Preface

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Cancer is a disease in which many of the characteristics of normal cell behavior are lost or perturbed. Uncontrolled cell proliferation and inappropriate cell survival are common features of all cancers, but in addition defects in cellular morphogenesis that lead to tissue disruption, the acquisition of inappropriate migratory and invasive characteristics and the generation of genomic instability through defects in mitosis also play important roles in the progression of the disease. In fact, localized cancer can often be cured by surgery and/or targeted therapies, but it is the ability of cancer cells to metastasize beyond the primary site and invade distant organs that is responsible for the high mortality rate of cancer patients. The last three decades has witnessed huge progress in understanding the molecular mechanisms that control cell proliferation and survival. This has led to the identification of key oncogenes and tumor suppressor genes that are frequently altered in human

cancer and many of these are now targets of new drug discovery programs. However, far less is known about the molecular changes that occur during tumor progression to metastasis.

The cytoskeleton, which plays a central role in determining cell shape and cell movements, has become an important focus of attention for those interested in the cell biology of tumor progression leading to metastasis. Two proteins in particular, actin and tubulin, form highly versatile, dynamic polymers (the actin and microtubule cytoskeletons) that influence many relevant aspects of cell behavior. They can organize cytoplasmic organelles and intracellular compartments, define cell polarity, and generate both pushing and contractile forces. In the cell cycle, these two cytoskeletal structures drive chromosomal separation and cell division. During morphogenesis, they determine cell shape and polarity, and promote stable cell–cell and cell–matrix adhesions through their interactions with cadherins and integrins, respectively. Finally, during cell migration they generate protrusive forces at the front and retraction forces at the rear. These are all aspects of cell behavior that are associated with tumor progression. In this thematic collection, we have brought together research leaders from around the globe and asked them to summarize their recent discoveries that highlight the significance of the actin and microtubule cytoskeletons in the development and maintenance of cancer phenotypes. We hope that these reviews will provide timely information to a broad spectrum of cancer biologists.

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