Mitosis and the Cell Cycle

Mitosis is the process of how a somatic cell (a cell that doesn't produce eggs or sperm) divides. **It is used primarily for growth and/or repair of organism and results in 2 exact duplicates of the parent cell.** The cell actually spends little time dividing, most of the time is spent preparing for cell division or "just doing what that cell is programmed to do".

The Cell Cycle – This is a brief overview (for a more detailed explanation of the many stages see a general Biology text).

Interphase – This is the time between cell divisions it is divided into several stages

- G_1 – This is the first growth period after mitosis has occurred when the cell regains its normal size.
- S – This is when new DNA is synthesized if the cell is going to continue on to another cell division.
- G_2 – This is the second growth period when the cell duplicates all the organelles it will need to make 2 new functioning cells.
- G_o – This is a period of no growth and it occurs **prior** to S phase, if it is going to happen. This is the stage that most cells are in when they are "just doing what the cell is programmed to do". Some cells spend most of their lifetime in G_o (for example nerve cells) others spend much less time in G_o (for example intestinal cells).
- Regulation of the cell cycle – the cell cycle is highly regulated and won't be discussed here. Please see a general biology text for a discussion of this material.

Mitosis - Cell division occurs at this time. It is also divided into several subphases

- Prophase
  - Chromosomes appear in a condensed form.
  - Nuclear membrane disappears
  - Centrioles (or centrosomes) move apart and the spindle forms
- Metaphase
  - Replicated chromosomes (sister chromatids) align in the center of the cell
- Anaphase
  - Sister chromatids separate and move towards centrioles (or centrosomes)
- Telophase
  - Chromosomes change into a less condensed form, fading from view.
  - Nuclear membrane reappears
  - Cytokinesis occurs

Cancer cells do not obey the normal rules of cell division: they continually repeat the cell cycle; they don't respond to contact inhibition (this is one of the signals for a cell to stop growing); and the cells are immortal, (they don't die after a certain number of divisions as normal cells do). This combination of factors can take place due to environmental or viral damage of the cellular DNA.

For more information and animations go to the University of Arizona's The Biology Project.