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## **Is human papillomavirus associated with Breast Cancer or papilloma presenting with pathologic nipple discharge?**

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**Purpose:** There are little data on the presence or interaction of human papillomavirus (HPV) in intraductal papilloma or Breast cancer (BC) presenting with pathologic nipple discharge (PND). The study aimed to determine whether the HPV-genotypes are identifiable in papilloma or carcinoma of the breast by real-time PCR with broad-spectrum genotyping.

**Methods:** Formalin-fixed-paraffin-blocks obtained from the patients who were suffering from PND and underwent ductoscopic papilloma extraction (n=27) or segmental/total mastectomy for cancer diagnosis (n=18). HPV-DNAs were identified by PCR with broad-spectrum genotyping. Mc Nemar test was used to compare cancer involved cases to normal-adjacent tissue concerning HPV positivity. Chi-Square test was used to analyze the association for receptor status in HPV positive cancer involved cases.

**Results:** The mean age (  $\pm$  SD) was  $49 \pm 16$  in papilloma and  $52 \pm 14$  in BC patients, respectively. We found high prevalence of HPV in papilloma and carcinoma: 29.6% (n=8) and 44.4% (n=8), respectively. The most common type identified in breast lesions was HPV-11 and the others were HPV- 6, 11, 39 and 82. Cancer involved samples were more contaminated by HPV in comparison to normal-adjacent tissues ( $p=0.016$ ). In HPV positive cancer involved cases, hormone receptors were found to be more positive than HER2-Neu ( $p=0.035$ ).

**Conclusions:** Our data suggest that HPV might be a causative agent for the development of papilloma and carcinoma of the breast in some cases presenting with PND. HPV positive breast cancers are more likely to be hormone positive. Further studies needed for validation regarding the integration of HPV-DNAs into the human genome that causes BC.

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