

Expression of autophagy and mitophagy markers in breast cancer tissues

ABSTRACT

Mitochondria play important roles in regulating cell bioenergetics status and reactive oxygen species (ROS) generation. ROS-induced mitochondrial damage is among the main intracellular signal inducers of autophagy. Autophagy is a cellular catabolic process that regulates protein and organelle turnover, while a selective form of autophagy, mitophagy, specifically targets dysfunctional mitochondrial degradation. This study aims to measure the levels of autophagy, mitophagy, oxidative stress, and apoptosis in invasive breast carcinoma tissues using immunohistochemistry (IHC). Tissue microarrays of 76 patients with breast cancer were stained with six IHC markers (MnSOD, Beclin-1, LC3, BNIP3, Parkin, and cleaved caspase 3). The expression intensity was determined for each tumor tissue and the adjacent tumor-matched control tissues. Intermediate and strong staining scores of MnSOD, Beclin-1, LC-3, BNIP-3, and Parkin were significantly higher in tumor tissues compared to the adjacent matched control. The scoring intensity was further classified into tissues with negative staining and positive staining, which showed that positive scores of Beclin-1 and Parkin were significantly high in tumor tissues compared to other markers. Positive association was also noted between BNIP-3 and Beclin-1 as well as LC-3 and cleaved caspase-3 immunostaining. To our knowledge, this is one of the first studies that measure both mitophagy and autophagy in the same breast cancer tissues and the adjacent matched control. The findings from this study will be of great potential in identifying new cancer biomarkers and inspire significant interest in applying anti-autophagy therapies as a possible treatment for breast cancer.

Keyword: Breast cancer; Autophagy; Mitophagy; Oxidative stress; Immunohistochemistry