

Pregnancy-Associated Genetic Signatures in the Human Breast

Background of the Invention

Breast cancer has traditionally been linked to nulliparity (childlessness) or late first term pregnancy, whereas young age at first childbirth, multiparity and breast-feeding are associated with a reduced risk. Early pregnancy confers protection by inducing breast differentiation. This protection is age-specific and risk of cancer development becomes greater than that of nulliparous women when the first full-term pregnancy occurs after 35 years of age.

Summary of the Invention

It has been found that parous women who after menopause had not developed breast cancer exhibit a specific genomic signature that significantly differs from that of parous women with cancer, and nulliparous women with or without cancer. The signature is comprised of both upregulated and downregulated genes.

- A total of 2,541 gene sequences have been found to be differentially expressed. A specific genomic profile that is still present in parous women at post-menopause has been identified.
- Samples clustered primarily based on parity status. This suggested that the principal source of global variation in gene expression across these data sets was due to genetic differences between women due to reproductive history.
- Combined parity and absence of breast cancer data generate a distinct genomic profile that differs from the breast cancer groups, irrespective of parity history and from the nulliparous cancer-free group, which has been traditionally identified as a high risk group.

Further characterization of the fully differentiated condition of the breast epithelium that is associated with reduced cancer risk and the genetic signature associated with this condition, will provide a useful molecular tool for identifying those patients in which pregnancy has been protective, and for identifying women at risk irrespective of their pregnancy history, and for its use as an intermediate biomarker for evaluating cancer preventive agents.

Patent Status

A U.S. Provisional Application has been filed.

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About Fox Chase Cancer Center

Fox Chase Cancer Center is an independent, not-for-profit institution devoted to cancer treatment and prevention, clinical research, and basic research on cancer prevention, initiation, and progression. More than 150 clinical trials are typically ongoing at any time. Key discoveries of Fox Chase researchers include the Scid mouse and the Hepatitis B vaccine. Fox Chase was one of the first institutes to be designated as a comprehensive cancer center by the National Cancer Institute and remains among the top three NCI-core grant recipients in the country. Fox Chase is a founding member of the National Comprehensive Cancer Network, an alliance of the world's leading cancer centers, and has a network of hospital affiliations in Pennsylvania, New Jersey and Delaware.