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

Functional Component (bioactive molecules)	***Source***	***Health Benefit***
Alpha-carotene	carrots	
Beta-carotene	fruits, vegetables	neutralize free radicals,
Lutein	green vegetables	reduce risk of macular degeneration
Lycopene	tomato	reduce risk of prostate cancer
Insoluble Fibre	wheat bran	reduce risk of breast or colon cancer
Beta-Glucan	oats	reduce risk of CVD
Soluble Fibre	psyllium	,,

Bioactives	*Food Source*	*Health benefit*
Omega-3	Fish and fish oils	reduce risk of CVD
?		improve mental, visual functions
? Flavonoids		
Anthocyanidins	fruits	neutralize free radicals reduce cancer risk
Catechins	tea	,,
Flavanones	citrus	,,
Flavones	fruits/vegetables	,,

Functional component	Source	Health Benefit
stanol ester	corn, soy, wheat,	inhibit cholesterol absorption
Fructo-oligosaccharides (FOS)	onion	Pre biotics
Lactobacillus	yogurt, other dairy	Gut health
Isoflavones: Daidzein Genistein	soya- soy-based foods	menopause, CVD lower LDL
Lignans	flax, vegetables	,,
Proanthocyanidins	cranberries, cocoa,chocolate	improve urinary tract health reduce CVD ? Complications of DM

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