Role of Food Ingredients and Nutrients in promoting Health

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Definition of an Ingredient

• An edible substance that is used in making a dish/food

• A component of a mixture or a compound

• A component, element, factor or constituent

• FDA- everything added to food.
Purposes

• Preserve food
• Maintain / improve Nutrition
• To compensate for processing losses
• To enrich- add some more of what is already in there
• To fortify – add new nutrients
• Enhance taste/flavor/color and appearance
3 main reasons- USFDA

- Fresh and Safe Food
- Nutritive Value ± health benefit
- Taste, Texture appearance

- About 20 different categories of ingredients
How do we meet our nutrient requirements?

• Consuming a diverse array of foods - food based approach/ balanced diet
• Even in Food secure situations this may not possible
• Nutrient supplements – for targeted populations
• Pharmaceutical preparations - short term therapeutic approach
• Food fortification
Why deliver nutrients and health promoting ingredients through processed food-1

• Data shows inadequate nutrient intakes

• Several major health problems are related to nutrient inadequacies- eg Anemia, Goiter, Vitamin A and D deficiencies etc

• 32% of Indian food market is processed food

(www.ibef.org)
Why deliver nutrients and health promoting ingredients through processed food-2

- Need for higher intakes during various physiological phases not being met eg pregnancy, Lactation, Infant and young children, adolescent girls, elderly

- Illness and Convalescence, Aging or living with a permanent health problem
Where do we add nutrients- suitable vehicles

- Salt
- Flour
- Bread
- Rice
- Cereals
- Oils and Fats
- Milk
- Fruit Juices and other Beverages
- Energy Bars
What are the commonly added nutrients

- Thiamine, Riboflavine, Niacin, Folate, beta Carotene, KI, iron salts, Vit E, Vit C, Vit D, Calcium salts
- Amino acids- Lysine, Leucine, Tryptophan, Methionine, glycine
- Zn, Mg, Mn and other trace minerals
How much to add ???

- Less than RDA
- Not to exceed RDA
- More than RDA but restricted to FSDU or FSMP
- More than RDA but less than Safe limit
- RDA- is the minimum requirement (Avg + 2SD)
- SUL – is the maximum level at which daily life long intakes are safe. Takes into consideration nutrient from all sources
Types of fortification

• Market Driven
• Targeted
• Household
• Bio fortification- selective breeding / GMO
Manufacturers responsibility

- Comply with regulation
- Scientifically tested
- Quality of Nutrients
- Shelf life - content at end of shelf life
- Bioavailability
- Quality of the vehicle or base material
- Safety of any other ingredient added as stabilizers
Fortified products and consumer behavior (WHO 2006)-1

- Nutrient benefit is important but price, taste, packaging, convenience are greater priorities

- Need for nutrients is unrecognized by consumer

- Benefits of fortified foods are subtle and not felt
Fortified products and consumer behavior (WHO 2006)

- Cost increase may be marginal but significant for resource poor societies

- Staple foods should be pure without mixing “Chemicals”

- Affluent may think they don’t need nutrients in excess
Functional Food Ingredients-1

• For calorie reduction - Non Nutritive sweeteners

• To reduce cholesterol absorption - Phytosterols

• Lower GI - Complex CHO
  Resistant Starch, Dietary Fiber
Functional Food Ingredients-2

• Promote Gut health – Pre and Probiotics

• Whey protein / Leucine to prevent muscle loss

• Calcium, Vitamin D, Vitamin K, Cu, Zn, F, Phyto estrogens- for bone health
Ingredients for F100 formula to manage severe malnutrition

- Skimmed milk powder
- Cereal flour
- Sugar
- Vegetable oil
- Mineral mix
<table>
<thead>
<tr>
<th>Functional Component (bioactive molecules)</th>
<th>Source</th>
<th>Health Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-carotene</td>
<td>carrots</td>
<td></td>
</tr>
<tr>
<td>Beta-carotene</td>
<td>fruits, vegetables</td>
<td>neutralize free radicals,</td>
</tr>
<tr>
<td>Lutein</td>
<td>green vegetables</td>
<td>reduce risk of macular degeneration</td>
</tr>
<tr>
<td>Lycopene</td>
<td>tomato</td>
<td>reduce risk of prostate cancer</td>
</tr>
<tr>
<td>Insoluble Fibre</td>
<td>wheat bran</td>
<td>reduce risk of breast or colon cancer</td>
</tr>
<tr>
<td>Beta-Glucan</td>
<td>oats</td>
<td>reduce risk of CVD</td>
</tr>
<tr>
<td>Soluble Fibre</td>
<td>psyllium</td>
<td></td>
</tr>
<tr>
<td><strong>Bioactives</strong></td>
<td><strong>Food Source</strong></td>
<td><strong>Health benefit</strong></td>
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<tr>
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</tr>
<tr>
<td>Omega-3</td>
<td>Fish and fish oils</td>
<td>reduce risk of CVD, improve mental, visual functions</td>
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<tr>
<td>Flavonoids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthocyanidins</td>
<td>fruits</td>
<td>neutralize free radicals, reduce cancer risk</td>
</tr>
<tr>
<td>Catechins</td>
<td>tea</td>
<td>&quot;</td>
</tr>
<tr>
<td>Flavanones</td>
<td>citrus</td>
<td>&quot;</td>
</tr>
<tr>
<td>Flavones</td>
<td>fruits/vegetables</td>
<td>&quot;</td>
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<tr>
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<td>Source</td>
<td>Health Benefit</td>
</tr>
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<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Stanol ester</td>
<td>Corn, soy, wheat</td>
<td>Inhibit cholesterol absorption</td>
</tr>
<tr>
<td>Fructo-oligosaccharides (FOS)</td>
<td>Onion</td>
<td>Pre biotics</td>
</tr>
<tr>
<td>Lactobacillus</td>
<td>Yogurt, other dairy</td>
<td>Gut health</td>
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<tr>
<td>Isoflavones:</td>
<td></td>
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<tr>
<td>Daidzein</td>
<td>Soya- soy-based foods</td>
<td>Menopause, CVD</td>
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<tr>
<td>Genistein</td>
<td></td>
<td>Lower LDL</td>
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<tr>
<td>Lignans</td>
<td>Flax, vegetables</td>
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<tr>
<td>Proanthocyanidins</td>
<td>Cranberries, cocoa, chocolate</td>
<td>Improve urinary tract health, reduce CVD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>? Complications of DM</td>
</tr>
</tbody>
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PRINCIPLES FOR ADDITION OF DIETARY ACTIVE COMPOUNDS IN FOODS-1

- Active compounds should be present at a level which will not result in either excess or insignificant intake

- Should be sufficient to exercise its beneficial effect

- Should not result in an adverse effect on the metabolism of any other nutrient
PRINCIPLES FOR ADDITION OF DIETARY ACTIVE COMPOUNDS IN FOODS

- Should be stable in food under customary conditions of packaging, storage, distribution and use

- Should be biologically available from the food

- Methods of measuring should be available
CLAIMS

- Nutrient content claim: eg. low sodium, low fat, rich in n3, high soluble fiber etc
- Structure/function claim: eg. Calcium builds strong bone, lycopene reduces prostate cancer risk
- Risk reduction claim: eg. Fibre and CHD, folic acid and NTD
HUMAN STUDIES

- Data from other countries
  Target population – Indian men / women / children / elderly

- Comparative study
  Placebo Vs. Nutraceuticals
  Low dose Vs. High
  Traditional Vs. test

- Clear cut end points/outcomes: Biomarkers if validated.
Ingredients of concern for public health-related to chronic degenerative diseases

- High energy - Increases calorie intakes
  Due to high refined CHO or High fat content
- Sugars - and refined carbohydrates – High GI
- Salt – or higher sodium
- Saturated fat – Myristic and Palmitic acids
- PHVO and Trans Fats
Thank You