

# Concordance Between Frozen Section and Permanent Section in Assessment of Resection Margins in Breast Conserving Surgery Among Patients with Breast Cancer

**Mahsa Ahadi, Elena Jamali, Behrang Kazeminezhad, Tahmine Mollasharifi, Sara Kasraee, Afshin Moradi\***

Cancer Research Center, Shohada Hospital, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

## Email address:

[afshinmoradi@sbmu.ac.ir](mailto:afshinmoradi@sbmu.ac.ir) (A. Moradi)

\*Corresponding author

## To cite this article:

Mahsa Ahadi, Elena Jamali, Behrang Kazeminezhad, Tahmine Mollasharifi, Sara Kasraee, Afshin Moradi. Concordance Between Frozen Section and Permanent Section in Assessment of Resection Margins in Breast Conserving Surgery Among Patients with Breast Cancer. *Journal of Cancer Treatment and Research*. Vol. 5, No. 6, 2017, pp. 90-94. doi: 10.11648/j.jctr.20170506.12

**Received:** October 3, 2017; **Accepted:** November 1, 2017; **Published:** December 22, 2017

---

**Abstract:** Introduction: Breast cancer is considered as one of the most common malignancies among Iranian women and the most common cancer among women worldwide, with an incidence of over one million new cases per year worldwide, and is still the leading cause of morbidity in women with 411,000 cases per annum. The purpose of current study is to evaluate the compliance between samples of Frozen Section and Permanent section with respect to examination of the breast mass margin in breast conserving surgery. Methods and materials: Current study was retrospective cross-sectional study in which, 143 patients with BC were included via convenient sampling method. Our study's sample was obtained from patients who referred to Shohada Tajrish Hospital (Tehran, Iran) between 2009-2011 and went through breast mass surgery; subsequently, their tissue samples were assessed and reported via frozen section and permanent section methods. Obtained data was assessed via SPSS-24 software. Results: Results of Chi-square test reported the chi-square is equal to 126.392 and the degree of freedom (dof)=2, which indicates that the data is three-layered; significance=0.000 confirmed rejection of the null hypothesis and the non-uniformity of the data. Hence, It can be inferred that data are valid and testable. In the t-test, the number of data is 143 and its mean is 1.028, which is the same as the descriptive statistics. However, it differs from the mean of the society, which should be considered our Inferential-test results. Our zero assumption seeks out the same results of both methods. The results of the research are not rejected by the significance of 0.481 above 0.05, and the results can be stated to be the same on average. Conclusion: According to the obtained data, compliance of the Frozen section and the Permanent section in the examination of marginal breast masses in Shohada Tajrish Hospital; two sampling modalities show higher than 77.6% similarity. Furthermore, Frozen section modality tend to be quicker procedure and the results can be delivered to surgeon and in result he may make more accurate therapeutic decisions and this may reduce number of anesthesia and surgical procedures on a patients. Hence, due to high concordance rate between results of Frozen section and permanent section plus competitive advantage of time saving in frozen section approach, this approach may be considered as gold standard approach regarding evaluation of tumoral and non-tumoral masses in the examination of the breast mass margin in breast conserving surgery.

**Keywords:** Breast-Conserving Surgery, Frozen Section, Permanent Section

---

## 1. Introduction

Breast cancer (BC) is among the most prevalent non-cutaneous malignancies worldwide; BC is ranked as 2<sup>nd</sup> most common cancer and the 5<sup>th</sup> most prevalent cause of cancer morbidity globally. According to American Cancer Society,

roughly around 232,670 women will realize they suffer from BC this year, and around 40,000 of afflicted will die from this malignancy [2]; male BC is responsible for less than 1% of all breast cancers in the United States and with early

diagnosis and fitting treatment it maintains high remission rate [5]. Over the past two decades, in Asia, numbers have shown that the incidence of breast cancer has doubled or tripled per annum [3]; this alarming number calls for prevention, early detection and impeccable intervention plans. Various factors have been attributed to etiology of BC such as family history [6], significant inherited predisposition [7, 8], breast morphology [9], reproductive, and hormonal factors, hormonal therapy, obesity and alcohol drinking [10-12]. Fortunately, there exists some protective factors and therapeutic plan to alleviate risk of BC among women such as Estrogen therapy after hysterectomy [13, 14, 15], physical training [16], early pregnancy [17], breast feeding [17], Selective estrogen receptor modulators (SERMs) [18], Aromatase inhibitors or inactivators [19], Risk decreasing mastectomy [20], Risk-reducing oophorectomy or ovarian ablation [21]. Screening tend to be vital with respect to diagnosis and early intervention in BC; some clinicians believe that breast self-examination can be useful approach; however efficacy of this method regarding reducing morbidity number has not scientifically been proved [22]; MRI, ultrasound, biopsy and blood chemistry evaluation are also commonly used with respect to BC detection, Mammography however, is considered as the backbone in breast cancer detection [23].

Various BC treatment approaches have been offered so far such as surgery, radiation therapy, chemotherapy, hormone therapy, targeted therapy [24].

Various surgery approaches have been offered so far depending on type, progression and characteristic of breast carcinoma such as Breast Conserving Surgery (BCS), Total Mastectomy (TM) and Modified Radical Mastectomy (MRM).

In BCS, surgeon tends to remove cancerous cells and some of the normal tissues around malignant part, however the whole breast remains [24]. Pathologists assess the tissue and accordingly they report to surgeon regarding characteristic of sample, subsequently the surgeon removes the tumor via BCS, TM or MRM. Hence, pathologist's reports play a vital role in decision making of surgeons and possible treatment plans and impeccable and quick assessment of characteristics of BCS would enable both patient and clinician to reach optimum result.

The purpose of current study is to evaluate the results' concordance between samples of Frozen Section and Permanent Section with respect to examination of the breast mass margin in BCS.

## 2. Materials and Methods

Current study was retrospective cross-sectional study in which, 143 patients with BC were included via convenient sampling method. Our study's sample was obtained from patients who referred to Shohada Tajrish Hospital (Tehran, Iran) between 2009-2011 and went through breast mass surgery; subsequently, their tissue samples were assessed and reported via frozen section and permanent section methods. While assessing patients' history files some of the samples were excluded because margin masses were not assessed and only type of the cancer was mentioned in their history.

- I. Histopathology Assessment: Frozen Section Procedure: Throughout the frozen section process, the surgeon removes part of the tissue mass. Subsequently, the mass biopsy is handed to a pathologist. Via cryostat device, the pathologist freezes the tissue, cuts it with a microtome, and then stains it with various dyes in order to assess the sample via microscopes. The whole process takes less than 20 minutes. Frozen section approach have some advantages:
  - a. If more amount of tissue is needed, it can be provided by surgeons during a surgery without a need for further surgeries
  - b. If the results of frozen section confirms carcinoma in tissue, the mass can be removed at that time
  - c. If the mass founded to be benign, then the surgery can be terminated
  - d. This method can confirm that whole mass and it margins are removed [25].

- II. Permanent Section Assessment:

Standardized protocols, which are gold standard method for the evaluation of tumoral and non-tumoral masses; the results of this approach is ready few days after a surgery and this long interval can be considered as Achilles hill of this modality.

Results obtained from frozen section procedure and permanent section procedure were compared and recorded. Obtained data was assessed via SPSS-24 software.

## 3. Results

One hundred forty three BC patients undergone BCS included in current study. Descriptive statistics of sample tissues obtained from patients is illustrated in Table 1.

*Table 1. Descriptive Statistics of Sample Tissues.*

Type of Tissue	Number	Concordant Sample	Discordant Sample	Deferred Sample
Mastectomy	2	0	0	2
Incisional Biopsy	6	1	1	4
Excisional Biopsy	9	5	0	4
Wedge Biopsy	1	0	0	1
Mass Resection	118	100	11	7
Lumpectomy	3	2	1	0
Re-Excision	4	4	0	0

We specified three codes with respect to concordance status between frozen section and permanent section approaches.

- 0 = Discordance of two approaches
- 1 = Concordance of two approaches
- 2 = Results cannot be assessed

**Table 2.** Concordance Statuses Between Two Modalities.

	Number of Observations	Percentage of Observations	Cumulative Percentage of Observations
0.00	14	9.8	9.8
1.00	111	77.6	87.4
2.00	18	12.6	100.0
Total	143	100.0	

According to our obtained data, compliance of the Frozen section and the Permanent section in the examination of marginal breast masses, two sampling modalities have more than 77.6% similarity. Results of Chi-square test reported the chi-square is equal to 126.392 and the degree of freedom (dof) =2, which indicates that the data is three-layered; significance=0.000 confirmed rejection of the null hypothesis and the non-uniformity of the data. Hence, It can be inferred that data are valid and testable. In the t-test, the number of data is 143 and its mean is 1.028, which is the same as the descriptive statistics. However, it differs from the mean of the society (with the number 1), which should be considered our Inferential-test results. Our zero assumption seeks out the same results of both methods. The results of the research are not rejected by the significance of 0.481 above 0.05, and the results can be stated to be the same on average. Finally, according to Likelihood Ratio test, results can be generalized and occurring discordant results in society is low.

## 4. Discussion

Considering mushrooming trend and alarming morbidity of breast cancer among Iranian women it seems vital to optimize diagnosis-treatment curve of this malady. Most women prefer to maintain their breast structure and using frozen section approach serve this preference via enabling surgeons to remove malignant mass intraoperative and would hinder unnecessary future invasive surgical procedures. Aforementioned concerns made us to conduct current study in order to evaluate the concordance between samples of Frozen Section and Permanent section with respect to examination of the breast mass margin in breast conserving surgery.

Various studies have discussed efficient role of frozen section modality in intraoperative setting during breast cancer surgery. In consistent with the result of current study, Mona and Colleagues (2014) postulated that frozen section analysis is a reliable modality with respect to Margin Status in Breast Conservation Surgery [26]. In another study conducted by Seung et al. (2017), they postulated that Frozen section analysis of lumpectomy margins during BCS is useful in evaluating lumpectomy margins and preventing reoperation [27].

In various studies accuracy of frozen section analysis is roughly between 78-80% and this number is highly depends on pathologist's experience. However some other factors such as technical errors such as tissue section folds or uneven staining, may preclude proper evaluation [28, 29].

Various studies discuss advantages of frozen section in the intraoperative margin assessment during breast surgery. For instance, according to Anila and Colleagues (2016), Intra-operative FSA allows resection of suspicious margins at the time of primary conservative surgery and results in low rates of local recurrence and second surgeries [30].

All in all, our study's result confirms the results in former literatures. According to results of current study there is high concordance between results of frozen section analysis and permanent section in evaluating breast margin during breast conserving surgery. Apart from high accuracy of frozen section modality, obtaining analysis results in short time is considered as competitive advantage of frozen section over permanent section approach. Although, permanent section is considered as gold standard modality regarding histopathology assessment of cancerous tissue in breast cancer, long period for analysis of the results has weakened this approach. Frozen section procedure can be conducted intraoperative in few minutes and the results would enable the surgeon to decide on optimum treatment plan and it would alleviate number of future invasive treatment.

## Limitation

This is study was retrospective cross-sectional study. It is advisable to conduct a study only with frozen section analysis; screen group of patients in period of time and see if risk of radical mastectomy, or recurrent surgery have reduced among this group or not.

## Conflict of Interest

The authors declare that they have no competing interests.

## Acknowledgements

We would like to thank all individuals, who participated in current study.

## References

- [1] Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray F. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer*. 2015; 136: E359–E386. [PubMed].
- [2] American Cancer Society Cancer facts & figures 2014. Available at: <http://www.cancer.org/acs/groups/content/@research/documents/document/acspsc-041770.pdf>. Accessed September 10, 2017.
- [3] Lin CH, Chuang PY, Chiang CJ, Lu YS, Cheng AL, Kuo WH, Huang CS, Lai MS, You SL, Tang CH. Distinct clinicopathological features and prognosis of emerging young-female breast cancer in an East Asian country: A nationwide cancer registry-based study. *Oncologist*. 2014; 19: 583–591. [PMC free article] [PubMed].
- [4] Chuang SC, Wu GJ, Lu YS, Lin CH, Hsiung CA. Associations between medical conditions and breast cancer risk in Asians: A nationwide population-based study in Taiwan. *PLoS One*. 2015; 10: e0143410. [PMC free article] [PubMed].
- [5] Leone JP, Zwenger AO, Iturbe J, Leone J, Leone BA, Vallejo CT, Bhargava R. Prognostic factors in male breast cancer: a population-based study. *Breast Cancer Res Treat*. 2016; 156: 539–548. [PubMed].
- [6] Colditz GA, Kaphingst KA, Hankinson SE, et al.: Family history and risk of breast cancer: nurses' health study. *Breast Cancer Res Treat* 133 (3): 1097-104, 2012. [PMC free article] [PubMed].
- [7] Malone KE, Daling JR, Doody DR, et al.: Family history of breast cancer in relation to tumor characteristics and mortality in a population-based study of young women with invasive breast cancer. *Cancer Epidemiol Biomarkers Prev* 20 (12): 2560-71, 2011. [PMC free article] [PubMed].
- [8] Cybulski C, Wokolorczyk D, Jakubowska A, et al.: Risk of breast cancer in women with a CHEK2 mutation with and without a family history of breast cancer. *J Clin Oncol* 29 (28): 3747-52, 2011. [PubMed].
- [9] Razzaghi H, Troester MA, Gierach GL, et al.: Mammographic density and breast cancer risk in White and African American Women. *Breast Cancer Res Treat* 135 (2): 571-80, 2012. [PMC free article] [PubMed].
- [10] Goldacre MJ, Abisgold JD, Yeates DG, et al.: Benign breast disease and subsequent breast cancer: English record linkage studies. *J Public Health (Oxf)* 32 (4): 565-71, 2010. [PMC free article] [PubMed].
- [11] Kabat GC, Jones JG, Olson N, et al.: A multi-center prospective cohort study of benign breast disease and risk of subsequent breast cancer. *Cancer Causes Control* 21 (6): 821-8, 2010. [PMC free article] [PubMed].
- [12] Worsham MJ, Raju U, Lu M, et al.: Risk factors for breast cancer from benign breast disease in a diverse population. *Breast Cancer Res Treat* 118 (1): 1-7, 2009. [PMC free article] [PubMed].
- [13] Anderson GL, Limacher M, Assaf AR, et al.: Effects of conjugated equine estrogen in postmenopausal women with hysterectomy: the Women's Health Initiative randomized controlled trial. *JAMA* 291 (14): 1701-12, 2004. [PubMed].
- [14] LaCroix AZ, Chlebowski RT, Manson JE, et al.: Health outcomes after stopping conjugated equine estrogens among postmenopausal women with prior hysterectomy: a randomized controlled trial. *JAMA* 305 (13): 1305-14, 2011. [PMC free article] [PubMed].
- [15] Anderson GL, Chlebowski RT, Aragaki AK, et al.: Conjugated equine oestrogen and breast cancer incidence and mortality in postmenopausal women with hysterectomy: extended follow-up of the Women's Health Initiative randomised placebo-controlled trial. *Lancet Oncol* 13 (5): 476-86, 2012. [PMC free article] [PubMed].
- [16] Bernstein L, Henderson BE, Hanisch R, et al.: Physical exercise and reduced risk of breast cancer in young women. *J Natl Cancer Inst* 86 (18): 1403-8, 1994. 94351760. [PubMed].
- [17] Kampert JB, Whittemore AS, Paffenbarger RS Jr: Combined effect of childbearing, menstrual events, and body size on age-specific breast cancer risk. *Am J Epidemiol* 128 (5): 962-79, 1988. 89047366. [PubMed].
- [18] Cuzick J, Sestak I, Bonanni B, et al.: Selective oestrogen receptor modulators in prevention of breast cancer: an updated meta-analysis of individual participant data. *Lancet* 381 (9880): 1827-34, 2013. [PMC free article] [PubMed].
- [19] Goss PE, Ingle JN, Alés-Martínez JE, et al.: Exemestane for breast-cancer prevention in postmenopausal women. *N Engl J Med* 364 (25): 2381-91, 2011. [PubMed].
- [20] Hartmann LC, Schaid DJ, Woods JE, et al.: Efficacy of bilateral prophylactic mastectomy in women with a family history of breast cancer. *N Engl J Med* 340 (2): 77-84, 1999. 99091091. [PubMed].
- [21] Rebbeck TR, Levin AM, Eisen A, et al.: Breast cancer risk after bilateral prophylactic oophorectomy in BRCA1 mutation carriers. *J Natl Cancer Inst* 91 (17): 1475-9, 1999. 99400811. [PubMed].
- [22] Kösters JP, Göttsche PC. Regular self-examination or clinical examination for early detection of breast cancer. *Cochrane Database Syst Rev*. 2003; (2): CD003373. [PubMed].
- [23] Smetherman DH. Screening, imaging, and image-guided biopsy techniques for breast cancer. *Surg Clin North Am*. 2013; 93: 309–327. [PubMed].
- [24] Pubmed Health. (2017). *Breast Cancer Treatment*. Available: <https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0032825/>. Last accessed October-2017.
- [25] Erin Brender, MD; Alison Burke, MA; Richard M. Glass, MD. (2005). *Frozen Section Biopsy*. Available: <http://jamanetwork.com/journals/jama/fullarticle/202100>. Last accessed October-2017. *JAMA*. 2005; 294 (24): 3200. doi: 10.1001/jama.294.24.3200.
- [26] Mona P. Tan, Nadya Y. Sitoh, and Amanda S. Sim. (2014). *The Value of Intraoperative Frozen Section Analysis for Margin Status in Breast Conservation Surgery in a Nontertiary Institution*. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4199066/>. Last accessed October-2017.

- [27] SeungSang Ko, Yi Kyeong Chun, 1 Sung Soo Kang, and Min Hee Hur corresponding author 2. (2017). *The Usefulness of Intraoperative Circumferential Frozen-Section Analysis of Lumpectomy Margins in Breast-Conserving Surgery*. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5500401/>. Last accessed October-2017.
- [28] Rosai J. Introduction. In: Rosai J, editor. *Rosai & Ackerman's surgical pathology*. 9th ed. Vol. 1. Philadelphia (PA): Mosby/Elsevier; 2004. pp. 1–23.
- [29] Raab SS, Tworek JA, Souers R, et al. The value of monitoring frozen section-permanent section correlation data over time. *Arch Pathol Lab Med*. 2006; 130: 337–42. [PubMed].
- [30] KR Anila, K Chandramohan, A Mathews, T Somanathan, K Jayasree. (2016). *Role of frozen section in the intra-operative margin assessment during breast conserving surgery*. Available: <http://www.indiancancer.com/article.asp?issn=0019-509X;year=2016;volume=53;issue=2;spage=235;epage=238;aulast=Anila>. Last accessed October-2017.