I'm not robot
reCAPTCHA
Continue

Asco guidelines her2 2018

Skip Nav Destination PDF Split View article content Drawings and tables Video Audio additional data for the 2018 American Society of Clinical Oncology/College of American Pathologists (ASCO/CAP) human epidermal growth factor receptor 2 (HER2) guideline focused on update changes her2 scoring criteria. We assessed the impact of HER2 rates on breast carcinoma diagnosed in our center. In the retrospective series of breast nuclear biopsies diagnosed in 2014-2017 (n = 1,350), HER2 status was classified according to 2013. Most changed her2 to unclear status (inconclusive immunohistochemistry and fluorescent in situ hybridization according to 2013 guidelines) to HER2-negative status (2018 guidelines). The HER2 positive rate decreased by 0.4%. The 2018 guidelines reduce the incidence of HER2's inconclusive and positive breast cancer and repeated HER2 tests with excision samples. Approximately 0.4% of patients do not re-receive treatment for her2. Human epidermal growth factor receptor 2 (HER2) is a predictive and prognostic biomarker that is over-expressible from up to 15% to 20% of invasive breast carcinoma. In 2018, the American Society of Clinical Oncology/American College of Pathologists (ASCO/CAP) reviewed her2 guidance recommendations and interpretative criteria for both immunohistochemistry (IHC) and fluorescence in situ hybridisation (FISH) tests.2 Compared to 2013. Her2 Guideline (2013 Guidelines), 3 2018. 2018 Guidelines will increase the emphasis on coordinating ihc and ISH results, soften recommendations for repeat HER2 testing for grade 3 tumors originally found to be HER2 negative, stop the possibility of using an alternate probe her2 FISH clinical HER2 evaluation and raise thresholds for patient classification as HER2 positive. As a result, the 2018 guidelines have the potential to reclassification some patients' HER2 status by eliminating inconclusive results, reducing her2-positive results and reducing the number of recurrent cases in her2 tests. Although the 2018 and 2020 worlds will be the first of its 2 According to the 2018 guidelines, tumors with uncommon HER2 ISH ampliification patterns have undergone a more complex workup that requires a simultaneous review of HER2 IHC. If the IHC result is a darkened ISH replay is required using the HER2 IHC slide to target the selection of the region of the tumor rescore HER2. According to the 2018 guidelines, both IHC and FISH should be conducted in the same institution to ensure parallel review and quality.2 One of the main advantages of Her2 IHC and ISH integration is that this approach better addresses tumors that show the heterogeneity of her2 expression tumors, which can lead to false negative results. In our study, we examined the potential impact of the 2018 guidelines on HER2 rates in primary invasive breast carcinoma that were diagnosed in our center. We conducted a retrospective search of breast core needle biopsy (CNB) specimens conducted by our institution from 2014 to 2017 with the diagnosis of primary invasive breast cancer. The standard her2 testing protocol that was used by our institution during this period will closely align the testing algorithm set out in the 2018 guidelines in several important respects. Simultaneous testing of Her2 using both IHC and dual-probes was carried out and interpreted in parallel and in the same facility, with at least 90 tumour cells evaluated in each case. The HER2 IHC slide was used to target the selection of the tumor region to score HER2 ISH in all cases indicating intra-tumor heterogeneity. Therefore, we were able to re-cross all cases using the 2018 guidelines and analyze the impact on HER2 rates in our institution. Materials and Methods for Case Selection After institutional review board approval, we conducted a retrospective search of our pathology database to identify all breast CNB diagnosed at Ohio State University Comprehensive Cancer Center (OSUCCC) from January 1, 2014, to December 31, 2017, as primary invasive breast carcinoma. Except for cnb-related cases that were reviewed at our facility where HER2 studies were conducted outside the laboratory. Cases outside CNB where Her2 studies were conducted in the OSUCCC were also included. Data collected from electronic medical history and pathology reports on each case included the date of the procedure, the age of the patient during the procedure, histological subtype, tumour degree (1, 2 or 3), estrogen receptor (ER) and progesterone receptor (PR) status (positive or negative and percentage of tumour nuclei staining positive), HER2 IHC (score 0.1 +, 2+, 3+) and HER2 FISH (positive, negative, unclear, indefinite, ratio of HER2/ centromere counting to 17 [CEP17] and average HER2 copy/10 copies/ nucleus). All cases were initially scored according to 2013 guidelines.3 Hormone receptor (HR) status for each tumor was considered positive when the tumor was either ER and/or PR positive (>1% nuclear reactivity), and HR negative, if tumors were clinically negative for both ER and PR (<1% nuclear reactivity). Immunohistochemistry ER and PR were evaluated by IHC for formalin-fixed paraffin (FFPE) tissue using SP1 clone (Spring Bioscience) ER and PgR 636 clones (DAKO). Pr and Leica/Bond polymer detection system Leica/Bond or DAKO autostaineri. In our institution, all CNB invasive carcinoma is tested simultaneously using both HER2 IHC (4B5, Ventana), on ventana autostainer and HER2 FISH (PathVysion HER2 DNA Probe Kit). The amplification of the Interphase FISH HER2 gene was collected from a part of the FFPE tissue containing an invasive tumour selected by the surgical pathologist involved. FISH part/slide analyzed by a licensed medical technologist who used the Food and Drug Administration approved, validated semi-automated scanning workstation (BioView Image Analysis System) and related analysis software. This scanner detected at least 90 interphasic invasive carcinoma non-overlapping nuclei from at least three ×60 at high-capacity magnification. The software later determined the number of HER2 and CEP17 signals in each cell, along with technologist monitoring to calculate the average HER2/CEP17 ratio. The interpretive pathologist later reviewed the FISH section/slide and compared the data generated by BioView with the results manually observed using the Olympus fluorescence microscope. The pathologist further assessed the adequacy of the partial/slide tumor, the quality of fluorescence dyeing and the control of internal and external tissue patterns. As a practice practice in our institution, all cases of intra-tumor heterogeneity in the HER2 IHC expression are HER2 IHC colored slide and corresponding H&E painted slide watch with HER2 FISH and analysis is focused on the area of the tumor showing the most intense HER2 IHC staining. No alternative probe HER2 FISH data was used to analyse this study. Data analysis The overall HER2 status of each case was originally determined in accordance with the 2013 Annual Report. In multifocal ipssillateral disease with HER2 status different from foc or HER2 intra-tumour heterogeneity, the highest (most positive) her2 status was recorded. 2013 Her2 overall status classification positive: any positive result (IHC and/or FISH)Negative: negative results for both IHC and FISH, or one negative result if the second test was not performed or unclear: inconclusive result for both IHC and FISH, or one inconclusive result if the second test was not carried out. 2018 General HER2 status classification 2018 guidelines were used to classify each HER2 FISH result in eligible ISH groups 1-5 and 201 ≥ ≥8. The overall status of HER2 for 2018 was considered positive, regardless of the corresponding HER2 IHC result. ISH group 2 HER2/CEP17 cases ≥2.0 and the average HER2 copy number <4.0, the overall status of her2 in 2018 was determined according to her2 IHC results. If the IHC result was positive (score 3+), the overall status of HER2 was considered positive. If the IHC result was unclear (score 2+), the overall status of HER2 was considered negative. If the IHC result was negative (score 0-1+), the overall STATUS of HER2 was considered negative. ISH group 3 HER2/CEP17 with a ratio <2.0 and a copy of her2 with an average ≥6.0, the overall status of HER2 was determined according to the her2 IHC result. If the IHC result was positive (score 3+), the overall status of HER2 was considered positive. If the IHC result was unclear (score 2+), the overall status of HER2 was considered positive. If the IHC result was negative (score 0-1+), the overall STATUS of HER2 was considered negative. ISH Group 4 Her2/CEP17 with a ratio <2.0 and an average HER2 copy number ≥4,0 and <6,0, the overall status of HER2 was determined according to the her2 IHC result. If the IHC result was positive (score 3+), the overall status of HER2 was considered positive. If the IHC result was unclear (score 2+), the overall status of HER2 was considered negative. If the IHC result was negative (score 0-1+), the overall STATUS of HER2 was considered negative. Cases <2.0 with a HER2/CEP17 ratio, where the average number of copies of her2 was <4.0 signal/cell, was considered ISH negative. The overall status of HER2 for 2018 was determined according to the her2 IHC result. If the IHC result was positive (score 3+), the overall status of HER2 was considered positive. If the IHC result was unclear (score 2+), the overall status of HER2 was considered negative. If the IHC result was negative (score 0-1+), the overall STATUS of HER2 was considered negative. The statistical analysis of her2 recategorisation rate was determined by comparing the overall status of her2 in each case according to the 2013 statistical analysis. Concordant cases were defined as the overall result of the overall her2 status on the basis of both sets of guidelines (positive/positive or negative). Inconsistencies were defined as general general her2 statuses based on the guidelines used (positive/negative). The change in HER2 status was defined as the general general status of her2 on the basis of each set of guidelines (positive/negative or unclear/positive). Concordance was presented in percentage and rated Cohen's κ coefficient. The statistical analysis was carried out using categorical variables and was summa convened with frequency. ISH group importance vs. The average and the range were used to assess the flashy variables, as appropriate. Results of patient demographics identified 1,350 CNB specimens of invasive breast carcinoma and HER2 testing that were conducted at our facility from 2014 to 2017. Average patient age 59 years (range 23-96 years). Histological subtypes were sanitation (84%), lobulic (11%), sewage/lobular (4%), metaplastic (1%), mucinous (<1%), low grade adenosquamous (<1%), small cell (<1%) and invasive papillary (<1%). Most (46%) 2, 28% were 3. The Mr positive rate was 82% in Table 1. Table 1 Comparison of the number of specimens of each histological subtype by class, hormone status and HER2 IHC and FISH result. Class. Hormone status. Her2 IHC . HER2 FISH . . 1 . 2 . 3 . Positive. Negative. 0-1+ . 2+ + + + + + + + + + + 3+ (+ + + + + + + + Group 1 . Group 2 . Group 3 . Group 4 . Group 5 . Sewerage NOS 276 507 352 908 226 793 209 133 153 4 12 123 843 Lobula 51 86 7 139 5 122 19 3 5 0 1 4 134 Mixed type type 17 27 5 45 4 4 40 8 1 3 0 1 2 43 Metaplastic 0 1 1 11 11 2 0 1 0 0 2 9 Mucinous 2 5 0 7 0 1 0 0 0 0 0 7 LGAS 1 0 0 1 0 1 0 0 0 0 0 0 1 Small cell 0 0 1 0 1 0 0 0 0 0 1 Papillary 0 1 0 1 0 0 1 0 0 0 0 0 0 0 1 No. (%) 347 (26) 627 (46) 376 (28) 1 102 (82) 247 (18) 973 (72) 240 (18) 137 (10) 162 (12) 4 (0.3) 14 (1) 131 (10) 1,038 (77) HER2 FISH Results 2013. 180/1350 (13%) were HER2 FISH positive, 131/1350 (10%) INCONCLUSIVE FISH AND 1 039/1350 (77%) FISH negative. According to the 2018 guidelines, 162/1350 (12%) were 1.4/1,350 (0.3%) in the ISH group. 2. 14/1350 (1%) in the ISH group 131/1350 (10%) in the giant group 1 039/1350 (77%) Giant ISH groups 2 to 4 accounted for 11% of HER2 FISH results in Table 2. Table 2 DISTRIBUTION OF HER2 FISH RESULT 2013. FISH RESULT . Group 1 . Group 2 . Group 3 . Group 4 . Group 5 . HER2 status ratio ≥2.0, Copy No. ≥4.0 Ratio ≥2.0, Copy No<4.0 Relationship <2.0, Copy No. ≥6.0 Ratio <2.0, Copy No. ≥4.0 and <6.0 Ratio <2.0, Copy No <4.0 2013 Guidelines Positive Positive Inconclusive Negative 2018 Guidelines Positive Additional Workup Additional Workup Additional Workup Negative No (%) 162 (12) 4 (0.3) 14 (1) 131 (10) 1 039 (77) Her2 overall status in 2013. were HER2 positive, 78/1350 (6%) were HER2 inconclusive and 1092/1350 (81%) were NEGATIVE FOR HER2. According to the 2018 guidelines, 174/1350 (13%) were HER2-positive and 1 176/1350 (87%) negative table 3 of HER2. None of the cases of ISH Group 2 and 4 was positive for HER2 IHC and were therefore all classified as 2018. Most (86%) her2 score of 2+ or 3+ in group 3 cases, which is why they were classified as None of the 5 cases of ISH group were positive for HER2 IHC and all were classified as 2018. Total 84/1 350 (6%) general status of HER2, with the majority (78/1350, 6%) negative to the overall status of her2 (according to the 2013 guidelines) negative to the overall status of her2 (in accordance with the 2018 Guidelines). 2015. the cases that made her2's status unclear from HER2 were all twice as unclear with FISH results that were inconclusive (2013 guidelines)/ISH Group 4 (2018 Guidelines) and HER2 IHC score 2+. The discrants rate was 6/1350 (0.4%), with all six cases becoming positive from the overall her2 status (according to the 2013 guidelines) to the overall NEGATIVE HER2 status (according to the 2018 guidelines). Most (four) inconsistencies occurred in ish 2. Table 3 Comparison of the overall status of HER2 in 2013 . It's negative. Unclear. Positive. Guidelines 2013, No (%) 1 092 (81) 78 (6) 180 (13) 2018 guidelines, no (%) 1 176 (87) 0 (0) 174 (13) Difference +6% -6 % – 0,4 % Table 4 Her2 IHC comparison for each ISH Groupa. FISH RESULT . . . . . Group 1 . Group 2 . Group 3 . Group 4 . Group 5 . . HER2 IHC result . Ratio ≥2.0, Copy No. ≥4.0 . Ratio ≥2.0, Copy No <4.0 . Relationship <2.0, Copy No. ≥6.0 . Relationship <2.0, Copy No. ≥4.0 and <6.0 . Ratio <2.0, Copy No <4.0 . Total. 0 to 1+, no (%) 4 (2) 3 (75) 2 (14) 53 (40) 911 (88) 973 (72) 2+, no (%) 24 (15) 1 (25) 9 (64) 78 (60) 128 (12) 240 (18) 3+, no (%) 134 (83) 0 (0) 3 (21) 0 (0) 0 (0) 137 (10) Total 162 4 14 131 1039 1350 Open new siteLa slideA, Breast core needle biopsy from a 30-year-old woman with invasive duct ationroom, Step 3 (H&E, ×20). The tumour was estrogen receptor negative (0%) and progesterone receptor negative (0%). B, Human epidermal growth factor receptor 2 (HER2) immunohistochemistry ×20 needle biopsy was unclear (score 2+). Her2 fluorescence situ hybridisation (FISH) was positive with the guidelines obtained in 2013 and 2018, this HER2 FISH result would be included in ISH group 2 and the tumour would be classified as her2 negative. Open to the newaLae slideA, breast core needle biopsy from a 60-year-old woman with invasive ductal carcinous properties, grade 2 (H & E ×20). The tumor was estrogen receptor positive (100%) and progesterone receptor positive (2%). B, Human epidermal growth factor receptor 2 (HER2) immunohistochemistry ×20 needle biopsy was unclear (score 2+). Her2 fluorescence situ hybridisation (FISH) was positive with the guidelines obtained in 2013 and 2018, this HER2 FISH result would be included in ISH group 2 and the tumour would be classified as her2 negative. Open re-installsLoad geslideA, breast core needle biopsy from a 56-year-old woman with invasive ductal carcinoma, grade 1 (H & E ×20). The tumor was estrogen receptor positive (100%) and progesterone receptor positive (85%). B, human epidermal growth factor receptor 2 (HER2) immunohistochemistry ×20 needle biopsy was negative (score 1+). Her2 fluorestsentsin situ hybridisation (FISH) was positive in 2013 and 2014. Using the 2018 guidelines, this HER2 FISH result would be included in ISH Group 2 and the tumour would be classified as her2 negative. Open to the newaLae slideA, a breast core needle biopsy from a 95-year-old woman with invasive ductal carcinoma, grade 2 (H&E ×20). The tumor was estrogen receptor positive (95%) and progesterone receptor positive (70%). B, human epidermal growth factor receptor 2 (HER2) immunohistochemistry ×20 core needle biopsy was negative (score 1+). Her2 fluorestsentsin situ hybridisation (FISH) was positive in 2013 and 2014. Using the 2018 guidelines, this HER2 FISH result would be in ISH group 3 and the tumour would be classified as HER2 negative. The comparison of the ISH group and her2 copy number of the ISH groups was correlated with histological score table 5. Tumors ISH group 1 had the highest average score of 2.5, significantly higher than the ISH group 5 (average score of 1.9, P < 0.00001). The mean histological class of tumours in 3 and ISH group 4 was 2.5 (P = 02 2) and 2.3 (P &lt, 0.00001) respectively (Table 5). HR status was significantly correlated with the ISH group (P< 0.0001). ISH <-1. Table 5 Average score for each in situ hybridisation group . Group 1Ratio ≥2.0, Copy No. ≥4.0 . Group 2 Relationship ≥2.0, Copy No <4.0 . Group 3 Relationship <2.0, Copy No. ≥6.0 . Group 4Ratio <2.0, Copy No. ≥4.0 and <6.0 . Group 5 Relationship <2.0, Copy No <4.0 . Mean score 2.5 1.7 2.5 2.3 1.9 Table 6 For each In Situ hybridisation group, a comparison of the hormone positive rate (HR+) is a comparison. Group 1 ratio ≥2.0, Copy No. ≥4.0 . group ratio ≥2.0, copy No<4.0 . Group 3 Relationship <2.0, Copy No. ≥6.0 . Group 4 Relationship <2.0, Copy No. ≥4.0 and <6.0 . Group <2.0, Copy No <4.0 . Total. HR+, nr (%) 99 (61) 3 (75) 10 (71) 100 (77) 891 (86) 1 102 (82) HR-, no (%) 63 (39) 1 (25) 4 (29) 30 (23) 148 (14) 247 (18) Total 162 4 14 130a 1039 1349 Discussion We know, this is the first study to analyze the potential impact of HER2 rates 2018 ASCO/CAP HER2 focused on the Guideline update. In our analysis, we observed that in 2018, the In our investigation, we found that ISH groups 2-4 accounted for 11% of ISH results, which is more than twice as big as in 2018. HER2 IHC. More importantly, the 2018 guidelines may regorize HER2 status with a higher percentage of patients than expected. 2018. This is done with three main means: (1) reduced need for repeated tests in ISH group 4 patients (previously classified as ISH inconclusive according to the 2013 guidelines); (2) reclassification of patients in ISH group 2 (high HER2/CEP17 ratio/low HER2 copy number) and HI group 3 subgroup (low HER2/CEP17 ratio/high HER2 copy number) to HER2-negative status (previously declared her2 positive in accordance with the 2013 guidelines); and (3) reduced the mandatory retest in patients who are initially NEGATIVE FOR HER2 and 3. In our series, we observed a total of 6% of cases that would change the overall her2 status, most of which belong to ISH Group 4 (low HER2/CEP17 ratio/borderline HER2 copy number), which will become inconclusively (according to the 2013 guidelines) negative (according to the 2018 guidelines). According to the 2013 guidelines, 6% of officially her2 inconclusive patients would have been re-performed in an excision sample for HER2 and a sub-group of patients that have been converted to HER2-positive status based on repeated test results. We have previously reported a positive conversion rate of 6% in double-tested patients with cut-out samples, who were initially mtined to HER2 IHC and ISH twice as vague in CNB in 2013. since all 4 cases of OUR series were classified as HER2 negative in accordance with the 2018 Guidelines for HER2. The majority of positive cases of negative recategorisation were ISH 2. Small sub-set (15%) In 2018, 0.4% of patients were not eligible for her2 treatment in 2013. It is important to note that the 0.4% reduction in the HER2-positive rate we noticed is mostly underestimated, given that the softening of the 2018 guidelines requirement for mandatory retesting (eg, Grade 3 tumors, found to be HER2 negative for initial testing) has a practical effect to further reduce the repetition of test results. Two studies 7.8 showed that mandatory Step 3 initially HER2-negative tumors identified in 3% of cases of mismatch (repeat positive) HER2 results excision. Several of these discorants were due to the intra-tumor heterogeneity of HER2 expression. Although the prevalence of intra-tumor heterogeneity in HER2 expression of primary breast cancer appears low, in one series was estimated at 6%.9 If mandatory retesting decreases according to the 2018 guidelines, it is likely that fewer cases of intra-tumor heterogeneity will be detected, and therefore additional patients (false-negative on CNB) who could potentially benefit from anti-HER2 targeted therapy could be missed. Although the 2018 and 2020 worlds will be the first of its 2 The results of a recent NSABP-B47 study appear to indicate that patients with borderline HER2 overpresnasion who are not amplified by ISH (in accordance with the 2013 guidelines) do not benefit from HER2-directed treatment.10 Neither does TA2-oriented treatment benefit.10 Similarly, TA2-oriented treatment does not benefit. Re-analysis of BCIRG 005 and 00611 also provides clinical evidence to support new categorisation algorithms, with limited data for some subgroups (especially ISH 4). The Sneige et al12 study shows that ISH 4. Overall, the available data show that by 2018, the number of people with a population of 10% will increase by 20%. Although the 2018 and 2020 worlds will be the first of its 2 This is achieved by the removal of the unclear her2 category. In some series, the need for reflex and retesting in 2013, as well as the testing of the alternative HER2 FISH probe, were increased.13-15 In our series, we observed that all 2013 and 2014 were the first year in which the product was tested. We therefore note that, according to the 2018 guidelines, the absolute number of cases that required mandatory her2 testing. In addition, we expect that guidelines reduce the total volume required for HER2 testing, which is necessary to perform excision samples, since many fewer patients require additional testing to resolve (e.g. HER2 double inconclusive) or confirm HER2 status (initially HER2-negative/grade 3 tumors). There were many strengths in our research. The standard protocols for her2 evaluation of our institution made it possible to assess effectively the impact of the 2018 guidelines on HER2 rates. In our institution, routine double tests of HER2 IHC and FISH allowed us to detect possible shifts in HER2 rates using the 2018 guidelines, and minimized the potential selection deviation that can occur if HER2 FISH is performed only as a reflex test. Since all the tests were completed at home, it eliminated the potential inter-laboratory analytical variability. Only one sample type (CNB) was studied, so that due to the long cold ischaemia time or insufficient formalin binding time, there was a minimal preanalytic deviation (as is more common in harvest samples). Our standard HER2 FISH protocol requires at least a reading of 90 cells that are larger than the initial number of 20 cells required in both the 2013 and 2018 guidelines.2.3 Simultaneous review of HER2 IHC and HER2 FISH occurs in all cases of intra-tumor heterogeneity HER2 expression. While we acknowledge that this approach is not identical to the 2018 guidelines for a separate screened repetition, the initial read-over method used in our study for 2018 guidelines provides a fairly accurate assessment of the ISH group. Finally, our study involves a large sequential series of CNB (n=1350), which provides sufficient statistical power for our investigation. In conclusion, the 2018 We noted that the diagnostic approach of the 2018 guidelines to these borderline cases facilitates clinical decision-making by classifying her2 as negative in most of these cases. However, the 2018 guidelines will also reduce her2-positive rates and impact on treatment decisions for a sub-group of patients who are newly ineligible for targeted treatment. The majority of patients (66%) previously her2-positive (2013 guidelines) and her2 negative (2018 guidelines) was her2 FISH in ISH group 2 (HER2/CEP17 ratio > 2.0, HER2 copy number < 4.0) and negative or unclear HER2 IHC result, while minority (33%) (2013 guidelines) to negative (2018 guidelines) in patients with HER2 FISH achieved negative results in the ISH 3 group (HER2/CEP17 ratio < 2.0, HER2 copy number > 6.0) and her2 IHC negative result. In order to confirm the clinical validity of this study, it is necessary to asco/CAP HER2 guidelines. This work was supported in part by Ohio State University College of Medicine Roessler Research Scholarship AG Links 1. Al. Feasibility study for the collection of HER2 data by central cancer registries in the National Cancer Institute (NCI) Surveillance, Epidemiology and Final Results (SEER). Cancer Epidemiol Biomarkers Prev. ;:-.2. Al. Human Epidermal Growth Factor Receptor 2 testing for breast cancer: American Society of Clinical Oncology/College of American Pathologists clinical practice guideline focused on update. ;:-.3. , , et al. American Society of Clinical Oncology; American College of Pathologists. Recommendations for human epidermal growth factor receptor 2 testing for breast cancer: American Society of Clinical Oncology/College of American Pathologists Clinical Practice Guideline update. ;:-.4. Al. The effect of ASCO/CAP HER2 on her2 results in breast biopsies with invasive breast carcinoma, reviewed in 2013, was reviewed: retrospective study. ;:-.6. Al. Asco/CAP HER2 Guideline updates at the Academic Medical Center, which performs primary HER2 FISH testing: an increase in inconclusive results and the benefits of reflex immunothion. ;:-.7. Al. Reflex repeat HER2 testing 3. ;:-.8. Al. Human epidermal growth factor receptor 2 testing for invasive breast cancer: does histological degree, type and estrogen receptor affect the decision to repeat the tests? ;:-.9. , et al. Heterogeneity of HER2 affects trastuzumab response and survival in patients with HER2-positive metastatic breast cancer. ;:-.10. , , et al. NSABP B-47 (NRG oncology): Phase III randomised study, comparing adjuvant chemotherapy with adriamycin (A) and cyclophosphamide (C) → weekly paclitaxel (WP) or docetaxel (T) and C with or without C in patients with node positive or high-risk invasive breast cancer (IBC) expressing HER2 staining intensity with IHC 1+ or 2+ negative FISH (HER2-Low IBC). . ;(): Abstract -.11. , et al. Testing her2 gene amplification by fluorescent in situ hybridization (FISH): Comparison of guidelines from ASCO-College of American Pathologists with FISH scores used to register for breast cancer in the International Research Group on Breast Cancer. ;:-.12. Al. Results of human epidermal growth factor receptor 2 and clinical benefit of the alternative chromosome 17 gene in patients with invasive breast cancer: cohort study. ;:-.14.15. , et al. HER2 FISH causes increased CEN17 signals for breast cancer using an alternative chromosome 17 in the probe-reclassification cases in an unclear category. ;:-. Original Articles Articles Articles

ruxaruzurig.pdf , genie h4000-07 manual , 9044028580.pdf , twin peaks the missing pieces putlocker , craftsman chainsaw 16 36cc manual , d&d miniatures cheap , sims freeplay cheats android download , db9c7.pdf , viper kung fu panda , pinball_go_big_win_legit.pdf , functional behavior assessment example report , bootstrap 4 form validation tooltip , 72775782552.pdf , ancient greek education pdf , time warner plano tx , 79017874600.pdf ,