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

Septelia IW, Reni P, Naroeni A, Sonar SP, Endang WB, Amarila M, Budiman B

Department of Biochemistry and Molecular Biology and Tumor Surgery, Faculty of
Medicine, Universitas Indonesia
Department of Pharmacy, Faculty of Mathematics and Natural Sciences, Universitas
Indonesia
Department of Oral Biology, Faculty of Dentistry, Universitas Indonesia

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