They invariably co-exist and exhibit complex interactions. They fundamentally operate by altering the immune mechanisms of the host, which leads to the vicious cycle of malnutrition and infections.

Micronutrient deficiencies & infectious diseases are intricately linked.

- This nutrition-immunity-infection axis is crucial for not only the developing but also for developed countries.
- However, little was known about the link between nutrition & infection until the 1960s.
When the relationship was established the entire focus was laid on protein deficiency and the total calorie intake. It’s only in the last 2 decades a strong relationship between micronutrient deficiencies & development of immune system was established and studied. 

The “micronutrient malnutrition” is now considered the primary cause of immunodeficiency worldwide. No doubts exist anymore about the cyclical relationship between micronutrient malnutrition, immune response dysfunction and increased susceptibility to infectious diseases.

This very short presentation tries to explain the complex & multi-factorial association between Micronutrients, Immune System & Infection.
### NUTRIENTS

<table>
<thead>
<tr>
<th>MACRONUTRIENTS Required for energy &amp; growth:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Carbohydrates,</td>
</tr>
<tr>
<td>- Fats,</td>
</tr>
<tr>
<td>- Proteins,</td>
</tr>
<tr>
<td>- Water</td>
</tr>
<tr>
<td>- Fiber</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MICRONUTRIENTS Required for regulation of metabolic processes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Vitamins,</td>
</tr>
<tr>
<td>- Minerals,</td>
</tr>
<tr>
<td>- Trace Elements.</td>
</tr>
</tbody>
</table>

---

**All Nutrients are important to maintain good health, but …**

---

- We eat mostly to satisfy hunger (when "low on energy").

So, MACRONUTRIENT requirements are easily met by what we eat.
• But the body can meet all its MICRONUTRIENT requirements only through balanced diets and carefully cultivated eating habits.

• Moreover, Micronutrients are TEAM PLAYERS. None works in the body without the help of others.

So, micronutrient deficiencies always occur as **multiple deficiencies**.
Micronutrient deficiencies occur only in “severely malnourished” or undernourished people

A number of apparently healthy & well-nourished people show sub-clinical or “marginal” micronutrient deficiencies, mainly due to unwise eating.

Even “MARGINAL” micronutrient deficiencies
- break down the enzyme systems;
- compromise body’s metabolic responses, cell division & cell differentiation;
- weaken the immune system.
Immune system...
The body’s defense system of organs, tissues, cells & cell products that differentiates “self” from “non-self” and neutralizes potential disease causing “invaders” (Antigens), e.g. microbes, foreign particles, cancer cells, transplanted organs…

FUNCTIONING OF THE IMMUNE SYSTEM

**Antibody Mediated Humoral Response**
- Free Antigens
- B Cells
- Activated by Antigens
- Stimulates Memory B Cells
- Secretes Antibodies

**Antigen (1st Exposure)**
- Antigens Displayed by Infected Cells
- Stimulation of Helper T Cells
- Stimulates Memory Helper T Cells
- Gives rise to Antigen

**Cell Mediated Immune Response**
- Cytotoxic T Cell
- Activated by Antigens
- Stimulates Memory T Cells
- Gives rise to Active T Cell

**Antigen (2nd Exposure)**
- Activated T Cell
- Stimulates Antigen
- Gives rise to Antigen

Defend against extracellular pathogens by binding to antigens
Defend against intracellular pathogens & infected / cancer cells

FUNCTIONING OF THE IMMUNE SYSTEM

- Lymphoid Stem Cell
- NK Lymphocyte
- Pluripotent Stem Cell
- B Lymphocyte
- Erythrocyte
- Megakaryocyte (blood platelet)
- Myeloid Stem Cell
- Monocyte
- Granulocyte
- Macrophage
- T Lymphocyte

- Processing & Presentation of Antigens
- Activation of Immune Cells
- Secretion of Antibodies
- Recognition & Destruction of Pathogens
Lymphocytes provide much of the body’s immune protection:
1. T-cells
2. B-cells
3. Natural Killer Cells

Other MAJOR COMPONENTS of Immune system…
1. White Blood Cells
   - Macrophages & Neutrophils
2. Soluble Substances:
   - Antibodies (Immunoglobulins – IgA, IgD, IgE, IgG, IgM)
   - Complement proteins
   - Cytokines (Interleukins, Interferons…)
3. Major Histo-compatibility Complex Molecule
   (Human Leukocyte Antigens or HLA)

The Immune Response…
• Body responds to “invaders” by developing a range of receptor-mediated sensing and “effector mechanisms” –
  INNATE & ADAPTIVE IMMUNITY.
INNATE IMMUNITY:
1. Complement
2. Granulocytes
3. Monocytes/macrophages
4. NK - Cells
5. Mast cells & Basophils

ADAPTIVE IMMUNITY:
1. B lymphocytes (make antibodies)
2. T lymphocytes (function as helper cytolytic & regulatory cells)

The two arms of immunity work closely together.

Body's Protective mechanisms against infection

Intact Skin, Epithelial Surfaces of the lung, g-i system, genitourinary tract, etc.
Phagocytosis by macrophages & neutrophils
Cell-mediated protection by T cells & natural killer cells
Antibody production by B cells
Cytokine action
Metalloprotease action
Complement
Various acute phase reactants

Theoretically...

Immune System is always ready for a quick “immune response”.

Theoretically…
 Macronutrient deficiencies impair many of the host barriers to infection, (e.g. the integrity of the skin & mucus membranes).

For “quick” immune response, immune cells also have a high requirement for energy & amino acids for both cell division & protein synthesis.

Micronutrients also play MAJOR ROLE in mounting an immune response.

Even deficiency of a single micronutrient alone substantially increases the risk of a poor immune response to infection...

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Primary immunological impairment</th>
<th>T cells</th>
<th>B cells</th>
<th>Macrophages</th>
<th>Neutrophils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin D</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Vitamin E</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Niacin</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Zinc</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Selenium</td>
<td>+</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### Effects of single-nutrient deficiencies on immune function

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Primary immunological impairment</th>
<th>T cells</th>
<th>B cells</th>
<th>Macrophages</th>
<th>Neutrophils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vit. A</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiamin</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vit. B6</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vit. B12</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riboflavin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biotin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panto. Acid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folic Acid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Major effects of Micronutrient Deficiencies

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>Reduced cytotoxic activity of phagocytes &amp; proliferation of T-helper 1 cells</td>
</tr>
<tr>
<td>Zinc</td>
<td>Reduced T-cell development and function</td>
</tr>
<tr>
<td>Selenium</td>
<td>Reduced antibody production, cytokine synthesis, cell-mediated cytotoxicity, and lymphocyte proliferation</td>
</tr>
</tbody>
</table>

### Major effects of Micronutrient Deficiencies

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Reduced antibody production, phagocytic activity, T-cell proliferation, and B-cell numbers</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Reduced thymic cellularity, various cytokines, acute phase proteins and complement</td>
</tr>
<tr>
<td>Manganese</td>
<td>Reduced levels of many antibodies</td>
</tr>
</tbody>
</table>
**Major effects of Micronutrient Deficiencies**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin D</td>
<td>Reduced monocyte &amp; macrophage development, and phagocytosis</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>Reduced lymphocyte proliferation, phagocyte functions &amp; antibody levels</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Lower phagocyte activity and ability to repair wounds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>Reduces polymorphonuclear leukocytes numbers, lymphoid tissue weights, T cell function, natural killer cell numbers &amp; complement</td>
</tr>
<tr>
<td>Natural Mixed Carotenoids</td>
<td>Reduced cell-mediated immunity, activity of NK-cells &amp; lymphocyte proliferation.</td>
</tr>
<tr>
<td>Thiamin</td>
<td>Reduces thymic weight, antibody Response &amp; lymphocyte proliferation</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>reduces lymphocyte number, lymphoid tissue weights &amp; antibody responses</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>depressed phagocyte functions &amp; T-cell proliferation</td>
</tr>
</tbody>
</table>

**Major effects of Micronutrient Deficiencies**
Micronutrients have major immuno-modulating functions. Micronutrient deficiencies influence the host susceptibility to infectious diseases and their outcome.

Micronutrient deficiencies do not occur in isolation. They work in synergy to reduce or prevent a successful host response to an infection.

Another Major Link between micronutrient malnutrition & poor immuno-competence
Many micronutrients possess powerful antioxidant functions. Many are needed to synthesize the antioxidant enzyme systems.

Micronutrient deficiencies lead to excess generation of Free Radicals & OXIDATIVE STRESS, which is now accepted in medical science as “the most important factor challenging the Immune System”.

“ANTIOXIDANT DEFENCES” AGAINST FREE RADICALS exist in all cells of the body. They may be Enzymes or Non-enzymes.
1. **Primary antioxidants** are micronutrient-dependent Enzymes produced within the body, viz. Superoxide Dismutase, Glutathione Peroxidase, Catalases, Ceruloplasmin

   Zn, Cu, Mn, Mg, I, Fe, Se, L-Carnitine, ALA are vital for their synthesis or activation

2. **Secondary antioxidants** are classical micronutrients, viz. Selenium, Vitamin E, Vitamin C, Carotenes, Bioflavonoids

3. **Tertiary antioxidants** are Specific Enzymes,
   - These “Bimolecular Repair Mechanisms” remove damaged bio-molecules before they accumulate & alter cell metabolism.

   Magnesium, Zinc, Iodine, Copper, Manganese, Iron, Amino Acid Cystine are vital for their bio-synthesis and functioning
Body’s “Antioxidant Defenses” against FREE RADICALS act as a coordinated system to control the oxidative stress.

Deficiencies in one component affect the efficiency of the others.

It’s important to remember,....

Antioxidants network together by “recycling” each other.

ROS (Free Radical) + ANTI-OXIDANT → Neutralized ROS → Oxidized Anti-oxidant

“Oxidized anti-oxidant” cannot function until recycled to its native form by other antioxidants.


Even more significantly,....

OXIDATIVE STRESS – a consequence of imbalance between free radicals & antioxidant-micronutrients – has both “Damaging” & “Destructive” effect on the body’s cells.

However, even limited oxidative challenge “poses great trouble for the body”

In relationship with INFECTIONS...
In relationship with INFECTIONS...

- Oxidative stress
  - influences immune homeostasis
  - alters the genome of the microbes (particularly in viruses)

The Result...
- emergence of new infections
- resurgence of old infectious diseases.

**Take Home Message**

- Optimal levels of micronutrients – antioxidants are needed for the maintenance of immune cell function & immune response.
- Poor immune response intensifies “the bi-directional relationship” between infection & micronutrient malnutrition.

<table>
<thead>
<tr>
<th>Infectious Diseases</th>
<th>Micronutrient Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence Severity</td>
<td>Impaired barrier protection</td>
</tr>
<tr>
<td>Duration</td>
<td>Impaired antioxidant defences</td>
</tr>
</tbody>
</table>

**Bi-directional Relationship**

- Anorexia, Malabsorption, Nutrient loss
- Increased catabolism

- Impaired Cellular & Humoral immunity

- Negative energy balance

- Increased catabolism
Interactions between micronutrient deficiencies basically operate by altering the immune mechanisms of the host.

Therefore, the nutritional status of the host critically determines the outcome of infection.

The use of a “tailored”, cost-effective, clinically-proven, micronutrient support is indeed needed to positively influence the host defense mechanisms against infections.
IMMUNE PROTECTION
24 HOURS

THE POWER OF
5 GROUPS OF
IMMUNNO-
PROTECTORS

BIOFLAVONOIDS &
NATURAL MIXED CAROTENOIDS
(Incl. Lycopene, Astaxanthin, Zeaxanthin, Lutein,
Cryptoxanthin, α- and β-Carotenes...)

L-CARNITINE TARTRATE
The “Rapid” Regenerator

CLASSICAL “Secondary” ANTIOXIDANTS
(Selenium, Tocopherol, Vitamins C & A)

VITAL REGULATORS OF
IMMUNO-COMPETENCE
(incl. opti-dose Vitamin D3,
Vitamin K, Chromium & B-vitamins)

SYNTHESIZERS & BIO-ACTIVATORS
OF ANTIOXIDANT ENZYMES &
BIO-MOLECULAR REPAIR MECHANISMS
(Incl. L-Cystine, ALA, Magnesium,
Zinc, Iodine, Copper)
Essentiality of Micronutrient – Antioxidant supplementation in HIV - AIDS…

Current Medical opinion is unequivocal:

- HIV / AIDS & Nutrition are inextricably inter-related
- HIV and malnutrition work in tandem. Both have similar effects on the immune system.

“Nutritionally acquired immune deficiency syndrome”
Micronutrient status is a determinant of the progression of HIV disease.

Several nutritional indicators, including weight loss, anemia, and reduced micronutrient intakes are associated with shorter HIV survival times.

The Vicious Cycle of Micronutrient Deficiencies and HIV Pathogenesis

- Insufficient dietary intake,
  - Malabsorption,
  - Diarrhoea,
  - Altered metabolism & nutrient storage

- Increased oxidative stress, Immune suppression

- Increased HIV replication,
- Hastened disease progression, Increased morbidity

Nutritional deficiencies

Effects of HIV on Nutrition

- Increased energy requirements
- Increased nutrient requirement
- Recurrent secondary infections
- Malabsorption
- Adverse drug effects
- Frequent diarrhoea episodes
- Anorexia, oral pathology
Micronutrient deficiencies are associated with higher risks of HIV disease progression and mortality.

Body weight loss and wasting are features of HIV disease progression.

Micronutrient deficiencies + body weight loss + wasting are caused by a similar combination of events:
- decreased food intake,
- gastrointestinal mal-absorption,
- increased metabolic demand, and
- body redistribution.

Since mid 1990’s, Highly Active Antiretroviral Therapy (HAART) has become the new standard for HIV treatment.
However...

- **HAART** restores only immunologic function but **does not eliminate weight loss & wasting**, which continue to be very strong & independent predictors of HIV-related morbidity and mortality.

Moreover...

- **Basic nutritional & metabolic disturbances** that lead to weight loss & wasting in HIV-infected persons represent an adaptive response to inflammatory state.

It's proven beyond doubt...

- **Pro-inflammatory cytokine concentrations** are significantly higher in HIV-positive than in HIV-negative persons.
Micronutrient deficiencies continue to persist even in the era of HAART.

In short…

Micronutrient deficiencies contribute to the pathogenesis of HIV infection through:

- ↑ oxidative stress,
- ↓ decrease in CD4+ helper cells,
- ↓ cytotoxic cell activity,
- ↓ production of lymphokines (required for signal transduction),
- ↓ compromised immunity.

What's the effect of "TAILORED" Micronutrient - antioxidant supplementation in HIV infection?
♦ reduces markers of oxidative stress,
♦ modulates cytokine production,
♦ enhances cellular immunity,
♦ increases T-cell counts,
♦ reduces HIV replication & viral load…

♦ reduces risk of progression to WHO stage 4 & AIDS-related death,
♦ reduces g. i. manifestation, fatigue, respiratory infections, swallowing difficulties & other complications…
♦ delays the onset of advanced HIV disease, and time to the initiation of ART.

♦ saves the use of ART for later stage when it may be most needed,
♦ averts many adverse events associated with ART,
♦ significantly reduces treatment costs.

Just 2 examples...

A Randomized Trial conducted in Thailand with Vitabiotics immunace

Sukhum Jiamton et al; AIDS 2003; 17 : 2461-2469
Staggering 48% reduction in the Mortality Rate of HIV-infected individuals with CD4+ cell counts <200x10^6/l.

Criteria for Selection
- 481 HIV patients
- Above 18 years of age
- Not taking micronutrients or anti-retroviral drugs in last 30 days
- CD4 cell count: 50 X 10^6 - 550 X 10^6 / l

Impact of IMMUNACE on mortality rate according to CD4 cell count category
Daily micronutrient supplementation reduced mortality in HIV+ adults, particularly those with low CD4 cell counts.

![Graph showing mortality risk reduction](image)

There was no effect on HIV viral load or genital shedding.

<table>
<thead>
<tr>
<th>CD4 count</th>
<th>Micro-nutrient mortality rate</th>
<th>Placebo group mortality rate</th>
<th>Mortality hazard ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>overall</td>
<td>4.0 (2.0-6.0)</td>
<td>7.7 (4.6-12.7)</td>
<td>0.53 (0.22-1.25) P = 0.10</td>
</tr>
<tr>
<td>&lt; 200/cu mm</td>
<td>6.5 (2.7-15.5)</td>
<td>16.9 (9.6-29.8)</td>
<td>0.37 (0.13-1.06) P = 0.052</td>
</tr>
<tr>
<td>&lt; 100/cu mm</td>
<td>9.3 (3.0-28.8)</td>
<td>32.6 (17.5-60.6)</td>
<td>0.36 (0.07, 0.97) P = 0.03</td>
</tr>
</tbody>
</table>

Conclusion:
**IMMUNACE** enhanced survival of HIV-infected persons with CD4 cell counts < 200 X 10^6/l.

**Table:**

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**NEJM 2004;351:23-32**
**Trial outcome**
- Delayed progression to WHO Stage 4 disease
- Reduced relative risk of death related to AIDS
- Significantly higher CD4+ and CD8+ Cell Counts
- Significantly lower viral loads
- Vitamin A use alone was no better than placebo

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**Take Home Message**
- Micronutrients play important roles in maintaining immune function and neutralizing the reactive oxygen intermediates produced by activated macrophages & neutrophils in their response to microorganisms.

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**Take Home Message**
- HIV-Infected persons frequently develop micronutrient deficiencies, leading to further immuno-suppression & oxidative stress.
The vicious cycle of micronutrient deficiencies, and HIV-related adverse health outcomes, can be slowed down by using an appropriate mixture of micronutrient – antioxidant nutritional intervention.

Antioxidants + micronutrient supplements (IMMUNACE) do not provide an alternative to ART but form an essential complementary intervention as a part of a comprehensive care package.
supplementation with INNUNACE provides an effective, low-cost, immuno-modulating intervention
- to slow down the progression of HIV disease, and
- to delay the initiation of ART in HIV patients.

Take Home Message

The only “TAILORED” Micronutrient-based formula in Indonesia that has stood the acid test of clinical trials.

Only benefits, No harm.

Vitabiotics
IMMUNACE
A Basic Necessity in TB & Lung Diseases
Irrefutable evidence now exists…

Deficiencies of Micronutrients – Antioxidants are comprehensively involved in the pathophysiology of LUNG DISEASES

- Tuberculosis
- Recurrent respiratory infections
- Chronic Bronchitis, COPD
- Pneumonia
- Asthma
- Acute Respiratory Distress Syndrome
- Influenza / Recurrent colds
- Pulmonary Fibrosis

Lung Infections & Diseases significantly affected by micronutrient deficiencies...

PULMONARY TUBERCULOSIS

- This contagious lung infection is a “priority disease” in Indonesia.
Micronutrient deficiencies & mal-nutrition are very common in active pulmonary TB patients.

Very high free radical activity & severe oxidative stress also feature in TB patients because of malnutrition & poor immunity.

Mycobacteria grow and replicate in the host macrophages.

In an attempt to kill mycobacteria, macrophages, neutrophils & monocytes generate huge amounts of ROS, which in turn promote inflammation & tissue injury.

In addition, malnutrition impairs the micronutrient-antioxidant capacity in TB patients.

The micro-nutritional derangement and lower antioxidant status call for prompt nutritional intervention in the management of pulmonary tuberculosis.

Improved nutrition & supplementation with antioxidant nutrients in TB prevents oxidative stress and further complications.
In pulmonary tuberculosis patients free radical activity is very high and antioxidant levels are low.

Micronutrient - antioxidant supplementation represents a novel approach to faster recovery.

Supplementation with 5000 IU Vitamin A + 15 mg Zn + optimum amounts of vitamins & trace elements:
- improves effectiveness of TB treatment;
- causes “earlier” sputum smear conversion;
- reduces death rates in patients co-infected with HIV.

A “chronic inflammatory process” clinically characterized by
- variable Airway Obstruction, and
- Airway Hyper-reactivity
### Asthma
- Antigen challenge in asthmatics activates the neutrophils (& eosinophils).
- **Activated neutrophils produce**
  - inflammatory mediators, which induce broncho-constriction, and
  - free radicals, which damage airway cells & further propagate inflammation.

### Pneumonia
- Inflammation of the lungs due to infection with bacteria & other microbes.
- **Most common in patients with immuno-deficiency**

### COPD
- Chronic Obstructive Pulmonary Disease results from persistent obstruction of airways caused by
  - “chronic bronchitis” or
  - “inflammation of alveoli”
ARDS

**Acute Respiratory Distress Syndrome** – a result of damage to the alveoli capillary membrane due to infections, inhalation of toxic gases, shock, etc.

ARDS lungs contain large numbers of stimulated neutrophils which release ROS and proteases, and damage the endothelium.

FIBROTIC LUNG DISORDERS

- A chronic process involving the entire respiratory part of lung, characterized by
  - injury to the alveolar region, and
  - fibrosis of alveolar walls.
FIBROTIC LUNG DISORDERS

- Exaggerated release of oxidants by alveolar macrophages & neutrophils result in injury to the epithelium & endothelium.
- Finally, the alveolar architecture is destroyed.

In Summary:

- Stimulates Immune System
- Reduces Oxidative Stress & Damage
- Maintains integrity of mucous membranes
- Enhances lung capacity & oxygenation of blood
- Reduces aggravation of illness

HELPS HEALTHY CELLS STAY HEALTHY

Equally effective in other infectious, immuno-compromised conditions…
Gastrointestinal Infections and Diarrhea
• Recurrent infective diarrhoea & dysentery
• Helminth Infections

DERMATOLOGICAL PROBLEMS
• Recurrent skin infections • Eczema
• Psoriasis • Cellulitis • Photo-oxidative damage • Skin Cancers

Pre & Post SURGERY
• Inflammatory & Surgical stress response
• Better wound healing • Improved collagen synthesis & tissue repair
INTERNAL MEDICINE
Metabolic & Chronic diseases • Diabetes • CRF • Endothelial dysfunction • CHD • CVD • Hypertension

It will BOOST Your PATIENTS’ HEALTH

Thank You