Mitochondrial DNA copy number instability in ERBB2-amplified breast cancer tumors

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Abstract

Increase in the copy number of *ERBB2*, a Tyrosine Kinase Receptor (TKR) leads to the overexpression of oncogene product and consequently uncontrolled cell proliferation which has been reported in different aggressive cancers with mitochondrial malfunctions. Although, amplification of *ERBB2* has been reported in different studies; however, the association between changes in mitochondrial DNA content and the *ERBB2* gene copy number is poorly understood. The relative mitochondrial DNA content of breast cancer tumor tissues of 70 patients who were referred to Imam Khomeini Hospital Complex was determined using quantitative Real-time PCR. Multiplex ligation-dependent probe amplification (MLPA) was conducted to evaluate the *ERBB2* gene copy number variation and finally, two-sample Wilcoxon rank-sum (Mann-Whitney) test was used to investigate the possible association between mitochondrial DNA (mtDNA) content and the *ERBB2* gene amplification. Seventeen out of 70 breast cancer tumor tissues were found with *ERBB2* gene amplification. Comparison of the mitochondrial DNA content of the aforementioned samples with the rest of the cases showed a significant decrease in the mitochondrial DNA content of the *ERBB2*-amplified samples (P=0.01). Our data provided evidence that *ERBB2* have the potential to have a regulatory role over mitochondrial activity by controlling the mtDNA content.

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