ESU 009– Classification of nutraceuticals compounds based on chemical and biochemical nature

Lecture 6

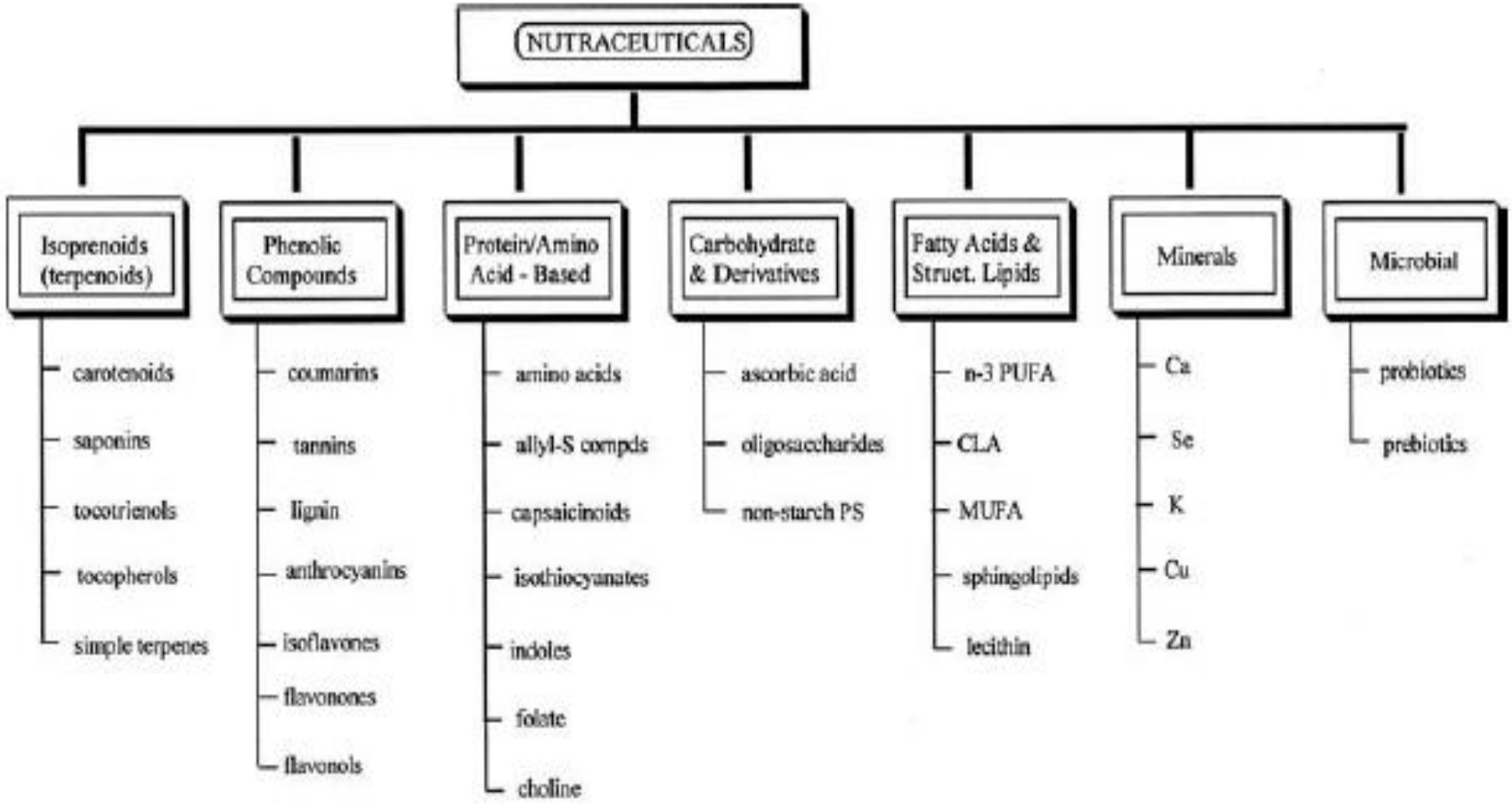
•One way to group nutraceuticals grossly is as follows:

- Isoprenoid derivatives
- Phenolic substances
- Fatty acids and structural lipids
- Carbohydrates and derivatives

  Amino acid-based substances

- Microbes
- Minerals

Classification Based On The Chemical Groups



Isoprenoid derivatives

- Isoprenoids and terpenoids are terms used to refer to the same class of molecules.
- These substances are without question one of the largest groups of plant secondary metabolites.
- In accordance with this ranking, they are also the basis of many plant-derived nutraceuticals.
- Under this large umbrella are many popular nutraceutical families such as carotenoids, tocopherols, tocotrienols, and saponins.

Phenolic compounds

- Like the terpenoids, phenolic compounds are also considered secondary metabolites.

- The base for this very diverse family of molecules is a phenol structure, which is a hydroxyl group on an aromatic ring.

- From this structure, larger and interesting molecules are formed such as anthocyanins, coumarins, phenylpropamides flavonoids, tannins, and lignin.

Carbohydrates and derivatives

- The glucose derivative ascorbic acid (vitamin C) is perhaps one of the most recognizable nutraceutical substances and is a very popular supplement.

- Ascorbic acid functions as a nutraceutical compound, primarily as an antioxidant.

- Meanwhile, plants produce some oligosaccharides that appear to function as prebiotic substances.

Fatty acids and structural lipids

- There are several fatty acids and/or their derivatives that have piqued the interests of researchers for their functional potential.

- These include the ω-3 PUFA found in higher concentrations in plants, fish, and other marine animals

- Conjugated linoleic acid (CLA) produced by bacteria in the rumen of grazing animals such as cattle.

- The formation of CLA probably serves to help control the vitality of the released bacterial population in the rumen, whereas plants and fish use ω-3 fatty acids for their properties in membranes.

Amino acid-based

- This group has the potential to include intact protein (i.e., soy protein), polypeptides, amino acids, and nitrogenous and sulfur amino acid derivatives.

- Today, a few amino acids are also being investigated for their nutraceutical potential.

- Among these amino acids is arginine, ornithine, taurine, and aspartic acid.

Microbes (probiotics)

- Where the other groupings of nutraceuticals involve molecules or elements, probiotics involves intact microorganisms.

- This group largely includes bacteria, and its criteria are that a microbe must be resistant to:

✓Acid conditions of the stomach, bile, and digestive enzymes normally found in the human gastrointestinal tract

✓Able to colonize the human intestine

✓Be safe for human consumption;

✓Have scientifically proven efficacy

- Among the bacterial species recognized as having functional food potential are Lactobacillus acidophilus, L. plantarum, L. casei, Bifidobacterium bifidum, B. infantis, and Streptococcus salvarius subspecies thermophilus.

MINERALS

- Several minerals have been recognized for their nutraceutical potential and thus become candidates for functional food recipes.

- Among the most obvious is calcium with relation to bone health, colon cancer, and perhaps hypertension and cardiovascular disease.

- Potassium has also been purported to reduce hypertension and thus improve cardiovascular health.

Thank you

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