

Introduction

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The field of the cancer stem cell in solid tumors, such as breast, is in its infancy. Yet the literature is rife with instances of hypothesis becoming dogma without critical examination of the data used to support the hypothesis or of alternative explanations for the observations made. H.L. Mencken once said, "Some problems are so difficult that they cannot be solved unless someone thinks about them for five minutes." Voltaire, somewhat earlier noted, "No problem can stand the assault of sustained thinking." The difficult part of the challenge by Mencken is to find the five minutes for deep contemplation of an issue such as that of the cancer stem cell. The aim of this volume is to provide the readers with food for thought. Einstein postulated that, "No problem can be resolved by the same kind of thinking that created it." Therefore, we have selected various contributors who are "thought leaders" in the area of stem cells in general and/or mammary stem cells in particular, to guide us in exploring and grasping the concepts necessary for a sound approach to the problem of identification and characterization of the cancer stem cell in the breast. The authors of the various papers

contained herein were asked to be provocative, to force the readers out of their comfort zone of thinking about stem cells in the breast and in breast cancer, to question the current "dogma" on what constitutes a stem cell and how we can recognize it and understand its properties.

These papers explore fundamental questions of the origin, evolution (Shostak; Strizzi et al.) and properties (Kern and Shibata; Sherley; and Klar) of the stem cell in normal as well as cancerous tissue. Both Booth et al. and Tanos and Briskin discuss the microenvironment in which the mammary stem cell resides and is manifest. The dominance of the mammary niche is explored and presented as key to understanding the properties of the stem cell. Finally Norton and O'Brien et al. explore the concept of the cancer stem cell within its niche and our approaches to cancer therapy. They raise the question of the inherent resistance of the cancer stem cell to chemotherapy and radiation therapy and the importance of the niche in this process. By understanding the fundamentals of the cancer stem cell and its niche they propose that better therapies can and will be designed.

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