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Original Research Article

IMMUNOHISTOCHEMICAL EVALUATION OF STROMAL CD10 EXPRESSION IN PRIMARY BREAST CARCINOMA AND ITS CLINICOPATHOLOGICAL CORRELATION

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ABSTRACT

Background: Breast carcinoma is a major malignancy in women, with tumour behaviour influenced not only by the characteristics of neoplastic cells but also by the surrounding tumour microenvironment. CD10 is a cell-surface metalloprotease expressed by stromal cells and has been implicated in tumour progression and aggressive biological behaviour. Evaluation of stromal CD10 expression may therefore provide additional information regarding the clinicopathological characteristics of breast carcinoma. **Objectives:** To assess the pattern of stromal CD10 expression in primary breast carcinoma and to determine its association with clinicopathological parameters, including histological grade, lymph node status, oestrogen receptor (ER), progesterone receptor (PR), and HER2 status.

Materials and Methods: This institution-based, cross-sectional, descriptive observational study was conducted in the Department of Pathology, North Bengal Medical College and Hospital, Sushruta Nagar, Darjeeling, West Bengal, from June 2024 to July 2025. A total of 30 consecutive cases of primary breast carcinoma undergoing modified radical mastectomy with axillary dissection or breast-conserving surgery with axillary lymph node dissection were included. Histopathological examination and immunohistochemical evaluation of stromal CD10, ER, PR and HER2 were performed. Stromal CD10 expression was assessed semi-quantitatively and categorised as negative, positive, or strongly positive. Data were analysed using frequencies, percentages, Chi-square test and Fisher's exact test, with $p<0.05$ considered statistically significant.

Results: The mean age of the study population was 52.27±6.53 years, with most patients belonging to the 41–50-year age group (46.7%). Invasive carcinoma of no special type was the predominant histological type (93.3%), and Grade II tumours constituted the majority (73.3%). Stromal CD10 expression was observed in 27 (90%) cases, including positive expression in 21 (70%) and strong expression in 6 (20%). A statistically significant association was observed between stromal CD10 expression and Nottingham histological grade ($p=0.00007$). Significant associations were also observed with ER status ($p=0.000004$), PR status ($p=0.00014$), and HER2 status ($p=0.00049$). No significant association was observed between stromal CD10 expression and lymph node status ($p=0.634$).

Conclusion: Stromal CD10 expression is frequent in primary breast carcinoma and shows significant association with histological grade and hormone receptor and HER2 status. Its higher expression in biologically aggressive tumour characteristics suggests a potential role of stromal CD10 in the tumour microenvironment and progression of breast carcinoma. Larger studies with clinical follow-up are required to establish its independent prognostic significance.

Keywords: Breast carcinoma; Stromal CD10; Tumour microenvironment; Immunohistochemistry; Histological grade; Oestrogen receptor; Progesterone receptor; HER2.

INTRODUCTION

Breast cancer is one of the most commonly diagnosed malignancies worldwide and remains a leading cause of cancer-related mortality among women. Its burden has continued to increase, particularly in low- and middle-income countries, where changing lifestyle patterns, delayed diagnosis and disparities in access to screening and treatment contribute to the increasing disease burden.[1] Breast carcinoma is not a single disease entity but a heterogeneous group of tumours with distinct histological patterns, molecular profiles, therapeutic responses and prognostic outcomes.[2] This biological diversity makes accurate pathological assessment essential for diagnosis, staging, treatment planning and prognostication.

Histopathological assessment provides important information regarding tumour type, histological grade, tumour extent and lymph node involvement. Among these parameters, histological grade remains an important prognostic factor in invasive breast carcinoma, as it reflects tumour differentiation, nuclear pleomorphism and mitotic activity.[3] Lymph node status is also a major determinant of prognosis and continues to influence pathological staging and decisions regarding adjuvant treatment.[4] The modern approach to breast carcinoma therefore incorporates conventional histopathological parameters together with biological and immunohistochemical characteristics.[2,4]

The use of immunohistochemistry has become integral to the pathological evaluation of breast carcinoma. Estrogen receptor (ER) and progesterone receptor (PR) status are important in determining endocrine responsiveness and are assessed according to standardized recommendations.[6] Human epidermal growth factor receptor 2 (HER2) is another major predictive biomarker because its accurate assessment identifies patients who may benefit from HER2-targeted treatment.[7] Ki-67 is widely used as a marker of tumour proliferative activity and may provide additional information for prognostic assessment and tumour characterization, although its interpretation is affected by differences in methodology and scoring.[8] Thus, assessment of breast carcinoma increasingly involves integration of morphological features with immunohistochemical biomarkers.

Despite the established value of these parameters, breast carcinomas with apparently similar conventional pathological characteristics may demonstrate different biological behaviour. This has led to increasing interest in the tumour microenvironment and, particularly, the stromal compartment surrounding malignant epithelial cells. The tumour stroma is increasingly recognized as an active component of tumour biology rather than merely a supporting framework. Stromal factors may contribute to tumour progression, invasion and metastatic behaviour.

CD10, also known as neutral endopeptidase or neprilysin, is a cell-surface metalloproteinase that has been investigated as a marker of the stromal compartment in breast carcinoma. Stromal CD10 expression has been studied in relation to aggressive tumour behaviour and may provide information complementary to conventional epithelial markers.[9] The evaluation of CD10 within the tumour-associated stroma is therefore of particular interest because stromal expression may reflect alterations in the tumour microenvironment associated with invasion and disease progression.

Previous investigations have provided a basis for considering stromal CD10 as a potential prognostic marker. Iwaya et al. evaluated stromal CD10 expression in invasive breast carcinoma and reported its association with clinical outcome, supporting the potential prognostic relevance of stromal CD10 expression.[9] The available literature has also described associations of stromal CD10 with higher tumour grade and unfavourable receptor profiles, including ER and PR negativity, as well as HER2 positivity in some cohorts. These observations suggest that stromal CD10 may be related to biological characteristics of more aggressive breast carcinomas.

The recognition of breast cancer as a biologically heterogeneous disease has also emphasized the importance of considering both conventional histological characteristics and biological tumour features when assessing prognosis. Histological grade continues to provide valuable prognostic information, while molecular and immunohistochemical characteristics contribute additional biological context.[10] Consequently, evaluation of potential stromal markers such as CD10 alongside established clinicopathological and immunohistochemical parameters may provide a broader understanding of tumour behaviour.

Neoadjuvant chemotherapy has further increased the importance of comprehensive pathological assessment in breast carcinoma. It is used in locally advanced disease and selected early-stage or biologically aggressive tumours, with the objectives of downstaging disease, facilitating surgery and providing an assessment of treatment response.[5] Pathological response following neoadjuvant chemotherapy has prognostic relevance, and residual disease in the breast and lymph nodes requires careful pathological evaluation.[5]

In this context, the present study was undertaken to evaluate stromal CD10 expression in breast carcinoma and its correlation with clinicopathological parameters, including histological grade, lymph node status and immunohistochemical characteristics such as ER, PR, HER2 and Ki-67. The study was designed to explore whether stromal CD10 expression demonstrates meaningful associations with established pathological and biological parameters of breast carcinoma and thereby assess its potential value as an additional marker in the pathological

evaluation of breast carcinoma. The study specifically focused on stromal CD10 expression rather than epithelial tumour-cell expression, in keeping with the proposed role of the tumour microenvironment in breast carcinoma biology.

MATERIALS AND METHODS

This institution-based cross-sectional, descriptive and observational study was conducted in the Department of Pathology, North Bengal Medical College and Hospital, Sushruta Nagar, Darjeeling, West Bengal, from June 2024 to July 2025, following approval from the Institutional Ethics Committee. Data collection and laboratory work were performed throughout the study period after ethical approval, while data compilation and statistical analysis were undertaken after completion of case collection and reporting.

The study population comprised all cases of primary breast carcinoma undergoing Modified Radical Mastectomy with axillary lymph node dissection or breast conservative surgery with axillary lymph node dissection and received in the Department of Pathology during the study period. Consecutive sampling of eligible cases was performed until the required sample size was obtained. Based on departmental case load and feasibility during the study period, approximately 30 cases were included. Patients providing written informed consent were eligible for participation. Cases of metastatic or secondary breast tumours, benign breast neoplasms, non-neoplastic breast lesions, specimens referred from other hospitals with inadequate fixation or over-fixation, patients not giving consent, and cases showing complete pathological remission after neoadjuvant chemotherapy with no residual invasive tumour were excluded. No separate control group was required for this descriptive cross-sectional observational study.

Clinical and pathological variables were recorded using clinical details and specimen requisition forms. The variables assessed included age, sex, type of surgery, laterality, tumour size, histological type, histological grade, pathological tumour stage, pathological nodal stage, lymph node status and post-neoadjuvant chemotherapy status. The principal outcome variable was stromal CD10 expression, which was correlated with estrogen receptor, progesterone receptor, human epidermal growth factor receptor 2/neu, Ki-67 and other clinicopathological parameters.

Breast surgical specimens were received fresh or in formalin along with duly completed requisition forms containing relevant clinical history, imaging findings and treatment history, including neoadjuvant chemotherapy status where applicable. Specimens were fixed in 10% neutral buffered formalin, with adequate fixation ensured before grossing and tissue processing. Gross examination included documentation of specimen type and orientation, measurement of specimen dimensions, identification and measurement of the tumour, recording of tumour location and distance from margins, and examination of the nipple-areola complex where applicable. Axillary lymph nodes were identified and dissected, with documentation of the number of nodes retrieved and the size of the largest node. Representative sections were taken from the tumour, including the tumour-normal interface, closest margins, nipple-areola complex where applicable, grossly suspicious areas and lymph nodes.

Selected tissue samples were processed in an automated tissue processor, embedded in paraffin and sectioned at 3–5 µm thickness using a microtome. Sections were stained with haematoxylin and eosin and examined by light microscopy. Histopathological assessment included determination of the histological type of carcinoma, tumour grading according to the Nottingham grading system based on tubule formation, nuclear pleomorphism and mitotic count, and pathological tumour and nodal staging. Lymphovascular invasion, nodal metastasis including extracapsular extension where present, and margin status in breast conservative surgery specimens were also assessed. Immunohistochemistry was performed on representative tumour sections using an automated immunohistochemistry staining platform. Antigen retrieval and detection were carried out according to the standard laboratory protocol, and appropriate controls were included with each batch. The CD10 antibody used was clone EP195. Estrogen receptor and progesterone receptor were interpreted as positive or negative according to nuclear staining of tumour cells and accepted departmental cut-offs. Human epidermal growth factor receptor 2/neu was assessed using the standard 0, 1+, 2+ and 3+ scoring system, with final categorization as positive or negative according to accepted criteria.

Stromal CD10 expression was assessed specifically in the tumour-associated stroma and scored semi-quantitatively. For the purpose of analysis, stromal CD10 expression was categorized as negative, positive or strongly positive. Negative expression was defined as no stromal staining or minimal staining below the cut-off; positive expression indicated definite stromal staining in a significant proportion of stromal cells; and strongly positive expression indicated diffuse and/or strong stromal staining involving a large proportion of stromal cells. Where required for statistical analysis, CD10 expression was dichotomized into negative and positive, with strongly positive cases included within the positive category. Data were entered into Microsoft Excel and analysed using appropriate statistical methods. Categorical variables were expressed as frequencies and percentages. Associations between stromal CD10 expression and clinicopathological or immunohistochemical variables, including histological grade, pathological tumour and nodal stage, lymph node status, estrogen receptor, progesterone receptor, human epidermal

growth factor receptor 2, Ki-67 and post-neoadjuvant chemotherapy status, were assessed using the Chi-square test or Fisher's exact test wherever applicable. A two-sided p-value of <0.05 was considered statistically significant.

RESULTS

A total of 30 cases of primary breast carcinoma fulfilling the study criteria were included in the analysis. The study evaluated stromal CD10 expression and its association with histological grade, hormone receptor status, HER2/neu status and lymph node status. The study methodology specified semi-quantitative assessment of stromal CD10 as negative, positive or strongly positive.

Table 1: Baseline clinicopathological profile of the study population (n = 30)

Variable	Category	Number of cases	Percentage (%)
Age group (years)	≤40	0	0.0
	41–50	14	46.7
	51–60	12	40.0
	>60	4	13.3
Histological type	Invasive carcinoma of no special type (NST)	28	93.3
	Metaplastic carcinoma	1	3.3
	Mucinous carcinoma	1	3.3
Histological grade	Grade I	1	3.3
	Grade II	22	73.3
	Grade III	7	23.3
Primary tumour stage	pT2	21	70.0
	pT3	9	30.0
Lymph node status	Negative	17	56.7
	Positive	13	43.3
Post-NACT status	No	20	66.7
	Yes	10	33.3

The mean age of the study population was 52.27 ± 6.53 years, with an age range of 42–65 years. The largest proportion of patients belonged to the 41–50-year age group (14/30, 46.7%), followed by 51–60 years (12/30, 40.0%). Invasive carcinoma of no special type was the predominant histological diagnosis (28/30, 93.3%). Grade II tumours constituted the majority (22/30, 73.3%), while Grade III tumours accounted for 23.3%. Most tumours were pT2 (70.0%), and lymph node metastasis was identified in 43.3% of cases.

Table 2: Distribution of cases according to stromal CD10 expression (n = 30)

Stromal CD10 expression	Number of cases	Percentage (%)
Negative	3	10.0
Positive	21	70.0
Strongly positive	6	20.0
Total	**30**	**100.0**

Stromal CD10 expression was detected in 27 of 30 cases (90.0%), comprising 21 cases (70.0%) with positive expression and 6 cases (20.0%) with strong expression. Only 3 cases (10.0%) were negative for stromal CD10. Thus, stromal CD10 expression was frequent in the present study population.

Table 3: Association between stromal CD10 expression and histological grade (n = 30)

Stromal CD10 expression	Grade I	Grade II	Grade III	Total
Negative	1 (3.3%)	2 (6.7%)	0 (0.0%)	3 (10.0%)
Positive	0 (0.0%)	19 (63.3%)	2 (6.7%)	21 (70.0%)
Strongly positive	0 (0.0%)	1 (3.3%)	5 (16.7%)	6 (20.0%)
Total	**1 (3.3%)**	**22 (73.3%)**	**7 (23.3%)**	**30 (100.0%)**
χ^2, df, p-value				**24.16, 4, 0.00007**

A highly statistically significant association was observed between stromal CD10 expression and histological grade ($\chi^2 = 24.16$, df = 4, p = 0.00007). Strong stromal CD10 expression was predominantly observed in Grade III tumours: 5 of 7 Grade III tumours (71.4%) showed strong positivity, whereas only 1 of 22 Grade II tumours (4.5%) showed strong positivity. No Grade I or Grade III tumour was negative for stromal CD10. These findings demonstrate a clear relationship between increasing tumour grade and stronger stromal CD10 expression.

Table 4: Association between stromal CD10 expression and immunohistochemical profile (n = 30)

Stromal CD10 expression	ER negative n (%)	ER positive n (%)	PR negative n (%)	PR positive n (%)	HER2 negative n (%)	HER2 positive n (%)
Negative	0 (0.0)	3 (10.0)	0 (0.0)	3 (10.0)	3 (10.0)	0 (0.0)
Positive	2 (6.7)	19 (63.3)	3 (10.0)	18 (60.0)	19 (63.3)	2 (6.7)
Strongly positive	6 (20.0)	0 (0.0)	6 (20.0)	0 (0.0)	1 (3.3)	5 (16.7)
Total	**8 (26.7)**	**22 (73.3)**	**9 (30.0)**	**21 (70.0)**	**23 (76.7)**	**7 (23.3)**
χ^2, df, p-value	**20.75, 2, p = 0.00003**		**17.76, 2, p = 0.00014**		**15.23, 2, p = 0.00049**	

A highly significant association was observed between stromal CD10 and ER status ($\chi^2 = 20.75$, df = 2, p = 0.00003). All six strongly CD10-positive cases were ER negative, whereas none of the ER-positive tumours showed strong stromal CD10 expression.

Similarly, stromal CD10 expression was significantly associated with PR status ($\chi^2 = 17.76$, df = 2, p = 0.00014). Strong stromal CD10 positivity was observed exclusively among PR-negative tumours, with all six strongly positive cases being PR negative. A significant association was also demonstrated with HER2/neu status ($\chi^2 = 15.23$, df = 2, p = 0.00049). Among HER2-positive tumours, 5 of 7 cases (71.4%) demonstrated strong stromal CD10 expression, compared with only 1 of 23 HER2-negative cases (4.3%).

Table 5: Association between stromal CD10 expression and lymph node status (n = 30)

Stromal CD10 expression	LN negative n (%)	LN positive n (%)	Total
Negative	1 (3.3%)	2 (6.7%)	3 (10.0%)
Positive	12 (40.0%)	9 (30.0%)	21 (70.0%)
Strongly positive	4 (13.3%)	2 (6.7%)	6 (20.0%)
Total	**17 (56.7%)**	**13 (43.3%)**	**30 (100.0%)**
χ^2, df, p-value			**0.91, 2, p = 0.634**

Lymph node metastasis was present in 13/30 cases (43.3%), while 17/30 cases (56.7%) were lymph node negative. Although stromal CD10 expression was observed in both node-negative and node-positive tumours, the association was not statistically significant ($\chi^2 = 0.91$, df = 2, p = 0.634). Strong stromal CD10 positivity was observed in 2/13 node-positive cases (15.4%) compared with 4/17 node-negative cases (23.5%).

The principal finding of the study was the high frequency of stromal CD10 expression, with 90.0% of cases demonstrating some degree of stromal positivity. Strong stromal CD10 expression showed a marked association with higher histological grade, ER negativity, PR negativity and HER2 positivity. These associations were statistically significant, with the strongest association observed for histological grade and ER status. In contrast, lymph node status did not demonstrate a statistically significant association with stromal CD10 expression in this cohort.

DISCUSSION

The present study evaluated stromal CD10 expression in primary breast carcinoma and assessed its relationship with important clinicopathological and immunohistochemical parameters, including histological grade, lymph node status, estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2/neu) status. A total of 30 cases were included. Most patients were in the 41–50-year age group (14/30, 46.7%), followed by those aged 51–60 years (12/30, 40.0%) and those aged more than 60 years (4/30, 13.3%). Invasive breast carcinoma of no special type was the predominant histological diagnosis, accounting for 28 cases (93.3%), while metaplastic carcinoma and mucinous carcinoma accounted for one case each (3.3%). Histological Grade 2 tumours predominated (22/30, 73.3%), followed by Grade 3 (7/30, 23.3%) and Grade 1 (1/30, 3.3%).

Stromal CD10 expression was detected in 27 of the 30 cases (90.0%), with 21 cases (70.0%) showing positive expression and 6 cases (20.0%) showing strong positivity, while 3 cases (10.0%) were negative. The high frequency of stromal CD10 expression in the present series supports the concept that stromal components may have an important role in breast carcinoma biology. Smollich et al. studied the role of neprilysin (CD10) and endothelin-converting enzyme 1 in breast carcinoma using a large cohort of 600 breast cancer tissue samples and highlighted the relevance of peptide-regulatory enzymes such as CD10 in breast cancer progression.[11] Although their study primarily addressed biological pathways rather than direct grade-wise statistical correlations, their findings provide support for the biological relevance of CD10 in breast carcinoma.

A major finding of the present study was the statistically significant association between stromal CD10 expression and histological grade. Among 22 Grade 2 tumours, 19 (63.3%) showed positive stromal CD10 expression, 1 (3.3%) was strongly positive and 2 (6.7%) were negative. In contrast, among the 7 Grade 3 tumours, 5 (16.7%) demonstrated strong stromal CD10 expression and 2 (6.7%) showed positive expression, while none were negative. The association was highly statistically

significant (χ^2 = 24.16, df = 4, p = 0.00007), indicating that stronger stromal CD10 expression was particularly associated with higher-grade tumours.

These findings are comparable with those reported by Makretsov et al., who evaluated stromal CD10 expression in 438 invasive breast carcinomas and demonstrated a significant association with higher histological grade (p = 0.01) and ER negativity (p = 0.002). They also reported an association between stromal CD10 expression and poorer clinical outcome (p < 0.01).[18] The strong grade-wise association observed in the present study, with a particularly low p-value, therefore supports the observation that stromal CD10 expression may be related to more aggressive histological characteristics of breast carcinoma.

Iwaya et al. investigated stromal CD10 expression as a predictor of clinical outcome in invasive breast carcinoma. In their study, stromal CD10 remained significant for time to recurrence in multivariate analysis (p = 0.0059), while univariate analysis demonstrated a significant association with overall survival (p = 0.0021). They also reported that lymph node metastasis was associated with a shorter metastasis-free interval (p = 0.0318).[19] Although the present study did not include survival follow-up, the observed relationship of stromal CD10 with higher histological grade and adverse receptor characteristics is in keeping with the potentially adverse biological implications described by Iwaya et al.

A significant association was also observed between stromal CD10 expression and ER status. ER positivity was present in 22/30 cases (73.3%), whereas 8/30 cases (26.7%) were ER negative. All 6 strongly CD10-positive cases occurred among ER-negative tumours. Among ER-negative cases, 2 (6.7%) showed positive CD10 expression and 6 (20.0%) showed strong positivity, with no cases showing negative stromal CD10. In comparison, among ER-positive tumours, 3 (10.0%) were CD10 negative and 19 (63.3%) were positive, with no strongly positive cases. This association was statistically significant (χ^2 = 24.75, df = 2, p = 0.000004).

The present finding closely corresponds with the observations of Makretsov et al., who demonstrated a significant relationship between stromal CD10 expression and ER negativity (p = 0.002).[18] Kesse-Adu and Shousha reported that at least 29% of ER-negative invasive breast carcinomas expressed myoepithelial markers.[12] Although their study did not specifically investigate stromal CD10, their findings indicate that ER-negative carcinomas may demonstrate biological characteristics distinct from ER-positive tumours. The marked stromal CD10 expression observed among ER-negative tumours in the present study is therefore consistent with this broader association with different tumour phenotypes.

A similar pattern was observed with PR status. PR positivity was present in 21/30 cases (70.0%), while 9/30 cases (30.0%) were PR negative. Strong stromal CD10 expression was observed in 6/30 cases (20.0%) among PR-negative tumours, whereas none of the PR-positive tumours demonstrated strong stromal CD10 expression. The association between stromal CD10 and PR status was statistically significant (χ^2 = 17.76, df = 2, p = 0.00014). These findings further support the observation that strong stromal CD10 expression was concentrated among hormone receptor-negative tumours in the present study.

HER2/neu status also demonstrated a statistically significant association with stromal CD10 expression. HER2-negative tumours constituted 23/30 cases (76.7%), while 7/30 cases (23.3%) were HER2 positive. Among HER2-positive tumours, 5/30 cases (16.7%) showed strong stromal CD10 expression and 2/30 cases (6.7%) showed positive expression, while none were CD10 negative. The association was statistically significant (χ^2 = 15.23, df = 2, p = 0.00049). Desmedt et al. characterized CD10-positive stromal cells within the breast cancer microenvironment and highlighted their clinical relevance, including their potential importance in relation to HER2-associated tumour biology.[14] Although their study used a different study design and signature-based approach, the significant HER2 association observed in the present study supports the relevance of CD10-positive stroma in biologically aggressive tumour subgroups.

In contrast to tumour grade and receptor status, stromal CD10 expression did not show a statistically significant association with lymph node status. Lymph node metastasis was present in 13/30 cases (43.3%), while 17/30 cases (56.7%) were lymph node negative. Among lymph node-positive cases, 9 (30.0%) showed positive stromal CD10 expression and 2 (6.7%) were strongly positive. Among lymph node-negative cases, 12 (40.0%) were positive and 4 (13.3%) were strongly positive. The association was not statistically significant (χ^2 = 0.91, df = 2, p = 0.634). Thus, in the present cohort, stromal CD10 appeared to correlate more strongly with tumour grade and receptor profile than with nodal metastasis. The absence of a significant nodal association may partly reflect the limited sample size, although the present study itself cannot establish the reason for this finding.

The findings can also be considered in the context of the broader tumour microenvironment literature. West et al. demonstrated the importance of stromal signatures in breast carcinoma and proposed that stromal characteristics could contribute to tumour behaviour and classification.[13] Maguer-Satta et al. described CD10 as a multifaceted environmental actor involved in physiological and cancer-related mechanisms, while Bachelard-Cascales et al. identified CD10 as an important enzyme in the identification and regulation of human mammary stem cells.[15,16] Earlier work by Kenny et al. also established the role of cell-surface peptidases as modulators of growth and differentiation.[17] Together, these observations provide a biological

rationale for evaluating CD10 within the stromal compartment rather than considering it merely as an immunohistochemical staining pattern.

Thomas et al. examined the effect of neoadjuvant chemotherapy on stromal CD10 antigen expression in breast cancer and reported that stromal CD10 expression remained unchanged in 13 of 29 cases (44.83%) following chemotherapy.[20] In the present study, cases showing complete pathological remission after neoadjuvant chemotherapy were excluded; therefore, a direct pre-treatment and post-treatment comparison of stromal CD10 expression was not possible. Nevertheless, the findings of Thomas et al. indicate that stromal CD10 expression may persist or change following treatment and provide further support for considering stromal characteristics in the assessment of breast carcinoma.

Overall, the present study demonstrates that stromal CD10 expression is frequent in primary breast carcinoma and shows significant associations with higher histological grade, ER negativity, PR negativity and HER2 positivity. The strongest statistical association was observed with ER status ($p = 0.000004$), followed by histological grade ($p = 0.00007$), PR status ($p = 0.00014$) and HER2 status ($p = 0.00049$). In contrast, no significant association was observed between stromal CD10 expression and lymph node status ($p = 0.634$). The findings are broadly comparable with the observations of Makretsov et al. and Iwaya et al,[18,19] and support the potential usefulness of stromal CD10 as a marker for understanding the biological characteristics and aggressiveness of breast carcinoma. However, the findings should be interpreted within the context of the relatively small sample size and the absence of survival follow-up in the present study.

CONCLUSION

The present study demonstrates that stromal CD10 expression is a frequent finding in primary breast carcinoma, with 27 of 30 cases (90%) showing some degree of stromal positivity. Strong stromal CD10 expression was observed predominantly in higher-grade tumours and showed a statistically significant association with Nottingham histological grade. A significant association was also observed between stromal CD10 expression and hormone receptor status. Strong CD10 expression was particularly noted among oestrogen receptor-negative and progesterone receptor-negative tumours, while HER2-positive tumours also demonstrated a higher proportion of strong stromal CD10 expression. However, no statistically significant association was observed between stromal CD10 expression and axillary lymph node status. The findings support the possible role of stromal CD10 as a marker of an aggressive tumour microenvironment and suggest its potential relevance in understanding the biological behaviour of breast carcinoma.

Recommendations

Further studies with larger sample sizes and longer follow-up are recommended to validate the observed associations and determine whether stromal CD10 expression has independent prognostic significance. Prospective studies incorporating disease-free survival and overall survival would help establish its clinical utility. Correlation of stromal CD10 expression with molecular subtypes, proliferative indices and response to neoadjuvant chemotherapy should also be explored in larger cohorts. Standardisation of immunohistochemical scoring and interpretation of stromal CD10 expression would be important before considering its incorporation into routine pathological assessment. Further investigation into the biological interaction between CD10-positive stromal cells and tumour cells may provide better insight into the breast cancer microenvironment and identify potential therapeutic implications.

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