# Multi-center investigation of the clinical and pathological characteristics of inflammatory breast cancer based on Chinese Society of Breast Surgery (CSBrs-007)

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## Abstract

**Background:** Inflammatory breast cancer (IBC) is an aggressive type of cancer with poor prognosis and outcomes. This study aimed to investigate clinicopathological features, molecular characteristics, and treatments among Chinese patients diagnosed with IBC.

**Methods:** We collected data of 95 patients with IBC who were treated by members of the Chinese Society of Breast Surgery, from January 2017 to December 2018. The data, including demographic characteristics, pathological findings, surgical methods, systemic treatment plans, and follow-up, were obtained using a uniform electronic questionnaire. The clinicopathological features of different molecular types in patients without distant metastases were compared using the Kruskal-Wallis (H) test followed by *post hoc* analyses.

**Results:** Lymph node metastasis was noted in 75.8% of all patients, while distant metastasis was noted in 21.4%. Pathological findings indicated invasive ductal and lobular carcinomas in 86.8% and 5.3% of cases, respectively. Hormone receptor-positive (HR+)/human epidermal growth factor receptor 2-negative (HER2−) (41.5%) and HR−/HER2+ (20.1%) were the most common biologic subtypes, followed by HR+/HER2+ (19.1%) and HR−/HER2− (19.1%). Stage III IBC was treated via pre-operative neoadjuvant chemotherapy in 87.7% of the cases, predominantly using anthracycline and taxanes. A total of 91.9% of patients underwent surgical treatment. Among them, 77.0% of the patients underwent modified radical mastectomy, 8.1% of whom also underwent immediate breast reconstruction. The Kruskal-Wallis test revealed that the efficacy of chemotherapy significantly differed among those with HR+/HER2− and HR−/HER2− tumors (adjusted $P = 0.008$), and Ki-67 expression significantly differed in HR−/HER2+ and HR+/HER2+ molecular subtypes (adjusted $P = 0.008$).

**Conclusion:** Our study provides novel insight into clinicopathological characteristics and treatment status among patients with IBC in China, and might provide a direction and basis for further studies.

**Trial registration:** chictr.org.cn, No. ChiCTR1900027179; http://www.chictr.org.cn/showprojen.aspx?proj=45030

**Keywords:** Inflammatory breast cancer; Clinicopathological characteristics; Adjuvant therapy; Neoadjuvant chemotherapy; Breast reconstruction

## Introduction

Inflammatory breast cancer (IBC) is rare, accounting for only 2% of all breast cancer cases, based on data from the Surveillance, Epidemiology, and End Results (SEER) registry.[1] However, prognosis and outcomes remain poor among patients with IBC due to its aggressive nature.[2,3]

IBC is diagnosed based on clinical signs such as diffuse erythema and edema (peau-d'orange) in the absence of a clinically evident underlying mass. Such signs can be attributed to the invasion of tumor emboli into the dermal lymphatic vessels, which may or may not be visible on skin biopsy.[4,5] Previous studies have demonstrated that the

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trimodal combination of neoadjuvant systemic therapy followed by mastectomy and post-mastectomy radiation therapy yields the best oncologic outcomes.[6]

Given the low incidence of IBC and poor outcomes among affected patients, individuals with IBC are commonly excluded from studies of early-stage breast or metastatic cancer.[7] To achieve satisfactory enrollment, clinical trials focusing on IBC have extended study durations; however, such studies may not accurately reflect current treatment statuses.[8,9] Furthermore, most previous studies have utilized data from single centers or public repositories of Europe or America, as only sporadic reports from single centers are available in China. Thus, factors influencing the efficacy of IBC treatment in China remain to be elucidated.

Therefore, in the present study, we investigated clinicopathological features, molecular characteristics, and treatments among Chinese patients diagnosed with IBC.

## Methods

### Ethical approval

This study was approved by the Ethics Committee of Tangshan People's Hospital (ECTPH) (No. RMYY-LLKS-2019-0917) and is registered with the China Clinical Trial Registry (No. ChiCTR1900027179). The ECTPH waived the requirement for informed consent due to the retrospective nature of the study.

### Data collection

We retrospectively collected data of 95 patients with IBC who were treated at 30 centers (members of the Chinese Society of Breast Surgery) between January 2017 and December 2018. Data related to patient demographics, pathological characteristics, surgical methods, systemic treatment plans, and follow-up were collected using a uniform electronic questionnaire. Inclusion criteria were (1) pathologic diagnosis confirmed by fine needle aspiration or biopsy and (2) treatment with at least a combination of surgery and chemotherapy. Exclusion criteria were the presence of a secondary invasive malignant tumor and diagnosis of other serious diseases, such as congestive heart failure, severe infection, uncontrolled diabetes, and serious psychological or mental disorders. Data regarding age, body mass index (BMI), hormonal status, familial history of breast cancer, pain, localized redness of the skin, distant metastases, and metastatic site of each included patient were collected. Pathological information such as histological type, tumor grade, estrogen receptor, progesterone receptor, and human epidermal growth factor receptor-2 (HER2) status were collected from the patients' pathologic reports. Treatment data such as surgery type (total mastectomy/partial mastectomy), chemotherapy, targeted therapy, and hormone therapy were collected from the patients' medical files.

### Statistical analysis

The Shapiro-Wilk test was used to determine whether data were normally distributed. Normally distributed data were presented as mean ± standard deviation. Categorical variables were presented as frequencies and percentages; missing values were not considered for the calculation of percentages. Data were analyzed using non-parametric Kruskal-Wallis and Dunn *post hoc* tests, with Bonferroni correction for multiple comparisons. SPSS version 24 (IBM Corp., Armonk, NY, USA) was used for all statistical analyses, and $P < 0.05$ was considered statistically significant.

## Results

### Clinicopathological characteristics among patients with IBC

The demographic and clinical characteristics of all study participants are presented in Table 1. Of the breast cancer patients, 0.30% had IBC. The mean age, BMI, and tumor size at the time of diagnosis of IBC were 50.55 ± 13.0 years ($n = 91$; four not reported), 25.4 ± 4.1 kg/m$^2$ ($n = 95$), and 6.2 ± 3.7 cm ($n = 81$, 12 not reported), respectively. Premenopausal status was noted in 54.4% of patients. Eight patients (8.5%) with IBC had a family history of malignant tumors. Stage III and IV cancers were noted in 80% and 20% of the patients, respectively, and most metastases had occurred in the bone. Invasive ductal carcinoma represented the most common type of breast cancer (86.8%), regardless of breast cancer subtype. Hormone receptor (HR)-positive/HER-2-negative (HR+/HER2−) (41.5%) and HR−/HER2+ (20.1%) were the most common biologic subtypes, followed by HR+/HER2+ (19.1%) and HR−/HER2− (19.1%).

### Treatment and outcomes among patients with IBC

A total of 76 included patients presented without distant metastases. Among them, 65 patients underwent pre-operative neoadjuvant systemic therapy (64 were treated with neoadjuvant chemotherapy, while one was treated with neoadjuvant endocrine therapy). One patient underwent adjuvant chemotherapy and endocrine therapy following surgery, and one patient chose to discontinue treatment.

Among the included patients, 57 underwent modified radical mastectomy, six underwent modified radical mastectomy with immediate reconstruction, two ($T_{4d}N_0M_0$) underwent mastectomy and sentinel lymph node biopsy, three underwent palliative resection, and six did not undergo surgery.

Among the 19 patients with metastatic IBC, three declined further treatment and could not be followed up. The remaining 16 received systemic chemotherapy. After chemotherapy, seven patients did not undergo surgery, six underwent modified radical mastectomy, two underwent mastectomy, and one underwent lumpectomy with immediate breast reconstruction using a latissimus dorsi flap.

Regardless of metastatic status, all patients with IBC mainly underwent pre-operative chemotherapy using anthracyclines and taxanes. Combined chemotherapy,

**Table 1: Clinicopathological characteristics for IBC, $n = 95$.**

| Characteristics | *n* | Percentage (%) | Missing data, *n* |
|---|---|---|---|
| Menstrual status | 68 | | 27 |
| Post-menopausal | 31 | 45.6 | |
| Pre-menopausal | 37 | 54.4 | |
| Family history | 94 | | 1 |
| No | 86 | 91.5 | |
| Yes | 8 | 8.5 | |
| BMI | | | 0 |
| Normal (<24.0 kg/m$^2$) | 37 | 38.9 | |
| Overweight (24.0–27.9 kg/m$^2$) | 36 | 37.9 | |
| Obesity (≥28.0 kg/m$^2$) | 22 | 23.2 | |
| Pain | 93 | | 2 |
| Yes | 52 | 55.9 | |
| No | 41 | 44.1 | |
| Redness skin area | 89 | | 6 |
| 1/3≤ area <1/2 | 33 | 37.1 | |
| 1/2≤ area <2/3 | 14 | 15.7 | |
| 2/3≤ area <100% | 16 | 18.0 | |
| area = 100% | 26 | 29.2 | |
| Nipple involvement | 88 | | 7 |
| Yes | 48 | 54.5 | |
| No | 40 | 45.5 | |
| Distant metastases | 95 | | 0 |
| Yes | 19 | 20.0 | |
| No | 76 | 80.0 | |
| Maximum diameter of mass | 81 | | 14 |
| ≤2 cm | 9 | 11.1 | |
| >2–5 cm | 32 | 39.5 | |
| >5 cm | 40 | 49.4 | |
| Axillary lymph node | 64 | | 31 |
| Positive | 49 | 76.6 | |
| Negative | 15 | 23.4 | |
| Pathologic type | 76 | | 19 |
| IDC | 66 | 86.8 | |
| ILC | 4 | 5.3 | |
| Other | 6 | 7.9 | |
| Molecular type | 94 | | 1 |
| HR+/HER2− | 39 | 41.5 | |
| HR+/HER2+ | 18 | 19.1 | |
| HR−/HER2+ | 19 | 20.2 | |
| HR−/HER2− | 18 | 19.1 | |
| Ki-67 | 93 | | 2 |
| Low (<15%) | 16 | 17.2 | |
| Middle (15%–30%) | 23 | 24.7 | |
| High (>30%) | 54 | 58.1 | |
| Miller-Payne grading | 64 | | 31 |
| G5 | 7 | 10.9 | |
| G4 | 17 | 26.6 | |
| G3 | 24 | 37.5 | |
| G2 | 10 | 15.6 | |
| G1 | 6 | 9.4 | |

IBC: Inflammatory breast cancer; BMI: Body mass index; IDC: Invasive ductal carcinoma; ILC: Invasive lobular carcinoma; HR: Hormone receptor; HER2: Human epidermal growth factor receptor 2.

sequential chemotherapy, monotherapy using anthracyclines or taxanes, and other regimens, namely, TP (docetaxel combined with cisplatin), TX (docetaxel combined with capecitabine), TCbH (docetaxel, carboplatin combined with trastuzumab), or multi-line therapy, were administered to 25, 23, 8, and 24 patients, respectively. In addition, all patients with overexpression of HER2 were treated with trastuzumab [Table 2].

**Table 2: Treatment of IBC patients.**

| Treatments | Distant metastases | |
|---|---|---|
| | No | Yes |
| Surgical treatments | | |
| Modified radical mastectomy | 57 (77.0) | 6 (37.5) |
| Immediate reconstruction | 6 (8.1) | 1 (6.3) |
| Mastectomy and sentinel lymph node biopsy | 2 (2.7) | 2 (12.5) |
| Palliative resection | 3 (4.1) | 0 (0.0) |
| No surgery | 6 (8.1) | 7 (43.8) |
| Total | 74 | 16 |
| Missing data | 2 | 3 |
| Chemotherapy | | |
| Combined treatment (anthracyclines, taxanes based) | 21 (33.3) | 4 (25.0) |
| Sequential treatment (anthracyclines, taxanes based) | 19 (30.2) | 4 (25.0) |
| Taxanes or anthracyclines | 5 (7.9) | 3 (18.8) |
| TCbH | 6 (9.5) | 0 (0.0) |
| Multiline therapy | 10 (15.9) | 4 (25.0) |
| Other | 3 (4.1) | 1 (6.3) |
| No chemotherapy | 9 (12.3) | 0 (0.0) |
| Total | 73 | 16 |
| Missing data | 3 | 3 |

Values are *n* or *n* (%). IBC: Inflammatory breast cancer; TCbH: Docetaxel, carboplatin combined with trastuzumab.

Following neoadjuvant chemotherapy, the Miller-Payne method[10] was used to evaluate the effect of chemotherapy in the 50 patients without distant metastases. Among these 50 cases, seven (14%) were classified as G5.

### *Clinicopathological features of different molecular types in patients with IBC without distant metastases*

The Kruskal-Wallis test revealed significant differences in Ki-67 expression ($H = 10.805$, $P = 0.013$; HR+/HER2− *vs*. HR−/HER2−, *H*: −19.830; adjusted $P = 0.008$) and efficacy of chemotherapy ($H = 8.830$, $P = 0.032$; HR +/HER2− *vs*. HR−/HER2−, *H*: −17.197; adjusted $P = 0.008$) among different molecular types [Table 3].

## Discussion

In the present study, we retrospectively examined clinicopathological features, molecular characteristics, and treatments among Chinese patients diagnosed with IBC. Our findings indicated that most patients had large tumor sizes (≤2 cm: 11.1%; >2–5 cm: 39.5%; >5 cm: 49.4%). This pattern is consistent with that reported in a population-based study of IBC using SEER data from 2010 to 2013 (≤2 cm: 15%; >2–5 cm: 34%; >5 cm: 50%).[11] A similar pattern has also been observed using the National Cancer Database (NCDB).[12]

**Table 3: Clinicopathological features of different molecular types in IBC patients without distant metastases.**

| Features | *n* | Molecular types, *n* | | | | Kruskal-Wallis test | |
|---|---|---|---|---|---|---|---|
| | | HR+/HER2− | HR+/HER2+ | HR−/HER2+ | HR−/HER2− | *H* | *P* |
| Maximum diameter of mass | 64 | | | | | 5.093 | 0.165 |
| ≤2 cm | 9 | 4 | 1 | 3 | 1 | | |
| 2 cm < diameter ≤ 5 cm | 26 | 11 | 7 | 5 | 3 | | |
| >5 cm | 29 | 9 | 6 | 4 | 10 | | |
| Ki-67 | 73 | | | | | 10.805 | 0.013* |
| Low (<15%) | 14 | 7 | 3 | 3 | 1 | | |
| Middle (15%–30%) | 21 | 14 | 5 | 2 | 0 | | |
| High (>30%) | 38 | 11 | 6 | 8 | 13 | | |
| Miller-Payne grading | 50 | | | | | 8.830 | 0.032† |
| G5 | 7 | 3 | 0 | 4 | 0 | | |
| G4 | 14 | 6 | 1 | 4 | 3 | | |
| G3 | 18 | 8 | 5 | 2 | 3 | | |
| G2 | 6 | 2 | 2 | 1 | 1 | | |
| G1 | 5 | 2 | 1 | 0 | 2 | | |

* Dunn's, −19.830; adjusted $P = 0.008$ (HR+/HER2− *vs.* HR−/HER2−). † Dunn's, −17.197; adjusted $P = 0.008$ (HR−/HER2+ *vs.* HR+/HER2+). IBC: Inflammatory breast cancer; HR: Hormone receptor; HER2: Human epidermal growth factor receptor 2.

High BMI is a known risk factor for the development of IBC, and patients with high BMI have poorer breast cancer outcomes[13,14] than patients with a low BMI. We defined obesity based on the criteria provided by the Working Group on Obesity in China, which specifies that BMI values ≥28.0 and 24 kg/m$^2$ represent general obesity and overweight status in Chinese adults, respectively.[15] In a previous study, obesity was noted in 49.5% of the patients and overweight was noted in 30.6% of the patients with IBC,[9] whereas in our study, the proportion of obesity is relatively lower (23.2%).

Breast cancer is classified into four subtypes based on HR status (ER, PR, HER2, and Ki-67) as luminal A, luminal B, HER2 overexpression, and triple-negative breast cancer.[16,17] Based on the phenotypic expression of HRs and HER2, IBC can be categorized as follows: HR+/HER2−, HR+/HER2+, HR−/HER2+, and HR−/HER2−.[18-20] Several studies have reported differences in prognosis based on IBC subtypes. Notably, survival outcomes are best for patients with the HR+/HER2+ subtype, while they are the worst for patients with the HR−/HER2− subtype.[21]

Pathologic complete response (pCR) refers to the absence of invasive/*in situ* cancer in the breast and/or axillary lymph nodes.[22] Achieving pCR following neoadjuvant chemotherapy is desirable, as pCR has frequently been associated with improved survival.[23] An NCDB study reported that, among 8550 patients diagnosed with non-metastatic, invasive IBC who had undergone surgery from 2004 to 2013, approximately 12% had attained pCR following pre-operative neoadjuvant chemotherapy.[12] Our overall pCR rate was 14.00%, which is slightly higher than that reported in the abovementioned retrospective study. This discrepancy may be related to the duration of the study, given that current treatment status is difficult to assess in longer studies. In the present study, using the Miller-Payne method we could accurately evaluate the efficacy of neoadjuvant chemotherapy. In the current study, we were able to accurately evaluate the efficacy of neoadjuvant chemotherapy using the Miller-Payne method. We observed significant differences among molecular types ($P = 0.032$).

Currently, the recommended treatment for stage III IBC includes neoadjuvant chemotherapy, surgery, and adjuvant locoregional radiotherapy (ie, trimodal therapy). Moreover, (neo)adjuvant trastuzumab and endocrine therapy are utilized in patients with HER2+ and/or HR+ tumors, respectively. These strategies have significantly improved survival among patients with IBC.[24] The 2019 National Comprehensive Cancer Network guidelines for IBC recommend pre-operative systemic chemotherapy using anthracycline and taxanes, as well as HER2-targeted therapy for tumors exhibiting overexpression of HER2. In our study, 63.5% of patients with stage III IBC were treated with anthracyclines and taxane-based neoadjuvant chemotherapy. In addition, 7.9% of patients with IBC received anthracyclines or taxanes alone, and supplemental post-operative chemotherapy was provided as needed. When patients were grouped according to the chemotherapy regimen, we observed no significant differences in the efficacy of chemotherapy among the groups.

Traditionally, breast reconstruction is contraindicated in IBC due to concerns related to margin positivity, a high risk of recurrence, poor long-term survival, and the potential delay of treatments due to surgical complications.[25-27] Recent advances in multimodal therapy have improved the 5-year overall survival (OS) rate for IBC,[28] improving the prognosis; hence, breast reconstruction may no longer be contraindicated in IBC.[29] Many single-center studies have investigated whether breast reconstruction affects oncologic and survival outcomes among patients with IBC.[30-32] Although breast reconstruction is an option for patients with IBC, the time at which reconstructive surgery should be performed remains controversial. One study analyzed SEER data of 3374 patients and noted that rates of contralateral prophylactic

mastectomy (CPM) and breast reconstruction have increased over the years. No significant differences in breast cancer-specific survival or OS have been observed among various types of breast surgeries (eg, breast-conserving surgery, CPM, breast reconstruction, standard unilateral mastectomy).[33] Therefore, immediate breast reconstruction may still be an option for patients with IBC. In a single-center study involving 240 patients with stage III IBC conducted from 1997 to 2016, 17% of patients underwent breast reconstruction. Among them, 33% underwent immediate reconstruction, which thus accounted for 5.4% of all procedures.[34] In our study, immediate breast reconstruction was performed in 8.1% of patients with IBC without distant metastases (6/74 cases), a rate that is higher than that in past studies, which may have led to an underestimation of current treatment status.

The research conducted in this study is susceptible to all the inherent biases and shortcomings that accompany a retrospective study. Additionally, the small sample size and missing data could have limited the statistical power of the analysis.

In conclusion, our study provides novel insight into the clinicopathological characteristics and treatment status among patients with IBC in China and might provide a direction and basis for further studies.

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## Conflicts of interest

None.

## References

1. Hance KW, Anderson WF, Devesa SS, Young HA, Levine PH. Trends in inflammatory breast carcinoma incidence and survival: the surveillance, epidemiology, and end results program at the National Cancer Institute. J Natl Cancer Inst 2005;97:966–975. doi: 10.1093/jnci/dji172.
2. Dawood S, Ueno NT, Valero V, Woodward WA, Buchholz TA, Hortobagyi GN, *et al*. Differences in survival among women with stage III inflammatory and noninflammatory locally advanced breast cancer appear early. Cancer 2011;117:1819–1826. doi: 10.1002/cncr.25682.
3. Cristofanilli M, Valero V, Buzdar AU, Kau SW, Broglio KR, Gonzalez-Angulo AM, *et al*. Inflammatory breast cancer (IBC) and patterns of recurrence: understanding the biology of a unique disease. Cancer 2007;110:1436–1444. doi: 10.1002/cncr.22927.
4. Schairer C, Hablas A, Eldein IABS, Gaafar R, Rais H, Mezlini A, *et al*. Clinico-pathologic and mammographic characteristics of inflammatory and non-inflammatory breast cancer at six centers in North Africa. Breast Cancer Res Treat 2019;176:407–417. doi: 10.1007/s10549-019-05237-5.
5. Dobbs J, Krishnamurthy S, Kyrish M, Benveniste AP, Yang W, Richards-Kortum R. Confocal fluorescence microscopy for rapid evaluation of invasive tumor cellularity of inflammatory breast carcinoma core needle biopsies. Breast Cancer Res Treat 2015;149:303–310. doi: 10.1007/s10549-014-3182-5.
6. Dawood S, Ueno NT, Valero V, Woodward WA, Buchholz TA, Hortobagyi GN, *et al*. Identifying factors that impact survival among women with inflammatory breast cancer. Ann Oncol 2012;23:870–875. doi: 10.1093/annonc/mdr319.
7. Rosenbluth JM, Overmoyer BA. Inflammatory breast cancer: a separate entity. Curr Oncol Rep 2019;21:86. doi: 10.1007/s11912-019-0842-y.
8. Alexander A, Arnold TL, Bishnoi S, Ballinger C, Shaitelman SF, Schaverien MV, *et al*. Survivorship and advocacy in inflammatory breast cancer. J Cancer 2018;9:1430–1436. doi: 10.7150/jca.21281.
9. Fouad TM, Ueno NT, Yu RK, Ensor JE, Alvarez RH, Krishnamurthy S, *et al*. Distinct epidemiological profiles associated with inflammatory breast cancer (IBC): a comprehensive analysis of the IBC registry at the University of Texas MD Anderson Cancer Center. PLoS One 2018;13:e0204372. doi: 10.1371/journal.pone.0204372.
10. Ogston KN, Miller ID, Payne S, Hutcheon AW, Sarkar TK, Smith I, *et al*. A new histological grading system to assess response of breast cancers to primary chemotherapy: prognostic significance and survival. Breast 2003;12:320–327. doi: 10.1016/S0960-9776(03)00106-1.
11. Li J, Xia Y, Wu Q, Zhu S, Chen C, Yang W, *et al*. Outcomes of patients with inflammatory breast cancer by hormone receptor- and HER2-defined molecular subtypes: a population-based study from the SEER program. Oncotarget 2017;8:49370–49379. doi: 10.18632/oncotarget.17217.
12. Biswas T, Jindal C, Fitzgerald TL, Efird JT. Pathologic complete response (pCR) and survival of women with inflammatory breast cancer (IBC): an analysis based on biologic subtypes and demographic characteristics. Int J Environ Res Public Health 2019;16:124. doi: 10.3390/ijerph16010124.
13. Chang S, Alderfer JR, Asmar L, Buzdar AU. Inflammatory breast cancer survival: the role of obesity and menopausal status at diagnosis. Breast Cancer Res Treat 2000;64:157–163. doi: 10.1023/A:1006489100283.
14. Becaria Coquet J, Caballero VR, Camisasso MC, González MF, Niclis C, Román MD, *et al*. Diet Quality, obesity and breast cancer risk: an epidemiologic study in Córdoba, Argentina. Nutr Cancer 2020;72:1026–1035. doi: 10.1080/01635581.2019.1664601.
15. Zhou BF. Predictive values of body mass index and waist circumference for risk factors of certain related diseases in Chinese adults–study on optimal cut-off points of body mass index and waist circumference in Chinese adults. Biomed Environ Sci 2002;15:83–96. doi: 10.1046/j.1440-6047.11.s8.9.x.
16. Cortazar P, Zhang L, Untch M, Mehta K, Costantino JP, Wolmark N, *et al*. Pathological complete response and long-term clinical benefit in breast cancer: the CTNeoBC pooled analysis. Lancet 2014;384:164–172. doi: 10.1016/S0140-6736(13)62422-8.
17. Xiang HY, Liu YH, Zhang H, Zhang S, Xin L, Xu L, *et al*. Clinicopathologic analysis of 722 breast cancer patients who met the inclusion criteria of the TAILORx trial. Chin Med J 2019;132:2914–2919. doi: 10.1097/CM9.0000000000000548.

18. Hoffman HJ, Khan A, Ajmera KM, Zolfaghari L, Schenfeld JR, Levine PH. Initial response to chemotherapy, not delay in diagnosis, predicts overall survival in inflammatory breast cancer cases. Am J Clin Oncol Cancer Clin Trials 2014;37:315–321. doi: 10.1097/COC.0b013e318271b34b.
19. Ueno NT, Espinosa Fernandez JR, Cristofanilli M, Overmoyer B, Rea D, Berdichevski F, *et al*. International consensus on the clinical management of Inflammatory Breast Cancer from the Morgan Welch Inflammatory Breast Cancer research program 10th anniversary conference. J Cancer 2018;9:1437–1447. doi: 10.7150/jca.23969.
20. Van Uden DJP, Van Maaren MC, Strobbe LJA, Bult P, Van Der Hoeven JJ, Siesling S, *et al*. Metastatic behavior and overall survival according to breast cancer subtypes in stage IV inflammatory breast cancer. Breast Cancer Res 2019;21:113. doi: 10.1186/s13058-019-1201-5.
21. Wu SG, Zhang WW, Wang J, Dong Y, Sun JY, Chen YX, *et al*. Inflammatory breast cancer outcomes by breast cancer subtype: a population-based study. Futur Oncol 2019;15:507–516. doi: 10.2217/fon-2018-0677.
22. Bai YG, Gao GX, Zhang H, Zhang S, Liu YH, Duan XN, *et al*. Prognostic value of tumor-infiltrating lymphocyte subtypes in residual tumors of patients with triple-negative breast cancer after neoadjuvant chemotherapy. Chin Med J 2020;133:552–560. doi: 10.1097/CM9.0000000000000656.
23. van Uden DJP, van Maaren MC, Bult P, Strobbe LJA, van der Hoeven JJM, Blanken-Peeters CFJM, *et al*. Pathologic complete response and overall survival in breast cancer subtypes in stage III inflammatory breast cancer. Breast Cancer Res Treat 2019;176:217–226. doi: 10.1007/s10549-019-05219-7.
24. Yamauchi H, Woodward WA, Valero V, Alvarez RH, Lucci A, Buchholz TA, *et al*. Inflammatory breast cancer: what we know and what we need to learn. Oncologist 2012;17:891–899. doi: 10.1634/theoncologist.2012-0039.
25. Dawood S, Merajver SD, Viens P, Vermeulen PB, Swain SM, Buchholz TA, *et al*. International expert panel on inflammatory breast cancer: consensus statement for standardized diagnosis and treatment. Ann Oncol 2011;22:515–523. doi: 10.1093/annonc/mdq345.
26. Rafnsdóttir SL, Audisio RA. Inflammatory breast cancer: what surgeons need to know. Eur J Surg Oncol 2018;44:1139–1141. doi: 10.1016/j.ejso.2018.06.007.
27. Muzaffar M, Johnson HM, Vohra NA, Liles D, Wong JH. The impact of locoregional therapy in nonmetastatic inflammatory breast cancer: a population-based study. Int J Breast Cancer 2018;2018:6438635. doi: 10.1155/2018/6438635.
28. Saigal K, Hurley J, Takita C, Reis IM, Zhao W, Rodgers SE, *et al*. Risk factors for locoregional failure in patients with inflammatory breast cancer treated with trimodality therapy. Clin Breast Cancer 2013;13:335–343. doi: 10.1016/j.clbc.2013.04.002.
29. Chin PL, Andersen JS, Somlo G, Chu DZJ, Schwarz RE, Ellenhorn JDI. Esthetic reconstruction after mastectomy for inflammatory breast cancer: is it worthwhile? J Am Coll Surg 2000;190:304–309. doi: 10.1016/S1072-7515(99)00267-7.
30. Patel SA, Ng M, Nardello SM, Ruth K, Bleicher RJ. Immediate breast reconstruction for women having inflammatory breast cancer in the United States. Cancer Med 2018;7:2887–2902. doi: 10.1002/cam4.1546.
31. Chang EI, Chang EI, Ito R, Zhang H, Nguyen AT, Skoracki RJ, *et al*. Challenging a traditional paradigm: 12-year experience with autologous free flap breast reconstruction for inflammatory breast cancer. Plast Reconstr Surg 2015;135:262e–269e. doi: 10.1097/PRS.0000000000000900.
32. Simpson AB, McCray D, Wengler C, Crowe JP, Djohan R, Tendulkar R, *et al*. Immediate reconstruction in inflammatory breast cancer: challenging current care. Ann Surg Oncol 2016;23:642–648. doi: 10.1245/s10434-016-5554-z.
33. Chen H, Wu K, Wang M, Wang F, Zhang M, Zhang P. A standard mastectomy should not be the only recommended breast surgical treatment for non-metastatic inflammatory breast cancer: a large population-based study in the Surveillance, Epidemiology, and End Results database 18. Breast 2017;35:48–54. doi: 10.1016/j.breast.2017.06.002.
34. Nakhlis F, Regan MM, Chun YS, Dominici LS, Caterson S, Bellon JR, *et al*. Patterns of breast reconstruction in patients diagnosed with inflammatory breast cancer: the Dana-Farber Cancer Institute's Inflammatory Breast Cancer Program experience. Breast J 2020;26:384–390. doi: 10.1111/tbj.13509.

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