

# Innovative Approaches to Prevent Breast Cancer

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**Received:** 20-Feb-2022, Manuscript No. OCCRS-22-54115; **Editor assigned:** 22-Feb-2022, PreQC No. OCCRS-22-54115(PQ); **Reviewed:** 10-Mar-2022, QC No. OCCRS-22-54115(Q); **Revised:** 13-Mar-2022, Manuscript No. OCCRS-22-54115 (R); **Published:** 20-Mar-2022; DOI: 10.37532/occrs.22.8(3)0.01

## Brief Report

Breast cancer is the most frequent disease in women and the leading cause of cancer death in women in the world, with an estimated 2.1 million new cases and 626,679 deaths reported in 2018. In the United States, a woman has a 13% risk of being diagnosed with breast cancer at some point in her life and a 2.6% chance of dying from it. Breast cancer prevention, treatment, and survivorship are all part of a multi-pronged approach to cancer control. In affluent countries, great advancements have been achieved in medicines and care standards, resulting in lower mortality. Breast cancer incidence, on the other hand, has remained stable over the last three decades, indicating that a new approach to population-wide breast cancer prevention is required.

Primary prevention (preventing cancer before it starts) vs. secondary prevention (screening and early detection), as well as population-level vs. focused prevention, can be distinguished. While widespread mammography screening promised a shift from more advanced to less-advanced disease at diagnosis, the increase in less-advanced disease has come from more diagnoses of presumed indolent disease rather than fewer diagnoses of advanced breast cancer, and the rate of diagnosis of advanced (late-stage) breast cancer has not decreased significantly. Provided certain adjuvant chemotherapy and radiation are now the standard of care for most non-metastatic breast cancers, this high rate of diagnosis comes at a significant financial and human cost to the healthcare system and to each person who is subjected to surgery, radiation, and adjuvant hormonal or chemotherapy. Primary prevention, on the other hand, has the potential to avoid these traps and reduce the incidence of both advanced and less advanced diseases. Individuals at increased risk (for example, those with BRCA gene variants linked to a higher risk of breast cancer) or the general public can be the focus of prevention initiatives. Although focusing on the high end of the risk spectrum can have an impact on those individuals, it still fails to prevent the vast majority of breast cancer cases that occur in the "normal" range of the breast cancer risk bell curve. Furthermore, for the vast majority of people, we are unable to accurately predict their breast cancer risk, and most incidences of breast cancer are spontaneous and unrelated to any known risk factors. Instead, population-level prevention tries to change the entire curve in the direction of lower risk. Instead of looking at individual risk, we can discover and eliminate common factors that lead to a greater breast cancer incidence in the population by looking at risk across the population (e.g., limiting exposures to environmental carcinogens and endocrine-disrupting compounds to which the population, in general, is exposed). Foundational efforts at system-level change across the population, addressing socioeconomic determinants of health and creating the framework for individuals to live healthier lives are the most effective public health initiatives.

Such initiatives have been successful in reducing tobacco use, particularly in California, and therefore in lowering the incidence of tobacco-related malignancies significantly. Finally, the continually broad variance in breast cancer incidence rates around the world, as well as the changes in incidence that occur when people migrate from low-incidence to high-incidence nations, indicate the importance of modifying our environment for cancer prevention. As a result, population-level primary prevention is an area with a lot of research promise.

The idea that a crowdsourced idea-generating competition or "great challenge" could be one source of research ideas was new to CBCRP's third round of Program Initiatives. Challenges and incentive or inducement awards are effective instruments for addressing problems and bringing about change that would otherwise be intractable. They are a strategy that has been implemented by a number of foundations and governments, particularly in the recent decade. The US federal government dramatically extended its use of challenges during the Obama administration, including the launch of Challenge. A competition's design and prize money can be tailored to achieve a variety of purposes.