

- Self
- Non-self

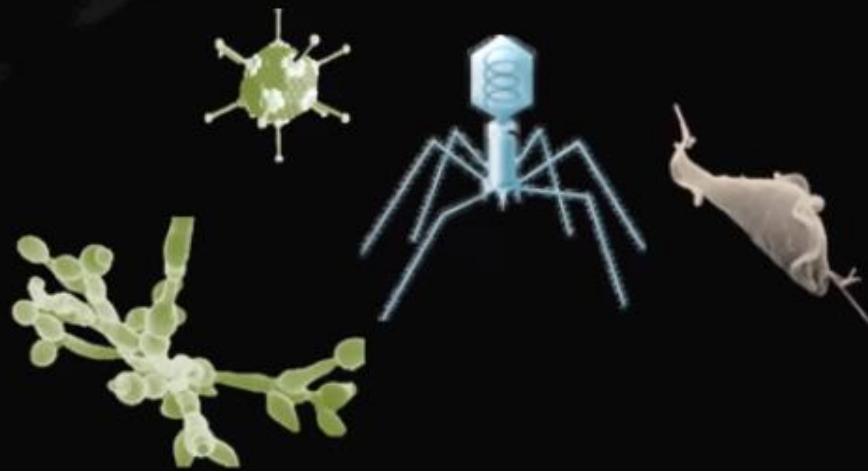
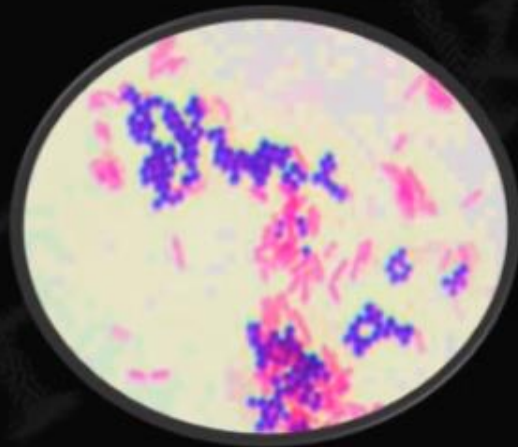


# CONCEPT OF “SELF” AND “NON-SELF”

- **“Self”** refers to the cells and molecules which are part of our own body.
- **“Non-self”** (foreign) refers to cells and molecules which are not part of our body.

# CONCEPT OF “SELF” AND “NON-SELF”

- “Non-self” substances are **harmful**, because they have **ability to cause damage to the body.**

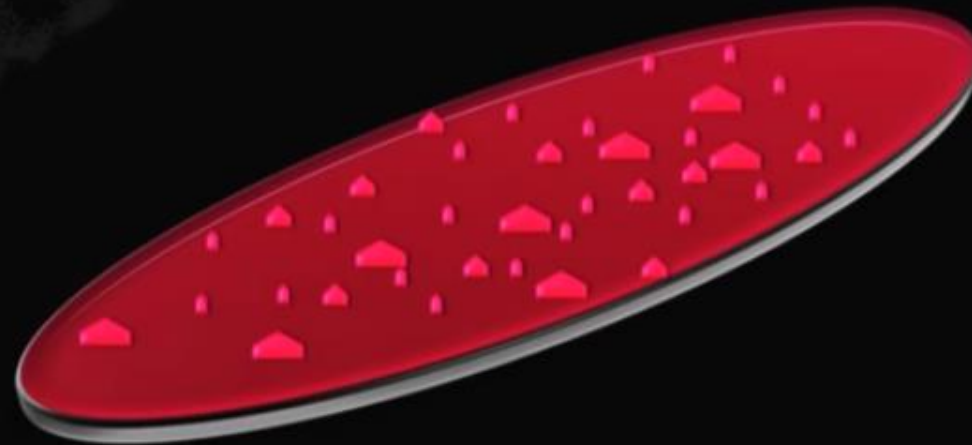


# Innate Immune System



*recognizes*

Repeating patterns of molecular structures



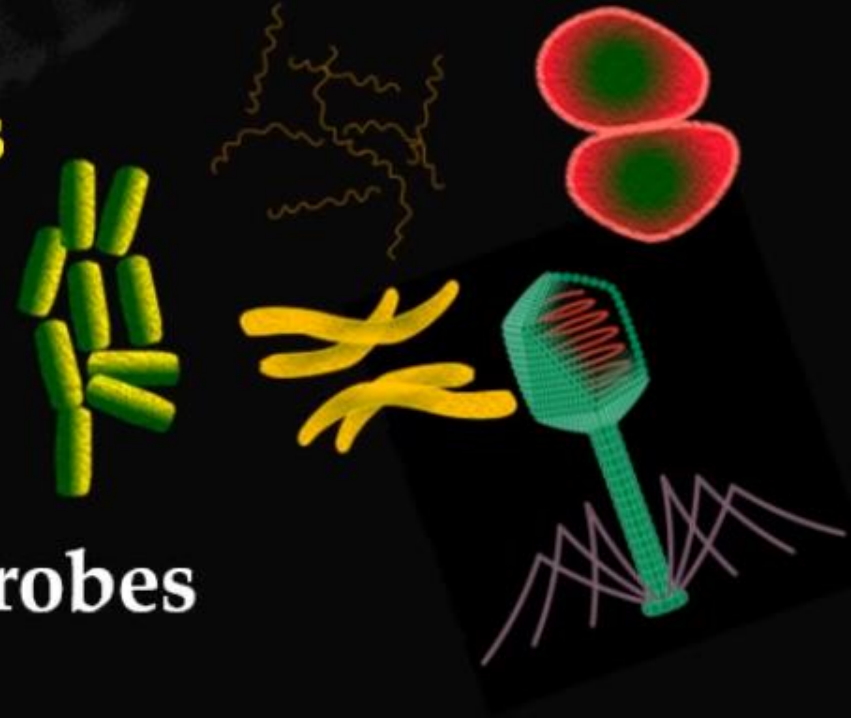
# PAMPs

*P*athogen-*A*ssociated *M*olecular *P*atterns

# PAMPs

## Pathogen-Associated Molecular Patterns

- **Unique structures present in microbes**
- **Repeating molecular patterns**
- **Absent in humans, but present in microbes**



# PAMPs

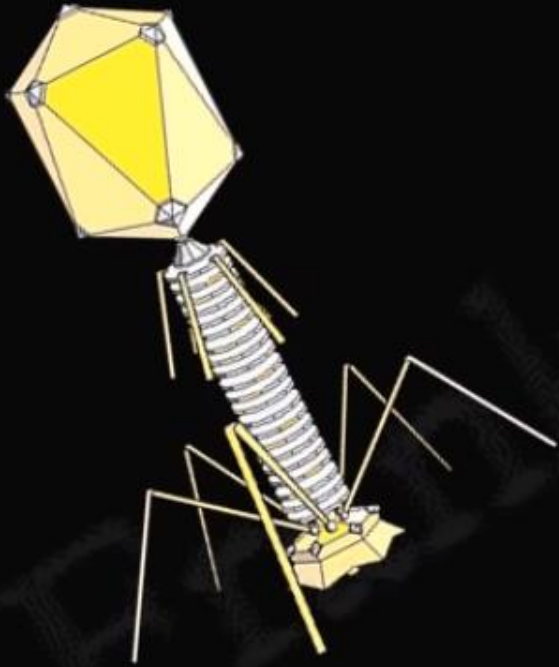
## Pathogen-Associated Molecular Patterns

- **Lipopolysaccharide (LPS)** present in the outer membrane of Gram-negative bacteria
- **Lipoteichoic acid** and **peptidoglycan** in cell wall of Gram-positive bacteria
- **Flagellin** in bacterial flagella



# PAMPs

## Pathogen-Associated Molecular Patterns



- **dsRNA** and **ssRNA** of viruses



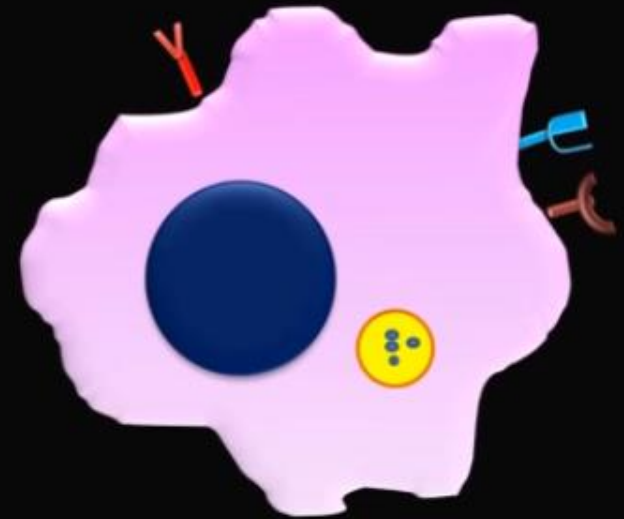
How does host's immune system  
recognize these PAMPs ?



# PRRs

## Pattern Recognition Receptors

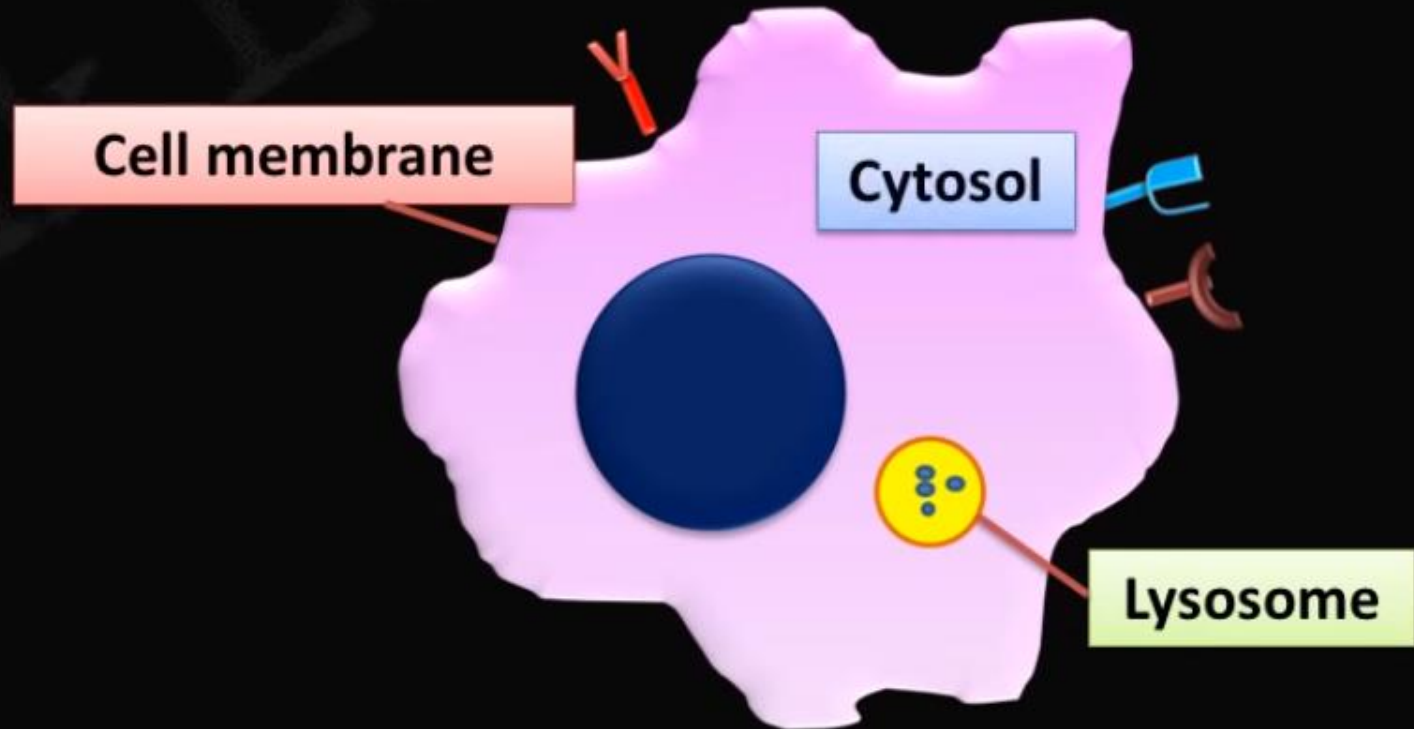
- **Receptors expressed on the plasma membrane** of cells of the innate immunity i.e on **Macrophages, Neurtophils, Dendritic Cells**



# PRRs

## Pattern Recognition Receptors

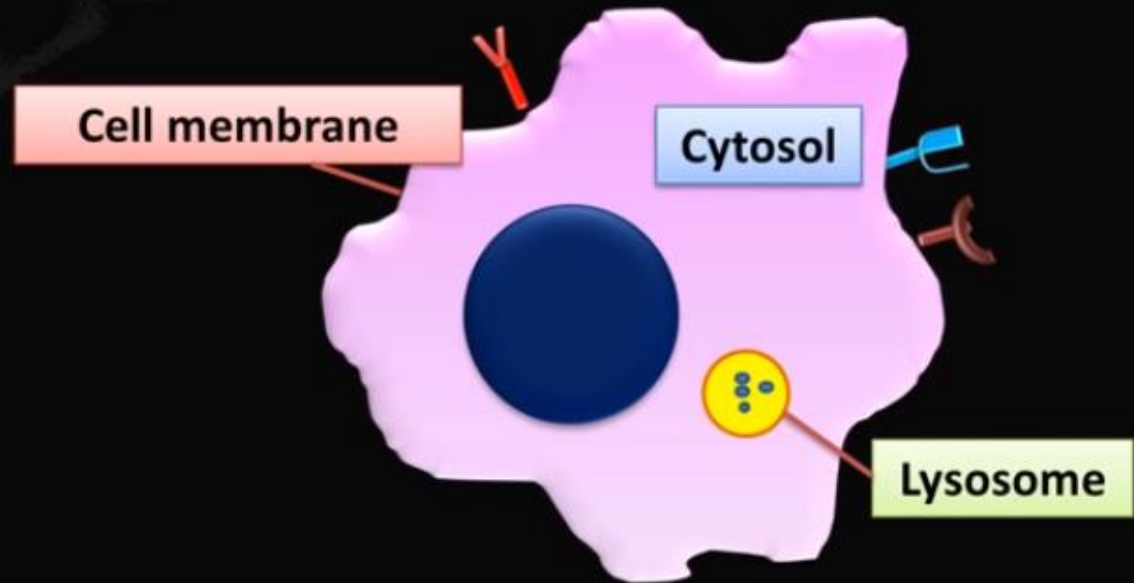
- Also present in various cellular compartments  
e.g. endosomes, lysosomes and in cytosol



# PRRs

## Pattern Recognition Receptors

- PRRs are able to detect extracellular as well as intracellular pathogens



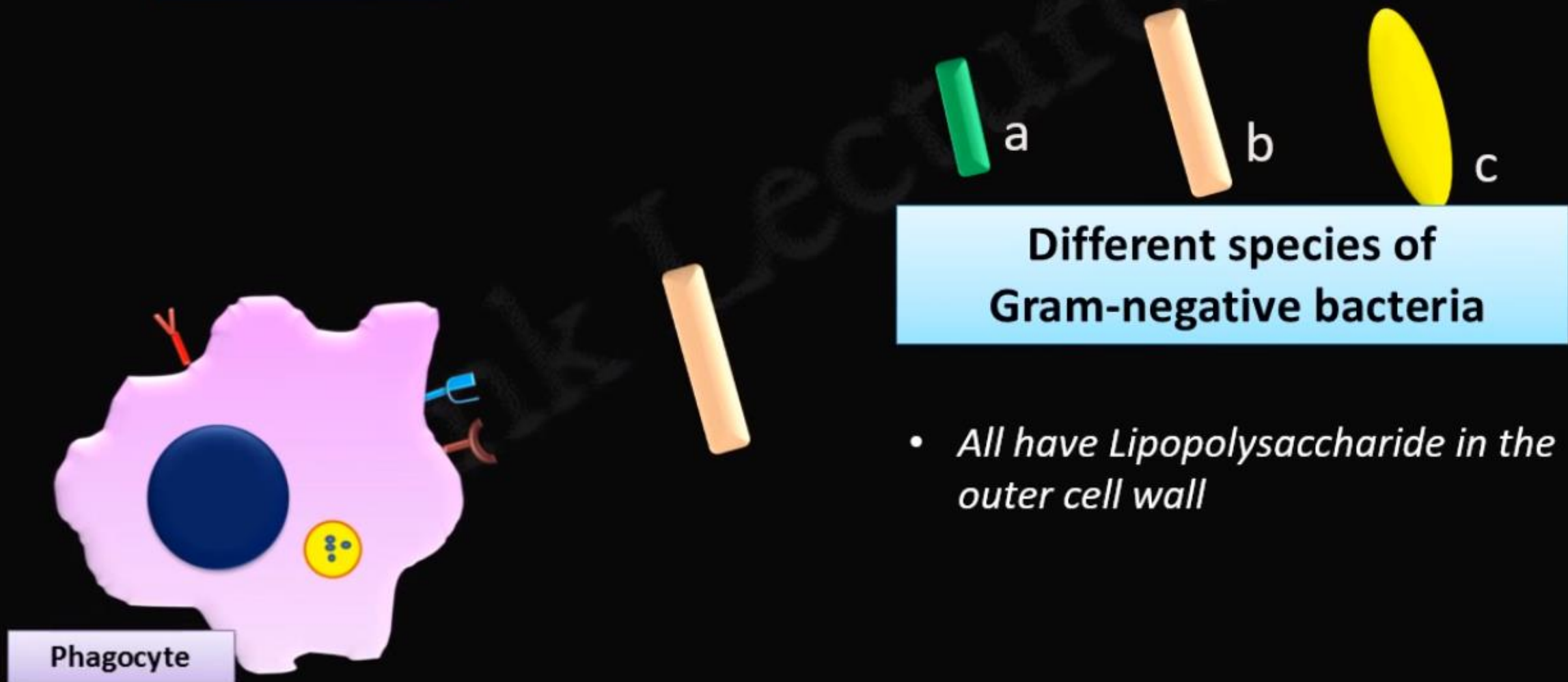
# PRRs

## Pattern Recognition Receptors

- Each type of PRR **can recognize multiple pathogenic species** that share a particular type of molecular pattern.

# PRRs

## Pattern Recognition Receptors



Different species of  
Gram-negative bacteria

- *All have Lipopolysaccharide in the outer cell wall*

# Types of PRRs

**TLRs : Toll-Like Receptors**

**CLRs : C- type Lectin Receptors**

**RLRs: RIG-Like Receptors**

**NLRs: NOD – Like Receptors**

# TLRs : Toll-Like Receptors

- **First family of PRRs to be discovered.**
- **“Toll” is actually a gene in fruit-fly *Drosophila melanogaster*.**

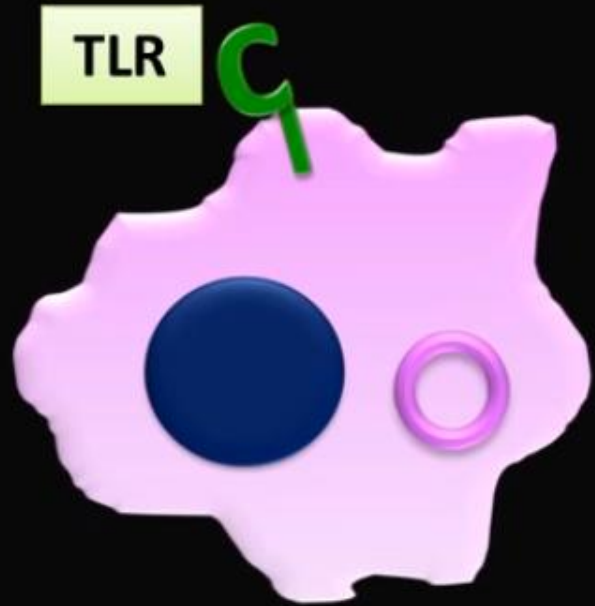




## **TLRs : Toll-Like Receptors**

- **Toll-like proteins have been found in animals which are known as Toll-Like Receptors(TLRs).**
- **TLRs are associated with defense against viral, bacterial and fungal infections.**

# TLRs : Toll-Like Receptors

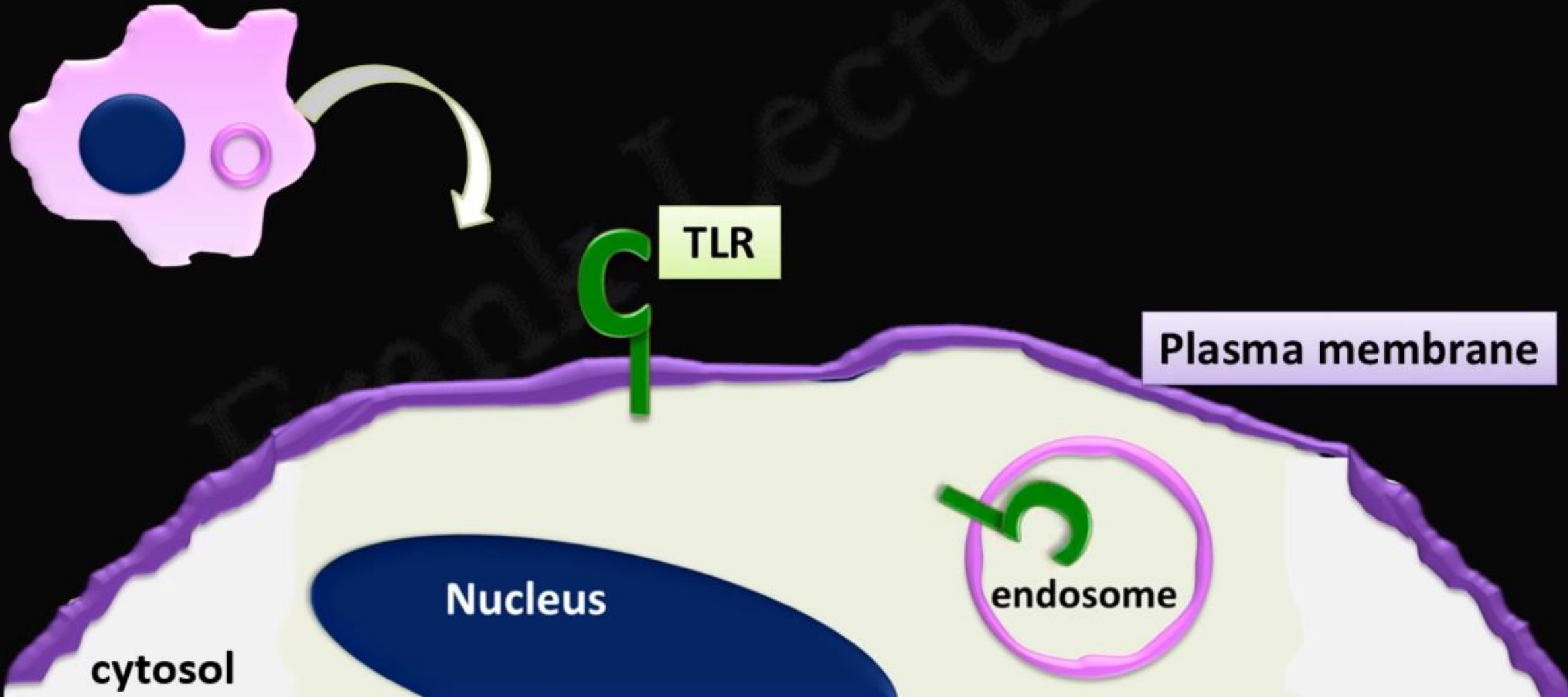


- TLRs are **membrane – spanning proteins**
- Ligand-binding pocket is **horseshoe-shaped**



Ligand-binding pocket

# TLRs : Toll-Like Receptors



# TLRs : Toll-Like Receptors

- **10 TLRs** are known for humans
- These TLRs are **specific for different components of the microbes.**

TLR

LIGANDS

TLR-2

Bacterial lipoglycans, peptidoglycans

TLR-3, TLR-7,

Viral nucleic acids

TLR-8

TLR-4

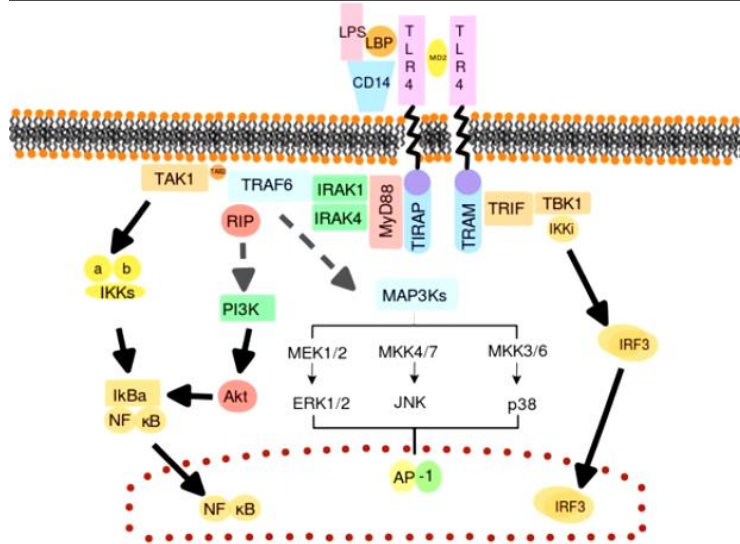
Bacterial LPS

TLR-5

Flagellin (bacterial flagellar protein)

TLR-9

Unmethylated CpG oligonucleotides



1 = 1 L = Lipoproteins

2 = + = Gram Positive (Peptidoglycan)

3 = 3 =  $\Rightarrow$  = dsRNA (virus)

4 = 4 =  $\text{O}$  = Lipopolysaccharide

5 = 5 =  $\text{S}$  =  $\text{S}$  = Flagella

6 = 6 =  $\text{B}$  =  $\text{B}$  = activated macrophage eating peptidoglycan (Gram<sup>+</sup> / Mycoplasma)

7 = 7 = 2 = ssRNA

8 = 8 =  $\text{B}$  = ssRNA

9 = 9 =  $\text{g}$  = C + g = CpG DNA sections