Polymorphisms in \textit{GSTM1}, \textit{GSTT1}, \textit{GSTP1}, and \textit{GSTM3} genes and breast cancer risk in northeastern Mexico

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Received January 9, 2015
Accepted April 29, 2015
Published June 11, 2015
DOI http://dx.doi.org/10.4238/2015.June.11.22

\textbf{ABSTRACT.} Glutathione \textit{S}-transferases (GSTs) are a family of phase II metabolizing enzymes involved in carcinogen detoxification and the metabolism of various bioactive compounds. Several genes that code for these enzymes are polymorphic in an ethnicity-dependent manner, with particular genotypes previously associated with an increased risk of breast cancer. The purpose of this study was to determine the frequencies of polymorphisms in the genes \textit{GSTM1}, \textit{GSTT1}, \textit{GSTP1}, and \textit{GSTM3} and to investigate whether an association exists between these genes and breast cancer risk in subjects from northeastern Mexico. Genotypes were determined for 243 women with histologically...
confirmed breast cancer and 118 control subjects. Gene polymorphisms were analyzed using a DNA microarray. We found an increased breast cancer risk associated with the GSTM1 gene deletion polymorphism (OR = 2.19; 95%CI = 1.50-3.21; P = 0.001). No associations between the GSTT1, GSTP1, and GSTM3 genotypes and neoplasia risk were observed. In conclusion, we determined the genotype distribution of GST polymorphisms in control subjects and breast cancer patients from northeastern Mexico. The GSTM1 null genotype was associated with breast cancer risk. Our findings may be used to individualize breast cancer screening and therapeutic intervention in our population, which displays ethnic characteristics that differentiate it from other populations in Mexico.

**Key words:** Breast cancer; Ethnicity; Glutathione S-transferases; Northeastern Mexico; Polymorphisms