Genistein inhibits MDA-MB-231 triple-negative breast cancer cell growth by inhibiting NF-κB activity via the Notch-1 pathway.


Source
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Abstract
Genistein (Gen) has been reported as a protective factor against breast cancer. However, the molecular mechanism by which Gen elicits its effects on triple-negative breast cancer cells has not been fully elucidated. In our study, the breast cancer cell line MDA-MB-231 was selected to determine the action of Gen on triple-negative breast cancer cells. MTT assay, flow cytometric analysis, siRNA transfection, western blotting and nuclear factor-κB (NF-κB) activation-nuclear translocation assay were used to address the role of NF-κB activity and the Notch-1 signaling pathway on the effects of Gen. Our study revealed that Gen elicited a dramatic effect on cell growth inhibition, in a dose-dependent and time-dependent manner. Treatment of MDA-MB-231 cells with 0, 5, 10 or 20 µM Gen induced apoptosis of 6.78, 18.98, 30.45 and 60.64%, respectively. Exposure of MDA-MB-231 cells to Gen also resulted in G2/M phase accumulation of cells corresponding to 4.93, 12.54, 18.93 and 30.95%, respectively. Furthermore, our data demonstrated for the first time that Gen inhibited the growth of MDA-MB-231 triple-negative breast cancer cells by inhibiting NF-κB activity via the Notch-1 signaling pathway in a dose-dependent manner. We also found that Gen downregulated the expression of cyclin B1, Bcl-2 and Bcl-xL, possibly mediated by NF-κB activation via the Notch-1 signaling pathway. In conclusion, our results suggest that inhibition of NF-κB activity via the Notch-1 pathway may be a novel mechanism by which Gen suppresses the growth of triple-negative breast cancer cells. Further preclinical and clinical studies are warranted to further investigate the application of Gen for the treatment of triple-negative breast cancer.

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