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## Preface

Cell cycle checkpoints control the fidelity and orderly progression of eukaryotic cell division. These checkpoints prevent progression into the next phase of the cell cycle until the processes at the current phase have been properly completed. The most studied cell cycle checkpoints act at transition points, such as from G1 to S, G2 to M, or the metaphase to anaphase transition. Genotoxic stresses from byproducts of cellular metabolism or environmental sources can also activate cell cycle checkpoints, halting cell cycle progression until the damages are repaired.

By controlling the orderly progression of critical cell cycle events such as DNA replication and chromosome segregation, and ensuring proper repair of damaged DNA, cell cycle checkpoints function to ensure genome integrity. Cell cycle checkpoint pathways consist of sensors that detect DNA damage or incomplete cell cycle processes, signal transducers that halt cell cycle progression, and effectors that execute damage repair or a commitment to apoptosis, if the damage cannot be repaired.

Research in the past decade or so has elucidated many of the molecular mechanisms involved in various aspects of cell cycle checkpoints. Mechanisms of checkpoint control are not only the focus of investigators interested in cell cycle regulation, but are also of interest to researchers studying cancer development. It is becoming increasingly clear that loss of cell cycle checkpoints, which leads to genomic instability, is a hallmark of tumorigenesis.

The aim of *Cell Cycle Checkpoints* is to provide detailed descriptions of a wide variety of methodologies currently employed by researchers in the field of cell cycle checkpoints. The methodologies include those commonly used in the mammalian, yeast, *Caenorhabditis elegans*, *Drosophila*, and *Xenopus* model systems. Each chapter describes a specific technique or protocol, such as a method for inducing cell cycle checkpoints in a particular model system, for synchronizing a population of cells to allow observations of cell cycle progression, for identifying genes involved in checkpoint regulation, or for studying particular protein components of cell cycle checkpoint pathways. Most of the chapters are aimed at researchers new to the field of cell cycle checkpoints and describe every step of the methodology in sufficient detail to allow for successful application.

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