



### RESEARCH ARTICLE

## ANALYSE AND CLASSIFY VARIOUS BREAST LESIONS ON FNAC WITH SPECIAL REFERENCE TO IAC STANDARDISED REPORTING SYSTEM: A RETROSPECTIVE ANALYSIS OF 300 CASES

Neetu Purwar<sup>1</sup>, Sobha Dwivedi<sup>2</sup>, Anita Omhare<sup>5</sup>, Swapnil Gupta<sup>2</sup>, Dev Prakash Shivhare<sup>3</sup>, Chayanika Kala<sup>2</sup> and Suman Lata Verma<sup>4</sup>

1. Associate Professor, Department of Pathology, GSVM Medical College, Kanpur.
2. Assistant professor, Department of Pathology, GSVM Medical College, Kanpur.
3. Assistant Professor, Department of Skin and VD, GSVM Medical College, Kanpur.
4. Professor, Department of Pathology, GSVM Medical College, Kanpur.
5. Associate Professor, Department of Pathology, Government Medical College, Kannauj.

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### Abstract

**Introduction:** Breast lumps are the common manifestations in clinical practice. For uniform reporting, better diagnostic clarity and uniform patient management International Academy of Cytology (IAC) has classified reporting of breast Fine needle aspiration cytology (FNAC) into 5 tier yokohama reporting system (C1 to C5).

**Material and Methods:** Present study is a retrospective study done in Department of Pathology, GSVM medical college, Kanpur over a period of 12 month (December 2020 to November 2021). Total 300 cases of FNAC breast smears were reviewed and classified according to IAC reporting system (C1 to C5).

**Results:** In our study we had total 300 cases in 12 month period with female patients (285) out numbered male patients (15). On age wise distribution we get maximum no of cases in 2nd and 3rd decade. On categorization of breast lesions according to IAC Yokohama reporting system out of total 300 cases we get C1 lesions in 09(3.0%)cases, C2 lesions in 184(61.3%) cases, C3 lesions in 26(8.6%) cases, C4 lesions in 11(3.6%) cases and C5 lesions in 70(23.3%) cases.

**Conclusion:** Use of FNAC method for evaluation of breast lump for preoperative management is quick, simple and cost effective, with IAC reporting system we can uniformly classify breast FNA cytology for better patient management and better guidance to clinician.

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### Introduction:-

In recent years breast carcinoma has become the most common cancer in Indian women and has left cervical carcinoma behind as second most common cancer.<sup>1</sup> As per the data from ICMR an estimated new cases of breast cancer were 1.5 lakhs (10% of all cancer) in 2016 making it most common cancer in india.<sup>2</sup>

Now a days use of FNAC in triple test approach has tremendously increased For preoperative diagnosis of breast carcinoma. For cytological classification of breast aspirates, several systems have been applied, still between local and international standardized facilities no standardization in reporting was found which has always affected patient

**Corresponding Author:- Dev Prakash Shivhare**

Address:- Department of Skin and VD, GSVM Medical College, Kanpur.

management. In 2016 breast cytopathology was reclassified by The IAC (International association of cytologists) yokohama system and this coding system has resolved this issue in an effective way.<sup>3</sup>

IAC gathered together a group of cytopathologist and developed in 2016, the IAC yokohama system for reporting breast fine needle aspiration cytology(FNAC). This system has established a comprehensive and standardized approach for breast cytology and has categorized FNAC of breast lesions into C1-C5, each Category has been given a clear descriptive term for categorial definition, risk of malignancy and suggested management plan. this reporting system helps cytopathologist to define and categorize uncertain areas in breast cytology and also help clinicians to plan further investigations like excisional biopsy and management judiciously.<sup>4</sup>

FNAC in conjunction with triple testing has now become integral part for breast ca evaluation.<sup>5</sup> In our study we analysed and reviewed 300 cases and reclassified them according to IAC reporting system.

### **Aims And Objectives:-**

Aim of present study is to analyze and classify various breast lesions on FNAC according to standardized IAC, Yokohama reporting system.

### **Materials And Methods:-**

The present study is a retrospective study done in Department of Pathology, GSVM medical college, Kanpur over a period of 12 month (December 2020 to November 2021).

#### **Inclusion criteria:**

Fine needle aspiration cytology smears from all the female and male patients presented with breast lump were included in our study.

#### **Exclusion criteria:**

Smears from all known cases of carcinoma breast undergoing repeat FNAC after chemotherapy or radiotherapy were excluded from our study.

Both Giemsa stained and H and E stained slides from all breast FNACs were reviewed and categorised according to IAC coding system from C1 to C5.

IAC has developed a comprehensive and standardized approach to FNAC reporting of breast lesions. They have categorized the breast lesion into C1 to C5 (C-Code).

C1: Insufficient material

C2: Benign

C3: Atypical probably benign

C4: Suspicious, probably in situ or invasive carcinoma

C5: Malignant

A total of 300 cases were included in the study and their clinical and radiological details were also considered.

#### **Statistical analysis:**

Epidata software was used for data entering and Statistical Package for Social Sciences (SPSS) version 17.0 is used for data analysis.

### **Results:-**

In our study age group of patients ranging from 14 years to 80 years, In female group the youngest patient was of 14 year old with Fibroadenoma (C2) and oldest patient was 76 year old female with ductal carcinoma breast in (C5), in male group the youngest patient was of 16 year old with gynaecomastia (C2) and oldest was 80 years old with ductal carcinoma (C5).

Present study included 285 (95%) female and 15 (05%) male patients, with largest no of cases 188 (62.6%) were in age group of 18 to 40 years , and least no of cases 19 (6.3%) in age group of >60 years (**Table 1**).

**Table 1:-** Distribution of cases according to age and sex.

Age in years	female	male	total	Percentage %
<18	19	02	21	7.1
18-40	183	05	188	62.6
40-60	67	05	72	24.0
>60	16	03	19	6.3
total	285	15	300	100

We found right sided breast lesions in 146(48.6%) cases, followed by left side 134 (44.6%) cases and the bilateral breast involvement in 20(6.6%) cases.

Out of the total 300 cases, 09(3.0%) cases were categorised in C1 , 184(61.3%) cases in C2, 26(8.6%) cases in C3, 11(3.6%) cases in C4 and 70(23.3%) cases in C5 category.(**Table 2**)

**Table 2:-** Distribution of breast lesion according to yokohama reporting system.

Codes	Total no of cases	Percentage %
C1	09	3.0
C2	184	61.3
C3	26	8.6
C4	11	3.6
C5	70	23.3
Total	300	100

We reported 09 cases of C1 lesions. In these cases due to less cellularity, no definite diagnosis could be made. All the cases were undergone repeat aspiration and clinic-radiological correlation was done in all cases.

In C2 category we reported, Fibroadenoma in 57% (105) cases followed by 12.5% (23) cases of benign breast disease, fibrocystic disease in 10.8% (20) cases, mastitis 8.15% (15) cases, inflammatory lesion in 3.26% (6) cases, galactocele in 3.26% (06) cases, and tubercular mastitis in 2.17% (04) cases.(**Table 3**)

**Table 3:-** Distribution of C2 lesions.

C2 lesions	No of cases	Percentage %
Fibroadenoma	105	57
Benign breast lesions	23	12.5
Fibrocystic disease	20	10.8
mastitis	15	8.15
Inflammatory lesions	06	3.26
Galactocele	06	3.26
Gynaecomastia	05	2.71
Tubercular mastitis	04	2.17
Total no of cases	184	100

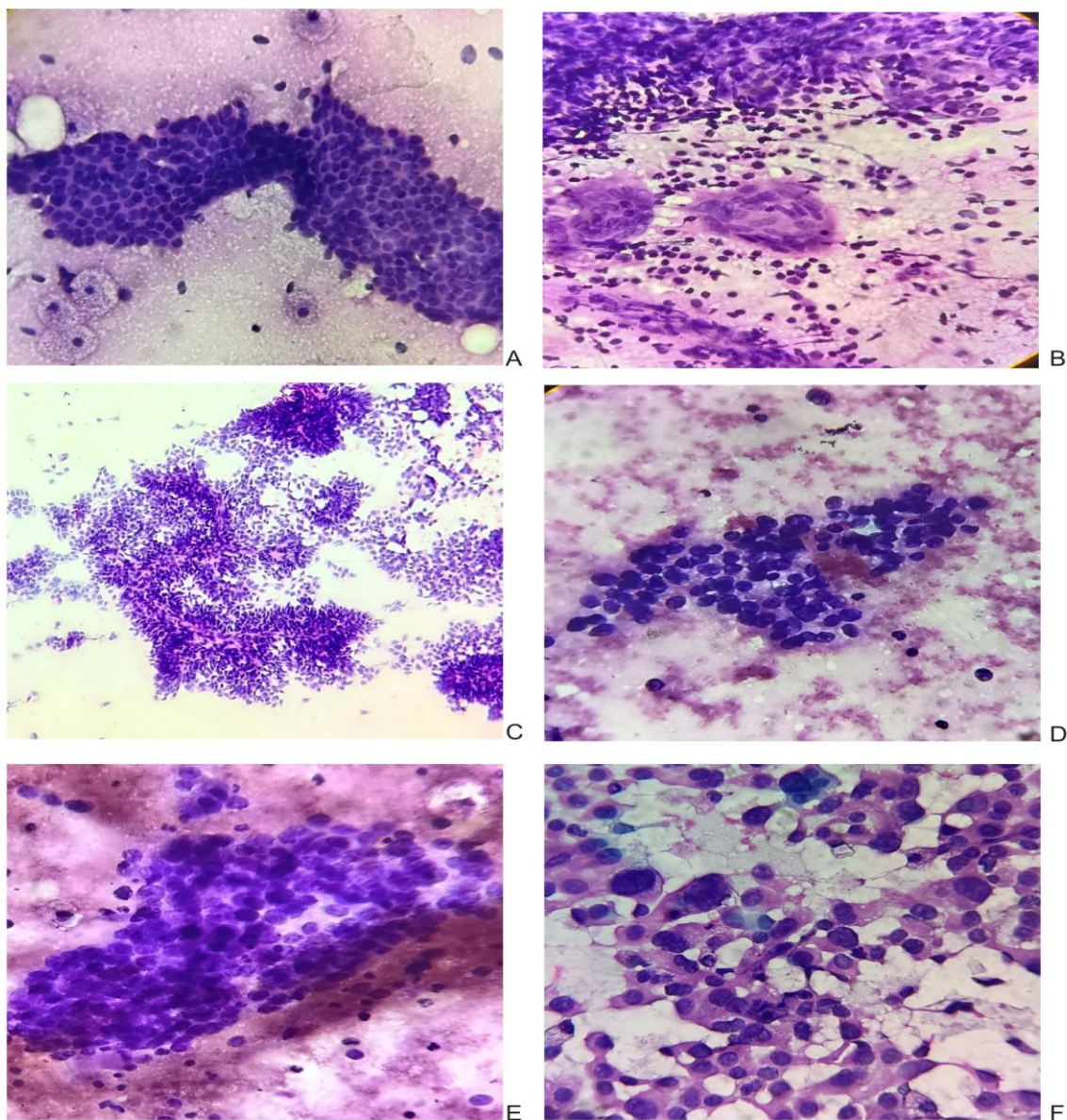
Total no of C3 lesion in our study were 26 (8.6%) cases, which included fibroadenoma with atypia 10 (38.4%) cases, proliferative lesions with atypia 07 (26.9%) cases, fibrocystic disease with atypia 04(15.3%) case, fibro-epithelial lesion 04 (15.3%) cases, and papillary neoplasm 01(3.84%) case. (**Table 4, Figure 1**)

C4 lesions included 11 (3.6%) cases which were suspicious for malignancy. Review of these smears showed mostly single or small clusters of cells with high Nuclear cytoplasmic ratio, hyperchromatic nuclei and mild nuclear pleomorphism. 02 cases were showing monolayered sheets of ductal epithelial cells with high Nuclear cytoplasmic ratio, hyperchromatic nuclei, mild nuclear pleomorphism and nuclear overlapping. out of 11 cases 02 male patients were of C4 lesions.(**Table 4, Figure 1**)

We reported total 70 (23.3%) C5 lesions, being the second most common lesions. out of total 70 cases we reported duct carcinoma in 63 patients (60 female and 03 male cases) followed by 03 cases of Lobular carcinoma, 02 cases of Apocrine carcinoma, 01 case of each mucinous carcinoma , and malignant phyllodes.(**Table 4, Figure 1**)

**Table 4:-** Distribution of C3 and C5 lesions.

C3 lesions			C5 lesions		
Types of lesion	No of cases	Percentage %	Type of lesion	No of cases	Percentage %
Fibroadenoma with atypia	10	38.4	Duct carcinoma	63	90
Proliferative breast disease with atypia	07	26.9	Lobular carcinoma	03	4.28
Fibrocystic disease with atypia	04	15.3	Apocrine carcinoma	02	2.8
Fibroepithelial lesions	04	15.3	Mucinous carcinoma	01	1.4
Papillary neoplasm	01	3.84	Malignant phyllodes	01	1.4
Total	26	100	Total	70	100



**Figure 1:-** (A) Fibroadenoma with cystic changes C2 lesion (H&E stain 40X) (B)Granulomatous mastitis (C2) smear shows collection of epithelioid histiocytes and giant cells (H&E stain 40X) (C) Papillary neoplasm (C3) (H&E stain, 40X) (D)Suspicious for malignancy (C4) (H&E stain, 40X) (E) Duct carcinoma breast (C5), smear

shows sheets of atypical ductal epithelial cells (H&E stain 40X) (F) Apocrine carcinoma breast (C5): smear showing large atypical cells with abundant granular eosinophilic cytoplasm and moderate nuclear pleomorphism.

### Discussion:-

Worldwide Breast cancer has become the most common cancer in females. Women from developing areas have greater no of cases (8,83,000) as compared to developed regions (7,94,000). Age adjusted incidence rate of breast cancer in India is lower (25.8 per 100 000) than United Kingdom (95 per 100 000), while mortality in India is near equal to united kingdom (12.7 vs 17.1/1,00,000).<sup>1,2</sup>

FNAC has become the most important diagnostic tool for assessment of breast lesions with significant reduction in excisional biopsy, with triple test approach (clinical examination, mammography, fine-needle aspiration cytology FNAC) for breast lesions 99% cases can be diagnosed accurately in a simple, non-invasive and cost effective way.<sup>3,6</sup> Core needle biopsy is the procedure of choice for breast lesions in developed world as compared to breast FNAC. On the other hand, in developing countries like India the core needle biopsy is still not a routine procedure at most of the medical facilities, and treatment of breast carcinoma cases usually starts with the first-hand diagnosis made on FNAC.<sup>7,8</sup>

IAC Breast Group members discussed and developed a standardized reporting system for breast cytology in 2016 at Yokohama International Congress of Cytology which include the use of a 3 or 5-stage coding system. IAC standardized reporting includes five categories from C1 to C5. The consensus was to use a 5-stage system, which will include:

- Code 1 - Insufficient material
- Code 2 - Benign
- Code 3 - Atypical, probably benign
- Code 4 - Suspicious, probably in situ or invasive carcinoma
- Code 5 - Malignant

Under C1 comes all the smears with Inadequate cellularity of the epithelial cells for evaluation, This can be due to incorrect aspiration method, deeply situated lumps, improper smearing.

Under C2 comes all the lesions which are showing benign features. these lesions on microscopic examination are usually cellular, with sheets of ductal epithelial cells and bipolar nuclei.

Two of the major areas for debate are the definitions of 'atypia' and 'suspicious for malignancy'.<sup>9</sup> The IAC reporting system will attempt to define specific criteria or sets of criteria or at least scenarios where atypia is the appropriate diagnosis. These could include:

- 1 Epithelial hyperplasia with marked dispersal often of columnar cells but minimal nuclear atypia, where the DD is epithelial hyperplasia or low-grade intraduct carcinoma
- 2 Intraduct papillomas with diagnostic stellate papillary fragments but again marked dispersal, where the DD is low-grade intraduct carcinoma
- 3 Epithelial hyperplasia with more complex possibly cribriform or micropapillary tissue fragments, where the DD is low-grade intraduct carcinoma
- 4 Stromal hypercellularity without nuclear atypia or necrosis in otherwise typical fibroadenomas raising the possibility of a low-grade phyllodes tumor
- 5 Low-cellularity smears with minute epithelial tissue fragments and single cells showing eccentric cytoplasm that raise the DD of lobular carcinoma or lobular carcinoma in situ.

C3 category aspirates were showing high nuclear cytoplasmic ratio, pleomorphism, cellular crowding and discohesion.

Aspirate with features such as poor preservation, hypocellularity, or components of a benign smear, precluding the diagnosis of malignancy, are reserved for C4 or suspicious malignant category.

Aspirates with strong malignant findings are categorized under C5.<sup>10,11,12,13,14</sup>



In our study we had total 300 cases, in C1 category we get 3% cases which had inadequate aspirate and which was in concordance with studies done by Gupta et al.<sup>3</sup> (3.84%), Sunita et al.<sup>15</sup> (2.9%), whereas Bajwa and Tariq<sup>16</sup> had a slightly higher rate (13.6%) of C1 cases and Panwar et al.<sup>1</sup> (1.3%) and Modi et al.<sup>17</sup> (1.36%) reported slightly lower rate of C1 cases. (Table 5)

In C2 category lesions we get total 61.3% cases, with Fibroadenoma (57%) as most common C2 lesion followed by 12.5% cases of benign breast disease and fibrocystic disease (10.8%). similar results were also reported by Bajwa and Tariq<sup>16</sup> et al 60.6% of C2 lesions, with 67.7% were fibroadenomas followed by fibrocystic disease (16.37%), where as Studies done by Sunita et al.<sup>15</sup> had 50% C2 lesions with fibroadenomas being most common (48.8%) benign lesion followed by fibrocystic disease (13.3%). (Table 5)

**Table 5:-** Comparison of various studies done for IAC grading system for breast cytology reporting.

Studies	C1	C2	C3	C4	C5
Georgieva et al (2013)	25.6%	44.3%	2.2%	5.3%	22.5%
Modi P et al (2014)	1.36%	72%	3.4%	6.5%	16.7%
Sunita et al (2015)	2.9%	50%	3.5%	6.55%	37.1%
Panwar et al (2019)	1.3%	82.6%	5.7%	1.7%	8.4%
Gupta et al (2020)	3.84%	70.76%	6.15%	4.60%	16.15%
Present study	3.0%	61.3%	8.6%	3.6%	23.3%

In our study gray zone lesions included C3-26 (8.6%) cases and C4-11 (3.6%) cases. however Bajwa and Tariq<sup>16</sup> reported lower no of C3 lesions (6.2%) and higher no of C4 lesions (9.3%). Sneige et al.<sup>18</sup> reported 10.4% C3 and 11% C4 cases and Panwar et al.<sup>1</sup> reported 5.7% C3 and 1.7% C4 lesions, these results were near concordance with our study. (Table 5)

In C5 category we reported total 70 (23.3%) cases, similar results were also reported by study done by Georgieva et al.<sup>19</sup> 22.5% cases and Sulaiman et al.<sup>20</sup> 21% cases. However Panwar et al.<sup>1</sup> study (8.4%) and Modi et al.<sup>17</sup> study (16.7%) reported lower no of cases in C5 category, where as sunita et al reported more higher no of cases 37.1% in C5 category. (Table 5) In our study Duct carcinoma breast was most common C5 lesion, similar results were also found by sunita et al, Modi et al., Sulaiman et al Bukari et al.<sup>15,17,20,21</sup>

In our study we have done cytological categorization of breast lesions based on IAC standardized reporting system. Structured reporting improves the quality, clarity and reproducibility of reports across departments, cities, countries and internationally and will assist patient management and improve breast health care and facilitate research.<sup>20</sup>

### Conclusion:-

In our study we concluded that diagnosis and classification of breast lesions can be uniformed by the standardized reporting system. 5 Tier IAC reporting system for breast FNB cytology report in conjunction with clinical and imaging findings yields definite management decision in breast by clinicians.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

### References:-

1-Panwar H, Ingle P, Santosh T, Singh V, Bugalia A, Hussain N. FNAC of breast lesions with special reference to IAC standardized reporting and comparative study of cytohistological grading of breast carcinoma. J Cytol 2020;37:34-9

2. Malvia S, Bagadi SA, Uma SD, Saxena S. Epidemiology of breast cancer in Indian women. *Asia Pac J Clin Oncol*. 2017;13:1–6.
3. Andrew SF, Fernando S, Philippe V. IAC Standardized reporting of breast fine-needle aspiration biopsy cytology. *Acta Cytologica*. 2017;61:3-6.
- 4-Gupta A, Kour B, Bhardwaj S. fnac of breast lesions with reference to international academy of cytology (iac) reporting system. *Int. J. Adv. Res.* 8(02), 1263-1267.
- 5- Mandosa P, Lacambra M, Tan PH, Tse GM. Fine Needle Aspiration Cytology of the Breast: The Nonmalignant Categories. *Pathology Research International*. 2011; 1-8.5.
- 6-Nassar A. Core needle biopsy versus FNAB in breast: A historical perspective and opportunities in the modern era. *Diagn Cytopathol*. 2011;39:380–8.
- 7-Bansal C, Pujani M, Sharma KL, Srivastava AN, Singh US. Grading systems in the cytological diagnosis of breast cancer: A review. *J Can Res Ther*. 2014;10:839–45.
- 8-Silverman JF, Elsheikh TM, Singh HK. The role of fine needle aspiration cytology of the breast in the core biopsy era. *Pathol Case Rev*. 2007;12:44–8.
- 9-Field AS, Fernando S, Vielh P. IAC standardized reporting of breast fine needle aspiration biopsy. *Actacytologica* 2017; 61:3-6
- 10-Royal College of Australasia (RCPA): Structured pathology reporting of cancer. [Last accessed on 2016 Oct 31]. <https://www.rcpa.edu.au/Health-Care> .
- 11- International Confederation Cancer Reporting (ICCR) [Last accessed on 2016 Oct 31]. Available from: <https://www.iccr-cancer.org> .
12. Joan C, Aylin S. Fine Needle Aspiration Cytology. Elsevier: Toronto; 2012. pp. 156–209.
13. Field AS, Zarka MA. Breast. In: Field AS, Zarka MA, editors. *Practical Cytopathology: A Diagnostic Approach to fine Needle Aspiration Biopsy*. 5. Amsterdam: Elsevier; 2017.
14. Sinha SK, Sinha N, Bandyopadhyay R, Mondal SK. Robinson's cytological grading on aspirates of breast carcinoma: Correlation with Bloom Richardson's histological grading. *J Cytol*. 2009;26:140–3.
- 15-Sunita H, Urmila T, Sharma DC. Cytomorphological study breast lesions with sonomammo-graphic correlation. *J Evol Med Dent Sci*. 2015;4:137–42.
- 16-Bajwa R, Tariq Z. Association of fine needle aspiration cytology with tumor size in palpable breast lesions. *Biomedica* 2010;26:124-9.
- 17-Modi P, Haren O, Jignasa B. FNAC as preoperative diagnostic tool for neoplastic and non-neoplastic breast lesions: A teaching hospital experience. *Indian J Med Res* 2014;4: 274-8.
- 18-Sneige N. Utility of cytologic specimens in the evaluation of prognostic and predictive factors of breast cancer. *Diagn Cytopathol* 2004;30:158-65.
- 19-Georgieva RD, Obdeijn IM, Jager A, Hoening MJ, Tilanus-Linthorst MM, van Deurzen CH. Breast fine-needle aspiration cytology performance in the high-risk screening population a study of BRCA1/BRCA2 mutation carrier. *Cancer Cytopathol* 2013;121:561-7.
- 20-Sulaiman K, Bary AD, Boaz M. (2021). Fine Needle Aspiration Cytology Findings of Breast Lesions in Female Patients Presenting with Palpable Breast Lumpsat Makerere University College of Health Sciences, Kampala-Uganda. *Mathews J Cytol Histol*. 5(1):16.
- 21-Bukhari MH, Arshad M, Jamal S et al. Use of fine needle aspiration in the evaluation of breast lumps. *Pathology ResInt*.2011;689521.