

# Potential implications of applying a nomogram based on the OSNA result

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## Introduction

About 50% of breast cancer patients with macrometastases in their sentinel lymph nodes (SLNs) show additional axillary nodal involvement. The remaining 50% receive unnecessary axillary lymph node dissection (ALND) [1, 2]. Di Filippo *et al.* [3, 4] have developed a nomogram that can predict the patient-specific risk of non-SLN metastases. This helps surgeons to decide whether to perform an ALND. The patient case described in this report shows the potential implications of the nomogram application and how this can guide clinical decision-making.

## Criteria at presentation

Left breast	Right breast
<ul style="list-style-type: none"> <li>Negative mammography</li> <li>Small lesion, 6 mm at ultrasound (US), classified as U4</li> <li>Core biopsy showed an invasive lobular carcinoma</li> <li>Clinically and US negative lymph nodes (cNO)</li> </ul>	<ul style="list-style-type: none"> <li>No lesions at mammography and US</li> <li>Clinically and US negative lymph nodes (cNO)</li> </ul>

Patient refers to a familial history of ovarian and breast cancer.

## Surgical procedure

Left breast	Right breast
<ul style="list-style-type: none"> <li>Nipple areola-sparing mastectomy</li> <li>SLNB</li> <li>Immediate reconstruction with Allergan 360 MM prosthesis and T loop</li> </ul> <p><b>Pathological report</b> Multifocal invasive lobular carcinoma, G2; diameter of the largest focus: 7 mm pT1b(m)</p>	<ul style="list-style-type: none"> <li>Prophylactic nipple areola-sparing mastectomy</li> <li>SLNB</li> <li>Immediate reconstruction with Allergan 360 MM prosthesis and T loop</li> </ul> <p><b>Pathological report</b> Unifocal invasive lobular carcinoma, G2, maximum diameter 2.6 mm pT1a</p>

Laparoscopic ovariectomy performed in the same surgery.

## SLN analysis with OSNA

Left axilla: 2 SLNs	Right axilla: 1 SLN
<p>SLN1: positive for macro-metastasis (140,000 CK19 mRNA copies/<math>\mu</math>L)</p> <p>SLN2: positive for macro-metastasis (6,400 CK19 mRNA copies/<math>\mu</math>L)</p> <p>Stage: pN1a(mol+)(sn)</p>	<p>SLN 1: positive for macro-metastasis (89,000 CK19 mRNA copies/<math>\mu</math>L)</p> <p>Stage pN1a(mol+)(sn)</p>

## Axillary surgery and final staging

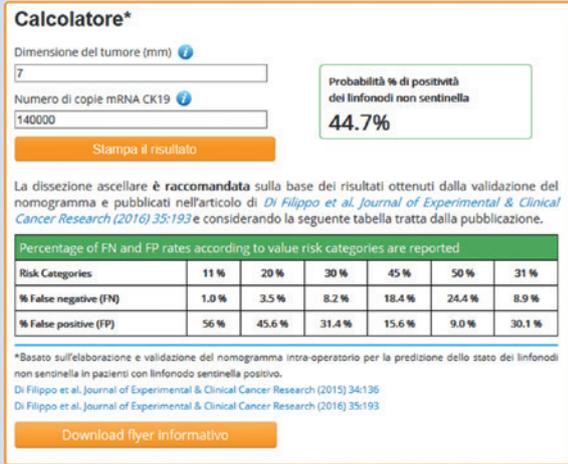
Left axilla	Right axilla
<ul style="list-style-type: none"> <li>ALND performed (24 lymph nodes examined)</li> <li>3 additional positive lymph nodes</li> <li>Stage changes to pN2a</li> </ul>	<ul style="list-style-type: none"> <li>ALND performed (25 lymph nodes examined)</li> <li>No further positive lymph nodes</li> <li>pN1a</li> </ul>



## Nomogram application

According to the nomogram, the probability to have further involved axillary lymph nodes was 44.7% and 32.8% in left and right axilla respectively.

### Left axilla



Dimensione del tumore (mm)

Numero di copie mRNA CK19

**Probabilità % di positività dei linfonodi non sentinella**  
**44.7%**

Stampa il risultato

La dissezione ascellare è **raccomandata** sulla base dei risultati ottenuti dalla validazione del nomogramma e pubblicati nell'articolo di *Di Filippo et al. Journal of Experimental & Clinical Cancer Research (2016) 35:193* e considerando la seguente tabella tratta dalla pubblicazione.

Percentage of FN and FP rates according to value risk categories are reported						
Risk Categories	11 %	20 %	30 %	45 %	50 %	31 %
% False negative (FN)	1.0 %	3.5 %	8.2 %	18.4 %	24.4 %	8.9 %
% False positive (FP)	56 %	45.6 %	31.4 %	15.6 %	9.0 %	30.1 %

\*Basato sull'elaborazione e validazione del nomogramma intra-operatorio per la predizione dello stato dei linfonodi non sentinella in pazienti con linfonodo sentinella positivo.  
Di Filippo et al. Journal of Experimental & Clinical Cancer Research (2015) 34:136  
Di Filippo et al. Journal of Experimental & Clinical Cancer Research (2016) 35:193

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### Right axilla



Dimensione del tumore (mm)

Numero di copie mRNA CK19

**Probabilità % di positività dei linfonodi non sentinella**  
**32.8%**

Stampa il risultato

La dissezione ascellare è **raccomandata** sulla base dei risultati ottenuti dalla validazione del nomogramma e pubblicati nell'articolo di *Di Filippo et al. Journal of Experimental & Clinical Cancer Research (2016) 35:193* e considerando la seguente tabella tratta dalla pubblicazione.

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Nomogram assessment indicates a high risk (44.7%) for further lymph node involvement. Pathological analysis of the axillary dissection, identifying another three positive axillary lymph nodes, confirms the utility of this tool in the decision-making process to proceed to axillary clearance.

Nomogram assessment indicates a borderline risk (32.8%). Sparring ALND could have been considered but, in this case, high risk patient criteria and the histological type with high lymphotropism (invasive lobular carcinoma) are an indication to also perform ALND on the right side.

### Clinician's feedback

At AOU Careggi Hospital we have been using OSNA analysis since 2013 July. In the last two years, we examined 903 SLNs in 586 patients with an average of 1.5 SLNs/patient.

The OSNA analysis of SLN is performed in the post-operative setting in breast cancer cases that do not need intraoperative examination of SLN and are at low risk of having a positive SLN for macro-metastasis.

### References

- [1] *Bolster MJ et al. (2007): Risk factors for non-sentinel lymph node metastases in patients with breast cancer. The outcome of a multi-institutional study. Ann. Surg. Oncol. 14:181.*
- [2] *Fleming FJ et al. (2004): Factors affecting metastases to non-sentinel lymph nodes in breast cancer. J. Clin. Pathol. 57:73.*
- [3] *Di Filippo F et al. (2015): Elaboration of a nomogram to predict non sentinel node status in breast cancer patients with positive sentinel node, intra-operatively assessed with one step nucleic acid amplification method. J. Exp. Clin. Cancer Res. 34:136.*
- [4] *Di Filippo F et al. (2016): Elaboration of a nomogram to predict non-sentinel node status in breast cancer patients with positive sentinel node, intraoperatively assessed with one step nucleic acid amplification: Retrospective and validation phase. J. Exp. Clin. Cancer Res. 35(1):193. haematology reference ranges for healthy adults. Hematol 29.*

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