

- Mammographic breast composition⁴⁾: Classified as fatty, scattered, heterogeneously dense, extremely dense

Results 1

- CT breast thickness decreased significantly as breast composition increased
- A strong positive correlation was observed between CT breast thickness and CBT (coefficient of determination: 0.75) (Fig. 3)

CT breast thickness (mm)

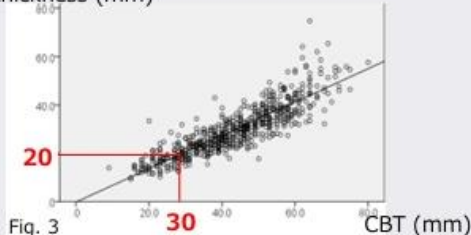


Fig. 3

Ideally, early-stage breast cancer measuring ≤ 20 mm should be detectable. Breast thickness 20 mm corresponds to CBT 30 mm.

Subjects and Methods 2

Subjects: 180 breast cancer patients treated at our hospital in 2018–2020

Methods: We examined symptom status, the proportion of early-stage breast cancer, CBT, and breast composition.

- *early-stage breast cancer is defined as stage 0 or 1
- = Tumor diameter of ≤ 20 mm with no LN metastasis.

Results 2

- Median CBT was 37.5 mm, and mean CBT was 38.9 mm (range: 18.0–69.0 mm)
- 72 cases (40%) presented with symptoms, and 73 cases (40.6%) had dense breasts (Tables 1, 2)
- Proportion of early-stage breast cancer was significantly higher in the CBT < 30 mm group compared to the CBT ≥ 30 mm group among symptomatic cases (Table 3)
- Women in the CBT ≥ 30 mm group were less likely to self-detect early-stage breast cancer (Table 3)

Table 1

	Dense breast	Non-dense breast	Total
Symptomatic	40	32	72
Asymptomatic	33	75	108
Total	73	107	180

Table 2

CBT	Dense breast	Non-dense breast	Number of dense breasts	Proportion of dense breasts (%)
< 30 mm	19	9	28	67.9
≥ 30 mm	54	98	152	35.5
Total	73	107	180	40.6

Table 3

CBT	Symptom status	Number of patients	Number of early breast cancer cases	Proportion of early breast cancer (%)
< 30 mm	Asymptomatic	10	8	28.6
	Symptomatic	18	16	57.1
≥ 30 mm	Asymptomatic	98	86	56.6
	Symptomatic	54	30	19.7

* Note. A chi-square test was used.

Discussion

- Early detection of breast cancer is possible based on CBT and self-reported symptoms.
- This finding is particularly useful for women with high breast compositions and low CBT, and provides insights for future applications in East Asia, where breast cancer incidence is increasing.

Country	Mean $\pm$ SD (mm)	Reference:
UK	58 $\pm$ 18	CBTs in various countries
Iran	58 $\pm$ 12	
Malaysia	56 $\pm$ 13	
Korea	48 $\pm$ 12	
China	42 $\pm$ 12	
Our study	39 $\pm$ 12	

- Future directions include providing notifications about breast density and CBT in breast cancer screening guidelines, and making efforts to promote and emphasize the importance of breast awareness.

Conclusion

- CBT is an indicator reflecting breast size and has been shown to correlate with breast cancer detection and prognosis.
- This finding may also contribute to determining the content of future breast cancer screening programs in Japan.

References

- National Cancer Registry in Japan
https://ganjoho.jp/reg_stat/statistics/data/dl/en.html
- Jpn J Clin Oncol, Volume 51, Issue 11, November 2021, Pages 1680–1686,
<https://doi.org/10.1093/jjco/hyab139>
- Graham H: The nurse's role in promoting breast awareness to women. Nurs Times, 101: 23–24, 2005
- 日本がん検診精度管理中央機構: 乳房の構成の分類に関するお知らせ
https://www.qabcs.or.jp/archives_dir/oshirase28.pdf