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CHARACTERIZATION OF MANGANESE SUPEROXIDE DISMUTASE EXPRESSION (MnSOD) IN HUMAN BREAST CANCER STEM CELLS AND ITS CORRELATION WITH CELL PLURIPOTENCY

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Background:

MnSOD - a major cellular antioxidant enzyme - is suggested to be responsible for the resistance of breast cancer stem cells (CSCs) against oxidative stress. The aim of this study is to analyze the MnSOD expression in human breast CSCs and its correlation with cell pluripotency.

Methods:

Specimens were tumor and normal breast tissues collected during radical mastectomy from 10 patients. CSCs were isolated using magnetic beads column and identified using immunofluorescence. Analysis of cell pluripotency (Oct-4 mRNA) and characterization of MnSOD mRNA expression were performed using Real Time RT-PCR. MnSOD specific activity was determined using xantin-oxidase inhibition assay. Data were statistically analyzed using t-test and Pearson Correlation.

Results and Discussion:

Higher expression of Oct-4 and MnSOD mRNA, as well as MnSOD specific activity were demonstrated significantly in CD24⁻ and CD24⁻/CD44⁺ cells containing breast CSCs compared to their counterparts. This study could demonstrate a very strong correlation between MnSOD mRNA level and specific activity, and between MnSOD and Oct-4 expression, suggesting that MnSOD might play an essential role on the survival of human breast CSCs against oxidative stress and is required for maintaining their pluripotency.

Conclusion:

This is the first study characterizing the MnSOD expression and activity in human breast CSCs from clinical specimens. MnSOD expression is up-regulated in human breast CSCs and strong correlated with their pluripotency.

Keywords:

Breast cancer stem cells, MnSOD expression, Oct-4 expression, cell pluripotency