

Human Cells

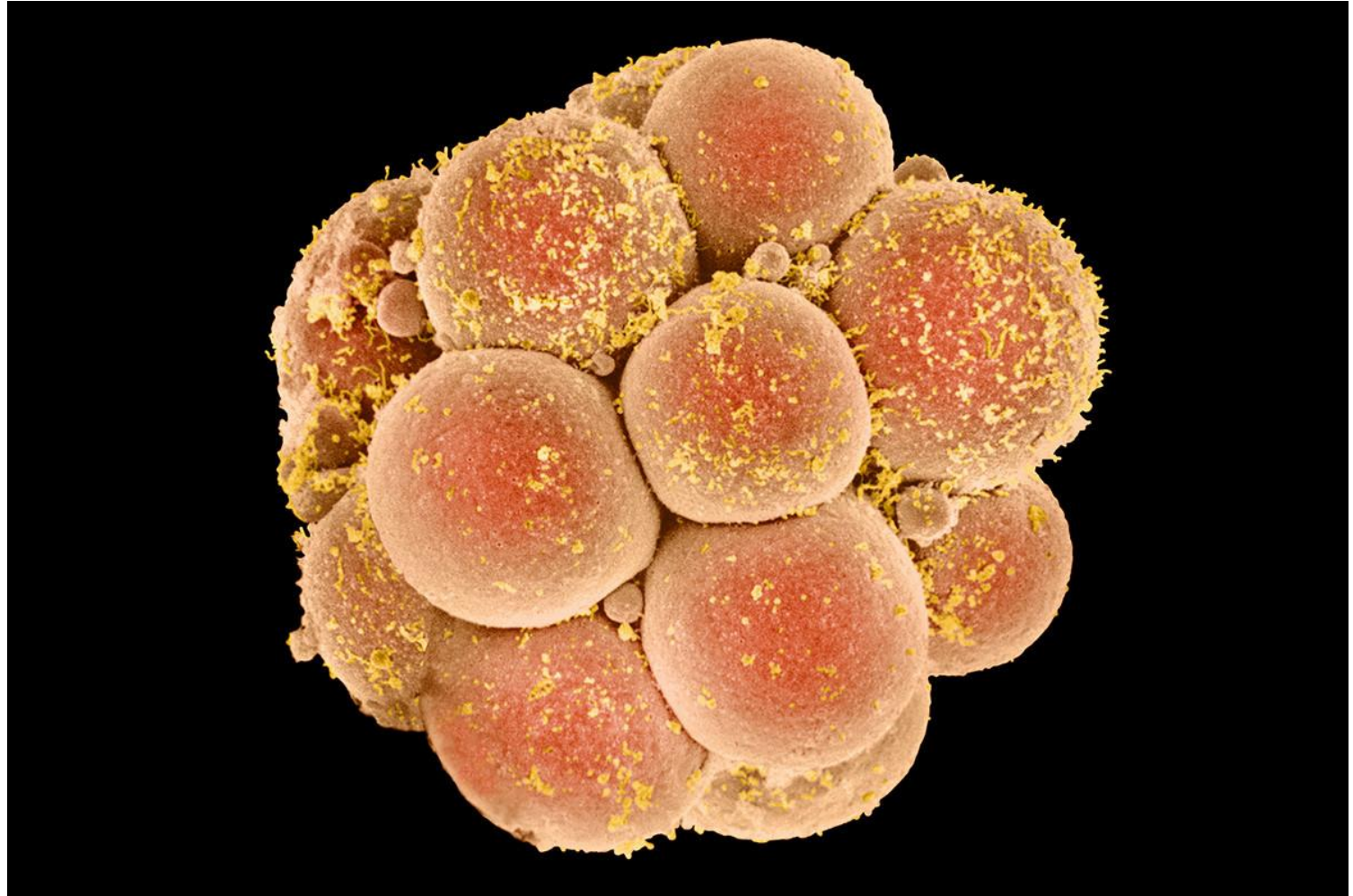
- Every human (including you) began life as one cell.
- We call the union between the egg and the sperm fertilization.
- We call the very first cell a zygote.
- Soon after the zygote is formed, it divides into two cells.

Human Cells

- This cell division continues until a ball of cells called a blastula is formed.
- This eventually forms into an embryo, fetus and finally the baby.



Human embryo

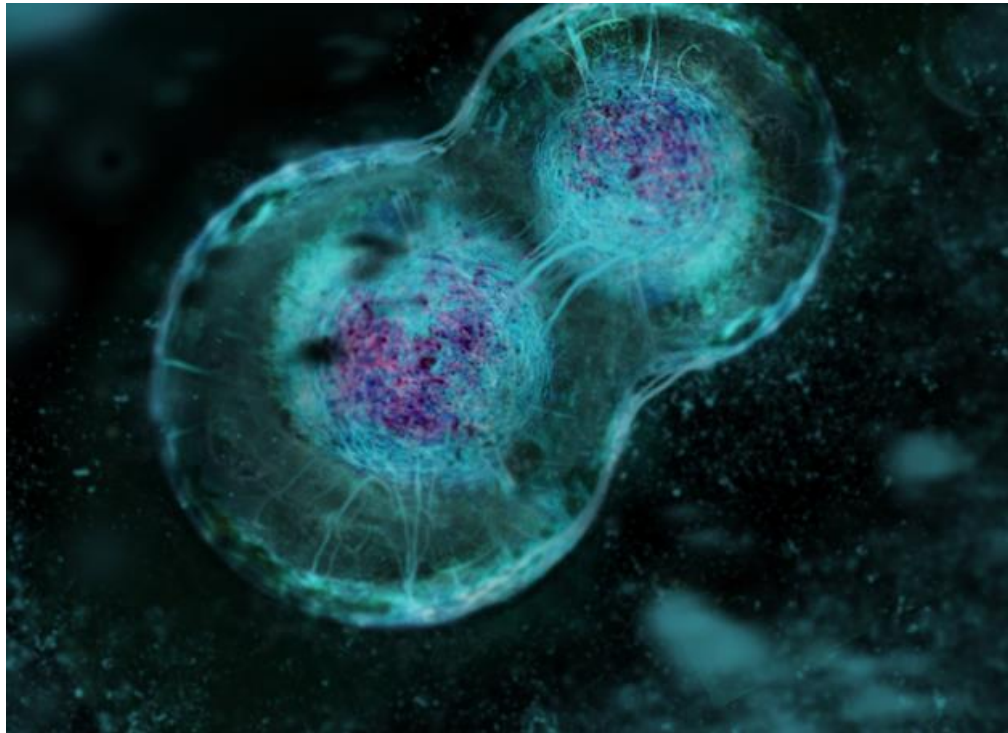


How does one cell become billions?

- After fertilization, the zygote undergoes changes that prepare it for a process called cell division.
- The actual cell division itself takes less than 1 hour.
- It takes between 18-24 hours for a cell to mature and be ready to divide again.

How does one cell become billions?

- A key part of cell division is called mitosis.
- The new cells are formed in the growing fetus at a rate of ~ 20 million per second.



Human Fetus at 4 and 16 weeks



Cell Differentiation

- These new cells are unspecialized and their purpose is to divide again and again, thus increasing the volume of the growing cell mass.
- Eventually, once the cell mass reaches a sufficient size, some of the cells begin to differentiate.
- Cell differentiation is a process in which cells specialize and physically change.

Cell Differentiation

- These specialized cells, then take on a role in the growing embryo.
- These cells become bone cells, skin cells, blood cells etc.
- The cell division and cell differentiation processes continue for your entire life.
- As you sit here in this room, ~10 million new cells are formed every second.

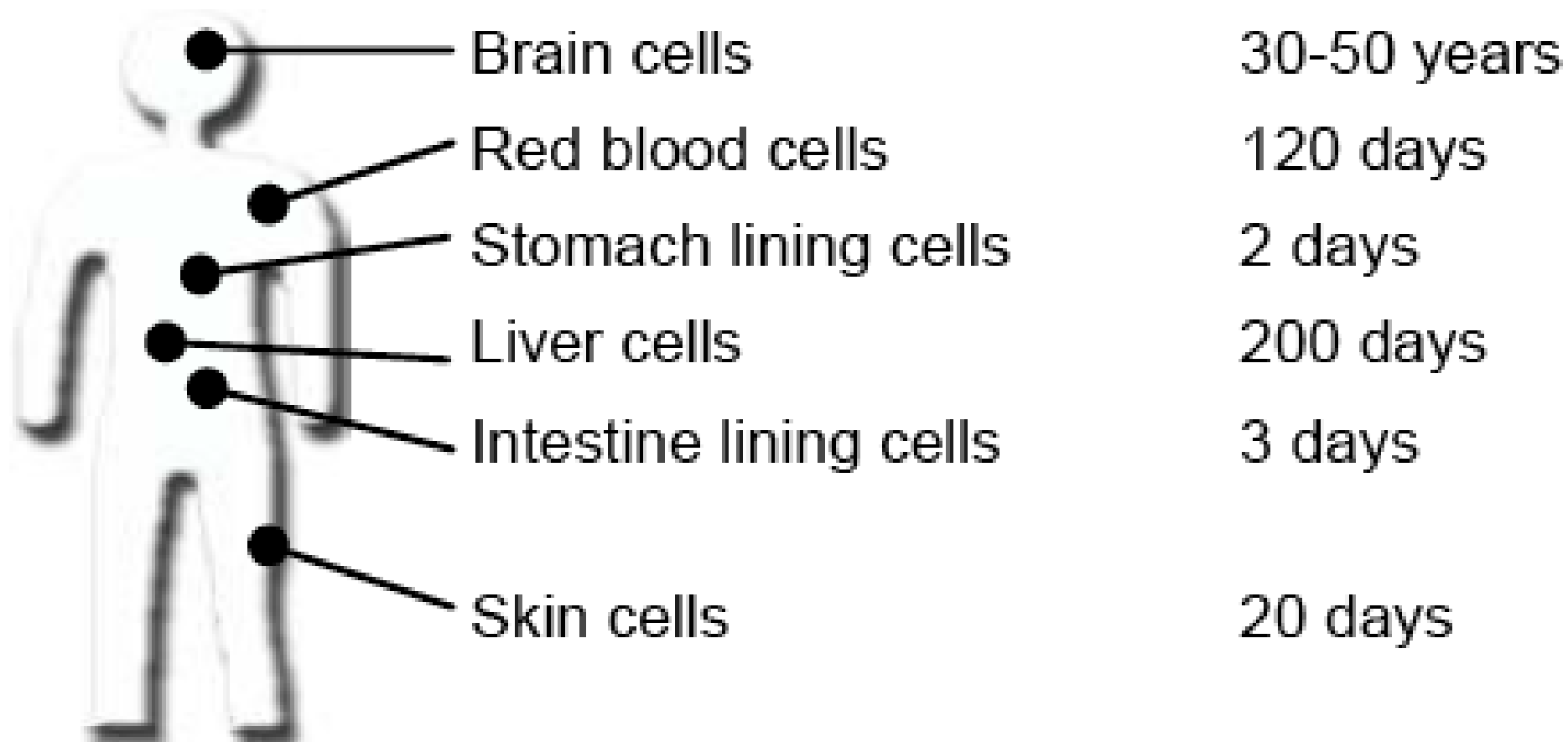
Cells wear out and must be replaced

- These new cells either help you grow larger, or replace old dead dying cells.
- As a teenager you are made up of ~ 50-60 trillion cells.
- As an adult you will max out at ~ 80-120 trillion.

Cells wear out and must be replaced

- The most abundant cell type in your body are the red blood cells.
- Red blood cells, like almost all cell types in your body, only last for a certain time before they wear out and need to be replaced.
- For example, RCBs last ~120 days.

A Few Cell Type Life Expectancies



Stem Cells

- The cells in your body that do not specialize, but whose purpose is to undergo cell division, are referred to as stem cells.
- The older you get, the fewer stem cells you have and the less active they become.
- We refer to this decrease in the rate of cell division as aging.

Stem Cells

- As mentioned, RBCs last ~120 days.
- Liver cells are replaced in ~200 days.
- Generally speaking, all cells in your body will be replaced by new cells within 1 year.
- So exactly how many different types of cells do we have in our human bodies?

Human Cell Types

- There are 210 cell types in the human body
- Epithelial cells: skin, hair, and tongue
- Gland cells: salivary, prostate, mammary
- Hormone producing cells: thyroid, testes
- Storage cells: liver and fat cells
- Kidney cells
- Blood and immune cells
- Muscle Cells: skeletal, cardiac
- Various nerve/brain cells
- Eye cells
- Pigment cells
- Intestinal tract cells
- Reproductive tissue cells

Undifferentiated Human Cell

