

Undergraduate Lecture Series: PHA-251

Immunity against viral infections: It's a dangerous matter.

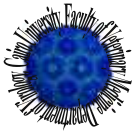


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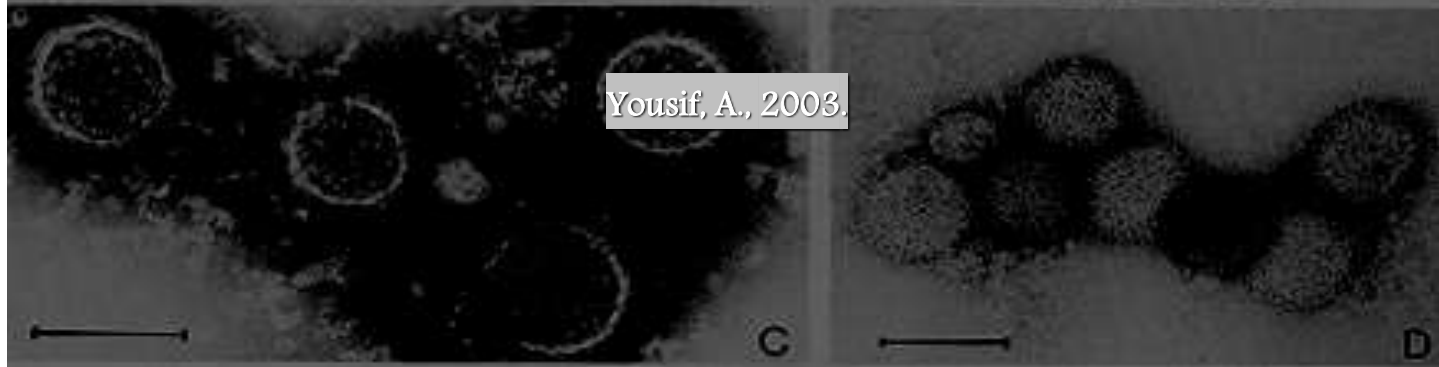
Vaccinology-Ausama

3/29/2020

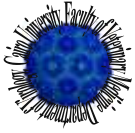


In the battle for survival of the human race
our most lethal adversaries,
besides ourselves,
are most probably viruses.
One of our greatest challenges
is to control them.

Yousif, A., 2003.







Learning objectives

- Overview the classical view of the immune response.
- Describe the names and functions of key players of the adaptive (Acquired) immunity.
- Show the evidence of specificity, memory and self limitation.
- Outline the main concepts of the Danger Theory.
- Link basic immunology with practical applications.

The Classical View

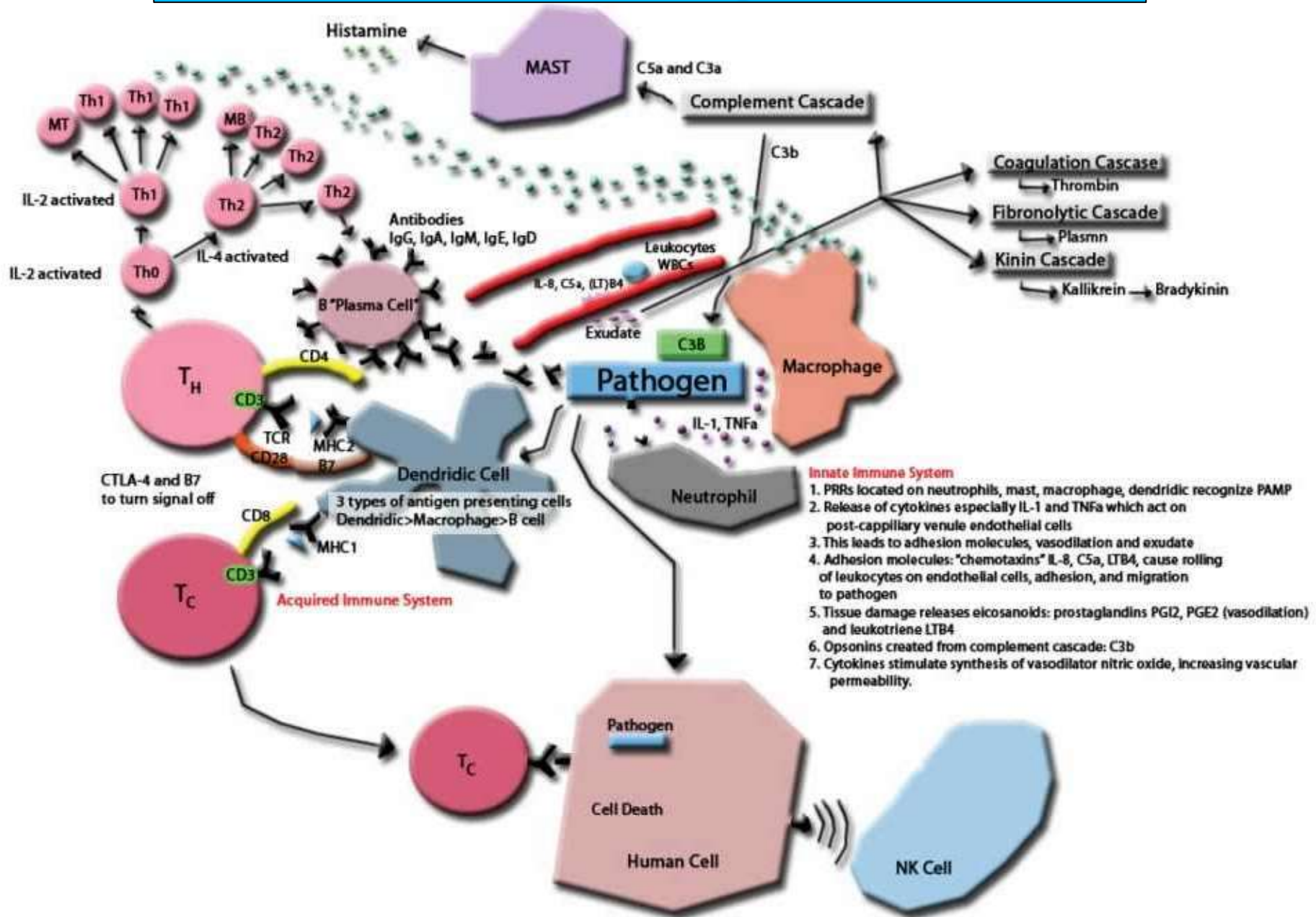
*Nancy L. Haigwood, Ph.D.
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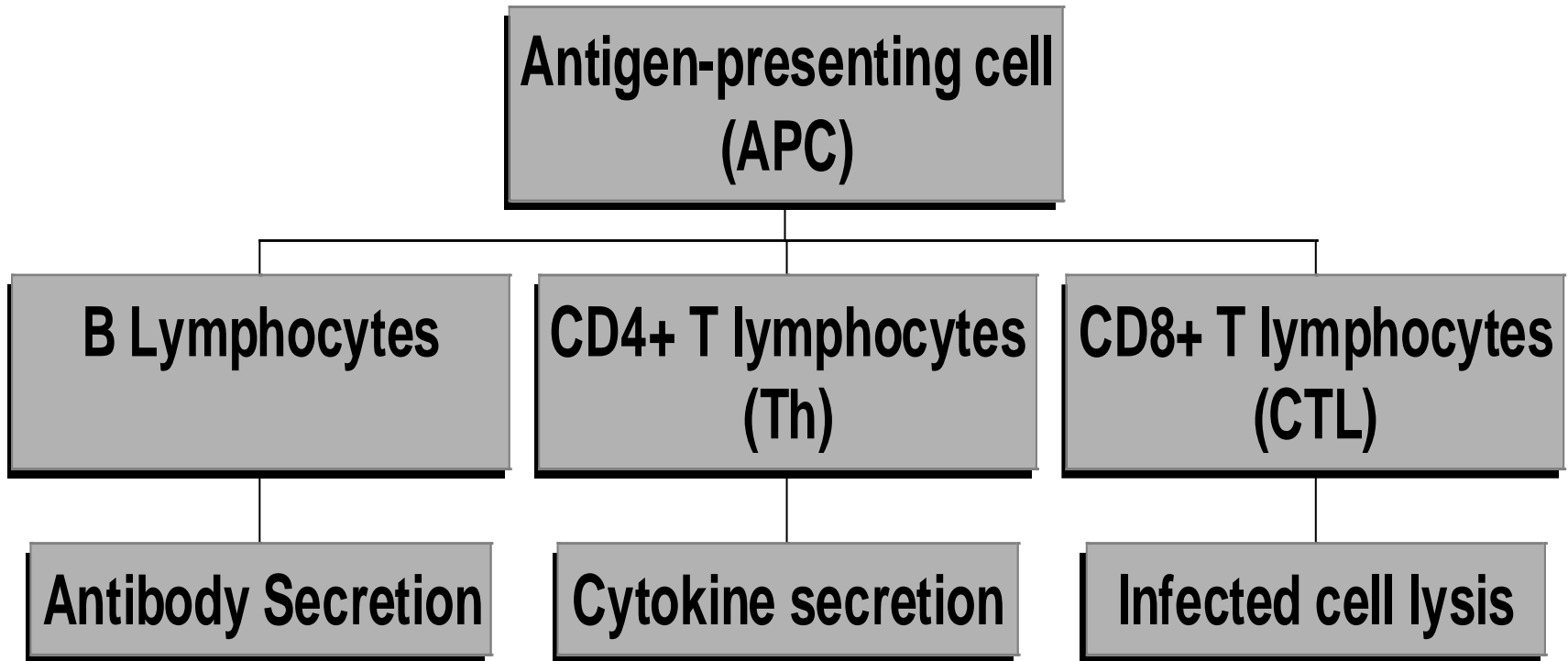
**Innate
Immunity**

**Acquired
Immunity**

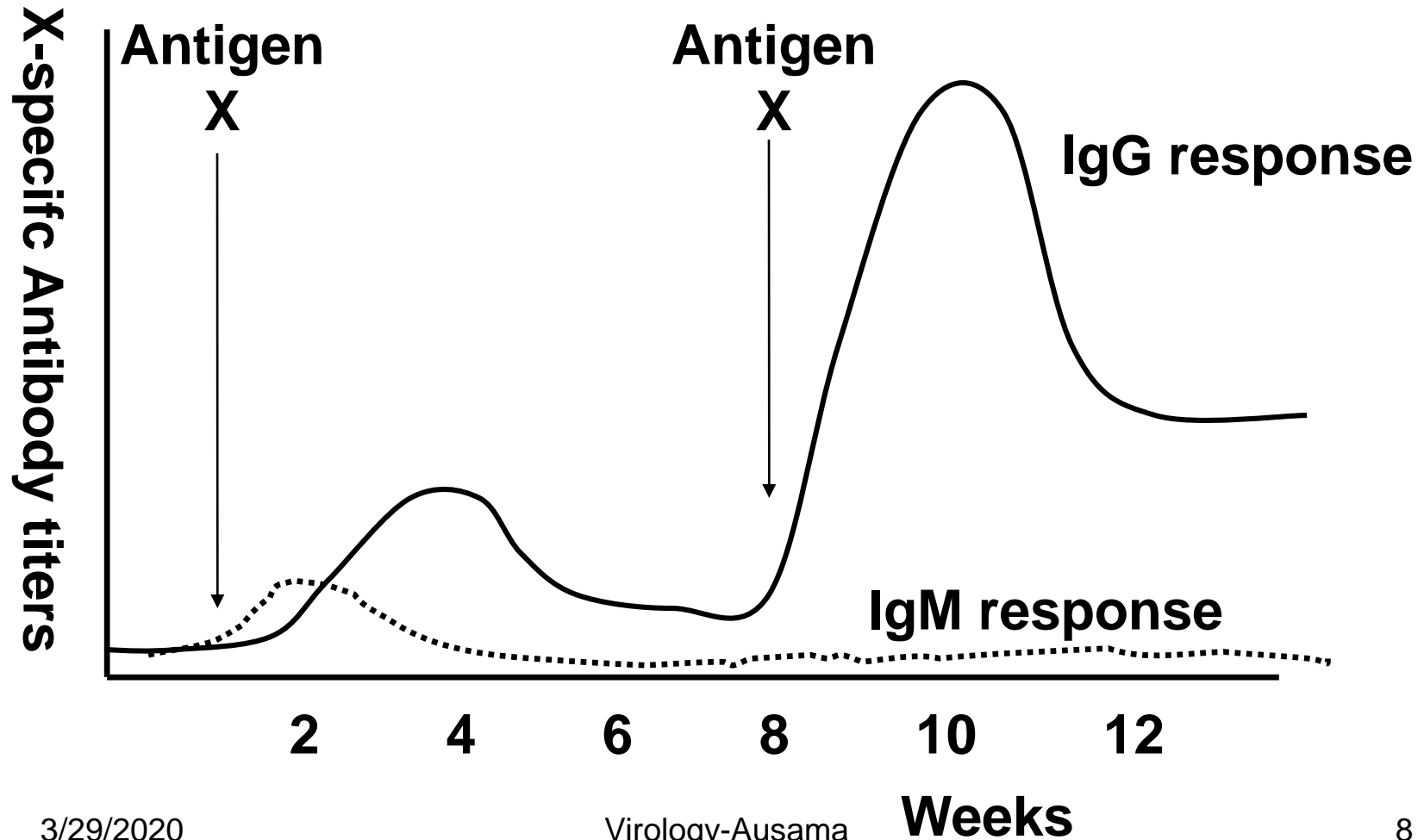
Post infection immune response are diverse



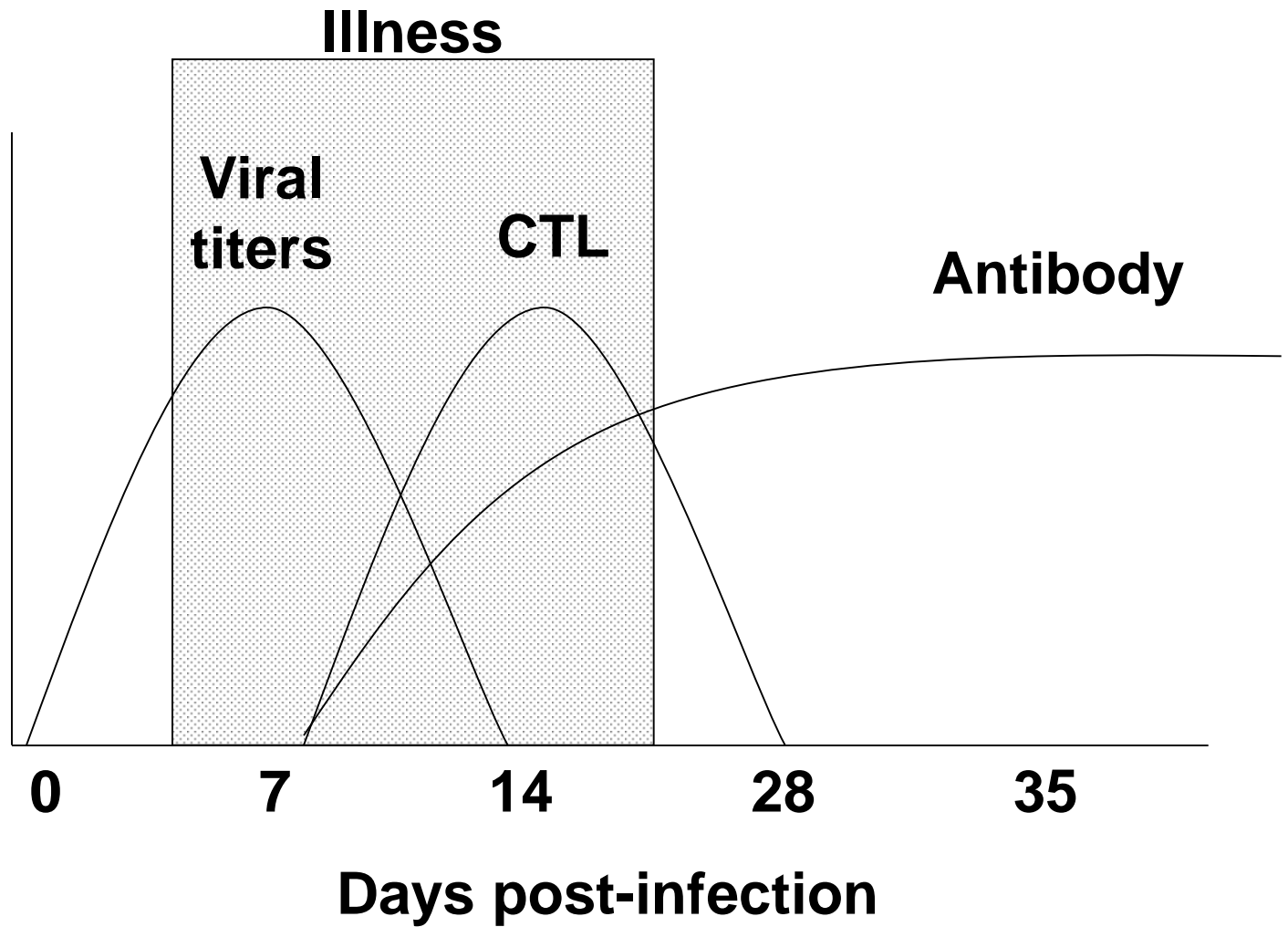
Acquired immunity is initiated by antigen presenting cells



Adaptive immunity is specific, self-limiting and, induces memory

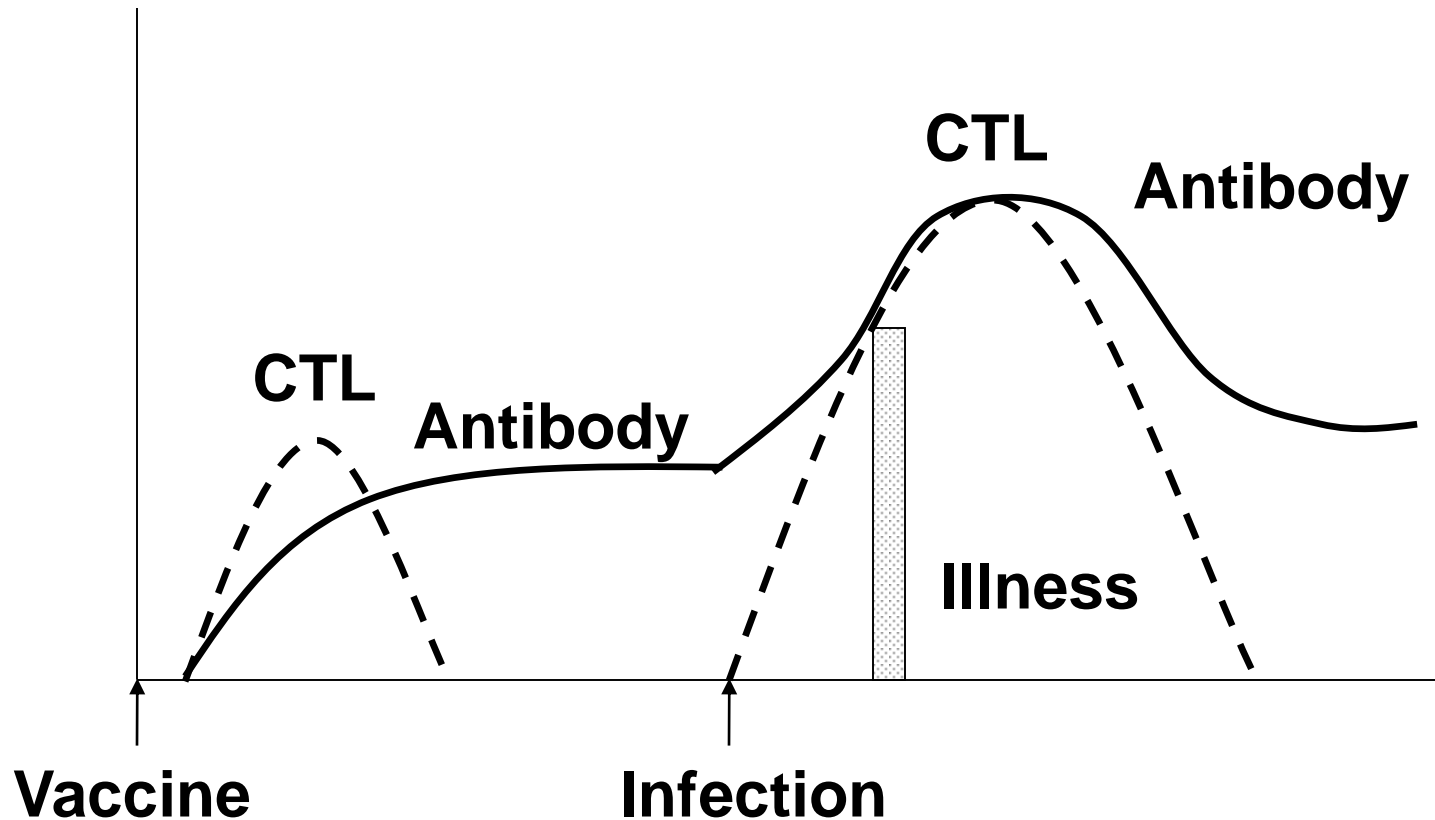


Recovery from illness can be a consequence of efficient specific responses

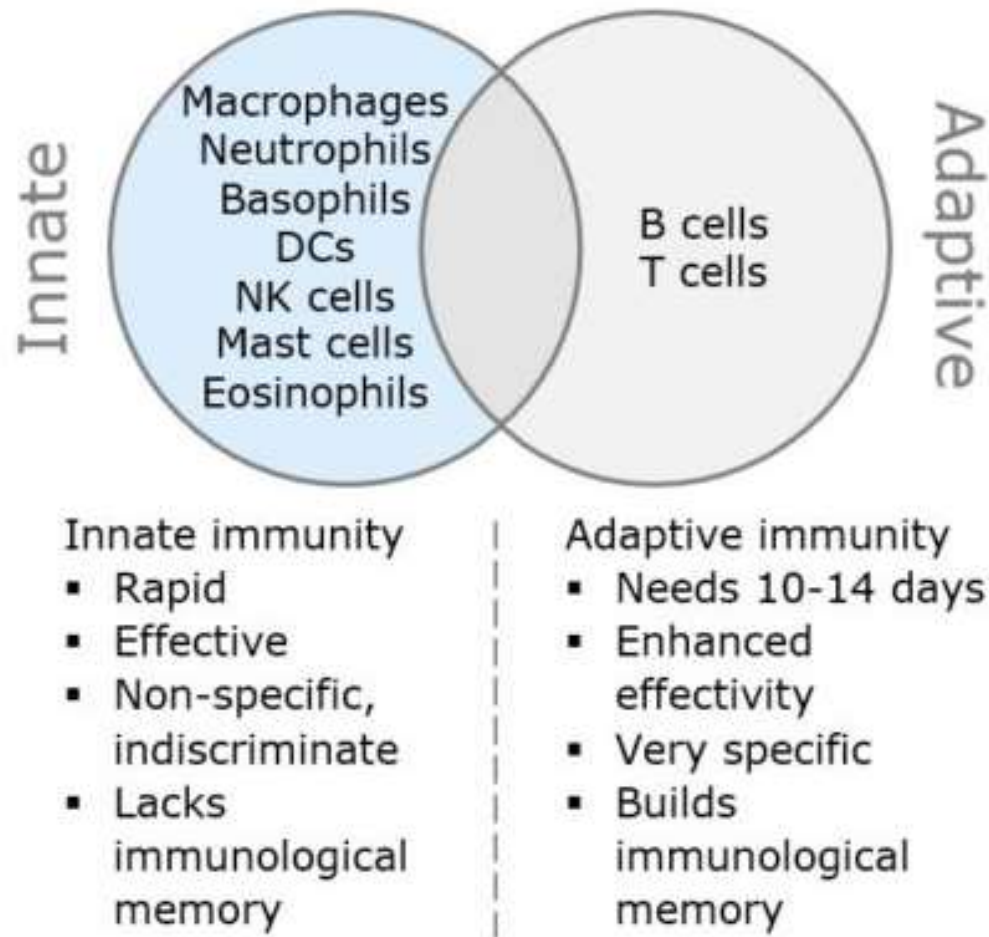


Vaccination:

Reduction of Illness Vs Reduction of Replication



Traditional view of immunological memory



<https://doi.org/10.1016/j.coi.2018.09.001>

Summary of the Classical View of how the adaptive immune system

- Discrimination between pathogens/self.
- Antigen specificity.
- Diversity of responses.
- Self-limiting.
- Produces immunologic memory.

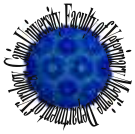
- **WHY DON'T IMMUNE CELLS RECOGNIZE SELF ANTIGENS?!!**
 - This is a trick question.

The danger theory: Introduction

**Immune cells present and recognize
self antigens but do not respond to
them except in special circumstances**

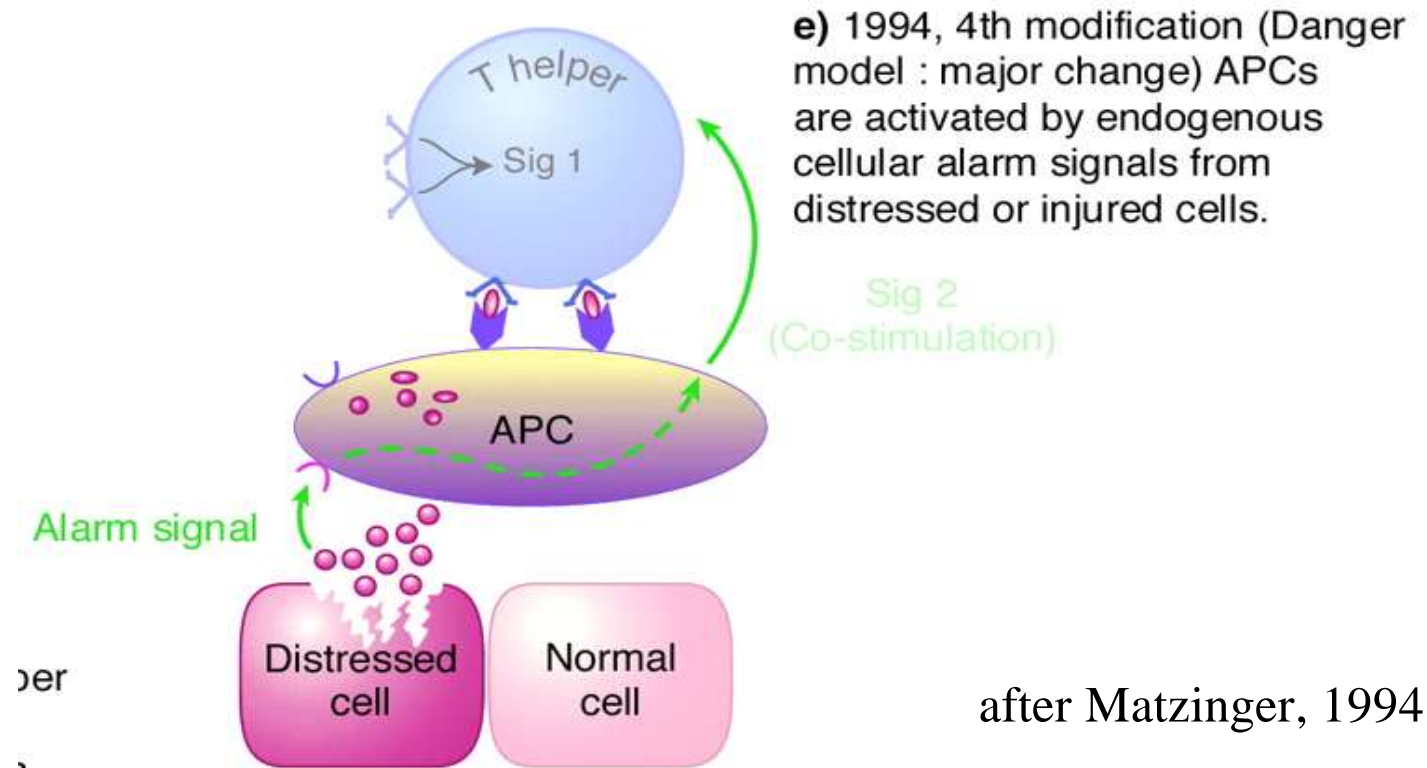
Self-recognizing T or B cells should be
suppressed/deleted in healthy individual

WHY???????



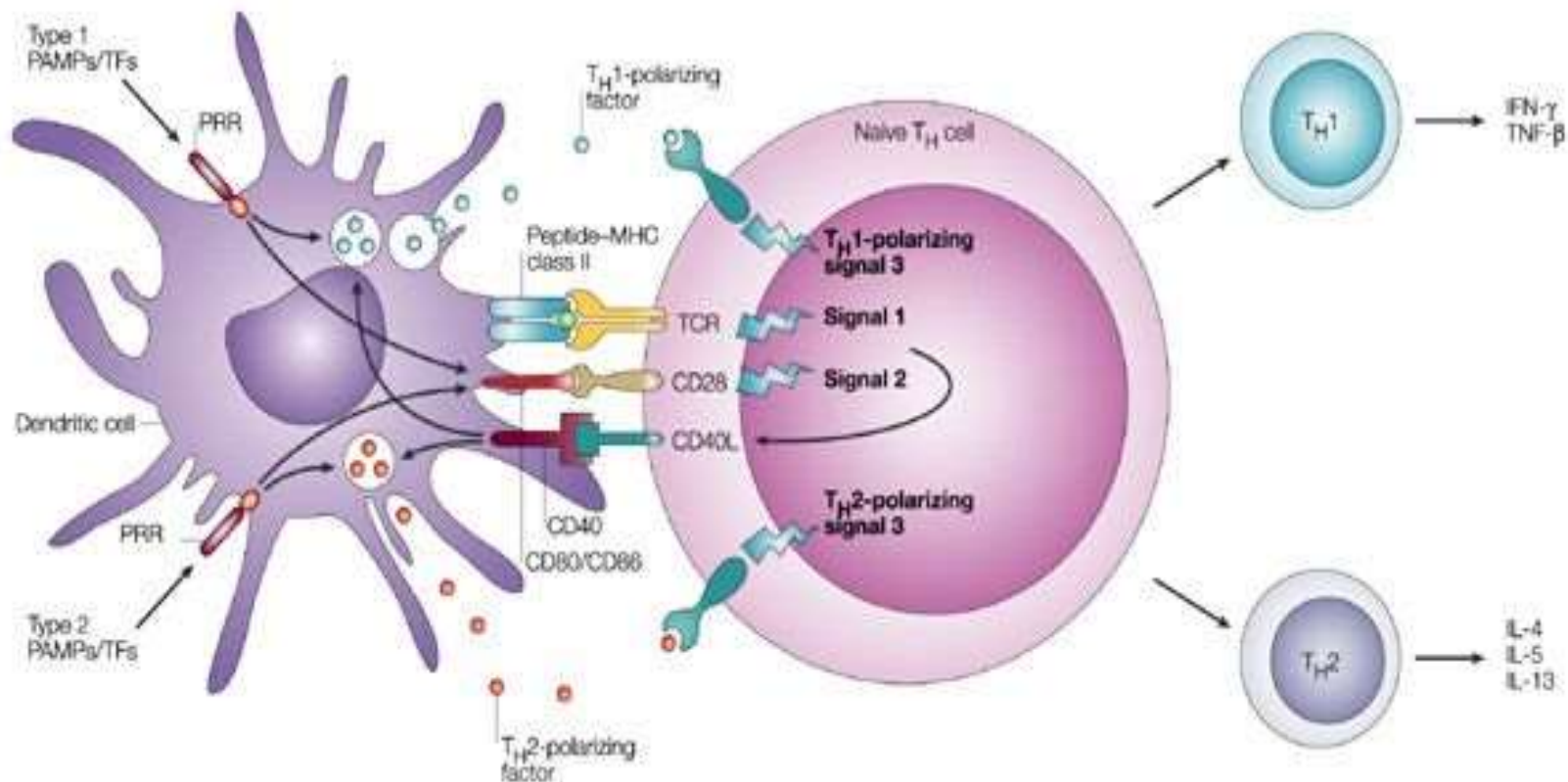
The danger theory

- Danger Theory



after Matzinger, 1994

Multiple signals are required for initiation of specific immune responses



PAMPs= Pathogen Associate Molecular Patterns

PRR= Pattern/Pathogen recognition receptor.

Nature Reviews | Immunology

Viruses survive in environments/ populations by evasion of immune responses

- **Inducing immunosuppression**

- Infect B or T cells
- Infect the thymus and induce tolerance
- Destroy specialized APCs

- **Evading antibody responses**

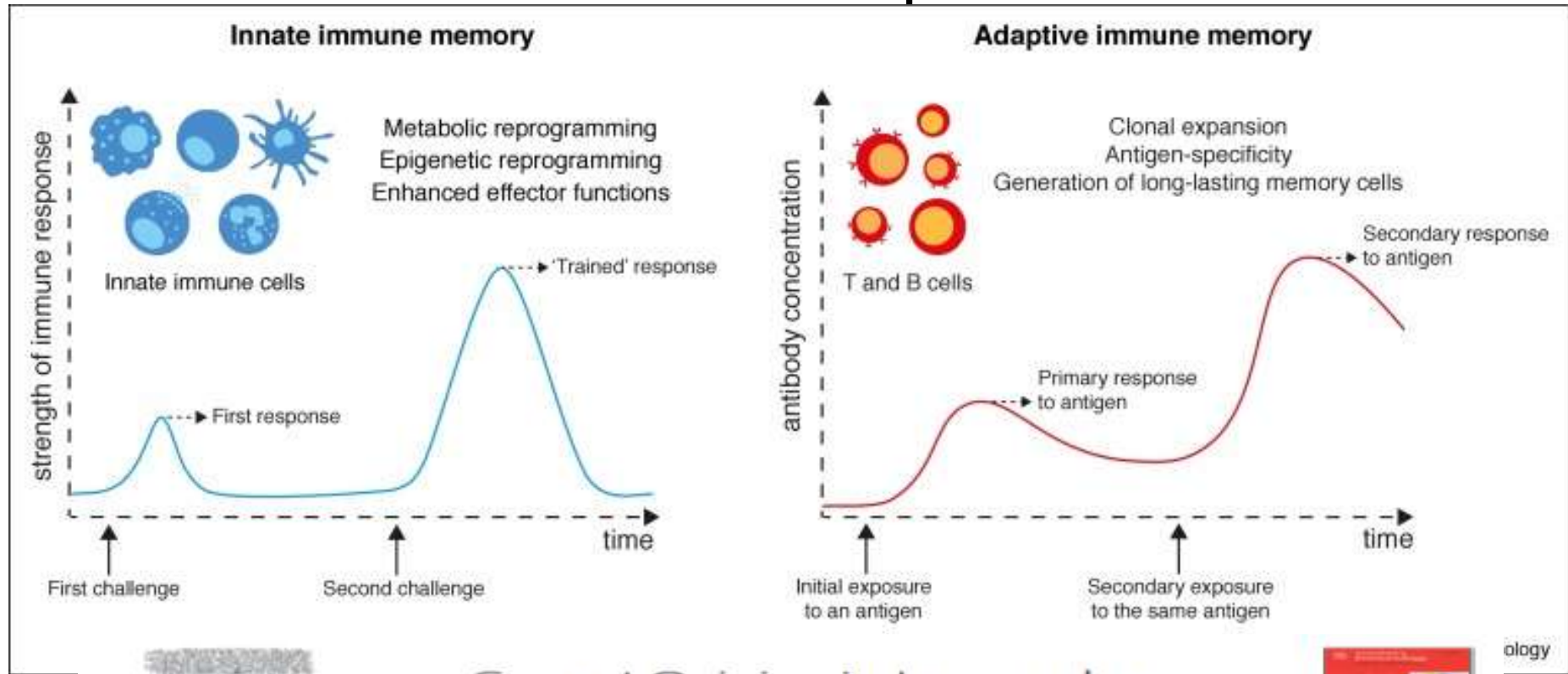
- Mutation or viral sequences
- Replacement of viral proteins
- Down-regulation of viral proteins

- **Evading T cell responses**

- Inhibit MHC function
- Down-regulate viral protein expression
- Mutation of viral protein T cell epitopes

Updated view of the immunological memory

FYI= Not required



ology



Current Opinion in Immunology

Volume 56, February 2019, Pages 10-16



Induction of innate immune memory: the role of cellular metabolism

Jorge Domínguez-Andrés¹, Leo AB Joosten^{1, 2}, Mihai G Netea^{1, 3, 4}

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<https://doi.org/10.1016/j.coi.2018.09.001>

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References

- The basic classical view: lecture by Dr. Nancy L. Haigwood, Ph.D. [haigwood@u.washington.edu]
- Additional resources: Lecture by Marie Lipoldová. Institute of Molecular Genetics. Academy of Sciences of the Czech Republic. www.img.cas.cz/mci/
- References from which other slides were used are mentioned within.