Role of Micronutrients in Immune System

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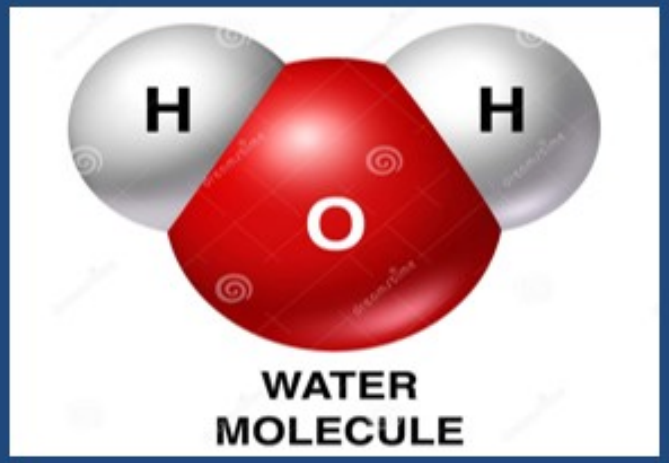
Basic needs of a living person



Micronutrients & Immune function

Studies before Covid-19 era

Review Article

- "Immune Function and Micronutrient Requirements Change over the Life Course"

Nutrients 2018,10, 1531; doi: 10.3390/ mu10101531

Micronutrients and Immunity

- A bidirectional relationship
  - among nutrition, immunity and infection exists
  - changes in one component affect the others

- vitamins A, C, D, E, B2, B6, and B12, folic acid, iron, and zinc
  - essential for immuno competence

Nutrients 2018,10, 1531; doi: 10.3390/ mu10101531

How to improve Immune function?

- Immune function may be improved
  - by restoring deficient micronutrients to recommended levels
  - thereby increasing resistance to infection
  - supporting faster recovery when infected

Nutrients 2018,10, 1531; doi: 10.3390/ mu10101531

Human Immune System

Innate Immune system

Innate immune system *

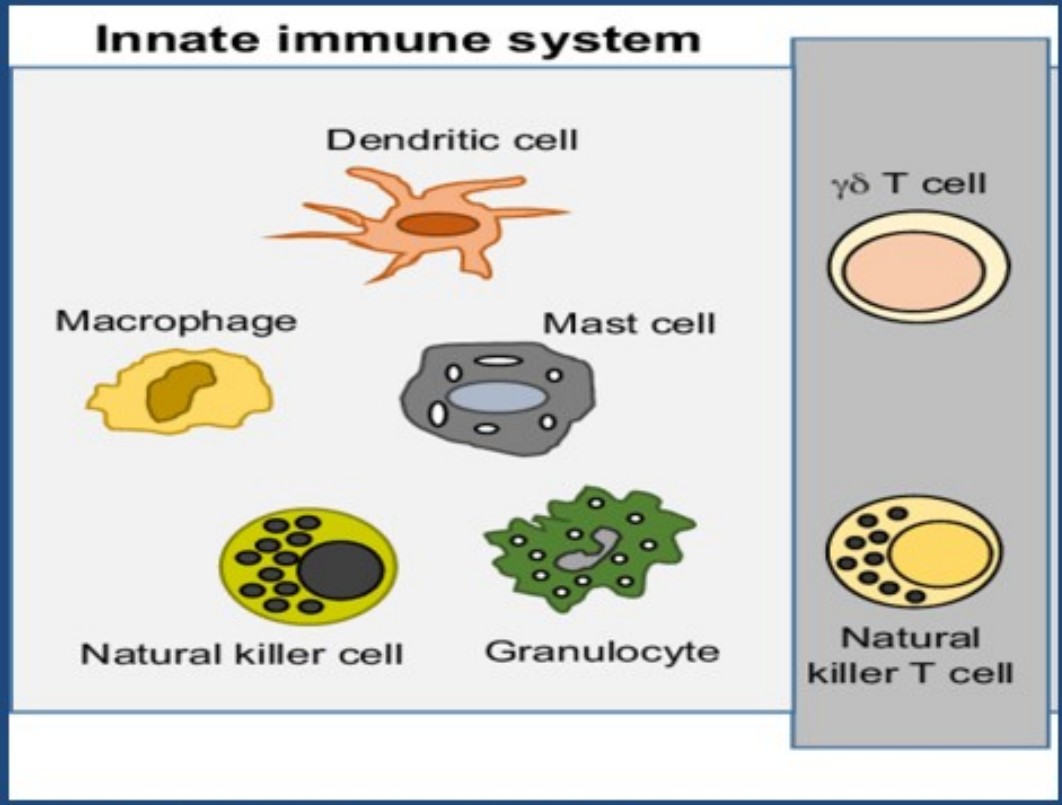
Physical barriers – skin, gastrointestinal tract, respiratory tract, nasopharynx, cilia, eyelashes, other body hair

Defence mechanisms – secretions, mucus, bile, gastric acid, saliva, tears, sweat

General immune responses – inflammation, complement, non-specific cellular responses

- Leukocytes – phagocytes, macrophages, mast cells, neutrophils, eosinophils, basophils, natural killer cells, dendritic cells
- Complement system [a] – opsonisation, chemotaxis, cell lysis, agglutination

Non-specific (will defend against anything that is identified as foreign or 'non-self') and **fast** (minutes or hours)



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Adaptive Immune system

Adaptive ('acquired') immune system **

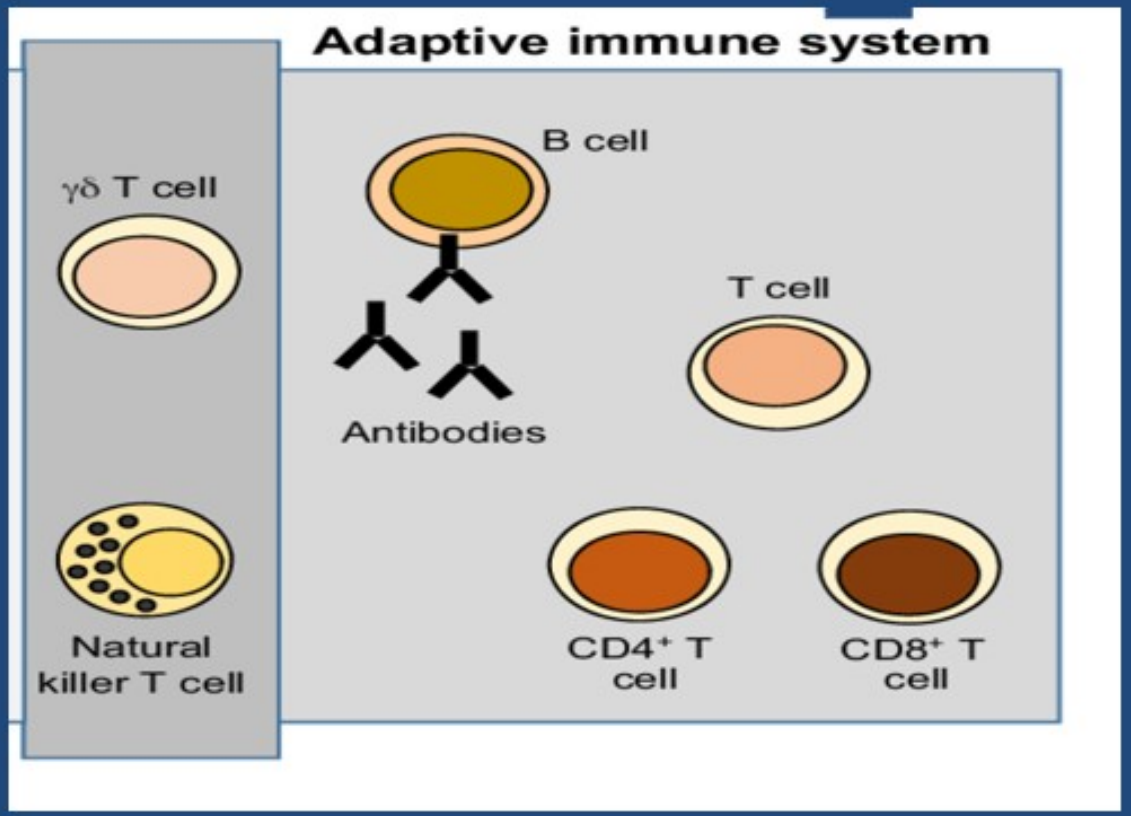
B cells – mature in bone marrow; contribute to antibodies that bind directly with specific antigens; contribute to humoral immunity [b]

T cells – mature in the thymus; express T cell receptors and CD4 or CD8 (not both); contributes to cell-mediated immunity [c]

T cell receptors only recognise antigens bound to certain receptor molecules (major histocompatibility complex [MHC] class I or II)

CD4 and CD8 contribute to T cell recognition and activation by binding to either MHCI or MHCII

Highly specific (identifies pathogens and differences in molecular structures) and **slow** (days)



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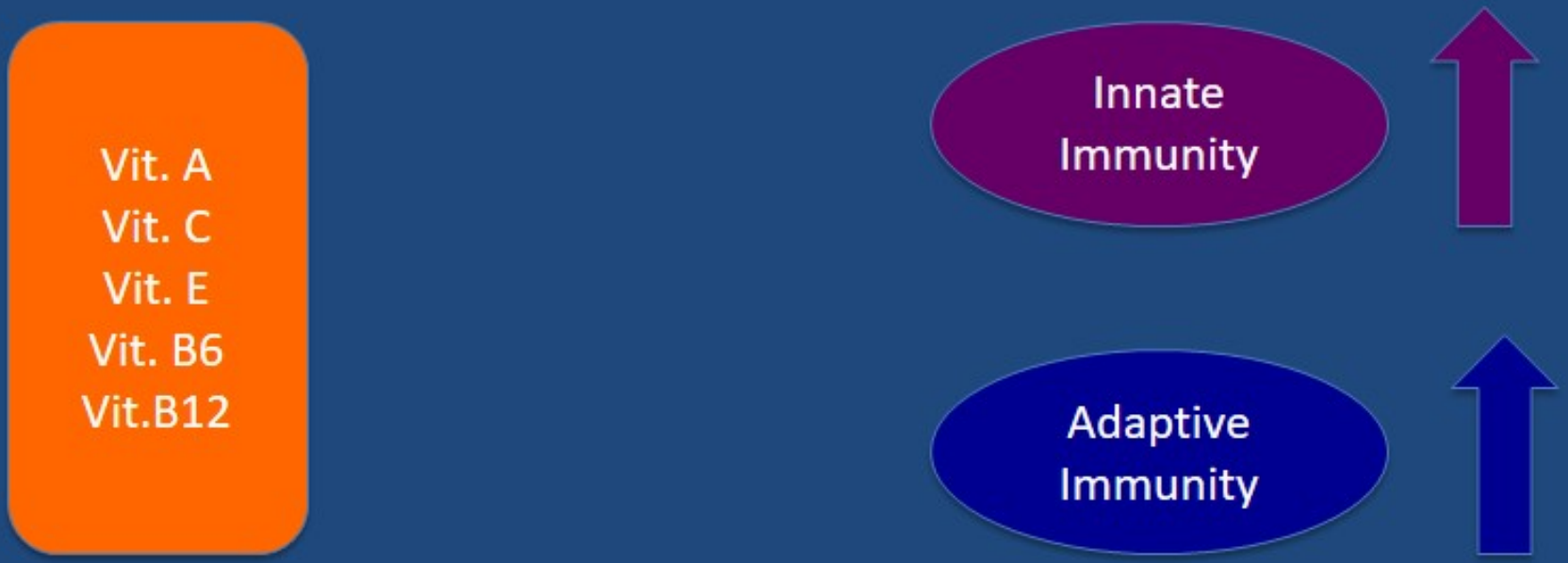
Vit. A,B,C,E and Immunity



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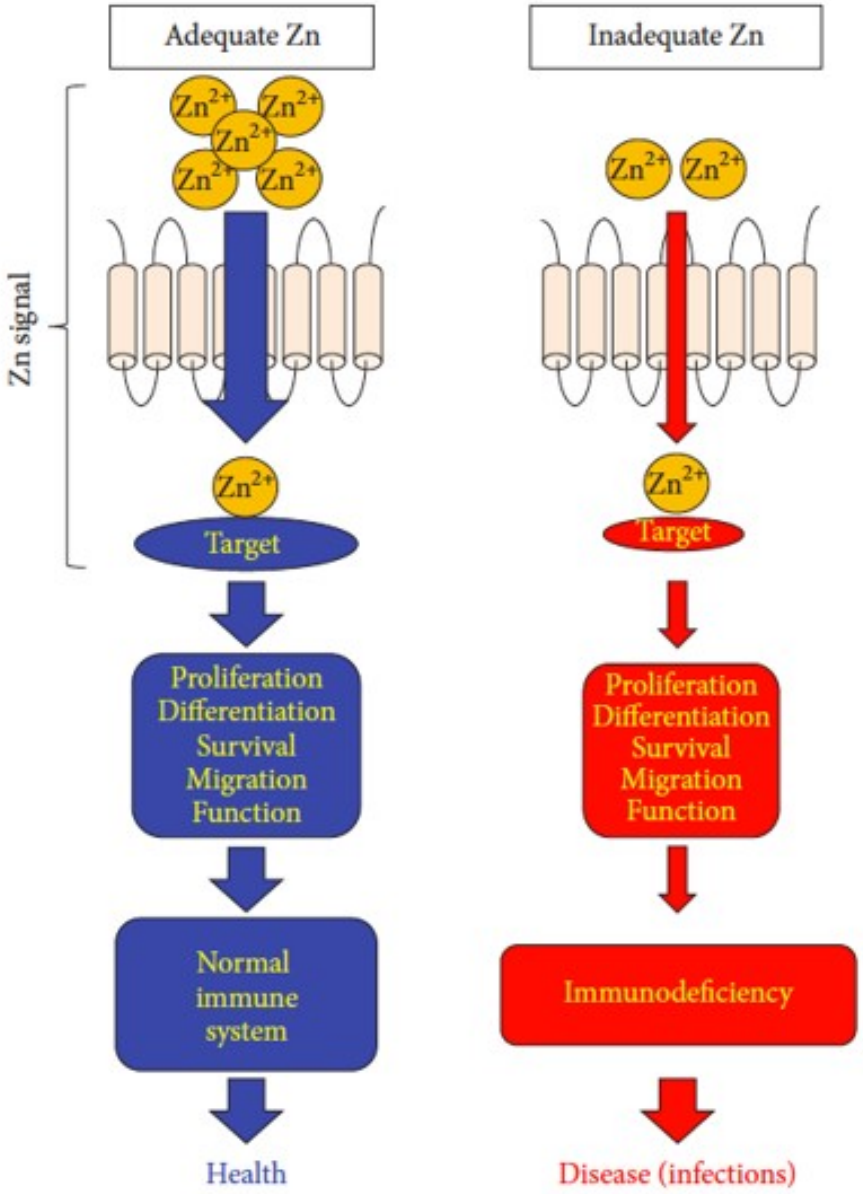
Role of Zinc in Immune function

- key structural or catalytic component
  - in more than 300 enzymes and transcription factors
- second messenger
  - in a variety of cellular activities
- facilitates the transduction of signaling pathways
  - for immune homeostasis and functions



Zn-signal axes in immune system

Journal of Immunology Research
Volume 2016, Article ID 6762343, 21 pages
http://dx.doi.org/10.1155/2016/6762343

Zinc as Gatekeeper of Immune Function

ZINC DEFICIENCY

- overproduction of pro-inflammatory cytokines & reactive mediators
- Thymus atrophy
- T_H1/ T_H2 dysbalance
- less naive B cells
- less T_{reg}
- more T_H17

ZINC HOMEOSTASIS

- balanced immune cell numbers & functions
- balance between tolerance and defense mechanisms

ZINC EXCESS

- suppression of T & B cell function
- overload of T_{reg}
- direct activation of macrophages

Remark

- micronutrients
  - important for immunity
- micronutrient deficiencies on the risk and severity of infection
  - scientifically well documented
- worldwide prevalence of an inadequate micronutrient status
  - form a sound basis for the use of micronutrient supplement to support immunity over a person's lifetime

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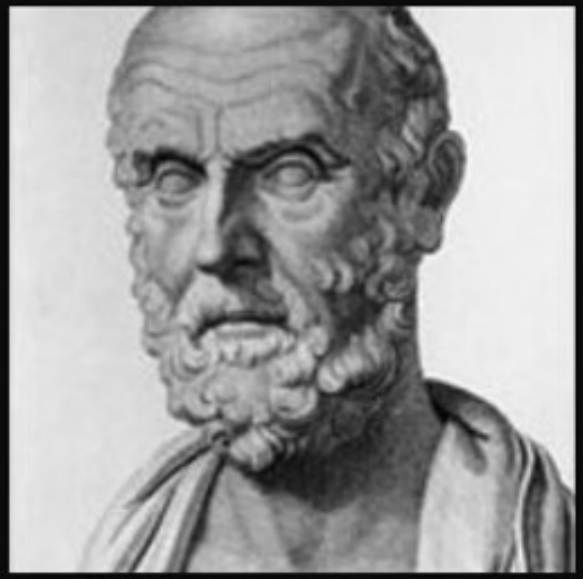
Get enough micro nutrients

Attain robust immunity



Let food be thy medicine and medicine be thy food

~ Hippocrates

AZ QUOTES

Thank you