

Nutraceuticals & functional foods



CHS 457

Outline



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 - Mechanism of action
 - Chemical nature

Introduction



- The interest in nutraceuticals & functional foods continue to grow, powered by progressive research efforts to identify their properties & applications, coupled with public interest & consumer demand.
- Life expectancies are rising.
- Diseases can be prevented by diet, PA, lifestyle. Supplementation, fortified foods can optimize the health promoting capabilities of their diet.
- Public education

Defining nutraceuticals & functional foods



- Nutraceuticals “ Nutrition & pharmaceutical”
- 1989
- 1994, restated & clarified
- Any substance that may be considered a food or part of a food & provides health or medical benefits, including prevention & treatment of disease.
- Nutrients, dietary supplements, herbal products, processed foods; cereal, soups.

Functional foods



- Foods or dietary components that may provide a health benefit beyond basic nutrition.
- Foods that by virtue of physiologically active food components provide health benefits beyond basic nutrition
- Similar in appearance to a conventional foods consumed as part of the usual diet with demonstrated physiological benefits and \or reduce the risk of chronic disease beyond basic nutrition functions

Functional foods



- Food fortified with add or concentrated ingredients to functional levels which improves health or performance.
- It includes enriched cereal, sport drinks, bars ...
- The food has some identified value leading to health benefits including reduced risks of disease for the person consuming it
- Fruits, veg, with fiber & antioxidants, fortified food, formulated ready to drink beverages

Functional foods



- Anything that is consumed primarily or particularly for health reasons.
- Functional foods are a kind of nutraceutical

Nutraceuticals



- Products that is prepared from food but sold in the form of pills or powder or any other medicinal form not usually associated with food
- It is demonstrated to have a physiological benefit or provide protraction against chronic diseases.
- Nutraceuticals are distinct from functional foods

Classification nutraceutical factors



nutraceuticals

Food source

Mechanism of
action

Chemical
nature

Food & nonfood sources of nutraceuticals



- One of the broader classification methods
- Many nutraceuticals are found both in plants & animals and sometimes in microbes.
- Ex: choline & phosphotidylcholine
- Linolenic acid, found in animal flesh but primarily found in plants.

Food & nonfood sources of nutraceuticals



Non food sources:

- Development of fermentation methods
- Ex: amino acids and their derivatives
- Recombinant genetic techniques have enabled new avenues for obtaining nutraceuticals.

Food & nonfood sources of nutraceuticals



- Eicosapentaenoic acid EPA FA produced by bacteria.
- Produced by bacteria & algae.
- EPA derived from salmon are produced by algae and are later incorporated in the salmon that consumes the algae.
- Nowadays, EPA are produced from non-EPA producing bacteria, importing appropriate DNA through recombinant methods.

Food & nonfood sources of nutraceuticals



- The ability to transfer the production of nutraceutical molecules into organisms that allow for economically feasible production is the cause for both optimism & discussion concerning regulatory and popular acceptance

Nutraceuticals in specific foods



- There are several nutraceuticals found in higher concentrations in specific foods or food families.
- One consideration is, relatively short list of food that are concentrated sources.
- However, other sources might have longer lists & various sources.
- Citrus fruit contain isoflavone quercetin as do onions, citrus fruits grow on trees whereas onion at ground level, red grapes also, broccoli & yellow squash.

Nutraceuticals in specific foods



- On the other hand, there are no guarantees that closely related foods contain same nutraceutical compounds.
- Ex: onions & garlic, same lily family however, onions are loaded with quercetin and garlic in quercetin void.

Mechanism of action



- Classified upon their proven physiological properties
- Antioxidants, antibacterial, antihypertensive, antihypercholesterolemic, antiaggregate, anti-inflammatory, osteoprotective & so on.
- Appropriate to be used for specific medical condition.
- However, many issues related to toxicity, synergism & competition associated with nutraceutical factors & their foods are not yet known.

Mechanism of action



- Pharmaceutical companies would spend hundreds of thousands on experiments to assure the efficacy of a specific product.
- Long process that requires continuous monitoring and evaluation of all phases.
- By contrast, few ingredients classed as nutraceuticals approach this level of study.

Mechanism of action



- Ex: beta-glucan from oats was the first substance to achieve FDA approval health claim for labeling purposes, after several evaluations and clinical studies demonstrating its hypocholesterolemic effect.
- Plant sterols and sterol esters have been the topic of more than 50 clinical studies and are also the subject of an approved health claim.

Mechanism of action



- Number of nutrients have been classified as GRAS based upon documentation submitted by FDA.
- The GRAS designation allows an ingredient to be introduced as a food product ingredient.
- Some nutraceutical ingredients are marketed on the basis that they have been used for many years in the practice of traditional or cultural medicine.
- This rationale for use is superficial and cause for concern.

Mechanism of action



- Animal and plants kingdoms contain many compounds that offer therapeutic and benefit or danger, depending on the dose.
- There have been no systematic regulatory efforts to determine safety.

Mechanism of action



- Several nutraceuticals can be listed as having more than one mechanism of action.
- Omega 3 PUFA, can be used as precursors for eicosanoid substances that locally vasodilate, bronchodilate and deter platelet aggregation and clot formation. Also, they can reduce the activity of protein kinase C and tyrosine kinase both which are involved in cell growth signaling mechanism.
- Affecting cardiac hypertrophy and cancer. Also they inhibit the synthesis of fatty acid synthase, which is the principle enzyme in de novo synthesis of FA.

Chemical nature



Isoprenoid
derivatives

Phenolic
substances

Fatty acids &
structural
lipids

Carbohydrates
& derivatives

Amino acid
based
substances

Microbes

Minerals



Thank you