



# YUHUA SECONDARY SCHOOL

Mark

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SIBo preparation 1

## prokaryotes

- usually in bacteria, archaea, etc
- ~~both have~~ <sup>has</sup> DNA, cytoplasm, ribosomes, cell membrane
- no nucleus
- unicellular organisms

## Eukaryotes

- usually in plants, animals, fungi, protists
- ~~both have~~ <sup>has</sup> DNA, cytoplasm, ribosomes, cell membrane
- has nucleus
- Multicellular or unicellular organisms



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7al bio olympiad

• diff levels of biodiversity?

genetic

species

ecosystems

highest biodiv → tropicslowest biodiv → north/south poles

How does climate change affect biodiv?

temp inc - ↑ temperature kill species

- melting of ice increase water which can flow and kill & destroy habitats
- if it can cause drought and kill species with the lack of water

loss of rich biodiversity? - loss of species, lose biomedicines and genetic diversity for food

why is preservation of genetic diversity for food important?

some genetics are resistant to pests, climate change and viruses/diseases

rich biodiversity <sup>in the tropics</sup> help us in what - food, medicines and materials



## Bio 2

**stem cells** - They are self renewable, they can differentiate into specialised cells

### Zygotic stem cells

totipotent

↳ can develop into  
any cell in the body  
(can create an organism)

### Embryonic stem cells

Pluripotent

can develop into  
all or most of  
the cells but cannot  
create organisms

### Adult stem cells

multipotent

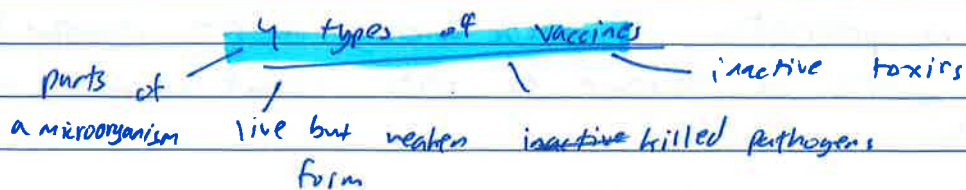
can develop into  
more than one  
cell type  
but more limited  
than pluripotent

### ~~Embryonic stem cells~~

Haematopoietic stem cells - used to differentiate into specialised types of blood cells in the body

induced pluripotent stem cells (iPSC) - reverse back to its original stem cells by giving that certain cell with specific genetic instructions

## Bio 3



### herd immunity

↳ if enough people are vaccinated,  
disease could be controlled

↳ these act as a memory of a pathogen,  
body will remember and be more  
prepared



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SJBO 4

## innate immune system



molecules, organ cells people are  
born with that fights the harmful  
microorganisms

## internal immune system

(to eat)  
- Phagocytes → engulf microorganisms

• neutrophils - 'self destruct' (basically pass)

• macrophages - free types | fixed types  
(big eaters') (patrol and engulf) (attached to fibers etc)



reals it with  
cytoplasmic extentions  
(can do more than once)

- natural killer cells

• can kill own cells if they are infected

How does it kill?



• It releases an enzyme  
and apoptosis occurs

How?

• healthy cell contain major  
histocompatibility complex, MHC1

• unhealthy cell stops making  
MHC1





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SJBO 4

## Humoral Immunity

### Adaptiz

- Adaptive immune system - molecules, cells, organs etc that provide highly specific defences to protect the body from foreign particles

- They remember specific pathogen → main difference between A.I.S and I.I.S

### key words

- dispatches antibodies

- Neutralisation - antibodies physically block binding sites of viruses

- agglutination

### Adaptive defences

- B lymphocytes will attach onto microorganisms

- able to distinguish healthy and infected cell or virus

• when matured it has a lot of protein <sup>(1)</sup> receptors are membrane-bound <sup>(1)</sup> organisms (can freely roam and bind and mark those thru opsonization)

• it will attach and bind and will <sup>(2)</sup> multiply itself all having instructions that are designed to fight that specific flu<sub>2</sub> with a specific antibody (most are effector cells/fighter cells)

### Adaptive immune response

- T-lymphoc<sup>tes</sup> (t-cells)

- go after infected cells (causes inflammation, <sup>activate</sup> macrophages, get other t-cells ready)

★ • helper/cytotoxic t-cells (do the killing thru apoptosis)

helper t-cells - similar to B cells, it binds to a specific class 2 MHC and antigen and then clone itself with some memory cells and mostly helper t-cells. + **regulatory t-cells**

Regulatory t-cells - inhibiting cytokines that deactivate other immune cells.

★ activate the cells? - releases cytokines which will activate more t-cells which will in turn activate t-cytotoxic cells

★ Effector cells (active fighters)?

- have a lot of AER for high antibody production

★ Professional Antigen presenting cells

- some cells like phagocytes, natural killers near parts of the micro-organism they killed (happens both in IIS and AIS)

- they can also be macrophages, ~~ant~~ dendritic cells, b-cells (class 2 MHC)

★ All ~~nucleated~~ nucleated cells have class 1 MHC

- infected cells make unusual protein and it will put pieces of it on its MHC