



PROTEIN:

THE OFTEN-NEGLECTED INGREDIENT IN DEVELOPMENT

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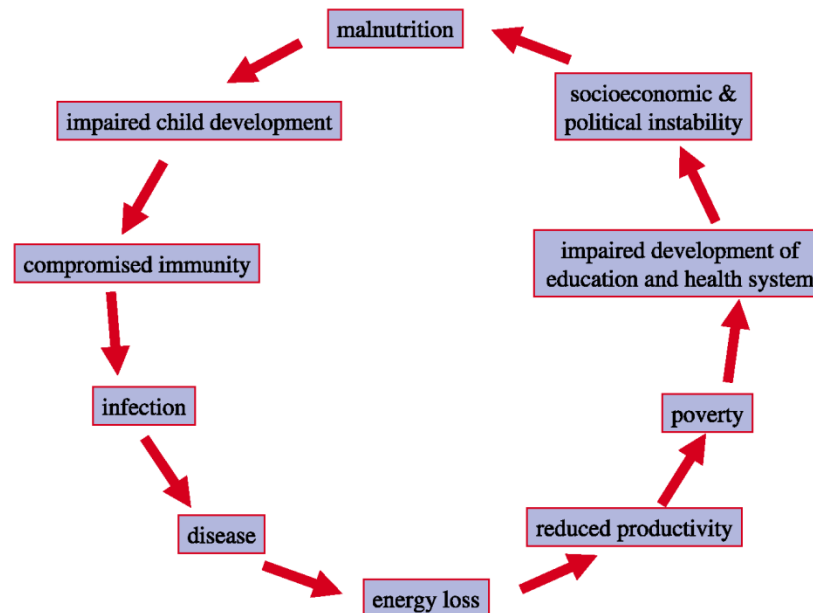
TOPICS

- Basic priorities for human health
- History of protein in development
- Where protein is missing now



NUTRITION AND DEVELOPMENT: WHO

- Nutrition = foundation for health and development
- Healthy children learn better
- Healthy people are stronger
- Healthy people are better able to break cycles of poverty



PRIORITIES AND HISTORY

What the body needs

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Survival time without

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PRIORITIES AND HISTORY

What the body needs

- AIR!
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Survival time without

- Minutes
-
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-
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PRIORITIES AND HISTORY

What the body needs

- AIR!
- Water/fluids
-
-
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Survival time without

- Minutes
- Days
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PRIORITIES AND HISTORY

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Survival time without

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PRIORITIES AND HISTORY

What the body needs

- AIR!
- Water/fluids
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Survival time without

- Minutes
- Days
- Months
- Months
-
-
-
-



PRIORITIES AND HISTORY

What the body needs

- AIR!
- Water/fluids
- Calories
- Protein
-
-
-
- Micronutrients

Survival time without

- Minutes
- Days
- Months
- Months
-
-
-
- Possibly years!



MALNUTRITION TODAY

○ Undernourished

- Protein-energy malnutrition (PEM)
 - Most deadly form
 - >50% of child deaths associated
- Micronutrients
 - Iron, zinc, iodine
 - Vitamin A



Photo by Sokwanele – Zimbabwe from Flickr Creative Commons, 2010.



EFFECT OF PEM

- Affects immune cell numbers and function
- Mild to moderate malnutrition: may be able to respond to infection
- Uncertain about real-world contribution of each nutrient



PROTEIN REQUIREMENTS

- Depends on:
 - Energy intake
 - Body weight and composition
 - Physical activity level
 - Presence of illness or injury
 - Need for growth/development (children)
 - Age – elderly
- Inadequate energy intake – increased use of protein from diet and body
- Inadequate protein intake – protein recycling leads to muscle wasting



PROTEIN: STUNTING AND DEVELOPMENT

- Stunting
 - = marker for chronic malnutrition
 - Lower protein intake related to growth failure
- Brain development
 - = compromised in chronic malnutrition
 - Directly related to protein intake when calories are adequate
- Protein malnutrition
 - Thymus atrophy → long-lasting immune defects
 - Respiratory infection, infectious diarrhea, others
 - Protracted, exacerbated disease course



THE OTHER SIDE OF MALNUTRITION TODAY

○ “Globesity”

- 1.5 billion adults are overweight (2.3 billion in 2015)
- 500 million are obese (700 million in 2015)
- 43 million children under 5 are overweight
- Consequences: increased risk for
 - Cardiovascular disease (#1 cause of death – 17 million/year)
 - Diabetes: deaths projected to increase by 50%/10 years
 - Childhood = premature death and disability in adulthood
- Under and over nutrition exist side by side
 - Inadequate nutrition followed by overnutrition
 - Dramatic rise in overweight and obesity in low/middle income countries
 - Both affect immunity and increase infectious disease risk



DOUBLE BURDEN ISSUES

- Study of stunting and overweight in China
 - 8041 children under 5 years of age
 - Stunting (30%), underweight (10%), wasting (3%)
 - Overweight (4%), overweight stunted (17%)
 - 41% stunted were overweight
 - <2% not stunted were overweight
 - Conclusions:
 - Stunting was most serious problem impeding growth and development
 - Overweight stunting was significant
 - Recommendation: increase protein consumption at an early age



LOW PROTEIN WITH ADEQUATE CALORIES

- Cassava as a staple food in Nigeria and Kenya
 - 1105 children aged 2-5 years
 - 13% Nigerian children inadequate protein intake
 - 53% Kenyan children inadequate protein intake
 - Stunting:
 - Directly associated with protein intake
 - Evaluation controlled for calorie and zinc intake
 - Recommendations: increase protein intake in vulnerable populations



LOW PROTEIN DIETS

- Maternal down-regulation leads to stunting:
 - Down-regulation of growth capacity for offspring
 - Offspring stunted
 - Possible adaptive response in anticipation of predicted postnatal environment: survival mechanism



SUMMARY

- Nutrition is intertwined with development:
 - Child development
 - Overall development efforts
- Malnutrition is multifaceted: under/over
- Priorities of nutrients should be considered in interventions
- Protein is a priority for vulnerable populations and for development efforts

