

# mitosis and the cell cycle webquest

**mitosis and the cell cycle webquest** is an engaging educational activity designed to help students understand the complex processes involved in cell division and growth. This webquest provides a structured exploration of the cell cycle, focusing on mitosis, its phases, and significance in biological systems. By completing this webquest, learners will develop a comprehensive understanding of how cells proliferate, the importance of accurate division, and the implications for health and disease. This article will guide you through the key concepts of mitosis and the cell cycle, supported by detailed explanations, lists, and educational insights to enhance your learning experience.

## Understanding the Cell Cycle

The cell cycle is the series of events that cells go through to grow and divide. It is fundamental to growth, development, tissue repair, and reproduction in all living organisms. The cell cycle consists of several distinct phases, each with specific activities and purposes.

## Phases of the Cell Cycle

The cell cycle is traditionally divided into two main phases:

1. **Interphase** - the preparatory phase where the cell prepares for division
2. **Mitotic phase (M phase)** - the actual process of cell division

During interphase, the cell carries out normal functions, grows, and duplicates its DNA. The mitotic phase involves the division of the nucleus and cytoplasm, resulting in two genetically identical daughter cells.

## Interphase Details

Interphase can be further subdivided into three stages:

- **G1 phase (Gap 1)** - cell growth and normal metabolic activities
- **S phase (Synthesis)** - DNA replication occurs, doubling the genetic material
- **G2 phase (Gap 2)** - additional growth, preparation for mitosis, and protein synthesis

The cell remains metabolically active and prepares for division during this extensive phase.

# Mitosis: The Process of Cell Division

Mitosis is a critical process that ensures the accurate segregation of duplicated chromosomes into two daughter cells. It maintains genetic stability across generations of cells and is essential for growth and tissue repair.

## Phases of Mitosis

Mitosis is divided into five well-defined stages:

1. **Prophase**
2. **Metaphase**
3. **Anaphase**
4. **Telophase**
5. **Cytokinesis**

Each stage has unique characteristics that facilitate accurate chromosome segregation.

## Detailed Breakdown of Mitosis Stages

### Prophase

- Chromatin condenses into visible chromosomes
- The nuclear envelope begins to break down
- The mitotic spindle, composed of microtubules, starts to form

### Metaphase

- Chromosomes align at the cell's equatorial plate (metaphase plate)
- Spindle fibers attach to the centromeres of each chromosome

### Anaphase

- Sister chromatids are pulled apart toward opposite poles
- Ensures each daughter cell receives an identical set of chromosomes

### Telophase

- Chromosomes reach the poles and begin to de-condense
- Nuclear envelopes re-form around each set of chromosomes
- The cell prepares for division completion

## **Cytokinesis**

- Division of the cytoplasm occurs
- Results in two separate, genetically identical daughter cells
- In animal cells, a cleavage furrow forms; in plant cells, a cell plate develops

# **The Significance of Mitosis and the Cell Cycle**

Understanding mitosis and the cell cycle is vital for grasping how organisms grow, heal, and maintain their tissues. Proper regulation of this process is essential; errors can lead to diseases such as cancer.

## **Roles of Mitosis in Living Organisms**

- **Growth** - increasing the size and number of cells in an organism
- **Tissue Repair** - replacing damaged or dead cells
- **Asexual Reproduction** - producing genetically identical offspring in some organisms

## **Implications of Cell Cycle Errors**

Errors during mitosis can result in:

- **Aneuploidy** - abnormal number of chromosomes, leading to genetic disorders
- **Cancer** - uncontrolled cell division caused by mutations in regulatory genes

Maintaining the fidelity of the cell cycle is essential for healthy development and preventing disease.

## **Using the WebQuest to Learn About Mitosis and the Cell Cycle**

The purpose of a webquest is to promote active learning through research and critical thinking. It typically involves exploring various online resources, answering questions, completing activities, and synthesizing information.

# Steps in the WebQuest

- Introduction: Overview of the importance of cell division
- Task: Define specific objectives, such as creating a diagram of mitosis or explaining the significance of each phase
- Process: Guided activities including watching videos, reading articles, and analyzing diagrams
- Resources: Curated links to educational websites, animations, and interactive quizzes
- Evaluation: Quizzes or projects to assess understanding
- Conclusion: Summarize key concepts and reflect on the importance of cell cycle regulation

## Benefits of the WebQuest Approach

- Engages learners actively
- Promotes research skills
- Enhances understanding through visual aids
- Encourages collaboration and discussion
- Provides a comprehensive understanding of complex processes

## Conclusion

A thorough understanding of mitosis and the cell cycle is fundamental for students interested in biology, medicine, and related fields. The webquest activity serves as an effective educational tool, guiding learners through the intricate steps of cell division, emphasizing its critical role in life processes. By exploring the phases of mitosis, understanding its regulation, and recognizing its significance, students can appreciate how cellular processes underpin growth, development, and health.

To succeed in this webquest, students should focus on:

- Mastering the stages and functions of mitosis
- Understanding the regulation of the cell cycle
- Recognizing the consequences of errors during cell division
- Applying knowledge to real-world biological and medical contexts

In summary, studying mitosis and the cell cycle through a webquest offers a dynamic and comprehensive learning experience, fostering curiosity and a deeper understanding of cellular biology.

# **Frequently Asked Questions**

## **What is the main purpose of mitosis in the cell cycle?**

The main purpose of mitosis is to produce two identical daughter cells for growth, repair, and maintenance of tissues.

## **What are the key stages of the cell cycle, and what happens in each?**

The key stages are Interphase (cell prepares for division), Mitosis (nuclear division), and Cytokinesis (cytoplasm divides). During interphase, the cell grows and DNA replicates; mitosis includes prophase, metaphase, anaphase, and telophase; cytokinesis splits the cell into two daughter cells.

## **How does the process of mitosis ensure genetic consistency in daughter cells?**

Mitosis ensures genetic consistency through precise duplication and segregation of chromosomes, resulting in daughter cells with identical DNA to the parent cell.

## **What are common errors that can occur during mitosis, and what are their consequences?**

Common errors include chromosome nondisjunction and missegregation, which can lead to aneuploidy—an abnormal number of chromosomes—potentially causing conditions like Down syndrome or cell malfunction.

## **Why is the cell cycle tightly regulated, and what happens if regulation fails?**

The cell cycle is tightly regulated to prevent uncontrolled cell division, which can lead to cancer. Failures in regulation can result in unchecked growth and tumor formation.

## **How does a webquest help students learn about mitosis and the cell cycle?**

A webquest guides students through online resources and activities, encouraging exploration, critical thinking, and a deeper understanding of mitosis and the cell cycle concepts.

## **What are some interactive tools or simulations that can enhance understanding of mitosis?**

Interactive tools like virtual cell division simulations, 3D models, and animations help students visualize the stages of mitosis and understand the dynamic processes involved.

## **How is the cell cycle different in somatic cells compared to germ cells?**

In somatic cells, the cell cycle involves mitosis producing identical diploid cells, while in germ cells, meiosis occurs, reducing the chromosome number by half to form haploid gametes.

## **What role do checkpoints play during the cell cycle?**

Checkpoints monitor and verify whether processes like DNA replication and chromosome segregation are completed correctly, preventing errors and ensuring proper cell division.

## **Additional Resources**

Mitosis and the Cell Cycle Webquest: Exploring the Fundamentals of Cellular Division

In the intricate world of biology, understanding how cells grow, divide, and multiply is fundamental to grasping the complexities of life itself. At the heart of this process lies mitosis, a meticulously orchestrated sequence of events that ensures genetic information is accurately transmitted from one cell generation to the next. When combined with the broader framework of the cell cycle, mitosis forms the basis for growth, development, tissue repair, and even the maintenance of genetic stability across generations. To facilitate a comprehensive understanding of these essential biological phenomena, educators and students often turn to webquests—interactive, inquiry-based online learning tools designed to promote active engagement and critical thinking. This article provides an in-depth exploration of mitosis and the cell cycle through the lens of a webquest, unraveling their mechanisms, significance, and relevance in both health and disease.

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## **Understanding the Cell Cycle: The Blueprint of Cellular Life**

### **What Is the Cell Cycle?**

The cell cycle is a series of ordered events that a cell undergoes to grow, duplicate its DNA, and divide into two daughter cells. It is a fundamental process underpinning biological development, tissue maintenance, and reproduction in multicellular organisms. The cycle can be broadly divided into two main phases:

- Interphase: The preparatory phase where the cell grows and duplicates its DNA.
- Mitotic (M) phase: The actual process of cell division, including mitosis and cytokinesis.

The precise regulation of the cell cycle ensures genetic fidelity, preventing mutations and maintaining organismal health.

# Phases of the Cell Cycle

The cell cycle comprises several distinct phases, each serving specific functions:

1. G1 Phase (First Gap): The cell grows in size, synthesizes proteins, and prepares the necessary components for DNA replication.
2. S Phase (Synthesis): DNA replication occurs, doubling the genetic content to prepare for division.
3. G2 Phase (Second Gap): The cell continues to grow, synthesizes additional proteins, and checks for errors in DNA replication.
4. M Phase (Mitosis and Cytokinesis): The cell divides into two genetically identical daughter cells.

An important aspect of the cell cycle is its regulation through checkpoints—control mechanisms that verify whether the cell is ready to proceed to the next phase. Key checkpoints include the G1/S checkpoint, the G2/M checkpoint, and the spindle assembly checkpoint during mitosis.

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## Mitosis: The Mechanism of Nuclear Division

### Definition and Significance of Mitosis

Mitosis is a process where a single parent cell divides its nucleus to produce two genetically identical daughter nuclei. It ensures the accurate distribution of duplicated chromosomes, maintaining genetic stability across cell generations. Mitosis is crucial for:

- Growth: Increasing organism size.
- Development: Formation of tissues and organs.
- Tissue Repair: Replacing damaged or dead cells.
- Asexual Reproduction: In unicellular organisms, facilitating reproduction without gamete formation.

Disruptions in mitosis can lead to serious consequences such as aneuploidy (abnormal number of chromosomes) and are associated with diseases like cancer.

### Stages of Mitosis

Mitosis is a highly ordered process, divided into five main stages:

1. Prophase
2. Prometaphase
3. Metaphase
4. Anaphase
5. Telophase

Each stage involves specific structural and molecular events:

**Prophase:**

Chromatin condenses into visible chromosomes, each consisting of two sister chromatids joined at the centromere. The nuclear envelope begins to break down, and the mitotic spindle—a structure made of microtubules—starts to form.

**Prometaphase:**

The nuclear envelope fully disintegrates, allowing spindle fibers to attach to kinetochores—protein complexes on the centromeres of chromosomes. Chromosomes begin to move toward the cell's equatorial plane.

**Metaphase:**

Chromosomes align along the metaphase plate, an imaginary equatorial line. This alignment ensures that each sister chromatid will be pulled to opposite poles during the next phase.

**Anaphase:**

The sister chromatids are separated as the spindle fibers shorten, pulling each chromatid toward opposite poles of the cell. This ensures equal genetic material is distributed.

**Telophase:**

Chromatids reach the poles and decondense into chromatin. Nuclear envelopes re-form around each set of chromosomes, and the spindle fibers disassemble.

Following mitosis, cytokinesis divides the cytoplasm, resulting in two separate daughter cells.

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## **The Webquest as an Educational Tool for Learning Mitosis and the Cell Cycle**

### **What Is a Webquest?**

A webquest is an innovative online educational activity designed to promote inquiry-based learning. It typically presents students with a scenario and a series of tasks that require them to explore information, analyze data, and synthesize findings using credible internet resources. Webquests are especially effective for complex topics like mitosis and the cell cycle because they foster active engagement, collaborative learning, and critical thinking.

### **Designing an Effective Webquest on Mitosis and the Cell Cycle**

An effective webquest should include the following components:

- Introduction: Provides background information and context, highlighting the importance of mitosis

and the cell cycle.

- Task: Clearly defines what students will accomplish—e.g., creating a detailed diagram, writing a report, or designing a presentation on the stages of mitosis.
- Process: Outlines step-by-step instructions for completing tasks, guiding students through research, analysis, and synthesis.
- Resources: Curated links to reputable sources such as educational videos, animations, scientific articles, and diagrams.
- Evaluation: Criteria for assessing student work, emphasizing accuracy, understanding, and clarity.
- Conclusion: Summarizes key learnings and encourages reflection on the significance of cell division.
- Teacher's Guide: Offers suggestions for facilitation and extension activities.

## **Sample Tasks for a Mitosis and Cell Cycle Webquest**

Students might be asked to:

- Create an animated video explaining each phase of mitosis, illustrating key events.
- Develop a detailed poster or infographic that compares mitosis in plant and animal cells.
- Write a report analyzing how errors in mitosis can lead to cancer.
- Investigate real-world applications, such as how scientists use knowledge of the cell cycle in cancer treatment.

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## **Why Studying Mitosis and the Cell Cycle Matters**

### **Implications for Human Health and Disease**

Understanding mitosis and the cell cycle is crucial for grasping how normal cellular functions are maintained and how their dysregulation can lead to disease. For example:

- Cancer: Characterized by uncontrolled cell division due to mutations affecting cell cycle regulation. Many chemotherapeutic agents target dividing cells during mitosis.
- Genetic Disorders: Errors during cell division can result in chromosomal abnormalities, such as Down syndrome (trisomy 21).
- Aging and Regeneration: Cell cycle regulation influences tissue regeneration and the aging process.

### **Advances in Biotechnology and Medicine**

Research into cell cycle mechanisms has fueled breakthroughs in therapies and technologies, including:

- Development of drugs that inhibit specific phases of mitosis in cancer cells.
- Use of stem cells for tissue repair and regenerative medicine.
- Gene editing techniques that require an understanding of cell division.

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## Conclusion: The Significance of Mitosis and the Cell Cycle in Life Sciences Education

The study of mitosis and the cell cycle forms the foundation of cellular biology, providing insights into how organisms grow, develop, and maintain their tissues. Utilizing webquests as educational tools enhances student engagement, promotes independent inquiry, and deepens understanding of these complex processes. As future scientists, healthcare professionals, and informed citizens, a thorough grasp of cellular division is essential to appreciating the delicate balance of life and the scientific advances that continue to improve human health. By exploring the stages, mechanisms, and implications of mitosis through interactive web-based activities, learners can develop a nuanced perspective on one of biology's most fundamental phenomena, preparing them for further exploration into the vast and dynamic field of life sciences.

## Mitosis And The Cell Cycle Webquest

**mitosis and the cell cycle webquest: Mitosis: Cell Growth & Division Science Learning Guide** NewPath Learning, 2014-03-01 The Mitosis: Cell Growth & Division Student Learning Guide includes self-directed readings, easy-to-follow illustrated explanations, guiding questions, inquiry-based activities, a lab investigation, key vocabulary review and assessment review questions, along with a post-test. It covers the following standards-aligned concepts: The Cell Cycle; Chromosomes; DNA Replication; Mitosis Overview; Phases of Animal Mitosis; Cytokinesis; Phase of Plant Mitosis; Comparing Plant & Animal Cell Mitosis; and Stem Cells. Aligned to Next Generation Science Standards (NGSS) and other state standards.

**mitosis and the cell cycle webquest: What is Mitosis? Mitosis Cycle vs. Cell Cycle Explained | Diploid Daughter Cells | Grade 6-8 Life Science** Baby Professor, 2024-04-15 Explore the miraculous world of cell division with this engaging guide, ideal for grade 6-8 science educators. Learn about the cell cycle, focusing on interphase and mitosis, to understand how cells replicate, enabling growth, healing, and reproduction. This book demystifies complex concepts, such as diploid daughter cells and the stages of mitosis, making them accessible to young learners. Enhance your science curriculum and equip your students with the knowledge to appreciate the foundational processes of life. Perfect for classroom exploration or individual study.

**mitosis and the cell cycle webquest: Mitosis and Meiosis**, 1998-12-16 Mitosis and Meiosis details the wide variety of methods currently used to study how cells divide as yeast and insect spermatocytes, higher plants, and sea urchin zygotes. With chapters covering micromanipulation of chromosomes and making, expressing, and imaging GFP-fusion proteins, this volume contains state-of-the-art how to secrets that allow researchers to obtain novel information on the biology of centrosomes and kinetochores and how these organelles interact to form the spindle. Chapters Contain Information On:\* How to generate, screen, and study mutants of mitosis in yeast, fungi, and flies\* Techniques to best image fluorescent and nonfluorescent tagged dividing cells\* The use and

action of mitoclastic drugs\* How to generate antibodies to mitotic components and inject them into cells\* Methods that can also be used to obtain information on cellular processes in nondividing cells

**mitosis and the cell cycle webquest: The Mitotic Cycle** Arthur Frederick William Hughes, 1952

**mitosis and the cell cycle webquest: What is Mitosis? Mitosis Cycle Vs. Cell Cycle Explained Diploid Daughter Cells Grade 6-8 Life Science** Baby Professor, 2024-01-04 Explore the miraculous world of cell division with this engaging guide, ideal for grade 6-8 science educators. Learn about the cell cycle, focusing on interphase and mitosis, to understand how cells replicate, enabling growth, healing, and reproduction. This book demystifies complex concepts, such as diploid daughter cells and the stages of mitosis, making them accessible to young learners. Enhance your science curriculum and equip your students with the knowledge to appreciate the foundational processes of life. Perfect for classroom exploration or individual study.

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**mitosis and the cell cycle webquest: *Leveled Texts: Mitosis*** Joshua BishopRoby, 2014-01-01 All students can learn about mitosis through text written at four different reading levels. Symbols on the pages represent reading-level ranges to help differentiate instruction. Provided comprehension questions complement the text.

**mitosis and the cell cycle webquest: Mitosis/Cytokinesis** Arthur Zimmerman, 2012-12-02 Mitosis/Cytokinesis provides a comprehensive discussion of the various aspects of mitosis and cytokinesis, as studied from different points of view by various authors. The book summarizes work at different levels of organization, including phenomenological, molecular, genetic, and structural levels. The book is divided into three sections that cover the premeiotic and premitotic events; mitotic mechanisms and approaches to the study of mitosis; and mechanisms of cytokinesis. The authors used a uniform style in presenting the concepts by including an overview of the field, a main theme, and a conclusion so that a broad range of biologists could understand the concepts. This volume also explores the potential developments in the study of mitosis and cytokinesis, providing a background and perspective into research on mitosis and cytokinesis that will be invaluable to scientists and advanced students in cell biology. The book is an excellent reference for students, lecturers, and research professionals in cell biology, molecular biology, developmental biology, genetics, biochemistry, and physiology.

**mitosis and the cell cycle webquest: Mitosis and Meiosis Part A** , 2018-05-24 Mitosis and Meiosis, Part A, Volume 144, a new volume in the Methods in Cell Biology series, continues the legacy of this premier serial with quality chapters authored by leaders in the field. Unique to this updated volume are chapters on Analyzing the Spindle Assembly Checkpoint in human cell culture, an Analysis of CIN, a Functional analysis of the tubulin code in mitosis, Employing CRISPR/Cas9 genome engineering to dissect the molecular requirements for mitosis, Applying the auxin-inducible degradation (AID) system for rapid protein depletion in mammalian cells, Small Molecule Tools in Mitosis Research, Optogenetic control of mitosis with photocaged chemical, and more. - Contains contributions from experts in the field from across the world - Covers a wide array of topics on both mitosis and meiosis - Includes relevant, analysis based topics

**mitosis and the cell cycle webquest: Cell Cycle** Source Wikipedia, 2013-09 Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Pages: 81. Chapters: Mitosis, Meiosis, Cell division, Endoreduplication, Biochemical switches in the cell cycle, Cdk1, Cyclin-dependent kinase 4, Cyclin-dependent kinase 2, Cell growth, P21,

CDKN1B, Cyclin D, ATG8, Mdia1, Spindle checkpoint, Cell division control protein 4, Cyclin-dependent kinase 8, E2F, Cyclin-dependent kinase 6, Rho-associated protein kinase, Cyclin-dependent kinase 7, APC/C activator protein CDH1, Septins, Wee1, Cyclin A2, Sic1, Cyclin-dependent kinase 5, Cytokinesis, Cyclin-dependent kinase inhibitor 1C, MAD1, G2 phase, Cell cycle analysis, Cdc25, Cell cycle checkpoint, CIT Program Tumor Identity Cards, CDK7 pathway, Preprophase, Ki-67, Cyclin-dependent kinase 10, Cyclin-dependent kinase 3, Aurora inhibitors, G2-M DNA damage checkpoint, Maturation promoting factor, Fission, Metaphase, Condensin, G1 and G1/S cyclins- budding yeast, Postreplication checkpoint, Start point, Preprophase band, G0 phase, SMC protein, S phase, CDK inhibitor, Hyperphosphorylation, Restriction point, Cyclin B, Polo-like kinase, Phragmoplast, G1 phase, Cell plate, Phragmosome, Phycoplast, Aster, Density-dependent inhibition, Cyclin E, Cyclin-dependent kinase complex, Meiomitosis, Salvage enzyme, Mitotic catastrophe, Bivalent, Cyclin D/Cdk4, G1/S transition, S-phase-promoting factor, CDK-activating kinase, Meiocyte.

**mitosis and the cell cycle webquest: Cell Cycle Control** Michele Pagano, 2013-06-29

Addressing the regulation of the eukaryotic cell cycle, this book brings together experts to cover all aspects of the field, clearly and unambiguously, delineating what is commonly accepted in the field from the problems that remain unsolved. It will thus appeal to a large audience: basic and clinical scientists involved in the study of cell growth, differentiation, senescence, apoptosis, and cancer, as well as graduates and postgraduates.

**mitosis and the cell cycle webquest: Mitosis Facts and Questions** M. Little, N. Paweletz, C. Petzelt, H. Ponstingl, D. Schroeter, H.-P. Administrative Editor: Zimmermann, V. Runnström-Reio, 2012-12-06 Two years ago, about twenty people gathered informally in our institute to discuss mitosis. We took this opportunity to try to separate the hard facts of mitosis which are accepted by most people, from the soft ones which are still open for discussion. Surprisingly few hard facts survived with their reputation still intact. This result led us to organize a similar meeting on a larger scale. The outcome was the workshop Mitosis: Facts and Questions, which was held at the German Cancer Research Center in Heidelberg from April 25-29, 1977. An introductory lecture was given for each of nine major topics, followed by an extensive discussion of facts, questions and future experiments. Further details were provided by posters. The proceedings of the meeting are published in this volume. We feel that many open questions and facts described here will provide stimulating ideas and a basis for further investigation of this fundamental process. The success of the workshop would not have been possible without the help of many people. We are very grateful to the German Cancer Research Center for its interest and assistance, and for the support of the Verein zur Förderung der Krebsforschung in Deutschland represented by Prof. Dr. h.c. K.H. Bauer, the ECBO (European Cell Biology Organization) and the Deutsche Gesellschaft für Zellbiologie. Our sincere thanks are also extended to our students and technicians for their enthusiastic help, and to Mrs. Joa for typing the manuscripts.

**mitosis and the cell cycle webquest: The Cell Cycle** Joseph Midthun, 2024-08 This graphic novel guides young readers through the biology of animals or plants by creatively pairing humor, action, and real-life examples with scientifically accurate illustrations. Surprising fun facts will inspire readers to conduct their own research and investigation. In The Cell Cycle, readers will learn about parts of the cell, cell division, mitosis, cytokinesis, disease, and more! A fun activity and handy timeline also included.

**mitosis and the cell cycle webquest: Cell Biology** Griffith Reid, 2017-05-25 This book presents the complex subject of meiosis and mitosis in the most comprehensible and easy to understand language. It elucidates the various methods and theories of these processes. Meiosis and mitosis are the processes of cell division that occur in cells. It is an important part of the cell cycle. The topics included in the text are of utmost significance and bound to provide incredible insights to readers. Coherent flow of topics, student-friendly language and extensive use of examples make this an invaluable source of knowledge. The book is appropriate for those seeking detailed information in this area.

**mitosis and the cell cycle webquest: Progress in Cell Cycle Research** Laurent Meijer,

Silvana Guidet, Michel Philippe, 2012-12-06 The Progress in Cell Cycle Research series has been conceived to serve as a collection of reviews on various aspects of a fast growing biology field, the cell division cycle. These reviews do not pretend to cover all aspects of cell cycle regulation and mechanisms but rather focus on a few topics of particular interest in the recent literature. This third volume starts with a broad overview of the diversity of ways by which viruses subdue their host cell cycle (chapter 1). Of particular interest in this area is the case of HN which has recently been extensively investigated (chapter 2). Although most of our understanding of cell cycle regulation derives from work performed in yeast and animal cells, plant models, reviewed in chapter 3 for one of the best studied example, Arabidopsis, are starting to contribute significantly to the cell cycle general picture. In mammals, the regulation of cell division of two types of tissues, the intestine (chapter 4) and the developing muscle (chapter 5) are investigated in an interesting physiological context. Cell division is accompanied by a number of morphological changes. One of them, organelle transport, is starting to be better understood (chapter 6). The next few chapter summarise our knowledge of some essential regulators of the cell cycle. A still intriguing enzyme, casein kinase 2, is reviewed in detail in chapter 7. Some of the most studied cell cycle regulators are certainly the CKI's, cyclin-dependent kinases inhibitors (chapter 8).

**mitosis and the cell cycle webquest: Studies on the Cell Cycle Feedback Control During Mitosis in Yeast** Rong Li, 1992

**mitosis and the cell cycle webquest: Mitosis** Andrew D. McAinsh, 2009-06-29 Made possible by the advent of modern methodology, and ideal for both experienced and novice scientists, this volume provides an up-to-date collection of approaches that can be used to investigate how the mechanism of mitosis operates at the molecular level.

**mitosis and the cell cycle webquest: Molecular Regulation of Nuclear Events in Mitosis and Meiosis** Robert A. Schlegel, Margaret S. Halleck, Potu N. Rao, 2013-09-24 Molecular Regulation of Nuclear Events in Mitosis and Meiosis presents papers from researchers in various fields engaged in the scientific study of molecular mechanisms involved in the control of nuclear events in meiotic and mitotic cell activity. Various articles in the book discuss a wide range of topics such as the development of cytoplasmic activities that control chromosome cycles during maturation of amphibian oocytes; dynamics of the nuclear lamina during mitosis and meiosis; role of protein phosphorylation in xenopus oocyte meiotic maturation; and cell cycle studies of histone modifications. Molecular and cell biologists, oncologists, and biochemists will find the book invaluable.

**mitosis and the cell cycle webquest: Optical Studies on Cell Division (Mitosis)** Norman Miyamoto Baker, 2010 Mitosis is the process by which cells, after having duplicated their DNA content, segregate chromosomes equally into two identical daughter cells. Mitosis is a very short part of a normal cell cycle (usually 24+hours) and ranges from 30 minutes to an hour depending on cell type and environmental conditions. During this incredibly short amount of time, the cell undergoes several complex re-arrangements, biomechanically and biochemically. Microtubules, 20 nm width dimer polymers, play an essential role as the building blocks that provides the cytoskeleton and mitotic spindle for the cell, provide the force that segregates chromosomes (anaphase), to satisfaction of tension and attachment based checkpoints (metaphase-anaphase transition). To elucidate the key role microtubules have in mitosis, drugs such as taxol and nocodazole have been used to impart catastrophic global damage to the mitotic spindle and study the effects on cellular division. However, catastrophic global damage can not answer specific questions regarding highly spatially localized damage and temporally transient damage. In elucidating the role of microtubules, chromosomes and other key biological structures, there is the need for a transient perturbation on the mitotic process. To study the effects of transient perturbation on mitosis, a Laser microscope system (Robolase) was developed to deliver spatially localized (~0.4 um) and temporally-specific disruption inside living cells (nanosurgery). Specifically, the affect of ablating chromosome tips, mitotic spindles, and chromatid are examined, and the relationship between damaged sites and pathways controlling the progression of the cell cycle and

DNA damage pathways are examined. In conclusion, an optically based method for studying mitosis with transient perturbation has been developed and used to determine that chromosome tip disruption affects cytokinetic progression, prolonged disruption of mitotic spindle reveals force sensing in the metaphase spindle, and double-strand breaks of DNA recruit CENP-A in addition to known DNA damage proteins.

**mitosis and the cell cycle webquest: Experimental Control of Mitosis: II** J. J. McCormick, 1972

## Related to mitosis and the cell cycle webquest

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**Mitosis (video) | Cell cycle | Khan Academy** Mitosis, a key part of the cell cycle, involves a series of stages (prophase, metaphase, anaphase, and telophase) that facilitate cell division and genetic information transmission

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**The cell cycle and mitosis (article) | Khan Academy** Mitosis is typically described as happening in stages: prophase, metaphase, anaphase, and telophase. These stages are highly regulated and involve detailed coordination of several cell

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