Altered expression of catenins and cadherins in lobular breast cancer: A focus on beta-catenin and E-cadherin

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Abstract

AIM: To compare the expression patterns of E-cadherin, β-catenin, and P120 catenin in breast carcinomas, focusing on aberrant patterns and their clinicopathologic significance.

- **B-catenin demonstrated a distinct Golgi pattern in aberrant cases, enhancing interpretability and sensitivity compared to E-cadherin and P120 catenin.**
- **Aberrant β-catenin expression was significantly associated with higher N and M stage, higher histologic grade, lymphovascular invasion, lower estrogen receptor (ER) expression, higher HER2 expression, and increased N-cadherin and P-cadherin expression (p<0.05).**

Introduction

- **Dysfunction of the E-cadherin/catenin complex is a hallmark of invasive lobular carcinoma (ILC) of the breast and contributes to its discohesive morphology and distinct clinical behavior.**
- **However, accurate histologic diagnosis of ILC remains challenging due to complex morphologic and immunohistochemical (IHC) patterns.**

Methods and Materials

- **We retrospectively analyzed 264 breast carcinoma cases with suspected lobular morphology.**
- **Tissue microarray (TMA) blocks were constructed from surgical specimens. IHC for E-cadherin, β-catenin, P120 catenin, N-cadherin, and P-cadherin was performed on TMA sections.**
- **The staining patterns were classified as membranous, aberrant, or loss.**

Results

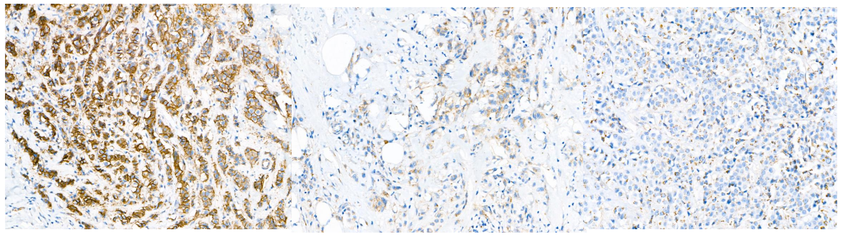


Figure 1. Representative figures of β-catenin staining patterns

(a) membranous expression of β-catenin ; (b) aberrant membranous expression of β-catenin, which shows gradual transition to Golgi pattern; (c) Golgi (loss) pattern of β-catenin

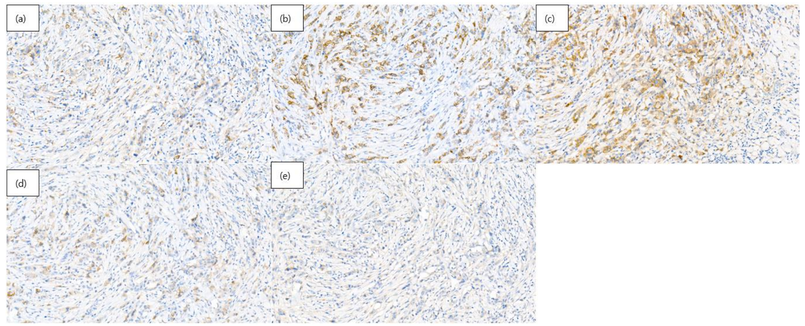


Figure 2. Representative figures of cadherin and catenin complex IHC pattern of a single case

(a) aberrant expression of β-catenin ; (b) aberrant expression of E-cadherin; (c) aberrant expression of P120; (d) expression of N-cadherin; (e) focal expression of P-cadherin

Table 1. Patterns of marker expression and tumor morphology in our cohort

E-cadherin	Morphology
Membranous (54)	IBC-NST (21, 38.9%)
	Lobular (33, 61.1%)
Aberrant membranous (54)	IBC-NST (11, 20.4%)
	Lobular (43, 79.6%)
Loss (156)	IBC-NST (11, 7.1%)
	Lobular (145, 92.9%)
β-catenin	Morphology
Membranous (49)	IBC-NST (20, 40.8%)
	Lobular (29, 59.2%)
Aberrant membranous (55)	IBC-NST (12, 21.8%)
	Lobular (43, 78.2%)
Loss (160)	IBC-NST (11, 6.9%)
	Lobular (149, 93.1%)
P120	Morphology
Membranous (53)	IBC-NST (22, 41.5%)
	Lobular (31, 58.5%)
Aberrant (49)	IBC-NST (9, 18.4%)
	Lobular (40, 81.6%)
Loss (162)	IBC-NST (11, 6.8%)
	Lobular (151, 93.2%)

- **The distribution of staining patterns was similar among E-cadherin, β-catenin, and P120 catenin**
- **β-catenin stain showed more aberrancy compared to E-cadherin.**
- **Aberrant β-catenin expression was significantly associated with higher N and M stage, higher histologic grade, lymphovascular invasion, lower estrogen receptor (ER) expression, higher HER2 expression, and increased N-cadherin and P-cadherin expression (p<0.05).**

Discussion and Conclusions

- **β-catenin IHC is more sensitive and interpretable than E-cadherin or P120 catenin for distinguishing ILC from IBC-NST, due to its unique localization patterns.**
- **Aberrant β-catenin expression is associated with aggressive clinicopathologic features and cadherin switching, implying its role in early or partial epithelial-mesenchymal transition (EMT) changes and tumor progression**
- **These findings support incorporating β-catenin IHC into the routine workup may improve diagnostic accuracy in morphologically ambiguous breast carcinomas.**

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