

iPS Cells

Outlines

- Reasons
- iPS cells
- Pluripotent stem cells
- ES cells and iPS cells
- Prospect

Reasons

- Prof. Yamanaka won a Nobel prize
- iPS cells have attracted considerable attention
- I am interested in iPS cells

What are iPS cells?

- induced pluripotent stem cells
- Able to differentiate and grow almost indefinitely (pluripotent stem cells)
- Born in 2006 by Prof. Shinya Yamanaka

Mr. Shinya Yamanaka

- The Director of Center for iPS Cell Research and Application, Kyoto University
- Nobel prize for medicine

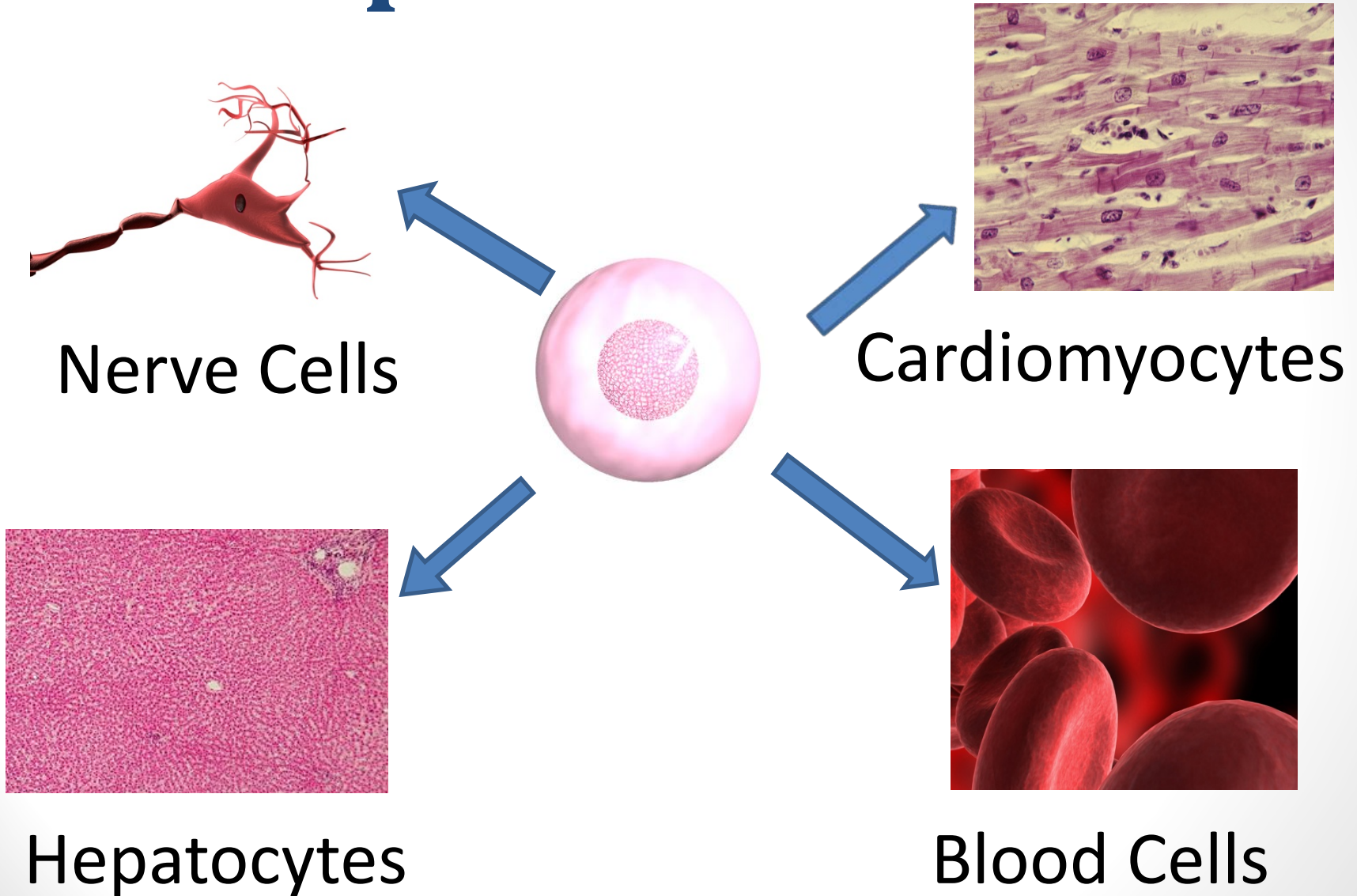
Pluripotent stem cells

Able to differentiate and grow almost indefinitely

- iPS cells
- ES cells

etc...

Pluripotent stem cells



How were iPS cells made?

Prof. Yamanaka

- Introducing four genes (Oct3/4, Sox2, c-Myc, Klf4) into mouse fibroblast by retrovirus vector
- Culturing for a few weeks
→ iPS cells

How to make iPS cells

- Genes
- Vector
- Compound (under study)

Background

- 1981: Embryonic stem (ES) cells
- 1998: Human ES cells
 - More expectations to apply to regenerative medicine
 - Ethical difficulties and problems of tissue rejection
- 2006: iPS cells from mouse's skin tissue
- 2007: iPS cells from human skin tissue

iPS cells and ES cells

- ES cells

Made from a embryo

- iPS cells

Made from a somatic cell

iPS cells and ES cells

Common Merit

- Pluripotency
- Grow almost indefinitely

→ pluripotent stem cells

iPS cells and ES cells

Common Problems

- Unknown in mechanism of maintaining pluripotency
- Possibility of canceration due to almost indefinite growth

iPS cells and ES cells

	ES Cells	iPS Cells
Merit	<ul style="list-style-type: none"> ▪ Pluripotency ▪ Grow almost indefinitely ▪ No introduction of genes ▪ Rich store of knowledge 	<ul style="list-style-type: none"> ▪ Pluripotency ▪ Grow almost indefinitely ▪ Low possibility of rejection ▪ No embryo
Demerit	<ul style="list-style-type: none"> ▪ High possibility of rejection ▪ Ethical problems ▪ Difficulty of stably getting embryos 	<ul style="list-style-type: none"> ▪ Possibility of canceration due to introduction of genes ▪ Unknown in mechanism of reprogramming
Common Problems	<ul style="list-style-type: none"> ▪ Unknown in mechanism of maintaining pluripotency ▪ Possibility of canceration due to almost indefinite growth 	

Application of iPS cells

- Regenerative medicine
- Elucidation of the cause of disease
- Development of new drugs

Problems of iPS cells

- Canceration
- Forming teratoma
- Unknown in mechanism of reprogramming
- Efficiency

iPS cells

- Expectations
- Problems and difficulties
- Under study

iPS cells

- Possibilities and potential
- Important role
- Great benefit

Thank you for listening!

Any Question?