

# Scientific Progress Report

Summary of Art beCAUSE Breast Cancer Foundation Consortium

September 2015 - August 2016

What follows is a summary of the *"Investing In Prevention"* Lab Consortium's recent progress report to the Art beCAUSE Breast Cancer Foundation, the complete copy of which can be found on the Foundation's website, [www.ArtbeCAUSE.org](http://www.ArtbeCAUSE.org)

In the world of medical research, results are measured in "baby steps." One of the Consortium's primary goals is to expand public awareness of cancer-causing chemicals through published manuscripts in high profile scientific journals and through presentations to international scientific associations, government agencies and funding organizations.

Since the Consortium was organized in mid-2014, these baby steps have been accomplished as follows:

- 1) 19 full-length, peer reviewed manuscripts directly related to our funding have been published by our scientists specifically acknowledging the support of Art beCAUSE.
- 2) 16 Abstracts acknowledging Art beCAUSE were presented at national and international conferences.
- 3) 13 by-invitation lectures, seminars and presentations were delivered, all acknowledging Art beCAUSE, with two more scheduled this Fall.

Because of these steps, the Consortium scientists are more convinced than ever that breast cancer prevention is a realistic goal. Using multiple human and animal models the Consortium has advanced their understanding of the molecular mechanisms behind breast cancer and the means through which environmental agents contribute to both the incidence and severity of human breast cancer.

As you recall, each scientist and lab has a specific focus that compliments the work of the other consortium members. The following is a summary of progress made in each lab.

## Dr. Sherr's

lab has demonstrated how the AHR (an environmental chemical receptor in the breast cell) induces the development of cancer stem cells in both breast and oral cancers, which invade tissues and migrate to the brain. They have also discovered that the AHR can be activated, causing cancer, by our own body's bacteria (our "microbiome") which has been altered by exposure to environmental chemicals.

## Dr. Monti's

computational biology lab has added several hundred suspected carcinogens to its high-throughput, genomic cancer-causing chemical predictive model. Since it's initial development two years ago, this model has a predictability success rate approaching 85%. Dr. Monti is presenting his work to the National Institutes of Health in Bethesda in September.

## Dr. Kupperwasser's

lab has generated preliminary data which indicates that estrogen-mimicking chemicals dramatically alter the normal development path of human breast cells. This finding suggests that early exposure to these chemicals may cause healthy cells to transform into full blown malignancies.

## Dr. Sonenshein's

lab has identified a unique signaling pathway that promotes the migration and metastasis of breast cancer. Further, they have developed a technology that detects residual breast cancer cells circulating in human blood and tells scientists what chemicals the human was exposed to.

**Very exciting work for a short two-year period!**

# Meet Our Scientists



## David H. Sherr, PhD, Consortium Director

Professor of Environmental Health, Professor of Pathology and Laboratory Medicine, Boston University School of Public Health, School of Medicine  
Director, Boston University Immunology Training Program  
Director, Boston University Superfund Research Program

Dr. Sherr is a molecular biologist and toxicologist who studies cellular receptors that recognize a wide variety of environmental pollutants that signal cells to both grow and metastasize. He is an internationally recognized expert on the aryl hydrocarbon receptor (AhR), a protein that binds to environmental carcinogens and begins the aberrant signaling that results in a full-blown cancer cell.



## Stefano Monti, PhD

Associate Professor of Medicine  
Adjunct Professor, Bioinformatics Program  
Boston University School of Medicine  
Affiliate Member, Broad Institute of MIT & Harvard

Dr. Monti has developed a cutting-edge technology for rapidly and economically screening thousands of chemicals for their ability to influence expression of virtually all cancer-related signaling pathways within human cells, including but not limited to the AhR, the Wnt, and the NF- $\kappa$ B pathways. The National Institutes of Health (NIH) has acknowledged that this type of high-throughput screening assay may be the only practical way to determine how we are affected by mixtures of environmental pollutants.



## Gail E. Sonenshein, PhD

Professor of Biochemistry  
Tufts University School of Medicine

Dr. Sonenshein's laboratory was the first to demonstrate inappropriate activation of NF- $\kappa$ B by environmental carcinogens and their role in promoting cancer growth and survival. While at Boston University, she established and directed the Women's Health Interdisciplinary Research Center, a center dedicated to determining the underlying causes of several diseases in women including breast cancer. She is now working at Tufts and committed to further investigating the links between breast cancer and the environment.



## Charlotte Kuperwasser, PhD

Associate Professor of Anatomy and Cellular Biology  
Tufts University School of Medicine

Dr. Kuperwasser is an internationally recognized researcher with expertise in the biology of cancer stem cells, the cell subset likely responsible for cancer relapses and ultimately death, and in the role of the tumor microenvironment in malignant cell growth. She pioneered the development of a unique and enormously powerful mouse model in which discarded normal human breast cells are transplanted into the mammary glands of mice to study how these normal cells influence outgrowth of cancerous cells.