The Ecology of Breast Cancer

The promise of prevention and the hope for healing

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Introduction

The diagnosis of breast cancer profoundly changes the lives of women, men, and their families. At the same time that people struggle with making difficult treatment-related decisions, they also commonly ask, why me? Why did this happen? The search for answers usually raises more questions.

In important ways, like other complex diseases, breast cancer is a design problem. By that I mean two things. First, although breast cancer is an ancient disease, it becomes much more common in countries where people adopt industrialized, Western-styles of eating, moving around, making and using consumer products, and general living. This strongly suggests that as we collectively make choices about the way we live, we can actually design disturbing breast cancer patterns into the complex fabric of society. This is not unique to breast cancer. It also applies to diabetes, cardiovascular disease, cognitive decline, dementia, other kinds of cancer, and asthma, among others.

Second, understanding, preventing, and treating breast cancer pose significant challenges for designing research and interventions. To be effective, proposed solutions must confront considerable complexity. Ideally they will connect and integrate knowledge from different disciplines and perspectives. Science, art, health, and healing must converge in the process of re-design.

Breast cancer is the most common invasive cancer among women in the United States, and rates are rapidly increasing in many other countries throughout the world. After increasing

for several decades, female breast cancer incidence in the U.S. began decreasing somewhat in 2000 and has been relatively stable in recent years. In the U.S., about one in eight women will develop breast cancer during their lives. The disease is about 100 times less common among men. Fortunately, death rates from breast cancer have been declining over the past 25 years, with larger decreases in women younger than 50. These decreases are probably due to a combination of more effective treatments and earlier detection. New therapies for some sub-types of breast cancer have especially improved.

Women and men who undertake combinations of surgical, pharmaceutical, and radiation therapies for breast cancer often wonder what else they might do to improve their long-term outcomes. This project began with a goal of addressing that question. A number of studies have examined the extent to which diet, exercise, weight control, stress reduction, and other factors are associated with recurrence and survival following diagnosis and initial treatment. My original intent was to summarize their findings, but for several reasons that goal soon began to seem too narrow.

Even though I have spent many years treating illnesses and injuries in medical practice, I have long been interested in the causes and primary prevention of diseases like breast cancer that are related in complex ways to environmental conditions. Here, by "environment" I mean the totality of the biologic, physical, chemical, built, nutritional, and social environments that humans have participated in creating throughout the world. In addition to its effects on breast cancer prognosis, I wanted to look more extensively into the role this complex environment might play in contributing to or preventing the disease in the first place.

Beyond that, since the latency period of breast cancer—the time between earliest tumor initiation and clinical diagnosis—is often decades long, an unknown number of people harbor early stages of the disease for a number of years without knowing it. In fact, some very early life experiences are clearly associated with breast cancer risk. For example, fetal diethylstilbestrol (DES) exposure or early onset of menarche increases breast cancer risk decades later. Some studies also show that certain kinds of diets and exercise patterns, beginning even in childhood, are linked to reduced risk or improved outcomes in people who develop breast cancer much later. It is, therefore, increasingly clear that efforts to prevent breast cancer and improve outcomes after diagnosis and treatment must begin in the earliest days of fetal development, if not before. In short, there is no bright line between interventions intended to make breast cancer less likely, slow its progression, perhaps even reverse its course, and improving outcomes. As a result, the scope of this project expanded to include breast cancer prevention.

Simply creating a list of known, probable, and plausible risk factors for breast cancer makes it apparent that they encompass many aspects of our individual and collective lives. At the population level, one or two variables do not stand out as overwhelmingly responsible for

changes in breast cancer incidence, although some individuals are at higher risk because of certain susceptibility genes. Rather, breast cancer patterns are largely determined by a complex mix of interacting, multi-level variables strongly pointing toward a more systemic problem.

We will undoubtedly be more successful at preventing the disease and promoting healing if we approach it through multi-level interventions. Individuals cannot do this alone. Opportunities and responsibilities lie within the range of activities of a large number of social, political, and professional organizations and institutions. All health care practitioners, including obstetricians and pediatricians, have important roles to play. Many public health professionals who do not typically see their work as related to breast cancer will inevitably see the connections if they step back and look at a bigger picture. Even more broadly, because of the complexity of breast cancer, decision-makers in all sectors whose activities help to shape the conditions out of which breast cancer is more or less likely to arise can make important contributions. They include teachers, city planners, farmers, legislators, and business leaders whose decisions and priorities strongly influence breast cancer-related features of the world we live in.

How this book is organized

This book is divided into three sections. Section I (chapters 1 and 2) briefly reviews the history of breast cancer and the evolution of ideas about its origins. It concludes that an ecological or eco-social framework is best suited to acknowledge and help clarify the complexity of the disease as well as helping to design research and interventions. This section includes a brief summary of breast cancer demographics, trends, and known risk factors.

Section II is comprised of five chapters addressing diet (chapter 3), exercise (chapter 4), environmental chemicals (chapter 5), features of the electromagnetic spectrum including vitamin D, light at night, and non-ionizing radiation (chapter 6), and stress (chapter 7). Each of these reviews an extensive literature and because of that, begins with a summary of the more detailed material that follows. In some instances, I found it particularly instructive to review the history of research into these categories of risk factors and have occasionally included discussions of older studies that influenced the direction and design of subsequent investigations.

Section III (chapter 8) summarizes and begins to reassemble the various risk factors into a more integrated whole. It explores implications for individuals, families, and communities as well as health care providers, public health officials, and others who can make a difference.

Most of the material reviewed in this book is drawn from epidemiologic and laboratory animal studies. I do not intend for it to be construed as medical advice. Nor, have I made any attempt to review or comment on a range of conventional medical therapies or their alternatives. But I do hope that people interested in a comprehensive approach to breast cancer prevention or treatment will find this material useful as they explore options.

Almost daily, medical journals and the press report new breast cancer research findings. Undoubtedly, some of the conclusions I reach here will need to be modified as new information becomes available. But, no matter how some of the details may change, it is my hope that we will increasingly address breast cancer—its origins and treatment—as a systems challenge, requiring an integrated, multi-level response.