



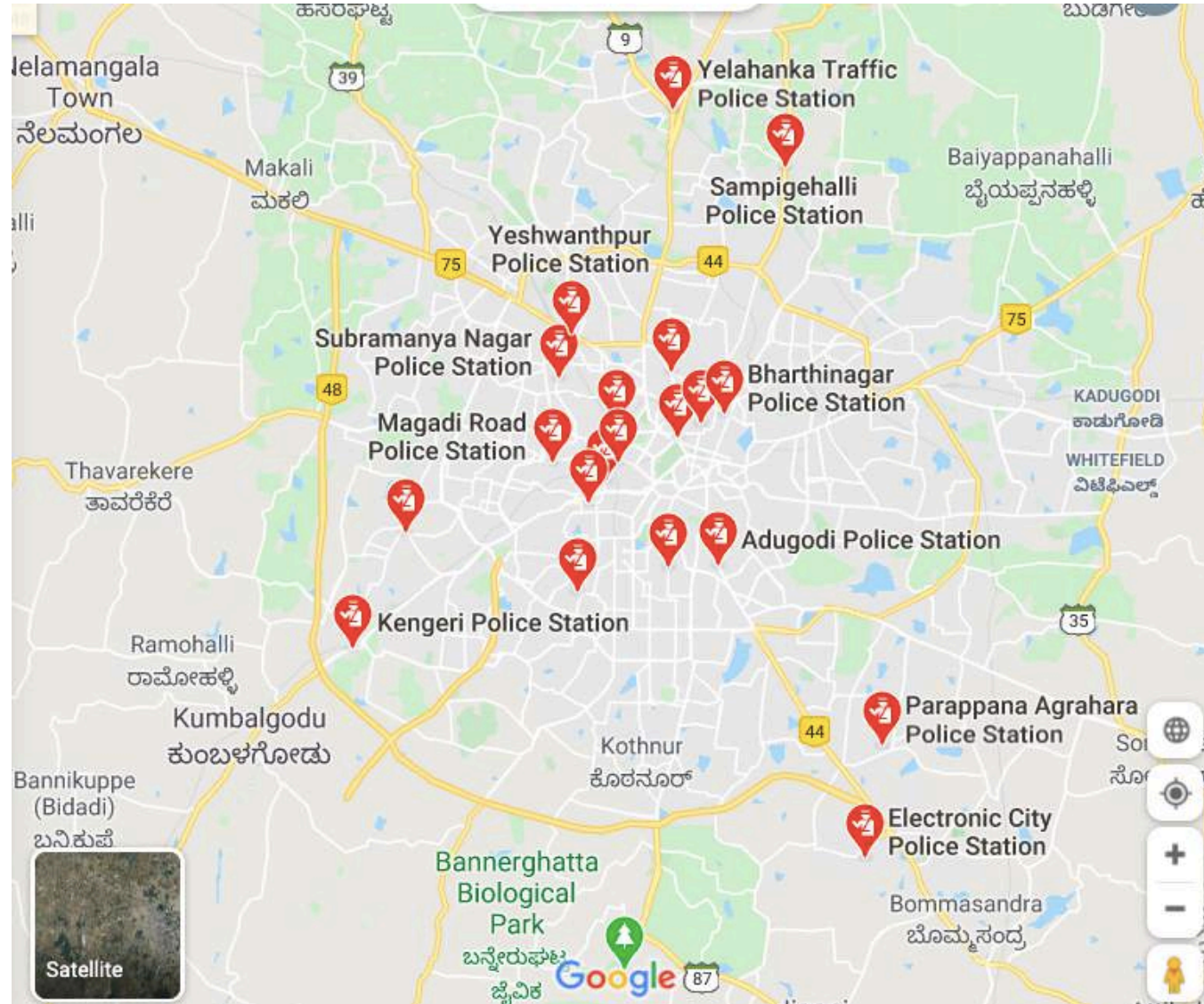
SYSTEMS BIOLOGY

CONCEPTS: Where biology meets computational programming

The External Defence System



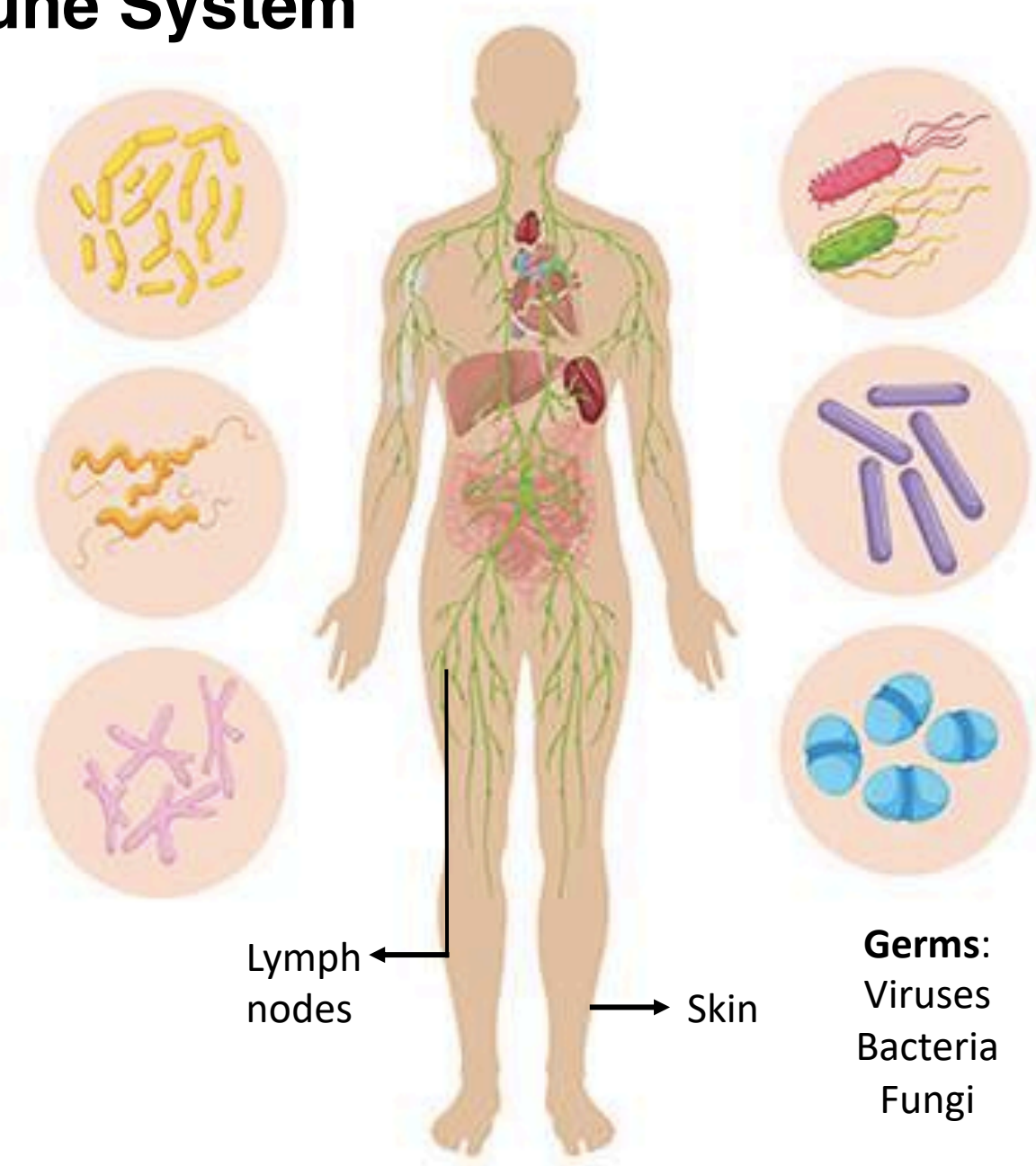
The Internal Defence System



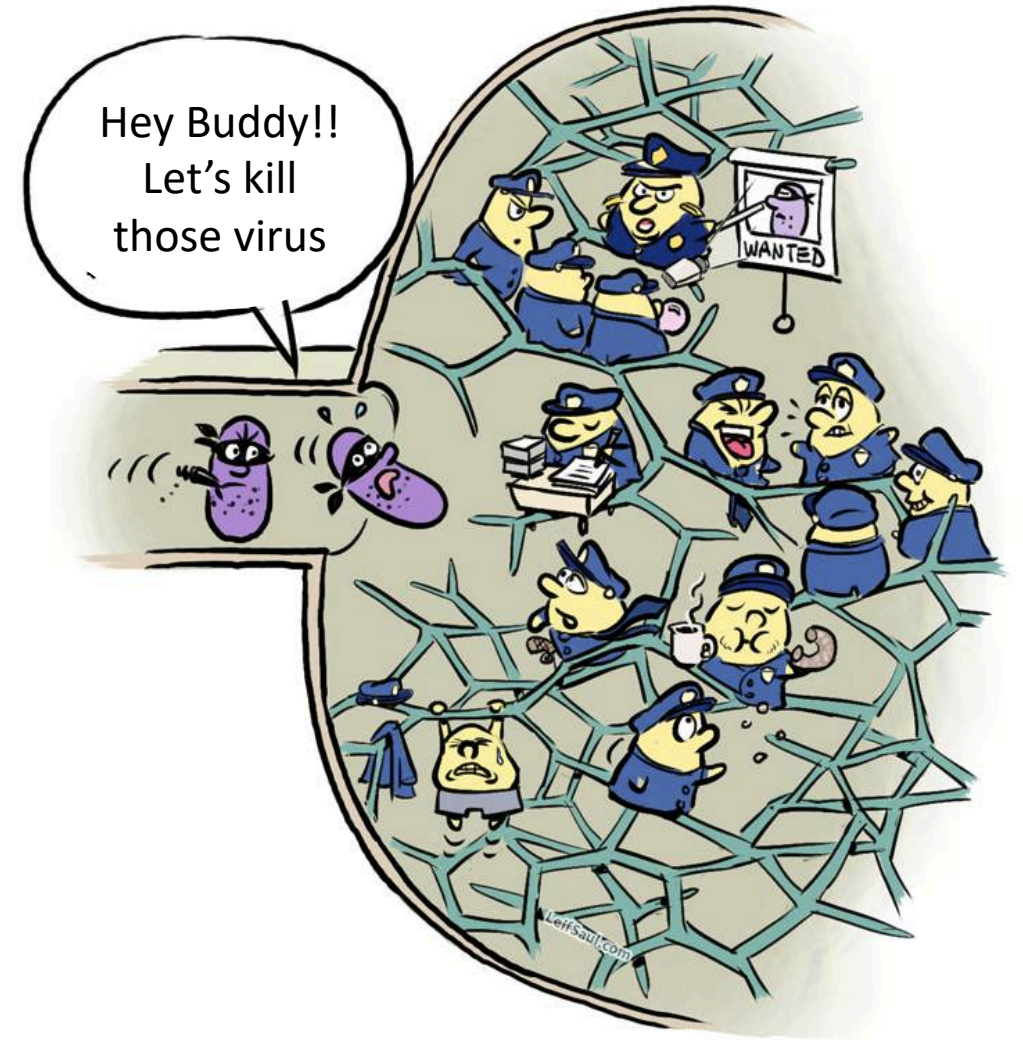
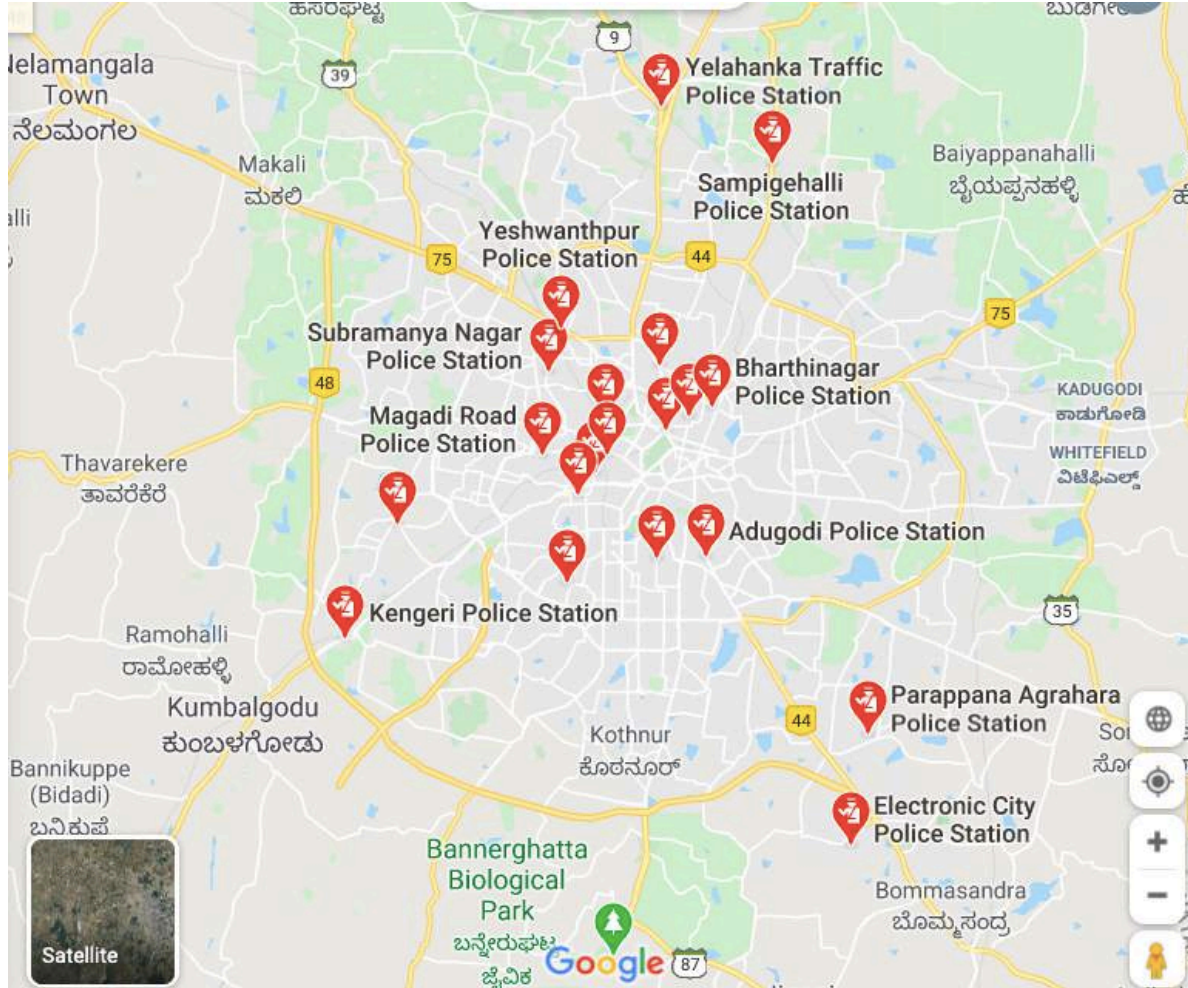
The Defence System



Our Body's Defence System: Immune System



Our Body's Defence System: Immune System



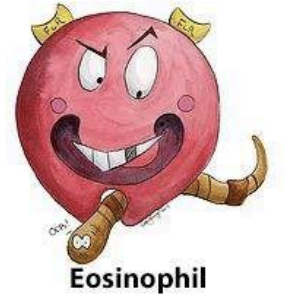
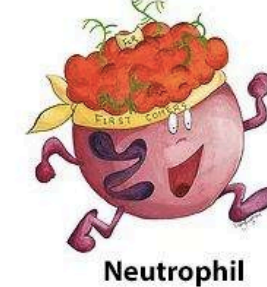
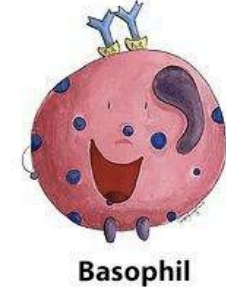
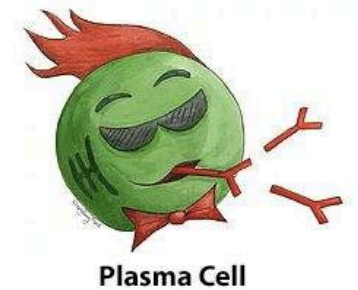
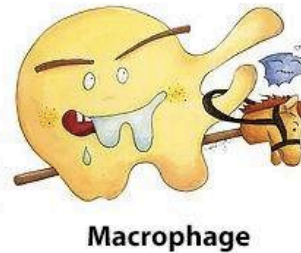
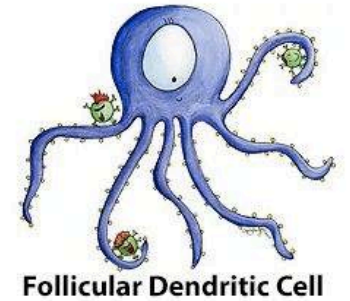
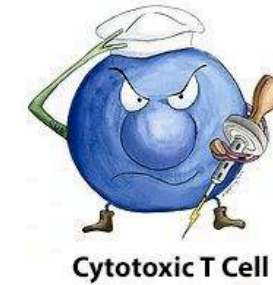
Lymph nodes: Police stations of the body

The Immune System: Protects our body from infection/disease

White Blood Cells



Different types of Immune cells

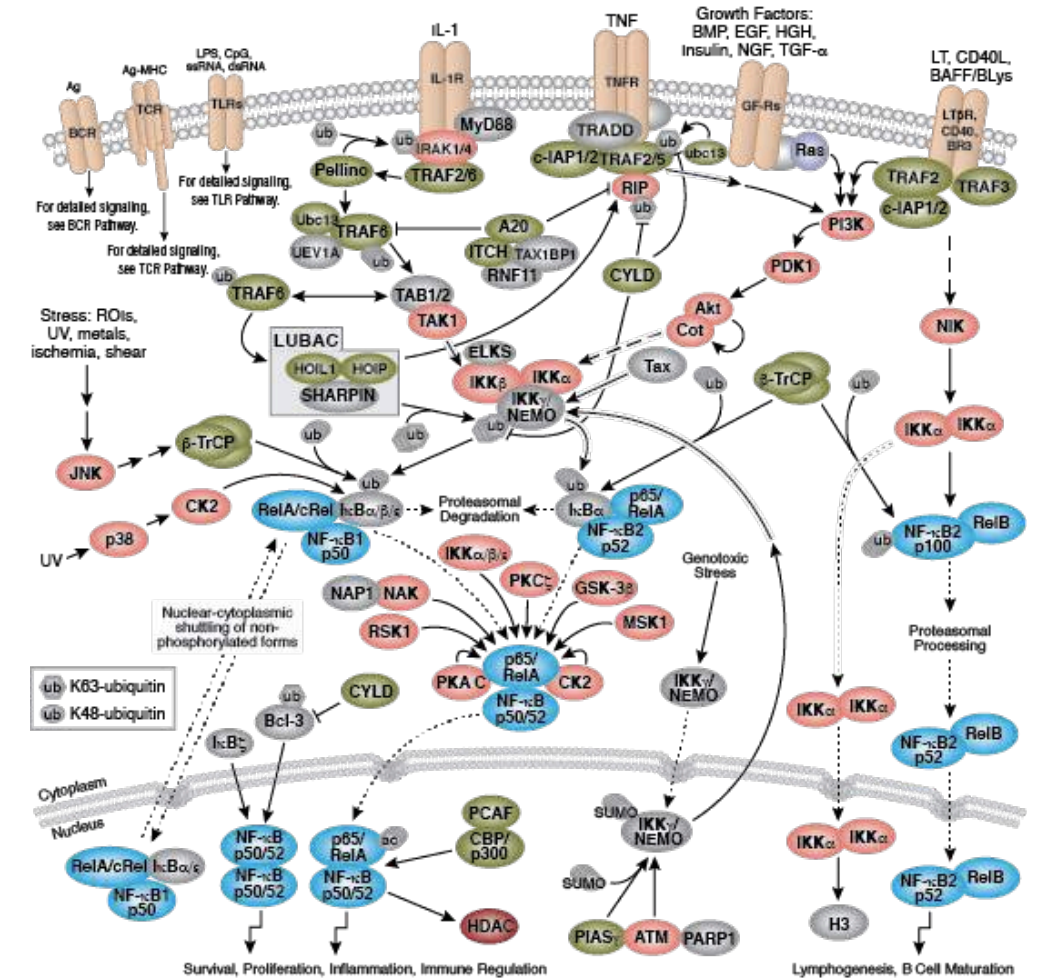


The Immune System: Signaling Network

White Blood Cells

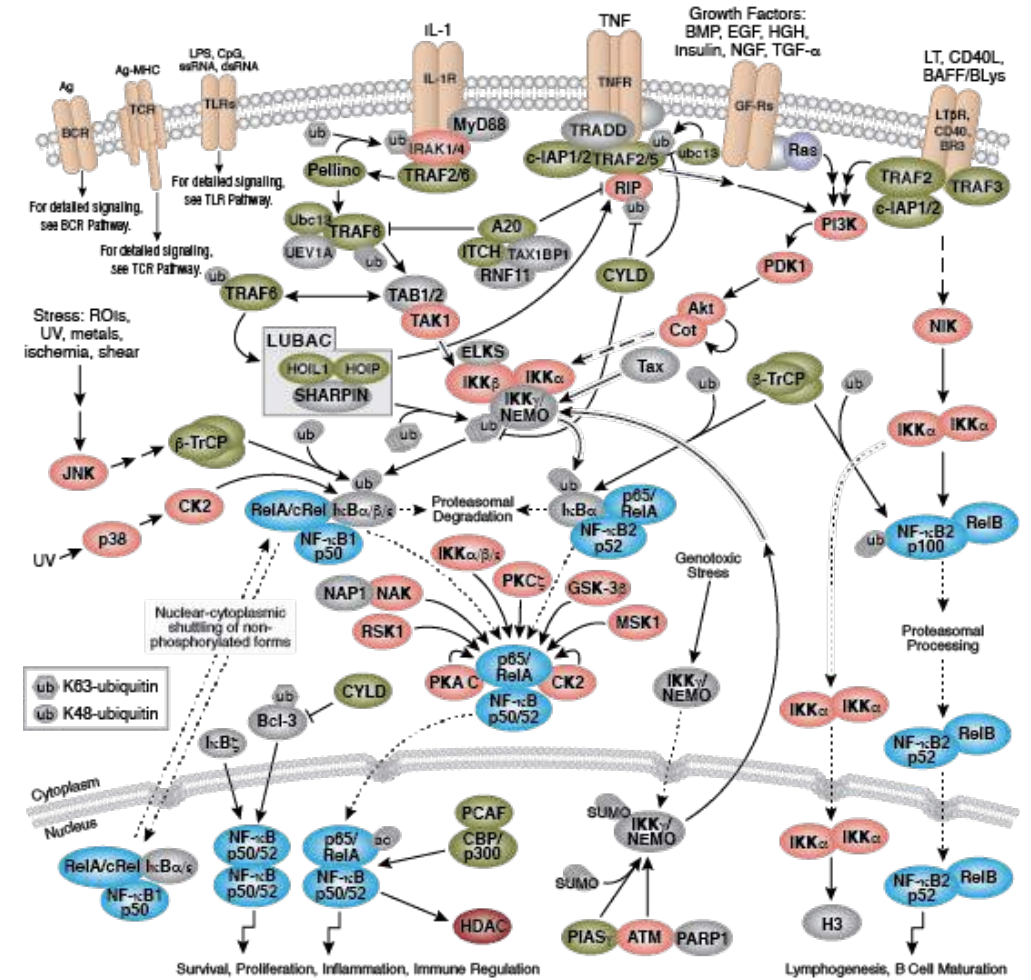
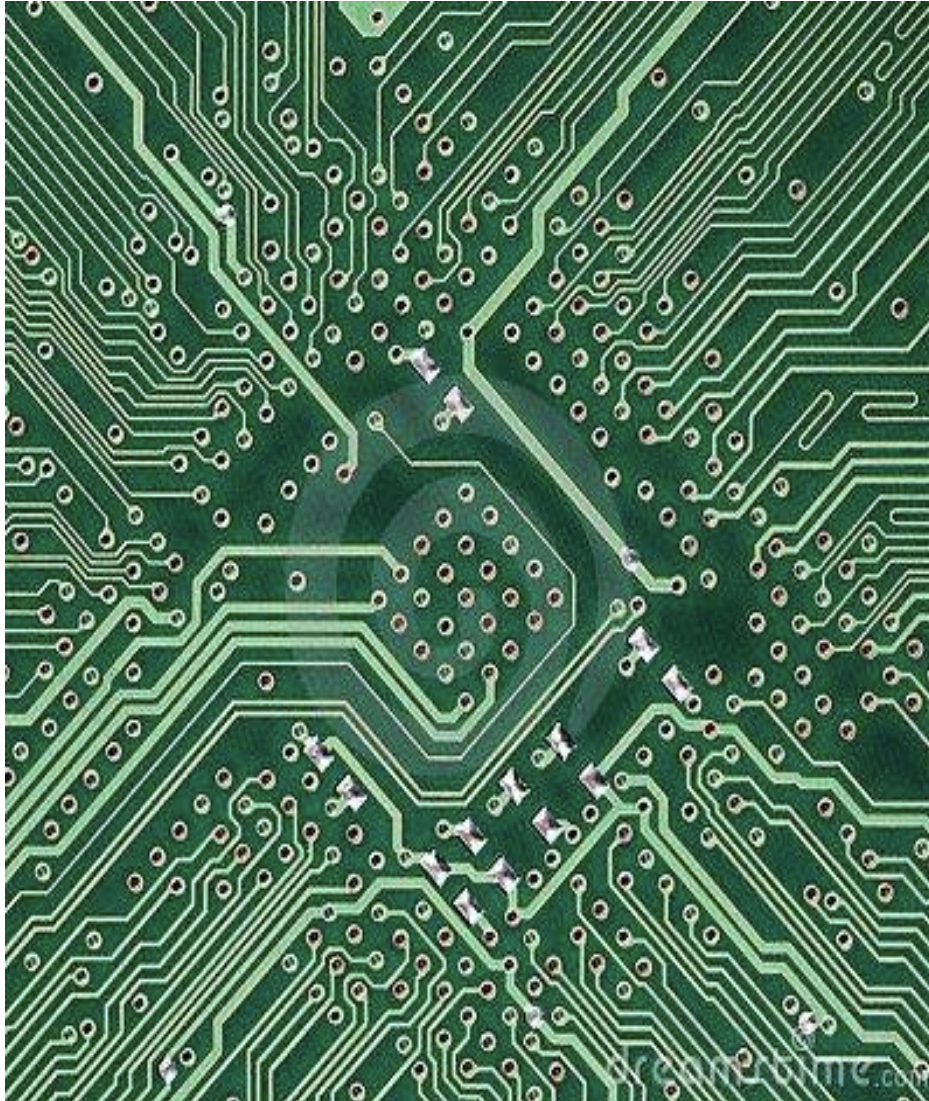


Signals



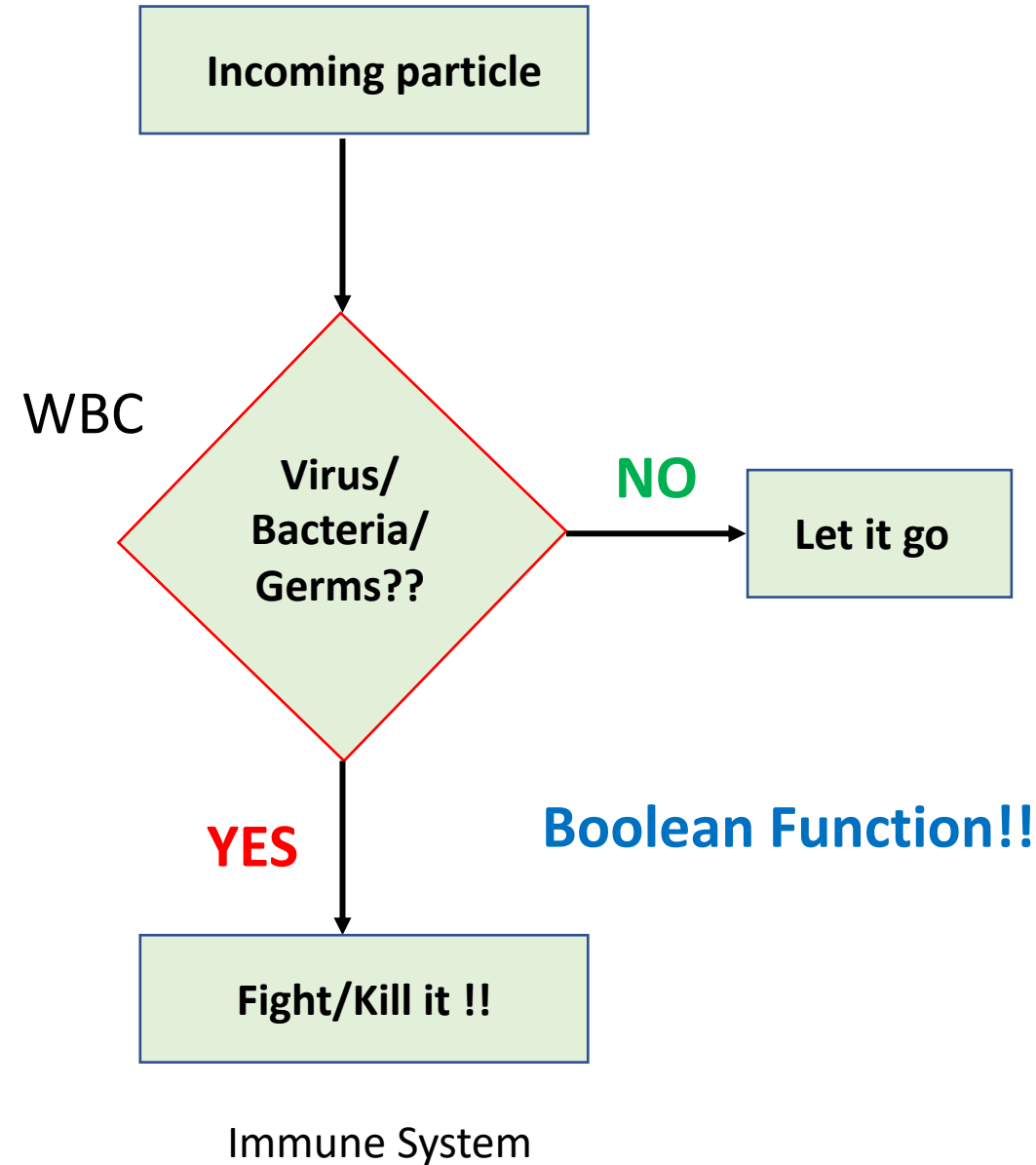
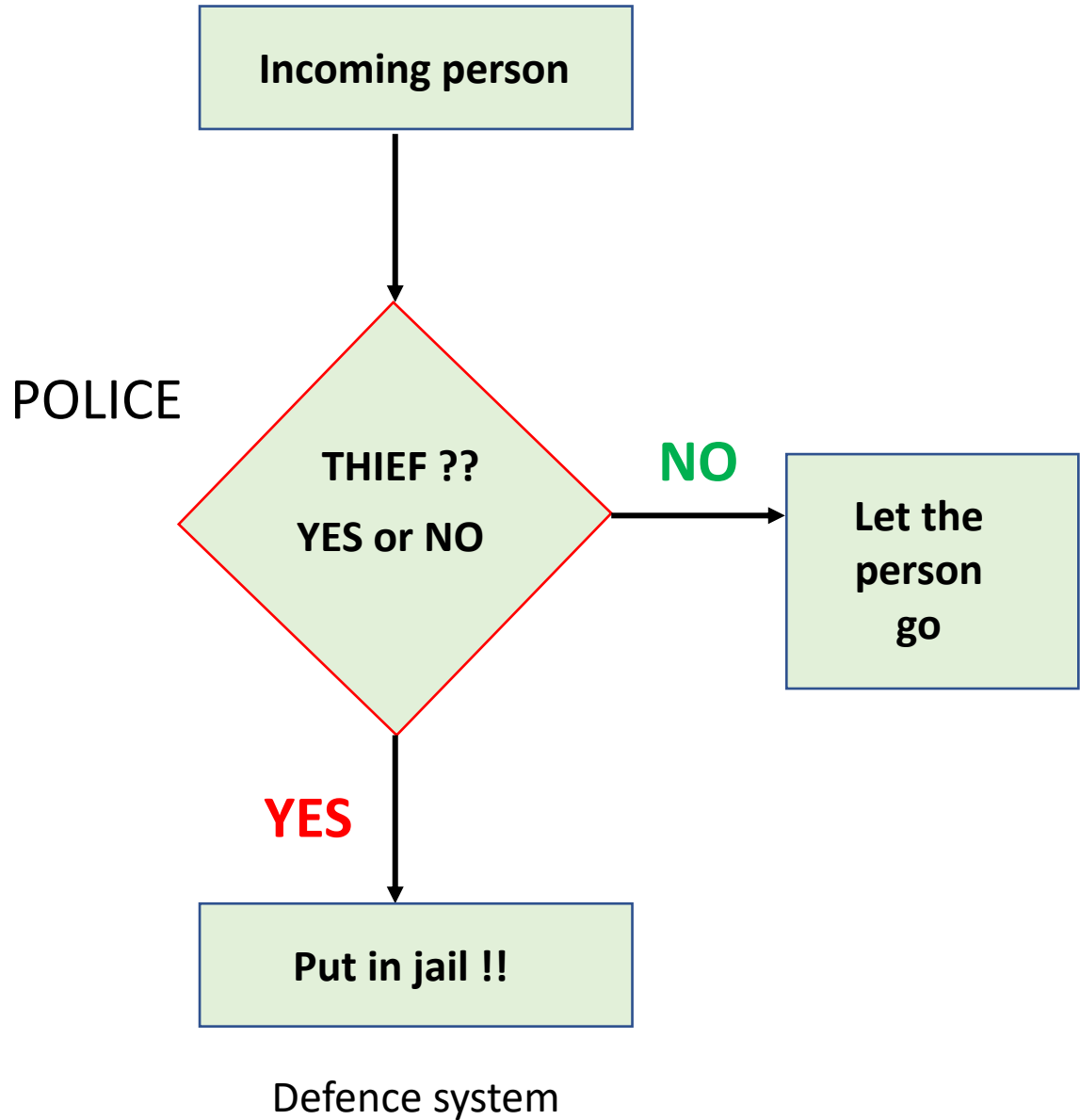
Generates Immune Response
(Again this looks like a circuit!!)

The Immune System: Signaling Network



**Generates Immune Response
(Looks like a circuit!!)**

Visualization: Flowchart



FOOD: The Source of Nutrients



FOOD: The Source of Nutrients



Protein

**Build & Protects
Muscle**

found in meat, dairy
& some plants



Fat

**Provides Long
Lasting Energy**

found in nuts, oils,
dairy & meat



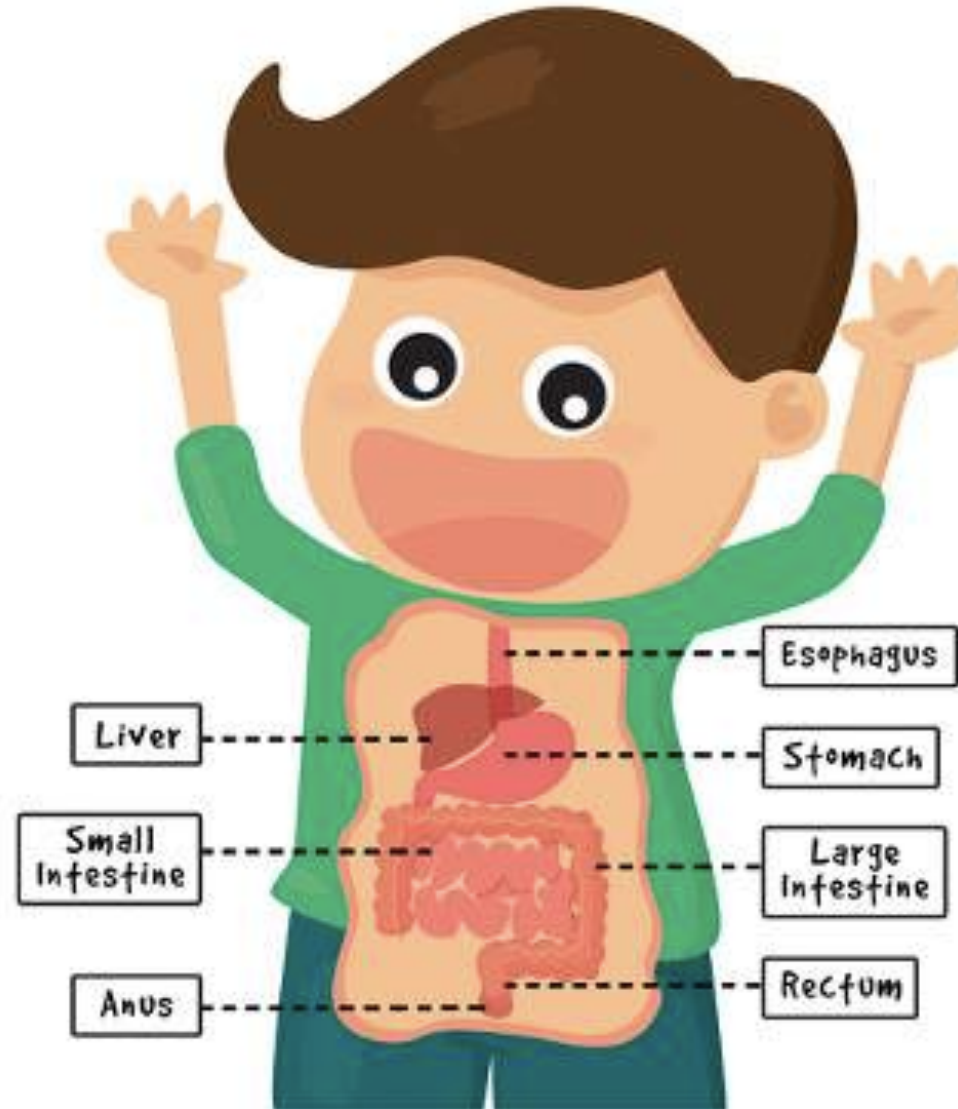
Carbs

**Quickest Source of
Energy**

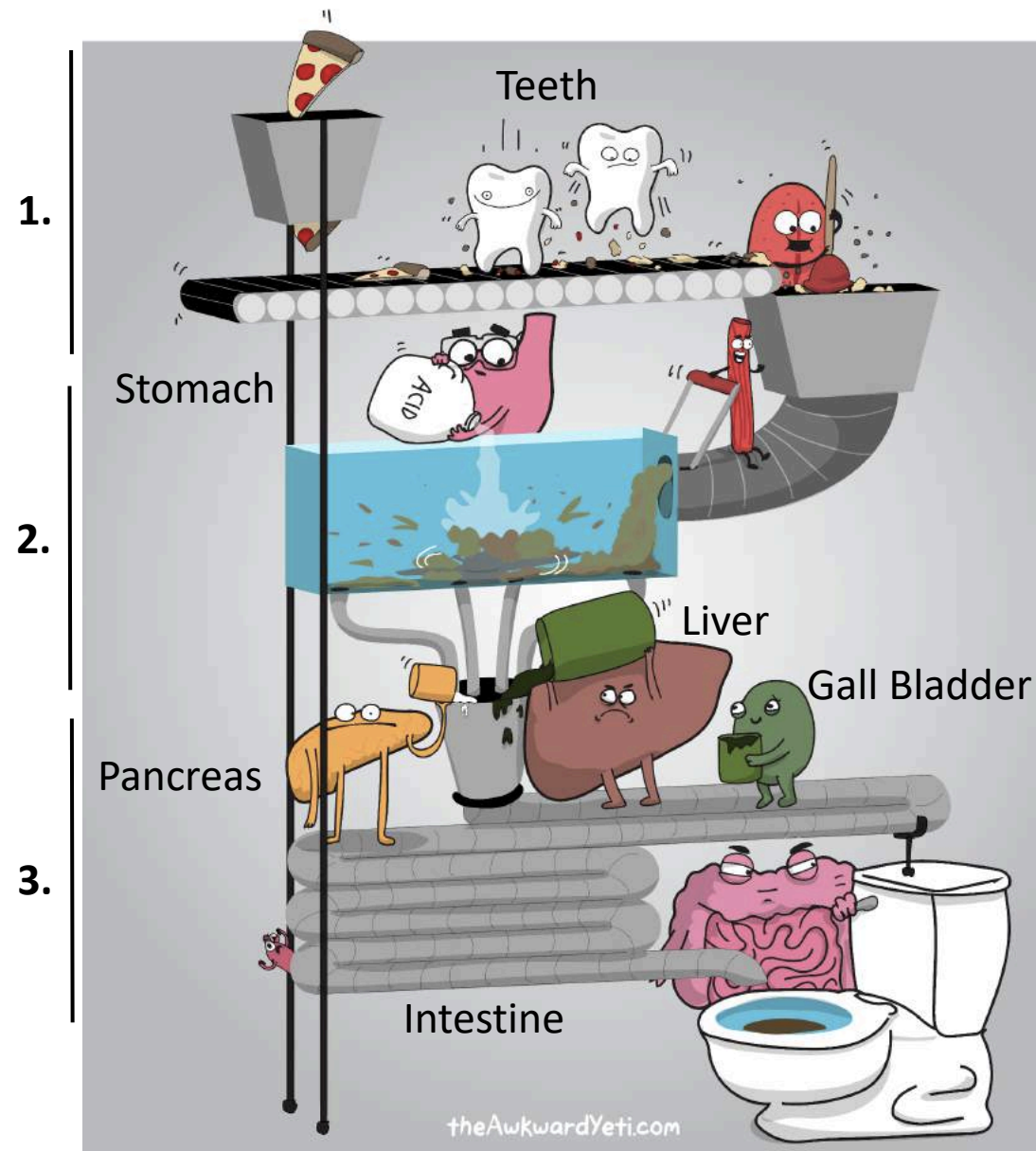
found in fruits,
veggies & grains

Decomposition!!

The Digestive System: What's its function??



The Digestive System: Let's break it down



Nutrients

Smaller components

Protein →

Amino Acids

Carbs →

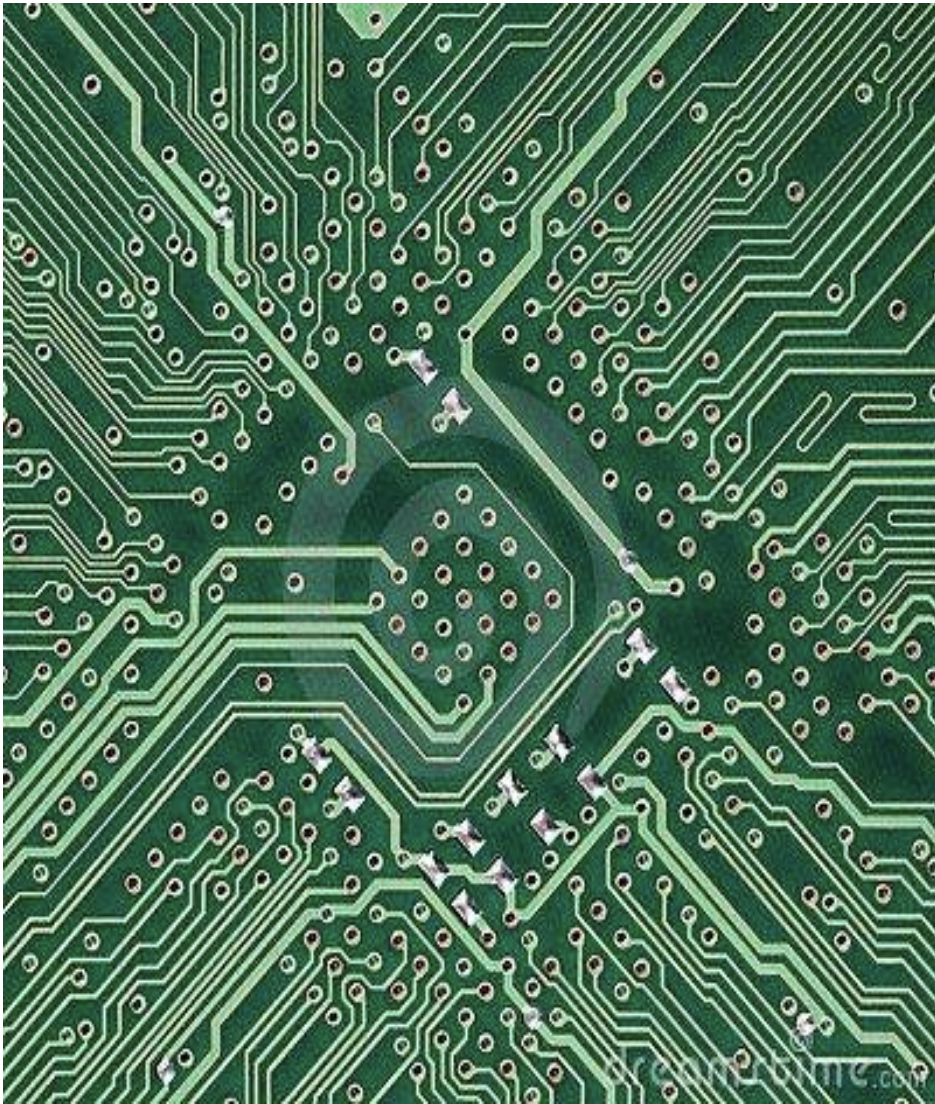
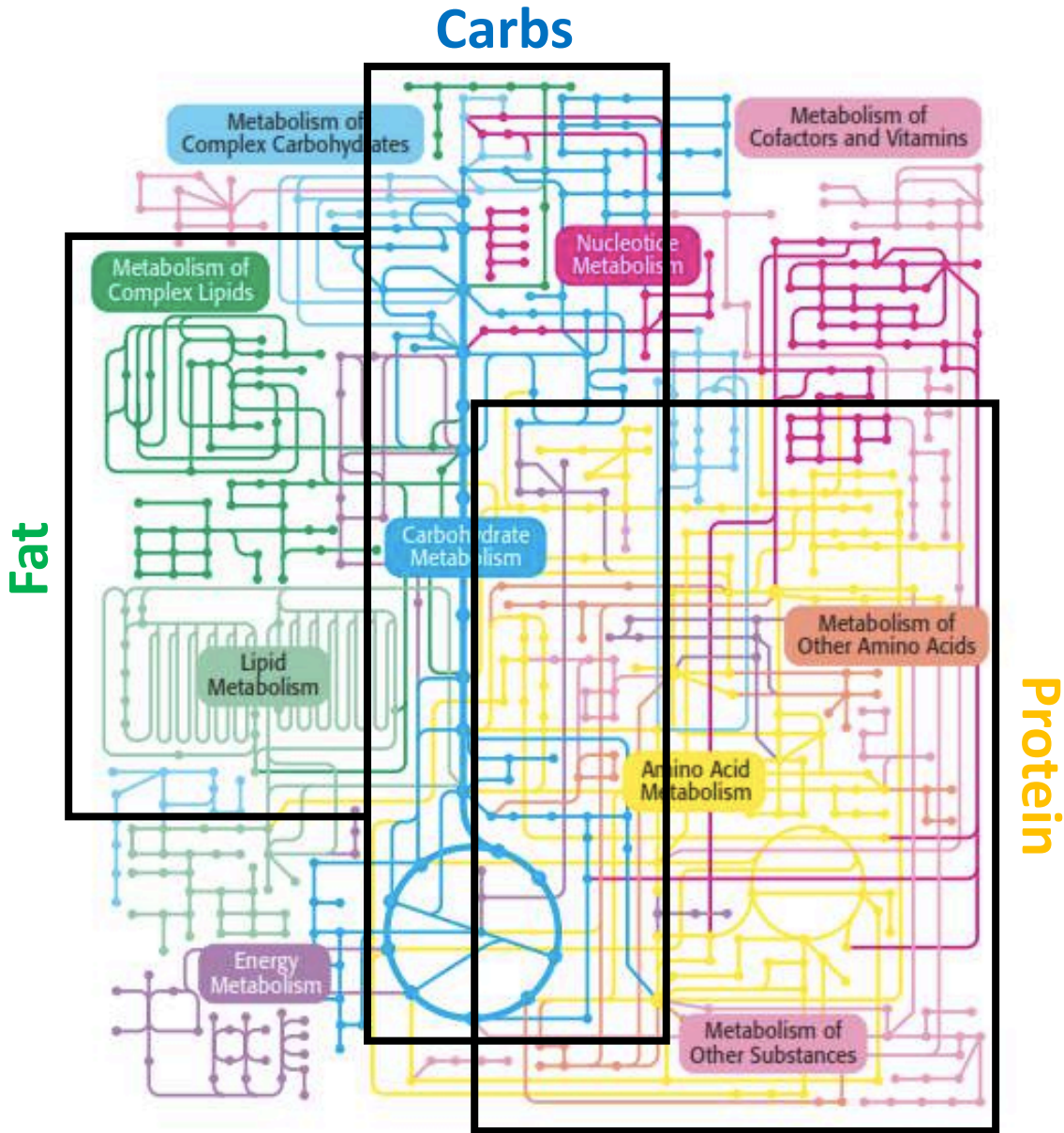
Sugars

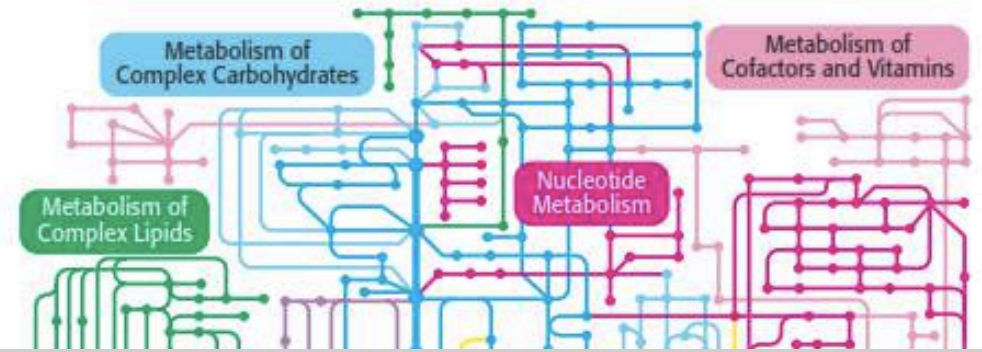
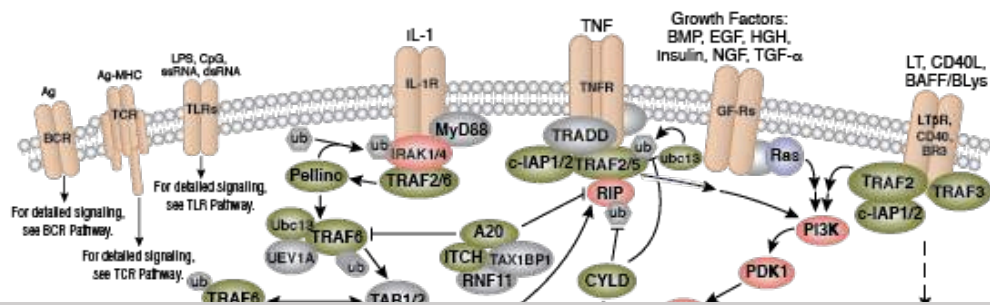
Fat →

Lipids

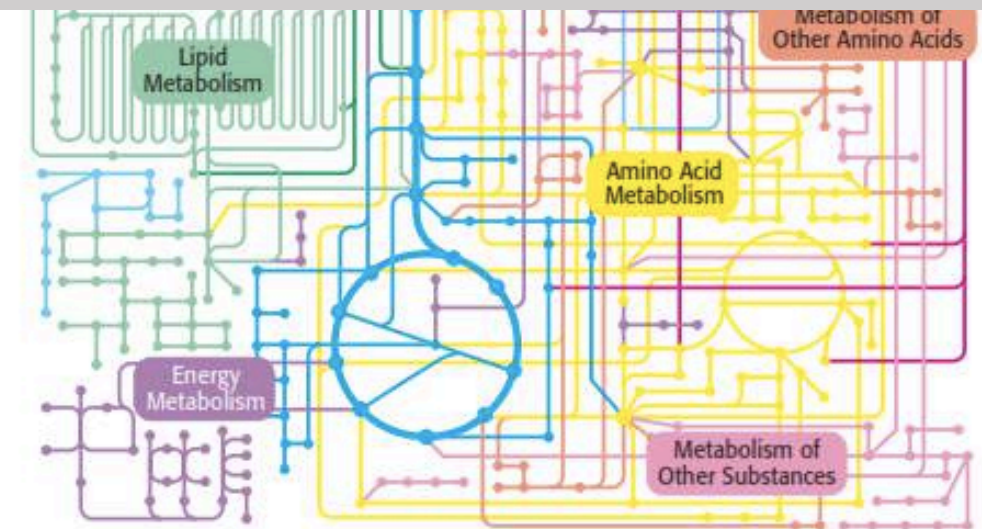
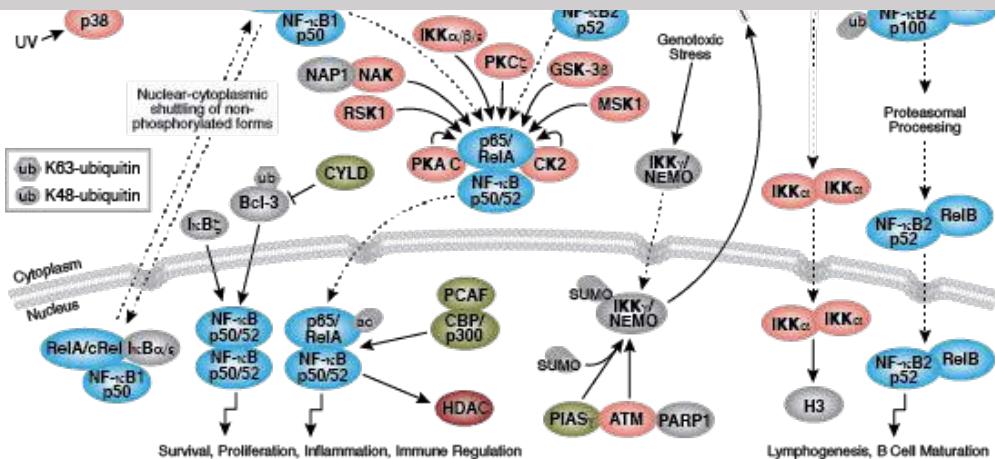
Decomposition!!

The Digestive System: Nutrients & Metabolic Network

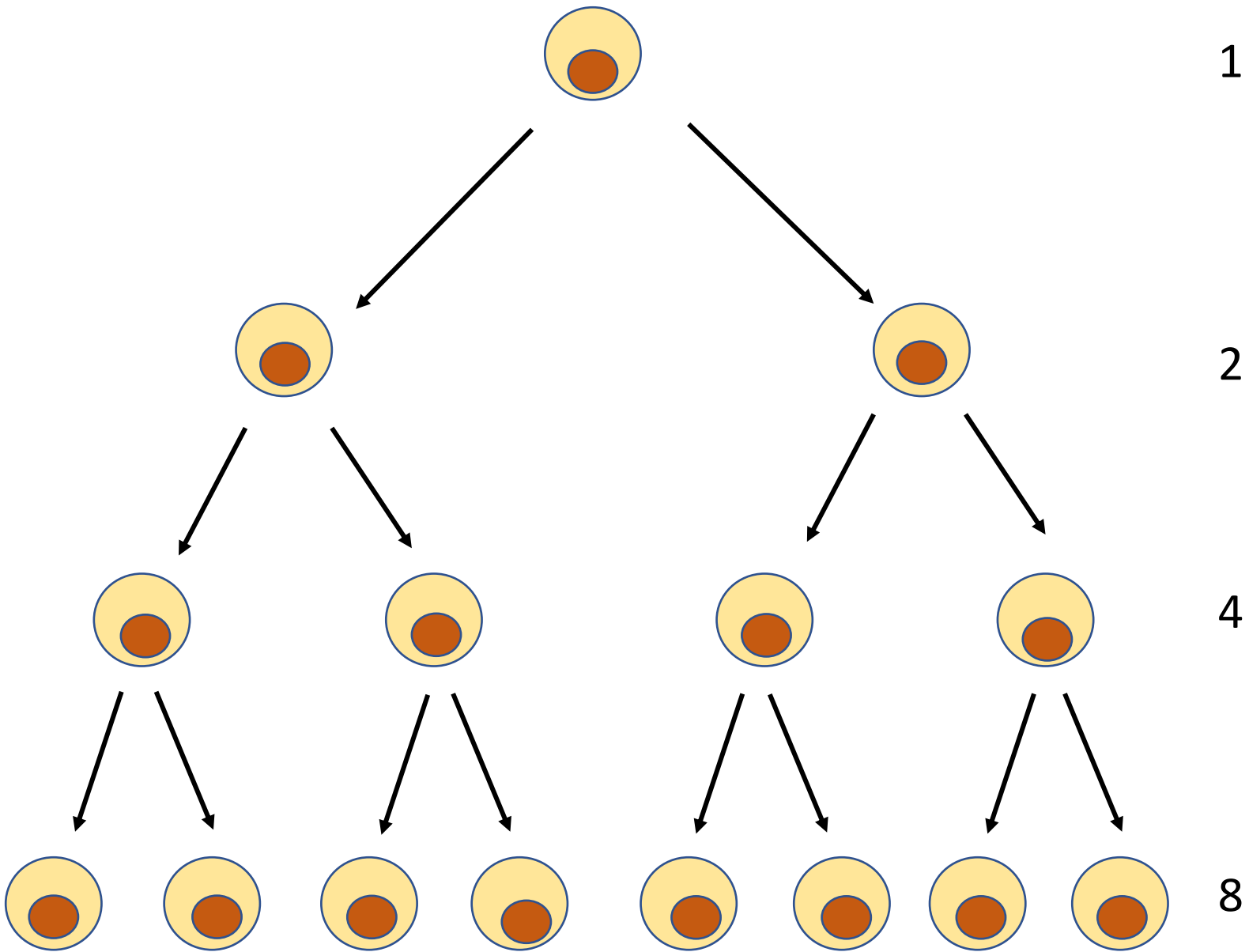




Each arrow/connection in the circuit/network can be written as a code to generate an Algorithm

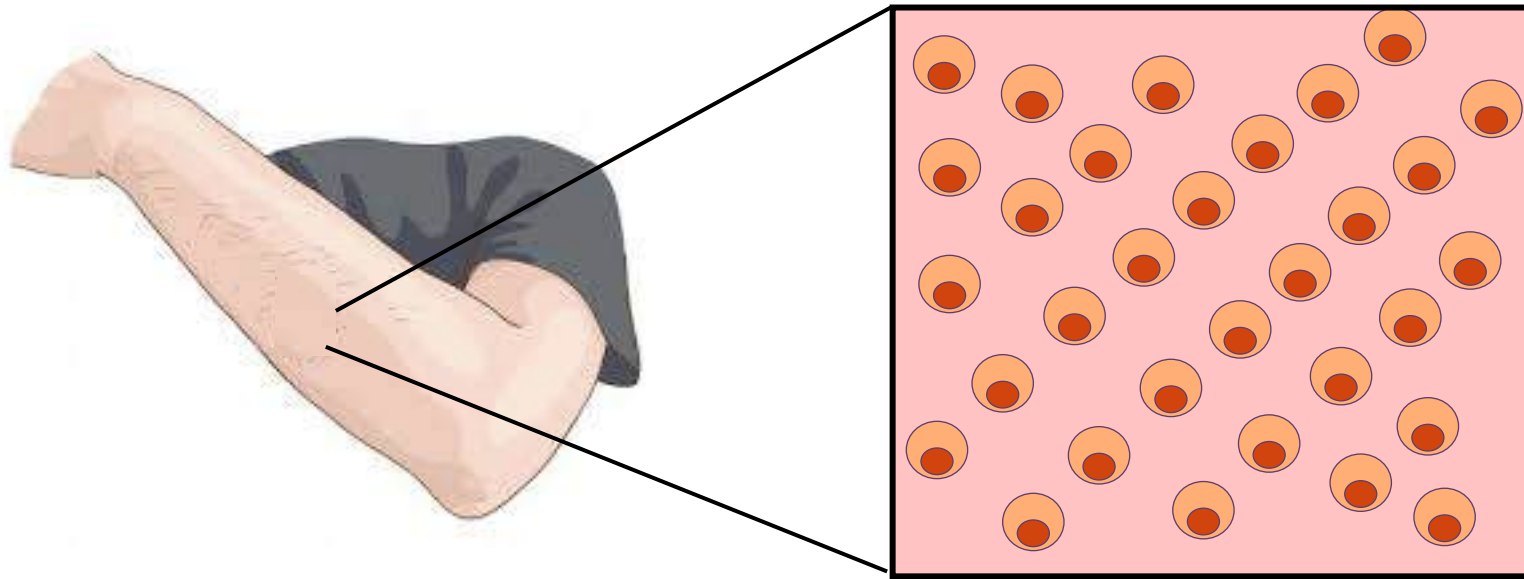


The Cell Division/Cycle

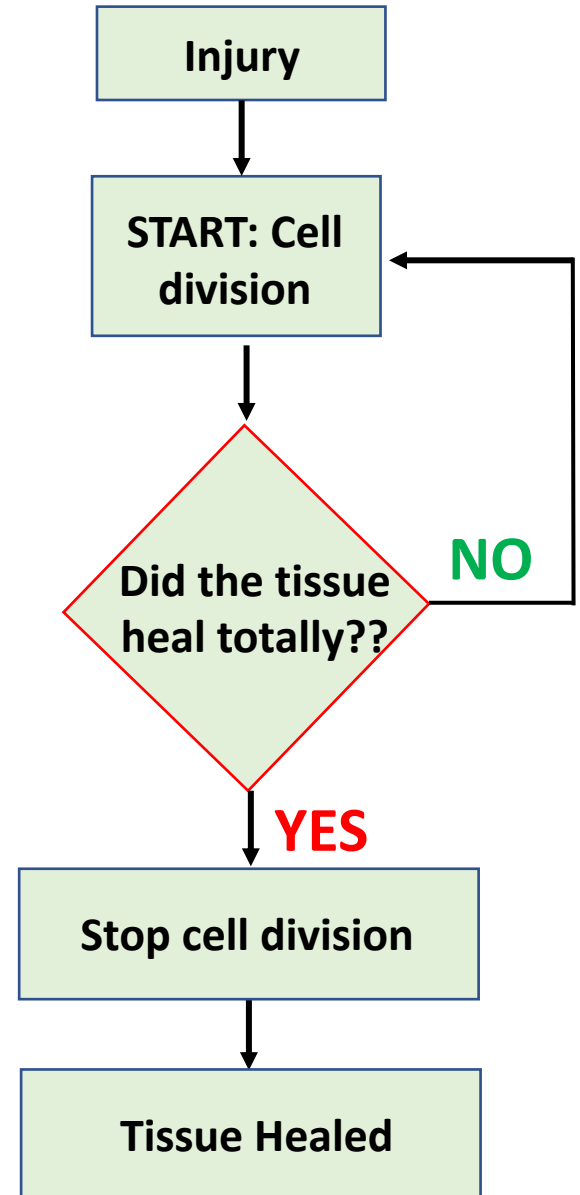


16, 32, 64, 128.....so on (2^n , where n number cycles)

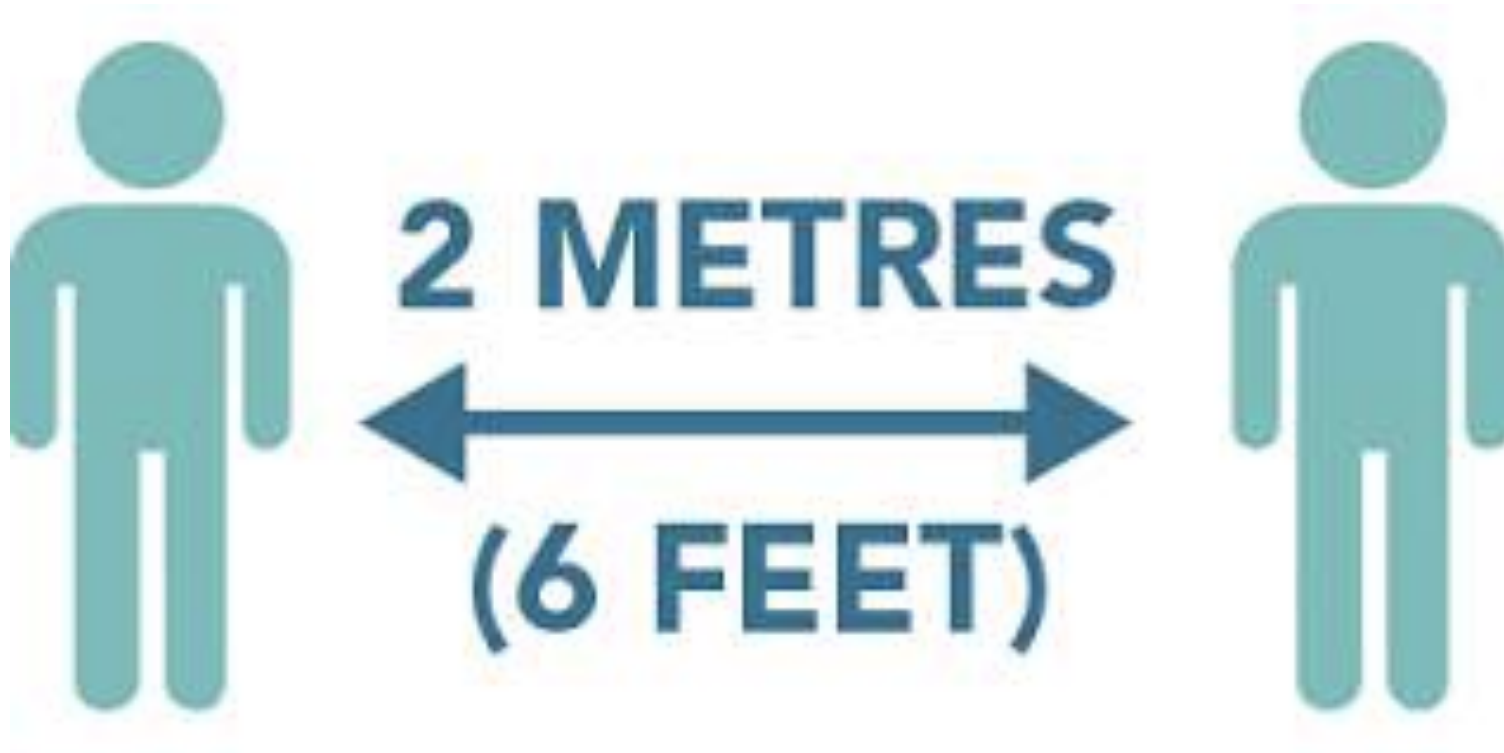
The Cell Division/Cycle: LOOP (IF ELSE, WHILE, FOR)



**** If there is uncontrolled growth, it would lead to tumour formation (Cancer)**



The COVID-19: Social Distancing (stay 2 metres apart)



<https://www.washingtonpost.com/graphics/2020/world/corona-simulator/>

Patterns In Nature

The Fibonacci Sequence

1,1,2,3,5,8,13,21,34,55,89,144,233,377...

$$1+1=2$$

$$1+2=3$$

$$2+3=5$$

$$3+5=8$$

$$5+8=13$$

$$8+13=21$$

$$13+21=34$$

$$21+34=55$$

$$34+55=89$$

$$55+89=144$$

$$89+144=233$$

$$144+233=377$$

