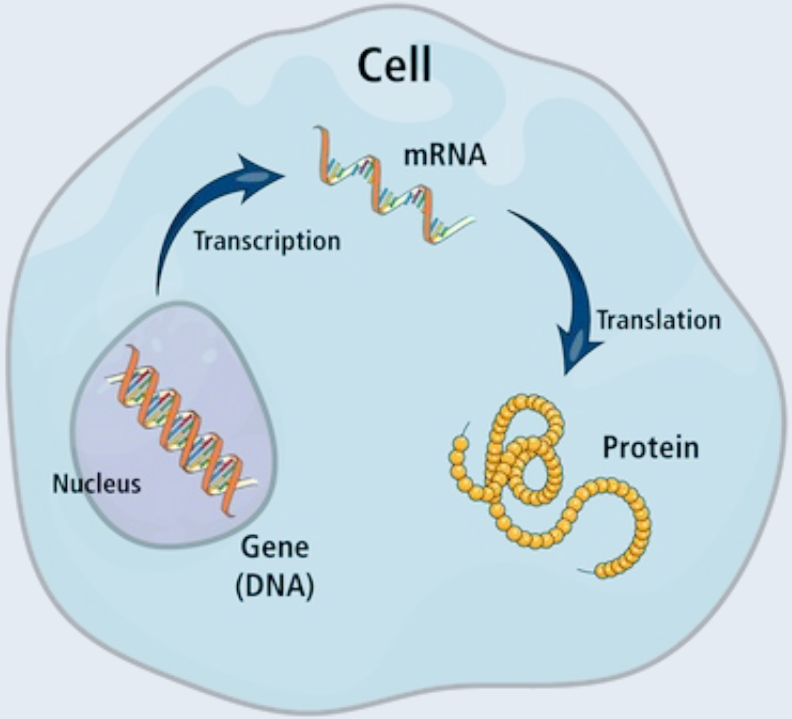
An Introduction to

Single-Cell RNA Sequencing Data

Cell Development

Overview

- Cell fate



New system of gene therapy by introducing mRNA-loaded nanomachine

Image from Diverse Applications of mRNA Technology, www.escolifesciences.com

Cell cycle

- Cell division
- Cell differentiation

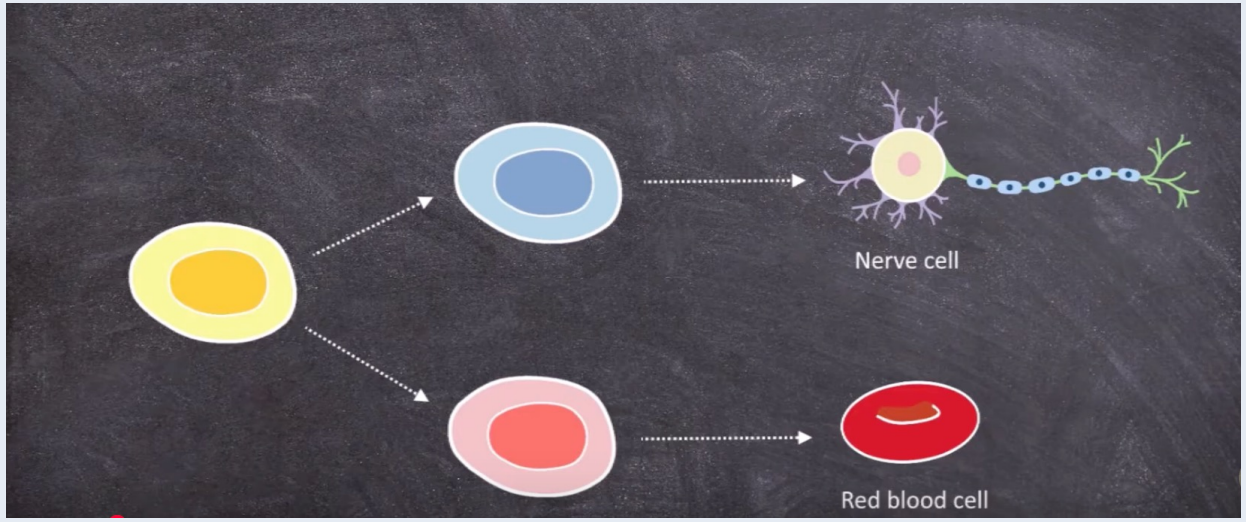
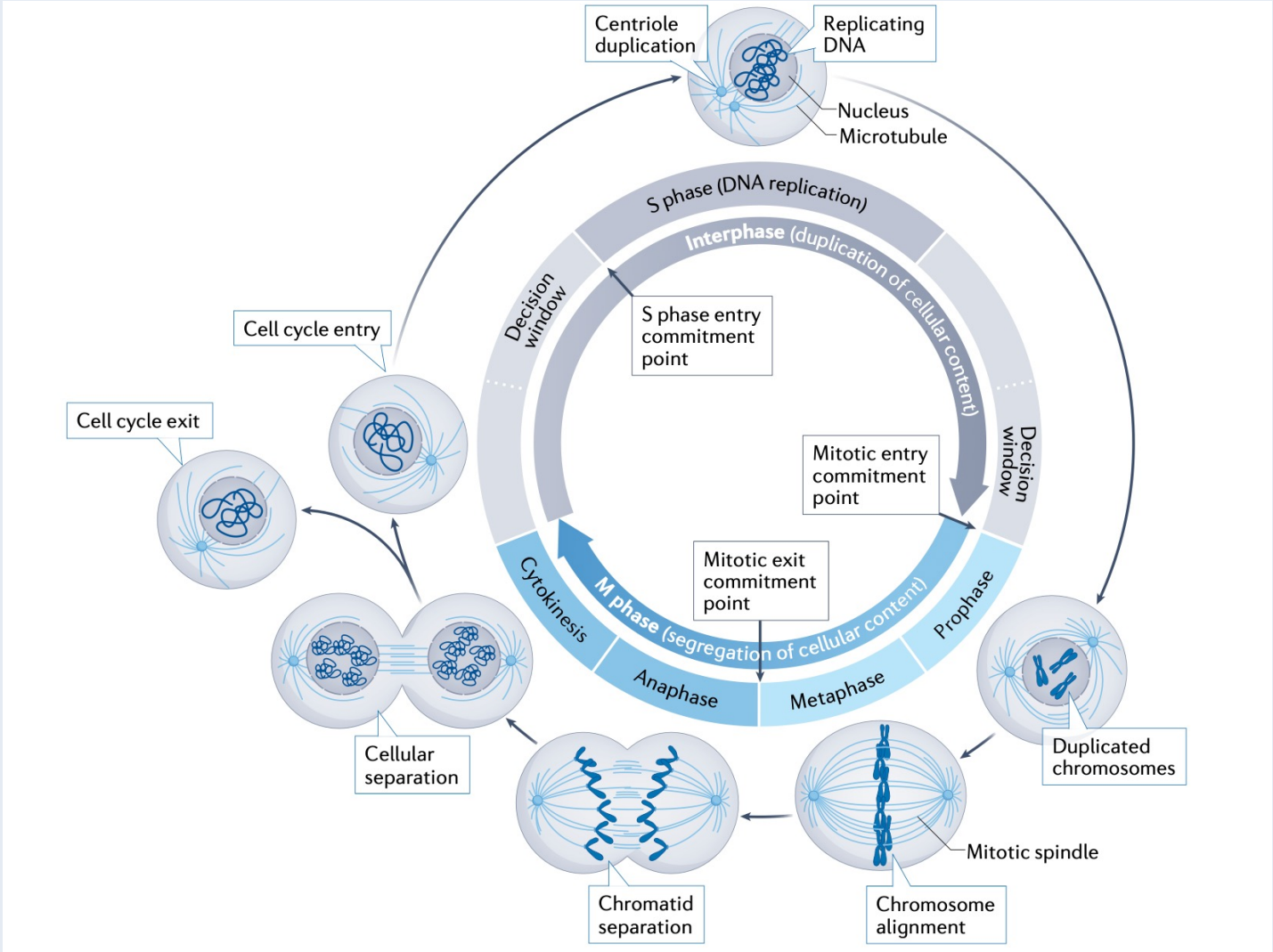


Image from Cell Differentiation & Gene Expression | Cell Biology, sci-ology

Cell division



Cell cycle control in cancer ,*Helen K. Matthews*

Cell differentiation

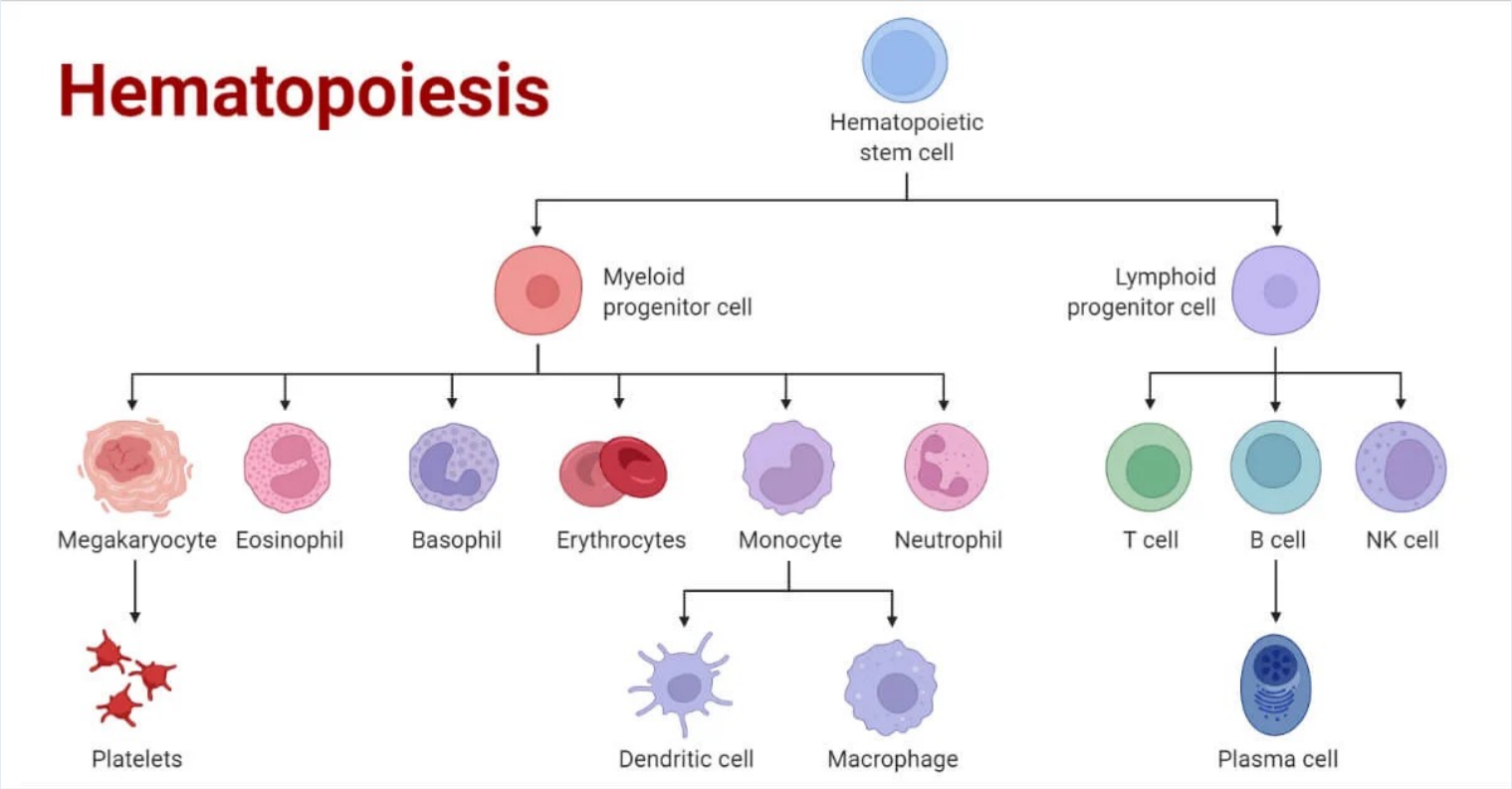


Image from Hematopoiesis- Definition, Cells, Growth Factors, Regulation , www.microbenotes.com

Stem Cell

- Embryonic stem cells
- Somatic (adult) stem cells
- IPS cells

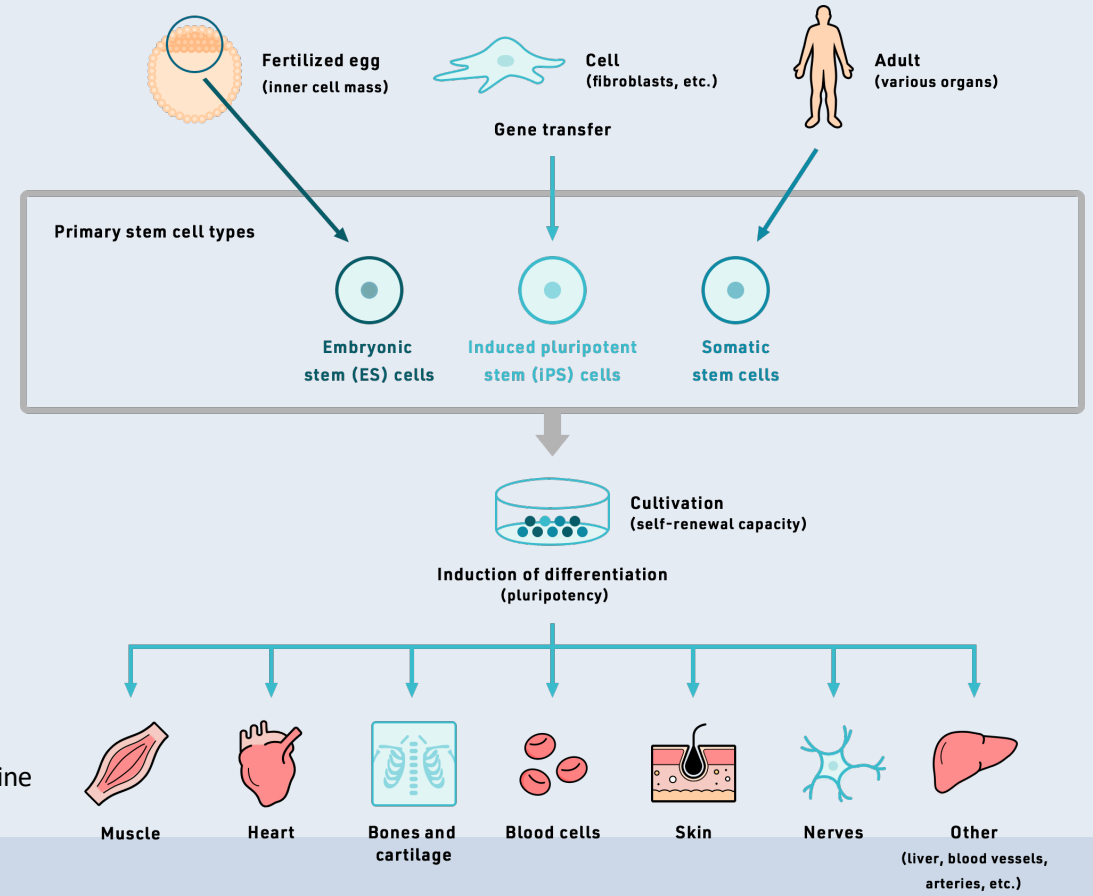
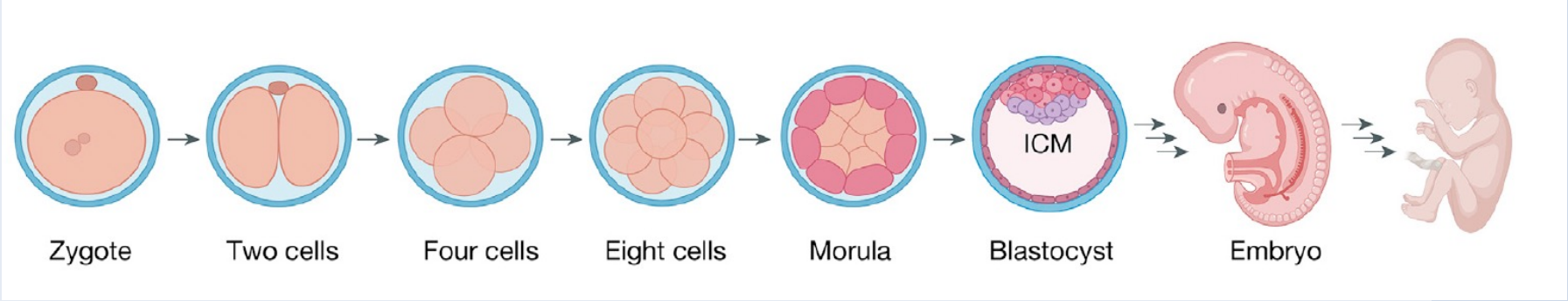


Image fromRegenerative Medicine
www.sanbio.com

Embryonic stem cell



Stem Cell Reports,
Laleh Haghverdi and Leif S. Ludwig

- Morphogens
- Signal factors

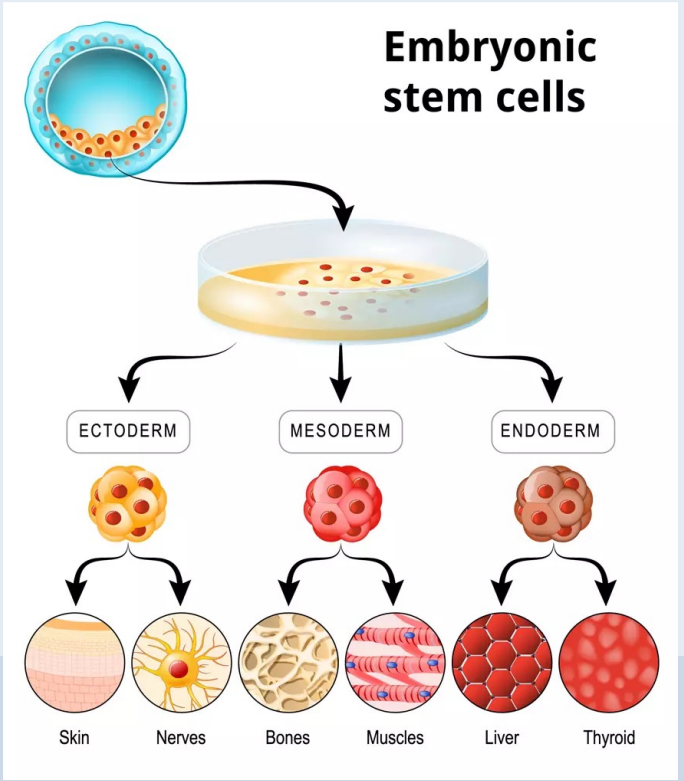


Image from stem cells, www.biorbyt.com

🔍: will be discussed

Somatic stem cell

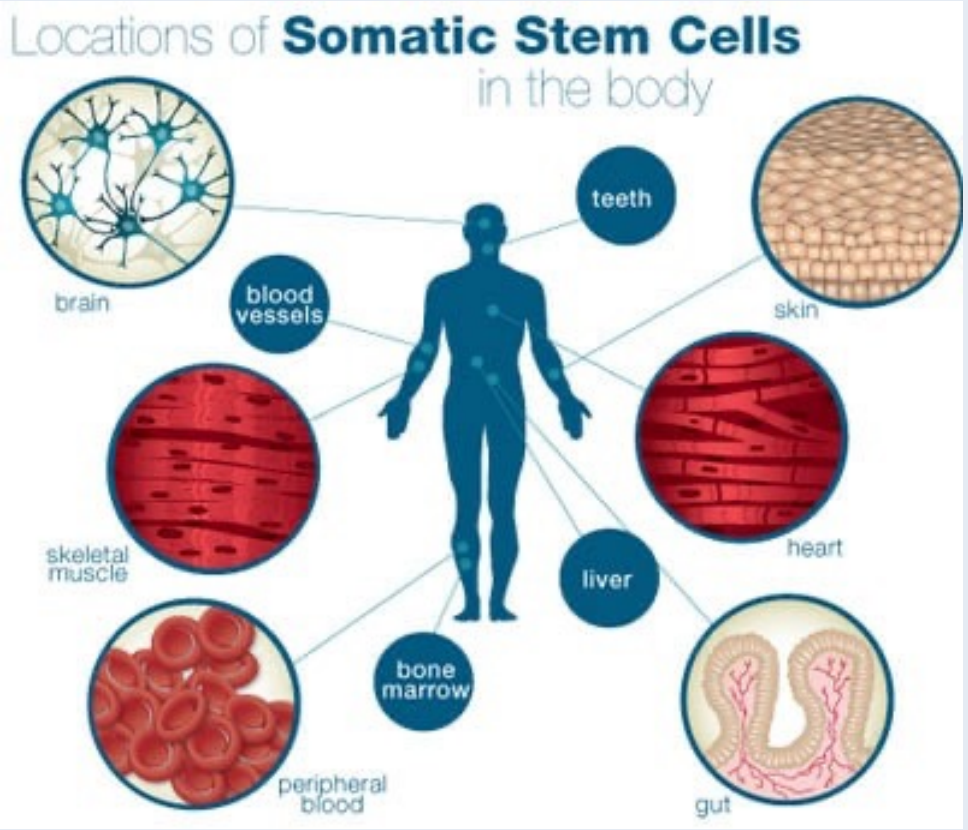


Image from learn.genetics

comparing somatic stem cells and embryonic stem cells

Feature	Somatic Stem Cells (Adult Stem Cells)	Embryonic Stem Cells
Origin	Found in specific tissues (e.g., bone marrow, brain, skin)	Derived from the inner cell mass of a blastocyst (early embryo)
Potency	**Multipotent** – can become only a limited range of cell types related to their tissue of origin	**Pluripotent** – can differentiate into any cell type in the body
Function	Tissue maintenance and repair	Formation of all body tissues during development
Availability	Harder to isolate, limited in number	Easier to grow in large quantities in the lab
Proliferation	Limited self-renewal, may lose potency with age	Can divide indefinitely under proper conditions
Therapeutic Use	Used in regenerative medicine, but with limited applications	High potential for regenerative medicine, but ethical issues limit use

Next session

- **Gene regulation**
  - DNA and mRNA
  - Gene expression
  - Transcription factors
  - Chromatin remodelers