

## AKT signaling pathway in invasive ductal carcinoma of the breast: correlation with ER $\alpha$ , ER $\beta$ and HER-2 expression

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### ABSTRACT

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**Aims and background.** Estradiol exerts most of its effects by direct binding to the estrogen receptor in breast carcinoma, ER $\beta$  expression is a useful biomarker for breast cancer in a manner that is independent of ER $\alpha$  expression. However, studies evaluating ER $\beta$  expression with certain tumor variables, such as tumor grade and disease-free survival, had produced conflicting results. The Akt signaling pathway currently attracts considerable attention as a new target for effective therapeutic strategies. The current study attempted to compare the relative associations of variables including ER $\alpha$ , ER $\beta$ , HER-2/neu and AKT staining with the presence of metastases or survival.

**Methods and study design.** Immunohistochemical staining was employed to determine the expression of ER $\alpha$ , ER $\beta$ , pAkt and HER-2/neu in 110 cases of primary breast carcinoma.

**Results.** Positive ER $\alpha$ , ER $\beta$ , pAkt and HER-2/neu expressions were respectively observed in 46.4% (51/110), 59.1% (65/110), 40.9% (45/110) and 31.8% (35/110) of the tumors. pAkt was significantly associated with HER-2/neu overexpression ( $P < 0.005$ ) and axillary lymph node metastasis ( $P < 0.05$ ). However, there was no significant relationship between pAkt and ER $\alpha$ , ER $\beta$ , p53 ( $P > 0.05$ ) expressions. Survival analysis showed that pAkt positivity was associated with poor disease-free survival of the patients.

**Conclusions.** The current study suggested that activity of the Akt signaling pathway may indicate a poor prognosis in patients with breast carcinoma. The results implied that estrogen can activate the PI3K-Akt pathway through ER $\alpha$  and ER $\beta$ -independent mechanisms in breast cancer.

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**Key words:** Akt, breast neoplasm, estrogen receptor- $\alpha$ , estrogen receptor- $\beta$ , HER-2.

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