

Cancer cells escape from the controls on cell division:

1. What is cancer? Cancer is essentially a **disease of mitosis** - the normal 'checkpoints' regulating mitosis are ignored by the cancer cell. Cancer begins when a single cell is **transformed**, or converted from a normal cell to a cancer cell. Often this is because of a change in function of one of several genes that normally function to control growth or suppress tumor formation.

Once these crucial Cell Cycle genes start behaving abnormally, cancer cells start to reproduce wildly by repeated, **uncontrolled mitosis**.

Unlike normal cells, cancer cells ignore the usual **density-dependent inhibition of growth**, multiplying even after contact with other cells are made and there is no room left. Instead they keep dividing and piling up until all nutrients are exhausted.

2. Tumors - Good Cells gone Bad...? The cancer cells reproduce to form a mass of cancer cells called a tumor. As the tumor grows larger, it begins to release proteins from the cell to attract new blood vessel growth to the tumor (this is called "angiogenesis"). At this point the tumor contains ~ 1 million cells and is about the size of a "bb".

Benign Tumors: tumor cells remain at original site – do not spread!

Malignant: some tumor cells send out signals that tell the body to produce a new blood vessel at the tumor site. These cells not only have a food and oxygen supply, they also have an avenue for escape to a new part of the body - through the new blood vessel and into bloodstream. Cells that break away from the tumor begin to spread to surrounding tissues (via the bloodstream or lymph nodes) and start new tumors = **metastasis**.

3. Unusual features of Cancer Cells.

Cancer cells are frequently "**immortal**": whereas normal cells divide about 50 times and then die, cancer cells can go on dividing forever if supplied with nutrients.

Cancer cells often have unusual numbers of chromosomes or mutations in chromosomes.

Cancer cells may also have an **abnormal** cell surface; instead of "sticking" to its neighboring cells, cancer cells tend to "round up" and break attachments its neighbors cells, allowing for metastasis.

Questions:

1. What is cancer?
2. a) What do you think "density-dependent inhibition of growth" means?
b) Are cancer cells affected by density-dependent inhibition of growth?
3. What is a tumor?
4. What is angiogenesis?
5. What is the difference between a benign and a malignant tumor?
6. What happens if a cell goes through metastasis?
7. What does it mean when they say that cancer cells are "immortal"?
8. How are cancer cells' surfaces abnormal?