LETTER TO THE EDITOR

Risk factors and early detection of breast cancer: facts, questions, and genome-based perspectives

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Substantial progress in detecting breast cancer at an early stage has been made over recent decades. Mammographic breast screening in the general population and *BRCA1/2* mutation testing in the subpopulation of women with significant family history of breast and ovarian cancer represent two prime paradigms of clinical success. However, breast cancer continues to be the most common female cancer, and mortality remains high.

In the October issue of *Current Oncology,* Narod[1], based on his large-scale experience in breast cancer and analyzing a huge body of genetic and non-genetic risk factors, provided a critical approach on early onset of the disease. Despite advances through classical biomedical reductionist research and genetic epidemiology in identifying lifestyle and environmental risk factors and the identification of many genes involved in breast cancer, grand challenges and unresolved questions are ahead of us. Identification of individual women at very high risk for personalized prevention is currently unrealistic for the vast preponderance of cases; only for a small percentage (5%–10% of annually diagnosed breast cancers with *BRCA1/2* mutation) is such prediction feasible.

Breast cancer is a heterogeneous disease that arises from complex genome–environment interactions and accumulation of genetic and epigenetic alterations. The high complexity involved in the understanding of how these driver mutations and epigenome events dysregulate critical cell signalling pathways, biomolecular networks, and biologic systems homeostasis leading to tumorigenesis explains the current limitations in personalized risk assessment and prevention of the disease. Whether all these problems can be resolved by using next-generation sequencing for exome and whole-genome sequencing and rapid advances in systems and synthetic biology for predicting biomolecular networks will result in the discovery of novel robust biomarkers for early detection at a very early stage in asymptomatic women and new preventive drugs is still unknown[2–9].

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CONFLICT OF INTEREST DISCLOSURES

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