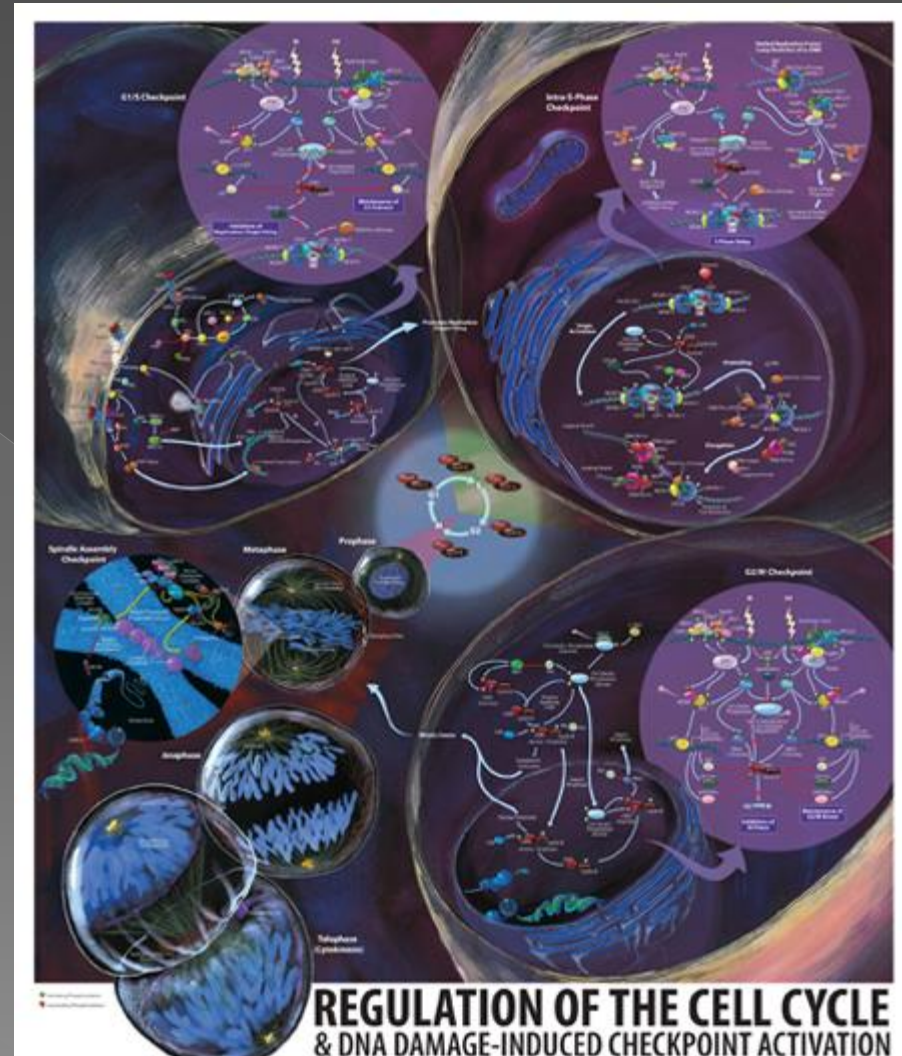


Division Controls

How does a cell 'know' when to divide?

Cell controls

- Cell cycle is driven by a chemical control system that is regulated at checkpoints
- Checkpoints: spots in the cycle where you check to make sure cell is ready for next step
 - Is the DNA duplicated?



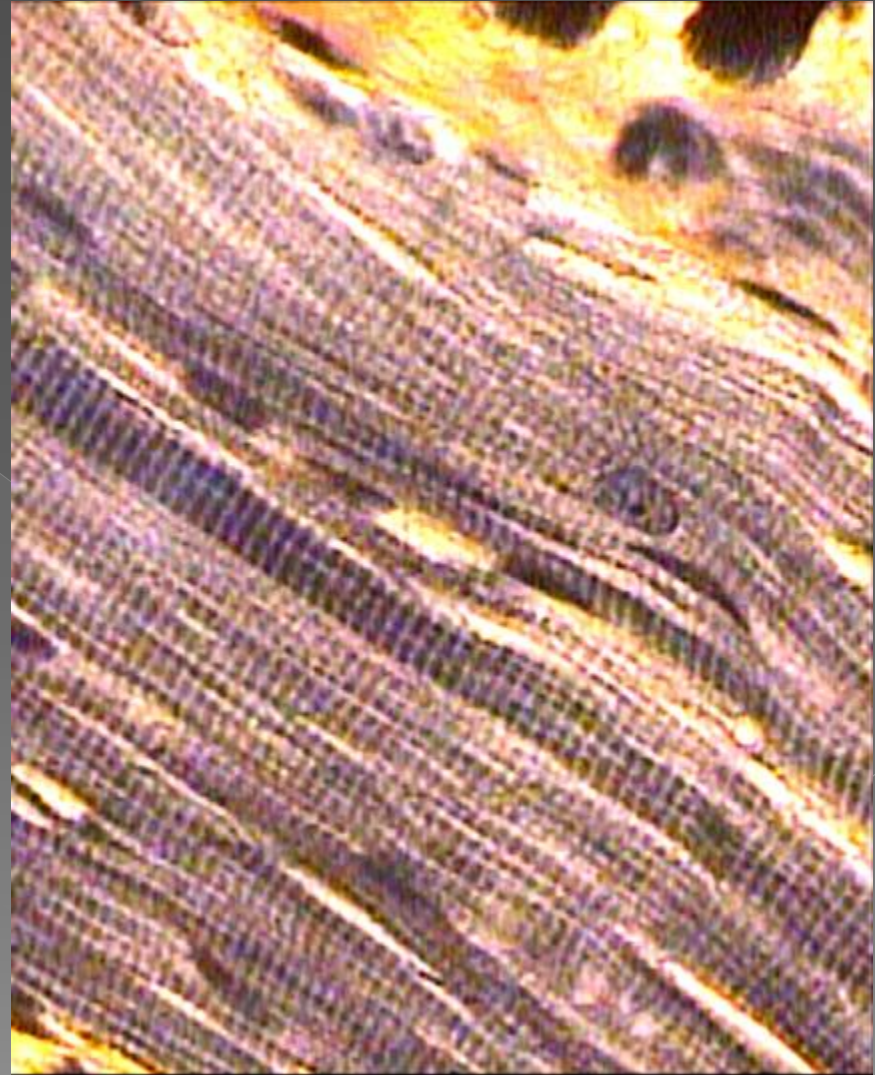
Cell cycle controls

- **Internal signals** are signs from inside the cell that regulate division
 - > Make sure the cell has what it needs to divide
 - > Regulated by cyclin
- **External signals** are from outside
 - > Such as growth factors that tell the cell to divide



Cell cycle controls

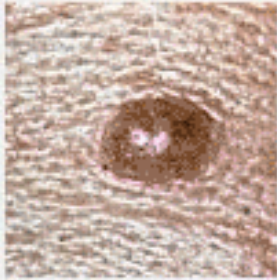
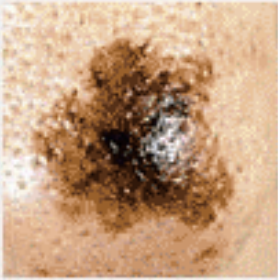



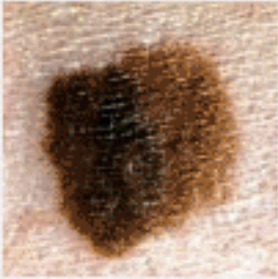

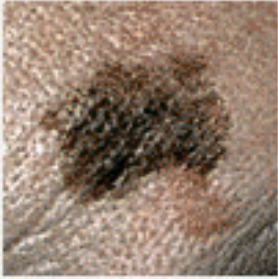
- Cells can also respond to signals from the environment
 - > If cell is tightly packed to other cells, division off
 - > If no surface contact, division on



Cancer

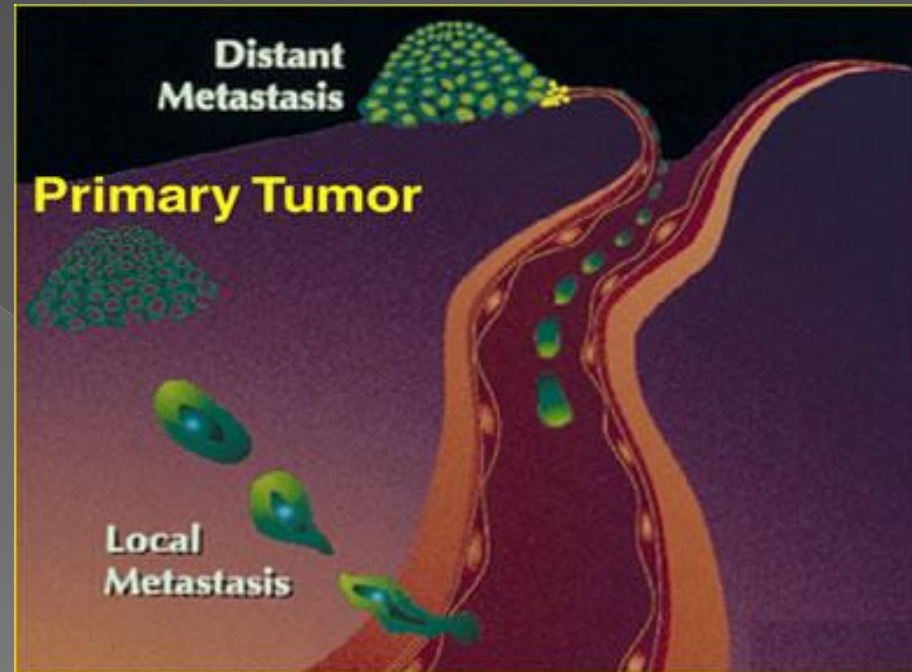
- ◉ Cancer cells ignore the signals that tell the cell to stop dividing
 - > Usually the immune system notices the problem and kills the bad cell
 - > If not, each daughter cell will be cancerous



Normal Mole	Melanoma	Sign	Characteristic
		Asymmetry	when half of the mole does not match the other half
		Border	when the border (edges) of the mole are ragged or irregular
		Color	when the color of the mole varies throughout
		Diameter	if the mole's diameter is larger than a pencil's eraser

Cancer

- **Malignant tumor** causes harm to one or more organs
- **Benign tumor** stays at the original site



Cancer Treatments

Cancer is treated mainly 2 ways:

Chemotherapy: uses drugs to or combination of drugs to kill dividing cancer cells, effects entire body not just cancer.

Radiation: specifically targets cancer cells and shrinks tumors (localized to specific area), damages cell's DNA so much they can not divide anymore.

Cloning

- Clone: identical copy of a gene or an entire organism. Can be natural (identical twins, asexual reproduction) or engineered by scientists
- Benefits:
 - > organ transplants,
 - > help endangered species
- Concerns:
 - > more likely to have genetic disorders
 - > clone is less healthy than original
 - > Low success rate
 - > Reduce biodiversity



<https://www.youtube.com/watch?v=-Qry1gYYDCA>