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Getting mitosis and meiosis confused on a biology exam can cost you a lot of points, so it's important to have these two cell processes straight. In this guide, we break the mitosis against meiosis, explain each of the processes and lay out their similarities and differences so that you can easily explain what each process does and how the two are different. What is mitosis? What is meiosis? Mitosis and meiosis are cell division processes. Organisms constantly replenish their cell stocks and create new cells to replace old or damaged cells, as well as make cells that will be used to create new organisms during sexual reproduction. Mitosis is when the cell divides to create two identical daughter cells. Mitosis occurs in somatic cells (all cells that are not sex cells), and it is a process critical to the production of new cells and keeping the body alive and healthy. Most cells in the human body only last a few days to a few weeks (the exceptions are brain cells that usually last a lifetime), so your body should constantly make new cells through mitosis. All cells go through the process of formation, growth, division and possible death. During mitosis, the nucleus of the parent cell breaks down to form two sets of chromosomes for each of the daughter's new cells. You can learn more about this process by reading our in-depth guide to mitosis. Meiosis also involves cell division, however, it occurs in a much smaller number of cells in your body. The only cells that pass through meiosis are gametes, or sex cells (sperm in men and eggs in women). Meiosis is essential for sexual reproduction, and each meiosis cycle creates four daughter cells with exactly half the number of chromosomes as a parent cell. During fertilization, the two cells of the daughter (one from each reproducing organism) will combine to create an embryo with a full set of chromosomes. How do mitosis and meiosis look like? As you will see in the next section, mitosis and meiosis have many differences, but they follow the same general pattern to complete the cell division process. The biggest similarity between them is that they both produce new cells. While the cells they create have some key differences, the ultimate goal is to create daughter cells that can be used to either keep the body alive (mitosis) or help create a new organism during sexual reproduction (meiosis). Both mitosis and meiosis begin with a single-parent cell that eventually disintegrates to form the daughter's new cells. They are both preceded by interphase, a period of growth (sometimes up to 90% of the cell's life) when DNA is synthesized. During the replication of cells mitosis and meiosis follow the same phases: profasis, metaphase, anaphase and telophase (although passes through each step twice, while mitosis passes only through each step once). Here's what happens at each stage: Profaz: Profaz: condensed into X-shaped structures, consists of two identical chromosomes of chromatids/chromatids pair up Membrane around the nucleus of the cell dissolves metaphase: chromosomes /homologous pairs of chromosomes line up along the center of the cell Mitotic spindle fibers attach to each of the chromosomes of Anaphase: the chromosomes of the vapor / sister chromatid are ravaged by spindle fibers and move to the opposite ends of the cell to create new nuclei Both processes also end with cytokines, which, when the cell's cytoplasm disintegrates, when the cell pinches in the middle and eventually separates, forming two new cells. From left to right: interphase, profaz, metaphase, anaphase, telophase, cytokinesis What is the difference between mitosis and meiosis? Although mitosis and meiosis follow the same basic steps, they have more differences than similarities. Most of these differences are due to the fact that although both are necessary for cell replication, mitosis and meiosis have different goals: mitosis replaces the body's cells with identical copies, while meiosis creates genetically different sex cells that will be used to create a completely new organism. Another difference between mitosis and meiosis is that during mitosis there is only one cell division, so the cell passes through the steps of profase, metaphase, anaphase and telophase once. However, during meiosis there are two cell divisions, and the cell passes through each phase twice (so there is a profaz I, Profaz II, etc.). Also, since increasing genetic diversity is the purpose of meiosis, but not mitosis (where all of the daughter's cells are identical), during the profasis in meiosis, a process called recombination/crossing occurs. This is when non-sister chromatids are homologous couples sharing genetic material, so that daughter cells are more genetically diverse from each other. Here is a diagram summarizing the key differences for mitosis vs. meiosis: Occurs in all organisms except viruses occurs only in animals, plants and fungi Creates body/somatic cells One cell division (4 stages total) Two cell divisions (8 stages of total) Recombination /crossing No recombination/crossing in profa procaton recombination/crossing chromosomes Individual chromosomes line up at the equator of the cell During metaphase I, pairs of chromosomes line up at the equator of the cell During anaphase I, sister chromatids move to opposite ends of the cell During anaphase I, sister chromatids move together to the same cell pole. During Anathasia II, Sister Chromatids Divided into Opposite Ends of Cell End Result: Two Daughter Cells The End Result: Daughter's Four Cells Creates Daughter's Diploid Cells Creates Daughter's Haploid Cells Daughter Cage Identical identical cells are genetically different from an academic point of view, understanding the difference between mitosis and meiosis is crucial. Read on to investigate what mitosis and meiosis are, significant similarities and difference between them. MayoZ is a type of cell division that results in the formation of four daughter cells each and a half number of chromosomes as a parent cell. Mitosis is a type of cell division that results in the formation of two daughter cells each with the same number and type of chromosomes as the parent cell. Table content Difference between mitosis and meiosis Introduction to single-celled organisms, cell reproduction leads to the next generation. In multicellular organisms, cell division occurs not only for the production of a completely new organism, but also for the growth and replacement of worn cells in organisms. Cell division is always strictly regulated and follows a highly organized series of steps. The term cytokines refers to cell division in half, while mitosis and meiosis refer to two different forms of nuclear fission. Mitosis leads to two nuclei identical to the original nucleus. MayoZis, on the other hand, leads to four nuclei, each of which has one-and-two chromosomes of the original cell. In animals, meiosis occurs only in cells that give up sex cells (hormit), i.e. eggs and sperm. Read also: The difference in the cell cycle between mitosis and meiosis The important difference between mitosis and meiosis is mentioned below: Mitoz MeioZ Every chromosome replicates. As a result, two genetically identical chromosomes of the chromatids sister are not yet visible, but DNA has been duplicated or replicated by Profase - Each of the duplicated chromosomes appears as two identical or equal sisters of chromatids, the mitotic spindle begins to form. Chromosomes condense and thicken Profase I - crossing recombination - Homologous chromosomes (each consists of two sisters of chromatids) appear together in pairs. A notebook is a structure that is formed. Segments of chromosomes are exchanged between non-sister chromatids on crossover points known as chiasmata (crossing) metaphase chromosomes collected at the equator on the metaphasse plate metaphase I Chromosome set up on a metaphassic plate. The chromosomes are still intact and are arranged as pairs of Homologers Anaphase - spindle fibers begin to contract. It starts to pull the sister chromatids apart. At the end of the anaphase, the full set of daughter's chromosome is found every pole of Anafasa I Sister chromatids remain intact. However, homologous chromosomes drift to opposite or reverse poles Asexual reproduction Sexual reproduction Of All Cells Reproductive Cells Total Growth and Repair, Cell Reproduction Genetic Diversity Through Sexual Reproduction Occurs in Telophase I and in Telophase II by Walter Flemming Hertwig Mitosis is a continuous cell division process that occurs in all types of living cells. Mitosis includes four main phases - protase, metaphase, anaphase and telophase. Mitosis is the process by which cell division occurs when reproduction is not refracted. In mitosis, the nuclear membrane is broken, the fiber spindle (microtubules) is attached to the chromatids on the centometer and corrode chromatids. When the chromatids reach the individual ends of the cells, the spindle fibers disintegrate, and the nuclear membrane recovers around the chromosomes, making two nuclei. Each core is identical to the original core, as it was in the G1. Read also: The difference between haploid and diploid meiosis Meiosis is a form of fission of nuclear cells that results in daughter cells that have half the chromosomal numbers as the original cell. In organisms that are diploid, the end result is cells that are haploid. Each cell of the daughter receives one complete chromosome, i.e. one of each homologous pair of chromosomes. In humans, this means that the number of chromosomes decreases from 46 to 23. The only cells that undergo meiosis will be sperm or eggs. Combining sperm and egg during fertilization returns the number of chromosomes to 46. Cells that pass meiosis go through the cell cycle, including phase S so start the process with chromosomes that consist of two chromatids just like in mitosis. MayoZis consists of meiosis I and meiosis II. In meiosis I am homologous chromosomes divided into different nuclei. This is a reduction in division; number of chromosomes are cut in half. MayoZis II is very similar to mitosis; chromatids are divided into separate nuclei. As in mitosis, it is spindle fibers that pull chromosomes and chromatids apart. The end result of meiosis is four cells, each of which has one complete set of chromosomes instead of two sets of chromosomes. Read also: The significance of the similarities between mitosis and meiosis occurs both mitosis and meiosis in the nuclei of cells that can be observed under the mitosis microscope and meiosis, both associated with cell division Both processes occur in the M-phase of the cell cycle. In both cycles, typical stages of metaphase, anaphase, telophase and profase In both cycles, DNA synthesis also occurs Read: The conclusion between Mitosis and MayoZis is quite obvious. These are two very different processes that have two different functions. Meiosis is necessary for the genetic variation and continuity of all living organisms. Mitosis, on the other hand, is focused on cell growth and development. Meiosis also plays an important role in the recovery of genetic defects in germ cells. Mitosis is a form of cell division where the cell breaks down into two parts, each identical to the original cell. Meiosis is a type of cell division Leads to four cells, each of which has one-and-a-half chromosomes of the original cell The difference between mitosis and meiosis is this: Mitosis was discovered by Walter Flammig, while meiosis was discovered by Oscar Hertwig. Cytokinesis occurs only in telophase during mitosis, while it occurs in Telofase 1 and Telophase 2 during meiosis. The main function of mitosis is the overall growth and repair. It is also used to reproduce cells. MayoZis, on the other hand, aims to ensure genetic diversity through sexual reproduction. In mitosis there is asexual breeding regimen. Sexual breeding regimen is observed in meiosis. The similarity between mitosis and meiosis is this: mitosis and meiosis occur in the nuclei of cells. Both are related to cell division. Both processes occur in the M-phase of the cell cycle. In both cycles, the stages are common - metaphases, anaphase, telophase and profase. DNA synthesis occurs in both. To learn more about mitosis and meiosis, what mitosis and meiosis is, the difference between mitosis and meiosis, or any other topic in biology, continue to visit THE BYJU'S website or download the BYJU app for further help. 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