**5.1 Mitosis and Asexual Reproduction.**

**The Cell Cycle and Mitosis.**

* Due to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of cells, the body must replace them.
* A good example of this is human skin cells:
* Each day \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are shed.
* The life of a cell is divided into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_stages known as the cell cycle:

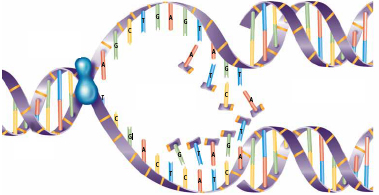
1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: cell carries out normal functions.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: nucleus contents duplicated and divide into two equal parts.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: separation of two nuclei and cell contents into two daughter cells.

**Parts of the Cell Cycle.**

**Interphase.**

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cell cycle stage, is when a cell

performs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_. For example, an intestinal lining cell absorbing nutrients.

* In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, DNA copies itself in

the process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. **Replication** involves several steps:

1. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

with the help of an enzyme.

1. New \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the

bases on the original DNA.

1. Two new identical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

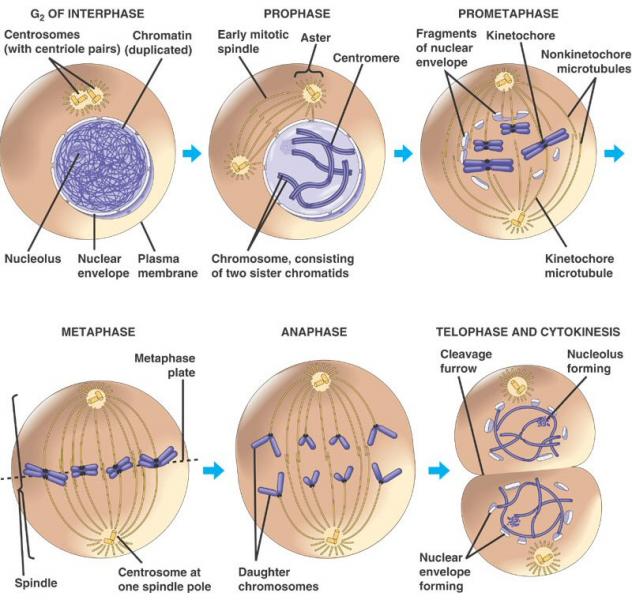
are produced.

* At the end of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the cell continues to grow and  
  make proteins in preparation for mitosis and cytokinesis.

**Mitosis.**

* Mitosis is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the cell cycle where \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and two daughter nuclei are formed. It occurs in 4 stages: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* As the nucleus prepares to divide, replicated DNA in interphase joins to form sister \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, joined by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - nucleolus disappears and spindle fibres form
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - spindle fibres attach to **centromeres** of chromosomes
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - chromosomes align on equator of cell
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - spindle fibres pull sister **chromatids** to opposite poles of cell
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - in this final stage, spindle fibres disappear and a nuclear membrane forms around each separated set of chromosomes.





Nucleus

Nuclear Membrane

**Cell Cycle Problems.**

Checkpoints in the cell cycle will prevent division if:

* If the cell is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* If the \_\_\_\_\_\_\_\_ within the nucleus has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* If the DNA is damaged

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ involving checkpoints can result in an out-of-control cell cycle. The result can be uncontrolled cell division: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Cancer.**

* Cancer is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Specifically, cancer is a loss of a cell’s ability to control its own rate of mitosis.
* This typically results from a mutation in the genetic control mechanism.

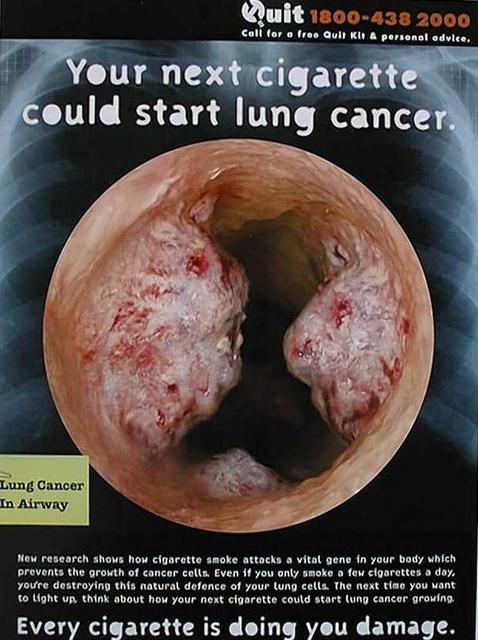
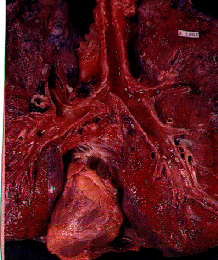
Cancer isn’t a disease in the conventional sense because:

1. It isn’t caused by a specific pathogen (although viruses are suspect in some).
2. Cancer isn’t characterized by one set of symptoms.

* In its simplest sense, cancer is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The problem is that because these cells are reproducing so rapidly ( up to once every 3 hours,), they do not have a chance to **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and become useful.
* They are like **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
* Despite being useless, they still must be fed and provided with the metabolites of life.
* They **\_\_\_\_\_\_\_\_\_\_** at the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** that do have a function.
* This ultimately can lead to the death of the individual as so many normal cells become sacrificed to satisfy the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of the cancer cells.
  + **Characteristics of Cancer Cells:**

1. They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Form \_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Lack \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Don’t stick to each other
6. Can \_\_\_\_\_\_\_\_\_\_\_\_\_
7. Can stimulate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * **7 Warning Signs of Cancer:**
8. Persistent **\_\_\_\_\_\_\_\_\_\_**
9. **\_\_\_\_\_\_\_\_\_\_\_** under the skin
10. **\_\_\_\_\_\_\_\_\_\_\_** in joints
11. Persistent **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
12. Blurred **\_\_\_\_\_\_\_\_\_\_\_**
13. Abnormal **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
14. **Sore** that won’t heal or change in **\_\_\_\_\_\_\_\_\_\_\_\_\_**
    * **The Common Cancers:**
    1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    4. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    5. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    6. **\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Lung Cancer.**

****

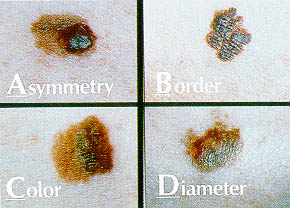
**Smoking.**

* Smoking is a very addictive habit, very difficult to break.
* It is the #1 cause of preventable death in BC, causing over 30% of all cancer deaths.

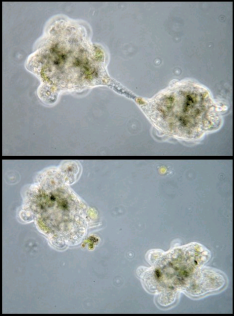
**Prostate Cancer.**

* 2,900 BC men will be diagnosed with prostate cancer in 2010, and 540 men will die from it
* 16,900 Canadian men will be diagnosed with prostate cancer, and 4,200 will die from it in 2010
* 1 in 8 Canadian men will develop prostate cancer

**Skin Cancer.**

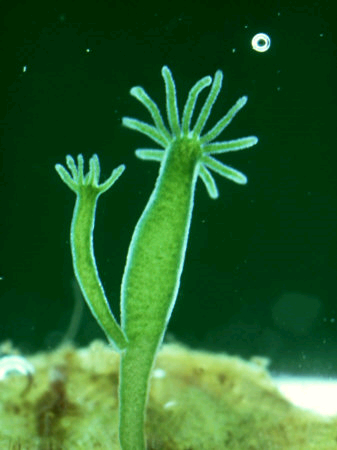
****

**Asexual Reproduction.**

* A \_\_\_\_\_\_\_\_\_\_ is an identical genetic copy of its parent.
* Many organisms naturally form clones via \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Cloning is also used in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to copy desired organisms, tissues and genes.

**Types of Asexual Reproduction.**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* ****When a single celled organism (ex. amoeba, paramecium) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_through the process of mitosis.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* When areas of some multicellular organisms

(ex. hydra, sponge) undergo repeated mitosis to

form an identical organism. \_\_\_\_\_\_\_\_\_ sometimes

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* When a part of an organism \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

and the part grows into a clone of the parent.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* When \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_which remain attached for a

time and may break off to form new adult plants.

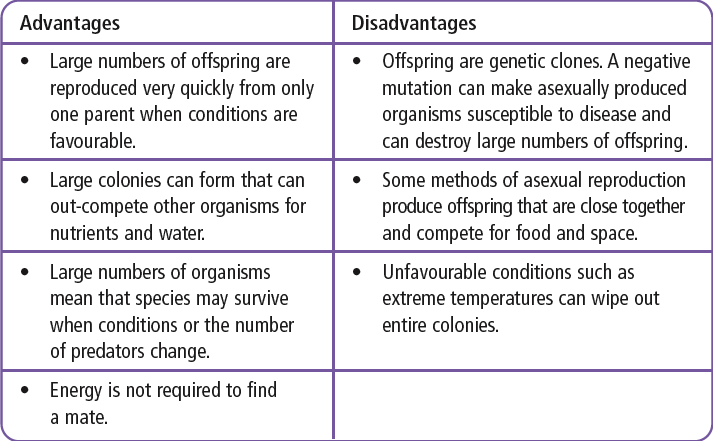
1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* When some bacteria, micro-organisms and

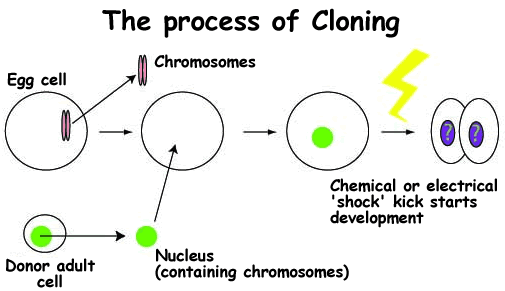
fungi can form \_\_\_\_\_\_\_\_\_\_\_\_ - single cells that

can grow into a whole new organism.

**Advantages & Disadvantages.**



**Human Assisted Cloning.**

* Humans use all the asexual cloning methods in order to produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with organisms. This is done in several ways.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  - purpose is

to produce a genetic duplicate of an existing or dead

organism. Steps involved:

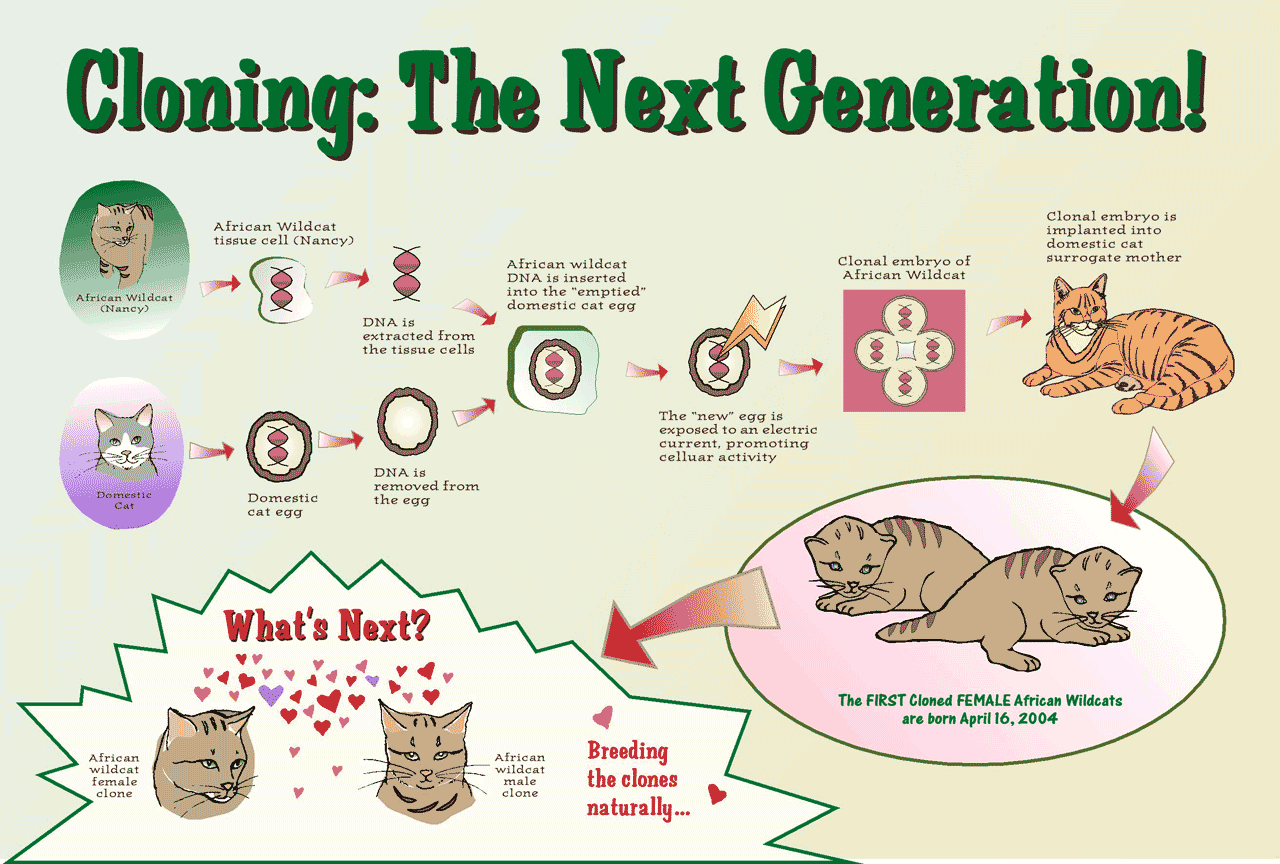
* 1. Remove \_\_\_\_\_\_\_\_\_\_\_ from an egg cell
  2. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

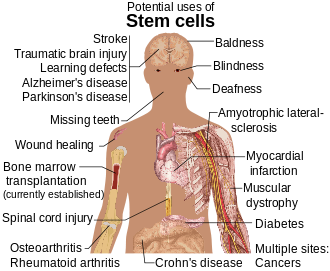
is removed from an adult female

* 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fuses mammary and

egg cell

* 1. Fused cell begins \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. Dividing embryo is inserted into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mother



* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - purpose is to correct health problems
  + Very important to therapeutic cloning

are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - cells that can

become different types of cells

* + Stem cells can be used to replace cells

damaged from injuries or disease

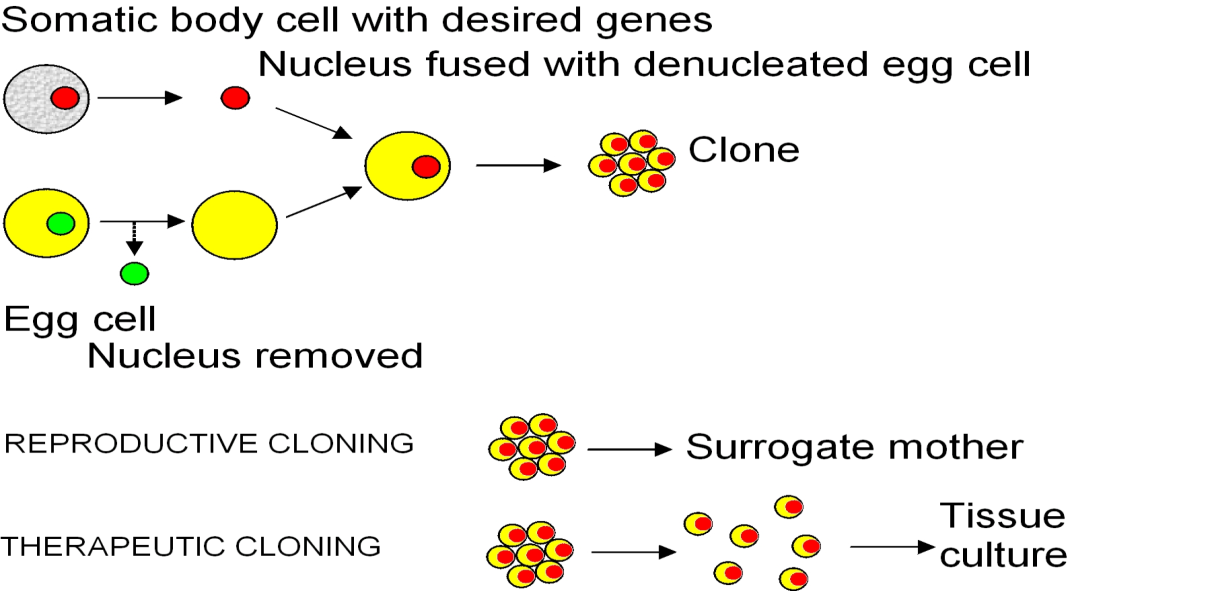
* + \_\_\_\_\_\_\_\_\_\_\_\_\_,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are only a

few that can benefit from stem cell therapy

* + Controversial because the best stem cells are

from embryos which are

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when harvesting cells.