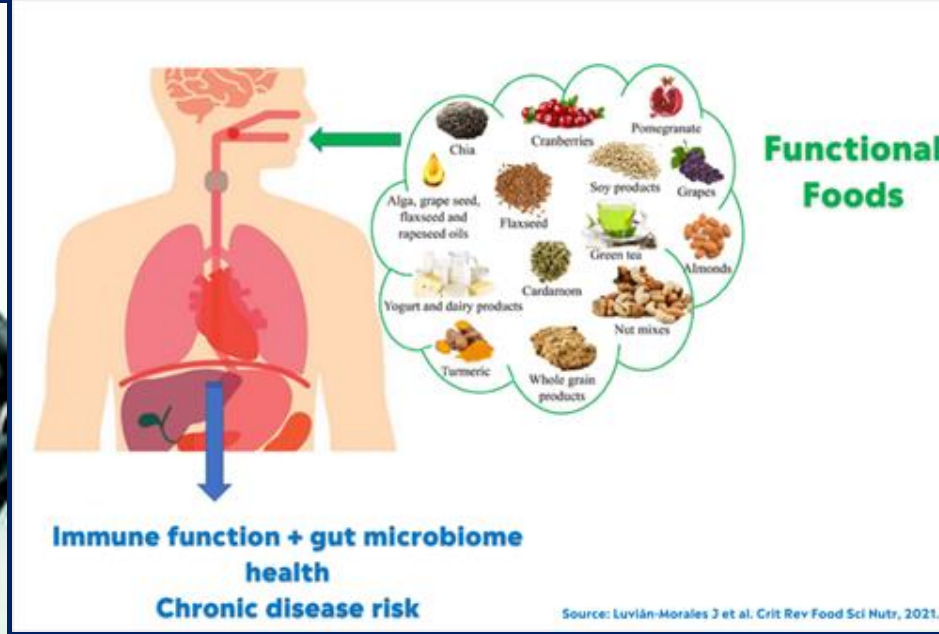
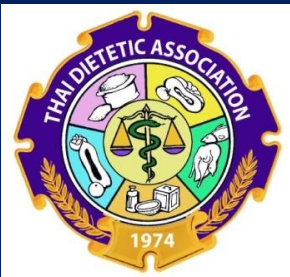


Update Functional Food and Future Food



Asst.Prof. Chanida Pachotikarn., *PhD., LD., MPH., CDT, RD*
Thai Dietetic Association



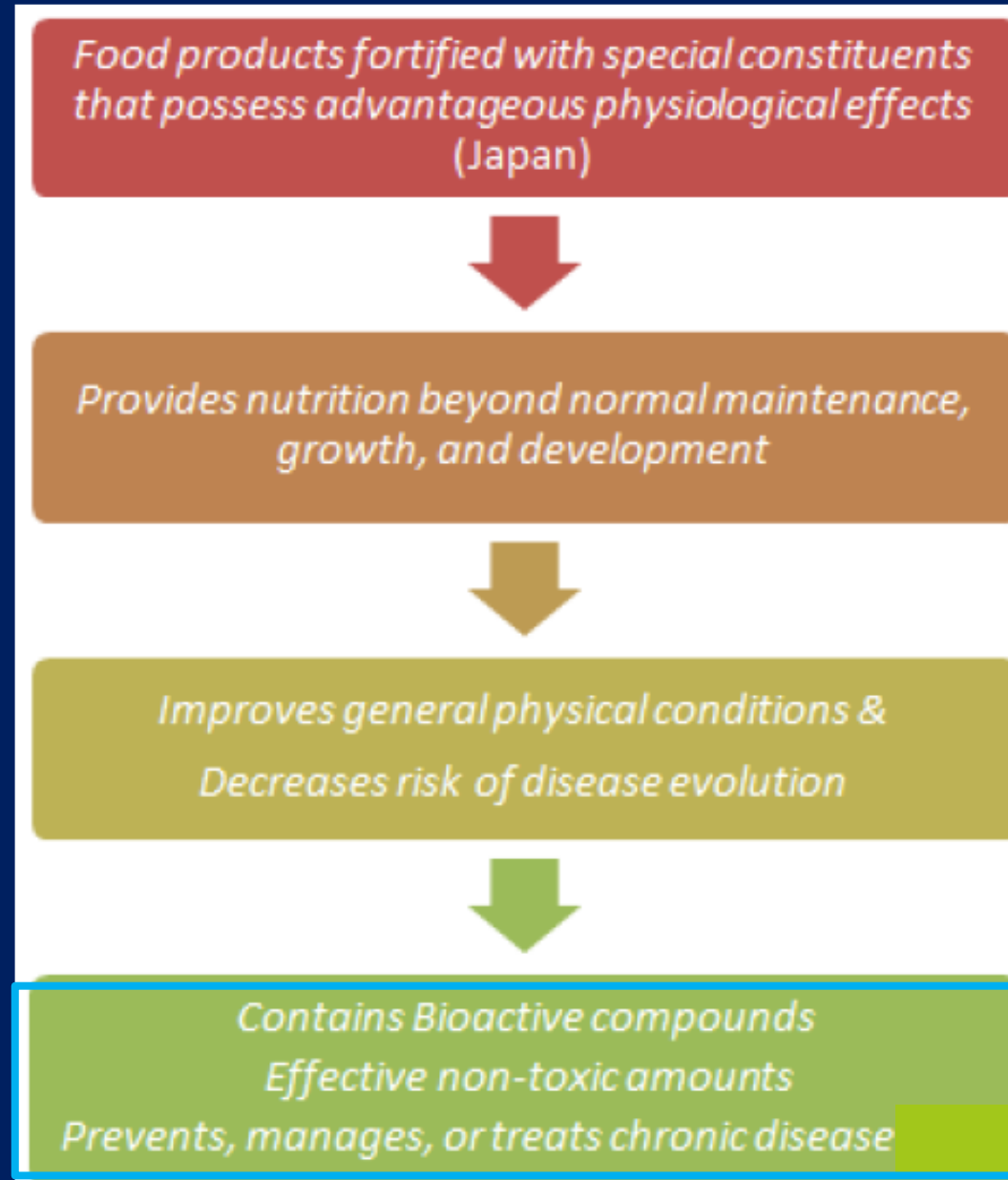
Outline

- ❑ Definition of Functional food
- ❑ Summary of requirements for making health claims on foods by country
- ❑ Functional foods and Dietetic Practice Point.
- ❑ Integration of Functional Food to Dietetic Practice
- ❑ Future Food





The development of the functional food definition



คำจำกัดความของอาหารที่ทำหน้าที่พิเศษ

Pharmaceutical

Dietary
supplements

Food for
Specified
Health Uses

Medical food

Unconventional
foods

Functional
foods

Nutraceuticals

Exempt infant
formulas

Special nutritional

Nutritional
supplements

Pharmafoods

Food for Specified Health Use

□ FOSHU

- อาหารที่ใช้เพื่อวัตถุประสงค์เฉพาะสำหรับสุขภาพ มีการกำหนดกฎเกณฑ์ในการขึ้นทะเบียน การผลิต การติดฉลาก
- ใช้อาหารนี้ในประเทศญี่ปุ่นเท่านั้น



Designer Foods

- ❑ อาหารธรรมชาติที่ประกอบด้วยสารพฤกษเคมี (phytochemicals)
- ❑ อาหารที่มีการเสริมสารพฤกษเคมีที่ทำหน้าที่พิเศษ **Non-nutritive physiological function** ที่มีผลต่อการลดความเสี่ยงของการเกิดโรคมะเร็ง



Dr. Herbert Pierson, 1989

อาหารฟังก์ชัน



□ อาหารที่มีสารที่ทำหน้าที่อื่นนอกเหนือไปจากหน้าที่ปกติ
ที่ทำประจำอยู่เดิม โดยสารนั้นจะทำหน้าที่ที่พิเศษไป
กว่าเดิมเพื่อ

□ ส่งเสริมระบบป้องกันตนเองของร่างกาย (Bio-defensiveness)

□ ส่งเสริม & ควบคุมให้ระบบการทำงานของร่างกายทำงานได้อย่าง
สม่ำเสมอ (Rhythm of physical condition)

□ ป้องกันหรือชะลอความเสื่อมของเซลล์ในอวัยวะต่างๆของร่างกาย

□ ควบคุมหรือลดอาการของโรคเรื้อรังบางชนิด

Functional Food Definitions

| Organization | Year | Definition |
|---|------|---|
| Japanese Ministry of Health, Labour and Welfare - Foods for Specified Health Uses (FOSHU) | 1991 | “Foods for Specified Health Uses (FOSHU) refers to foods containing ingredient with functions for health and officially approved to claim its physiological effects on the human body. FOSHU is intended to be consumed for the maintenance/promotion of health or special health uses by people who wish to control health conditions.” ² |
| Health Canada | 1998 | “A functional food is similar in appearance to, or may be, a conventional food, consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce risk of chronic disease beyond basic nutritional functions.” ¹ |

| | | |
|--|------|--|
| Food and Agricultural Organization (FAO) of the United Nations | 2007 | “Functional foods should be a food similar in appearance to a conventional food (beverage, food matrix), consumed as part of the usual diet which contains biologically active components with demonstrated physiological benefits and offers the potential of reducing the risk of chronic disease beyond basic nutritional functions.” ³ |
| Academy of Nutrition and Dietetics (formerly the American Dietetic Association) | 2009 | “All foods are functional at some physiological level, but it is the position of the Academy of Nutrition and Dietetics that functional foods that include whole foods and fortified, enriched, or enhanced foods have a potentially beneficial effect on health when consumed as part of a varied diet on a regular basis, at effective levels.” ⁴ |

| | | |
|---------------------------|------|---|
| Dietitians of Canada (DC) | 2010 | “Functional foods are foods that offer unique health benefits that go beyond simply meeting basic nutrient needs. Many also help to reduce chronic disease risk. Functional foods contain... “bioactive compounds,” or naturally occurring chemicals that act on our bodies. It is these bioactive compounds that offer the health and wellness benefits that have been linked to functional foods.” ⁵ |
|---------------------------|------|---|

Applying scientific research to the development of functional foods

1st generation

supplements

- vitamin supplements
- calcium enrichment
- fibers

- Components with established efficacy
- Research based on epidemiology

2nd generation

whole foods

- broccoli
- yoghurts
- green tea
- whole grain products

- Research based on safety and efficacy assessment: 'discovery' of positive effects of food components
- Active component(s) may not have been identified or the efficacy confirmed

3rd generation

enhanced foods

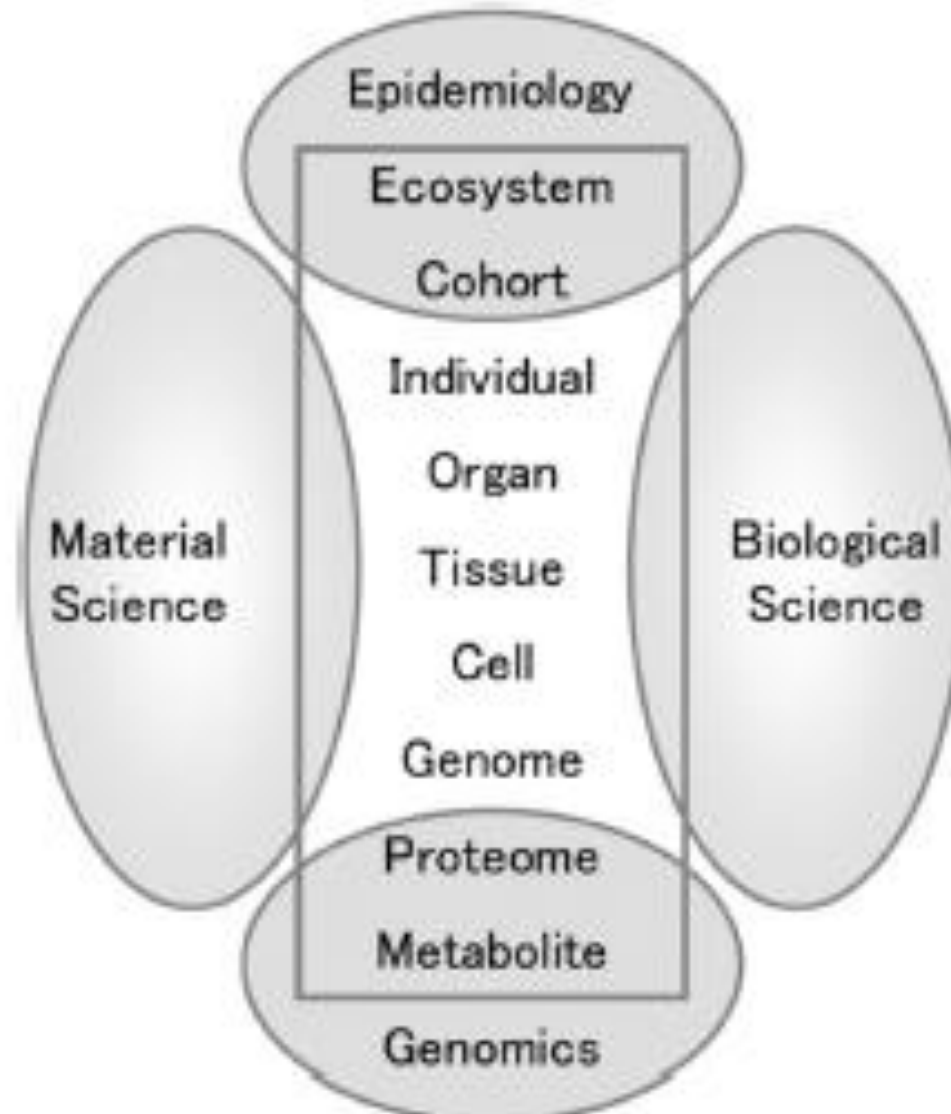
- novel ingredients?
- novel products?
- ??

- Newly developed functional ingredients / foods based on mechanistically proven efficacy
- Research based on 'pharma' type of screening: effect targeted development, lead optimization, bioavailability

Functional Food Categories

| Category | Definition | Examples |
|---|---|--|
| Basic foods | <ul style="list-style-type: none">• The food or food product naturally contains the bioactive. | <ul style="list-style-type: none">• Carrots naturally contain beta-carotene.• Oat bran cereals naturally contain beta-glucan. |
| Processed foods with added bioactives | <ul style="list-style-type: none">• The bioactive does not exist naturally in the food and is added during processing. | <ul style="list-style-type: none">• Orange juice with added calcium.• Milk with added omega-3 fatty acids. |
| Foods enhanced to have more of a bioactive | <ul style="list-style-type: none">• The bioactive exists naturally in the food but the level of the bioactive is modified or concentrated (e.g. by traditional breeding, special livestock feeding or genetic engineering). | <ul style="list-style-type: none">• Yogurt with increased levels of probiotics.• Tomatoes with increased levels of lycopene.• Eggs with increased levels of omega-3 fatty acids. |

Systematized Methodologies for Analysis of the Functions of Food and Hierarchical Targets of Analysis.



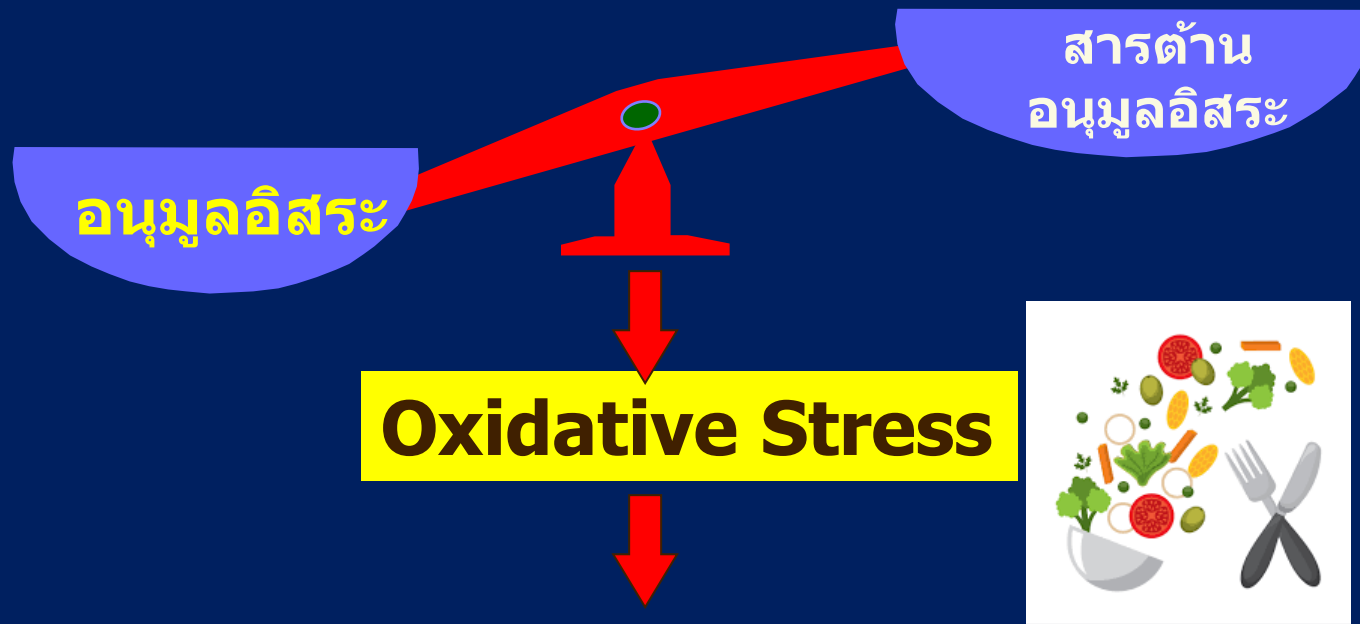
Types of Research Needed

- **Nutrients and bioactive substances**
- **New and existing biomarkers**
- **Food vehicles for bioactive ingredients**
- **Food composition and dietary intake databases**
- **Nutrigenomics and function of bioactive components**
- **Well designed clinical Study**



Evidence from Research

- **Mechanistic studies –how does it work?**
- **Human experimental studies –can it be observed in human systems?**
- **Epidemiological evidence –are the relationships out there?**
- **Clinical trials –can the knowledge be applied?**
- **Feasibility studies –is the application realistic?**



สารต้านอนุมูลอิสระ

Flavonoids

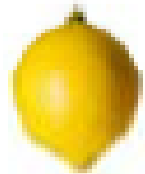


Polyphenol family

Other Polyphenols

Flavonoids

Flavanones



Isoflavones



Flavonols

Flavanols



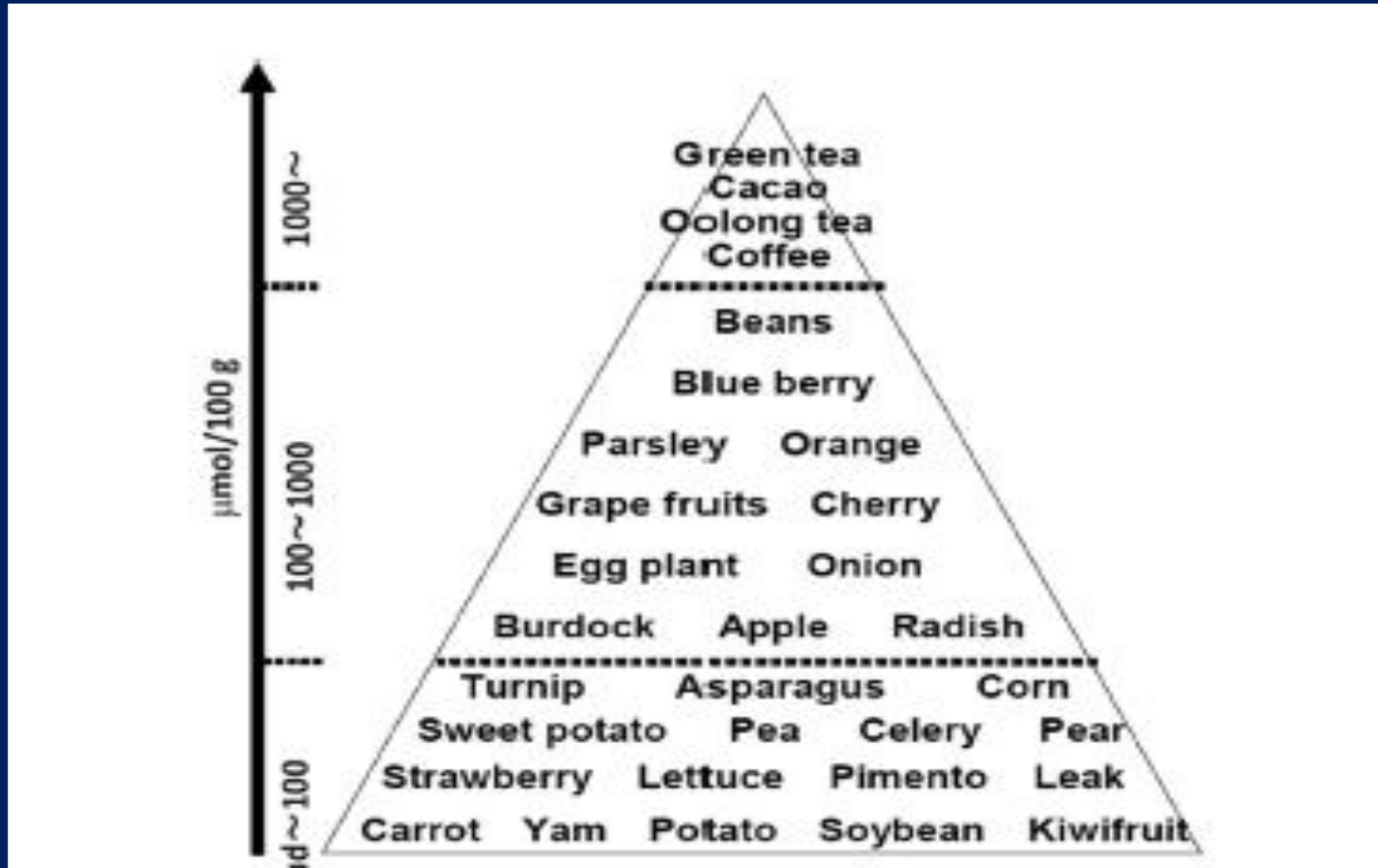
Anthocyanins



Flavones



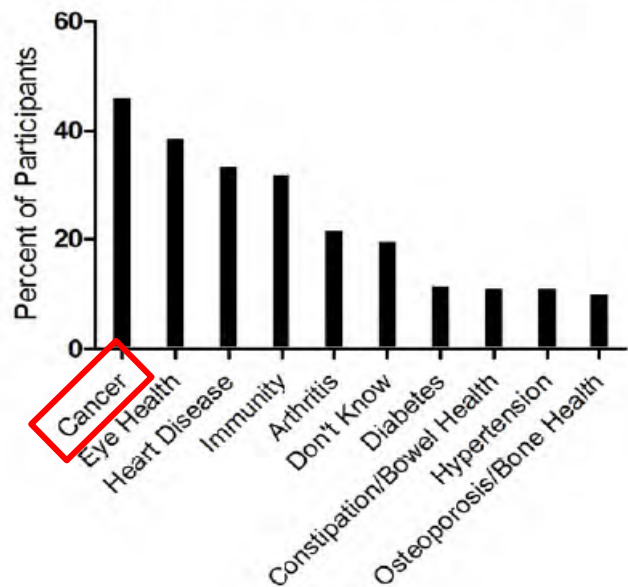
Polyphenol Pyramid



Bioactives as they Relate to Functional Foods

- Naturally occurring chemical compounds contained in, or derived from Plant animal or marine source, that exert the desired health/wellness benefit
- Types of functional food bioactives /functional ingredients can be both nutrients and “non-nutrients” can be considered bioactives
 - Antioxidants
 - Dietary fiber
 - Omega-3 fatty acids
 - Plant sterols,
 - prebiotics and probiotics.

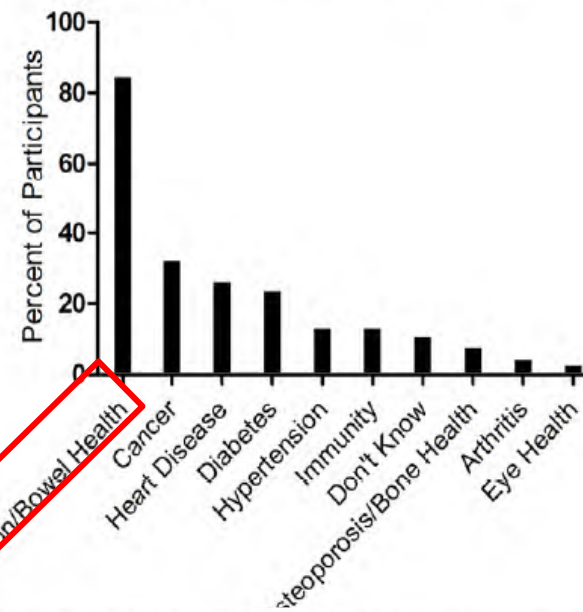
Health areas addressed through the consumption of **antioxidants** in functional foods



Antioxidant Review References:

1. Fusco D, Colloca G, Lo Monaco MR, Cesari M. Effects of antioxidant supplementation on the aging process. *Clin Interv Aging*. 2007;2:377-387.
2. Obrenovich ME, Nair NG, Beyaz A, Aliev G, Reddy VP. The role of polyphenolic antioxidants in health, disease, and aging. *Rejuv Res*. 2010;13:631-643.
3. Willcox J, Ash S, Catignani G. Antioxidants and prevention of chronic disease. *Critical Reviews in Food Sci Nutr*. 2004;44:275-295.

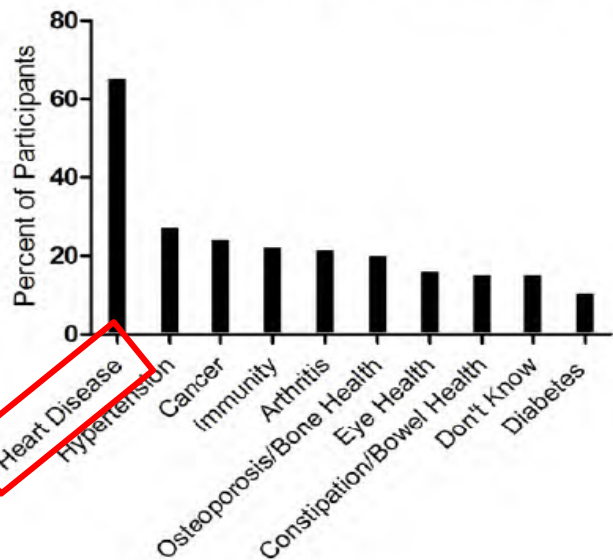
Health areas addressed through the consumption of **dietary fibre** in functional foods



Dietary Fibre Review References:

1. Position of the American Dietetic Association: Health Implications of Dietary Fiber. *J Am Diet Assoc*. 2008;108:1716-1731.
2. Anderson JW, Baird P, David Jr RH, Ferreri S, Knudtson M, Koraym A, Waters V, Williams CL. Health benefits of dietary fiber. *Nutr Rev*. 2009;67: 188-205.
3. Raninen K, Lappi J, Mykkänen H, Poutanen K. Dietary fiber type reflects physiological functionality: comparison of grain fiber, inulin, and polydextrose. *Nutr Rev*. 2011;69: 9-21.

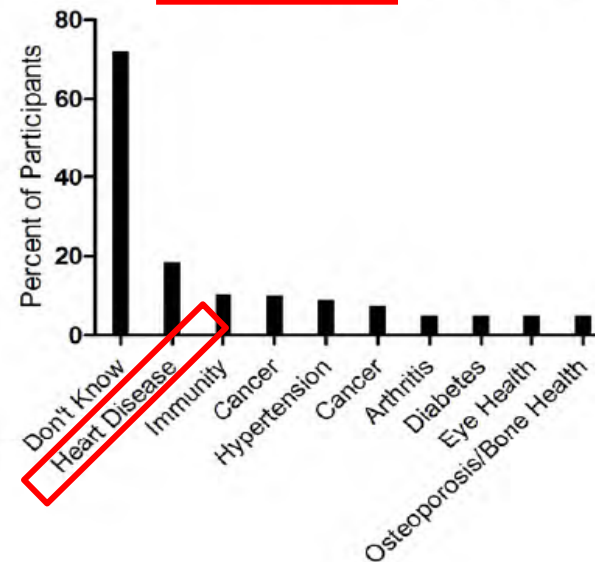
Health areas addressed through the consumption of **omega-3 fatty acids** in functional foods



Omega-3 Fatty Acid Review References:

1. Riediger ND, Othman RA, Suh M, Moghadasian MH. A systemic review of the roles of n-3 fatty acids in health and disease. *J Am Diet Assoc*. 2009;109:668-679.
2. Plourde M. Omega-3 PUFA in aging. *Lipid Technol*. 2011;23:32-34.
3. Stark AH, Crawford MA, Reifen R. Update on alpha-linolenic acid. *Nutr Rev*. 2008;66:326-332.
4. Holub BJ. Clinical Nutrition: Omega-3 fatty acids in cardiovascular care. *Can Med Assoc J*. 2002;166:608-15.

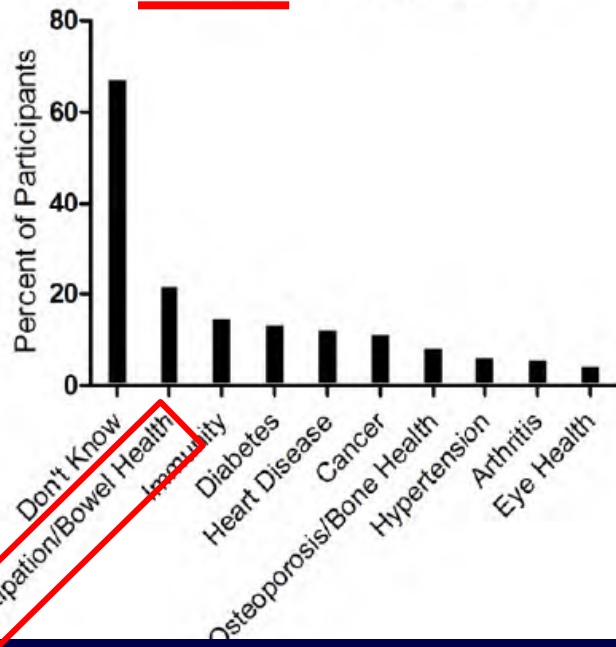
Health areas addressed through the consumption of **plant sterols** in functional foods



Plant Sterol Review References:

1. AbuMweis SS, Jones PJ. Cholesterol-lowering effect of plant sterols. *Curr Atheroscler Rep*. 2008;10:467-472.
2. Jones PJ, AbuMweis SS. Phytosterols as functional food ingredients: linkages to cardiovascular disease and cancer. *Curr Opin Clin Nutr*. 2009;12:147-151.
3. Rudkowska I. Plant Sterols and stanols for healthy ageing. *Maturitas*. 2010;66:158-162.

Health areas addressed through the consumption of **prebiotics** in functional foods

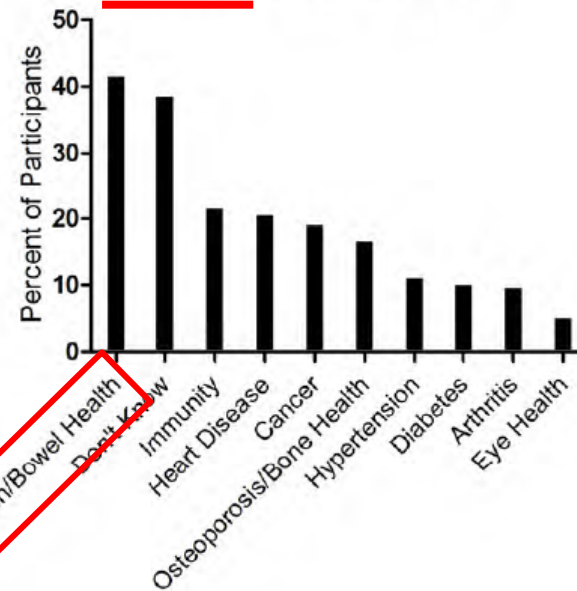


Prebiotics Review References:

1. Lomax AR, Calder PC. Prebiotics, immune function, infection and inflammation: a review of the evidence. *Br J Nutr.* 101;5:633-658.
2. Tuohy KM. Inulin-type fructans in healthy aging. *J Nutr.* 2007;137 (11 Suppl):2590S-2593S.
3. Roberfroid M, Gibson GR, Hoyles L, McCartney AL, Rastall R, Rowland I, Wolvers D, Watzl B, Szajewska H, Stahl B et al. Prebiotic effects: metabolic and health benefits. *Br J Nutr.* 2010;104(Suppl 2):S1-S63.

Alison M. Duncan, Ph.D., R.D., et.al., Functional Foods for Healthy Aging: A Toolkit for Registered Dietitians.

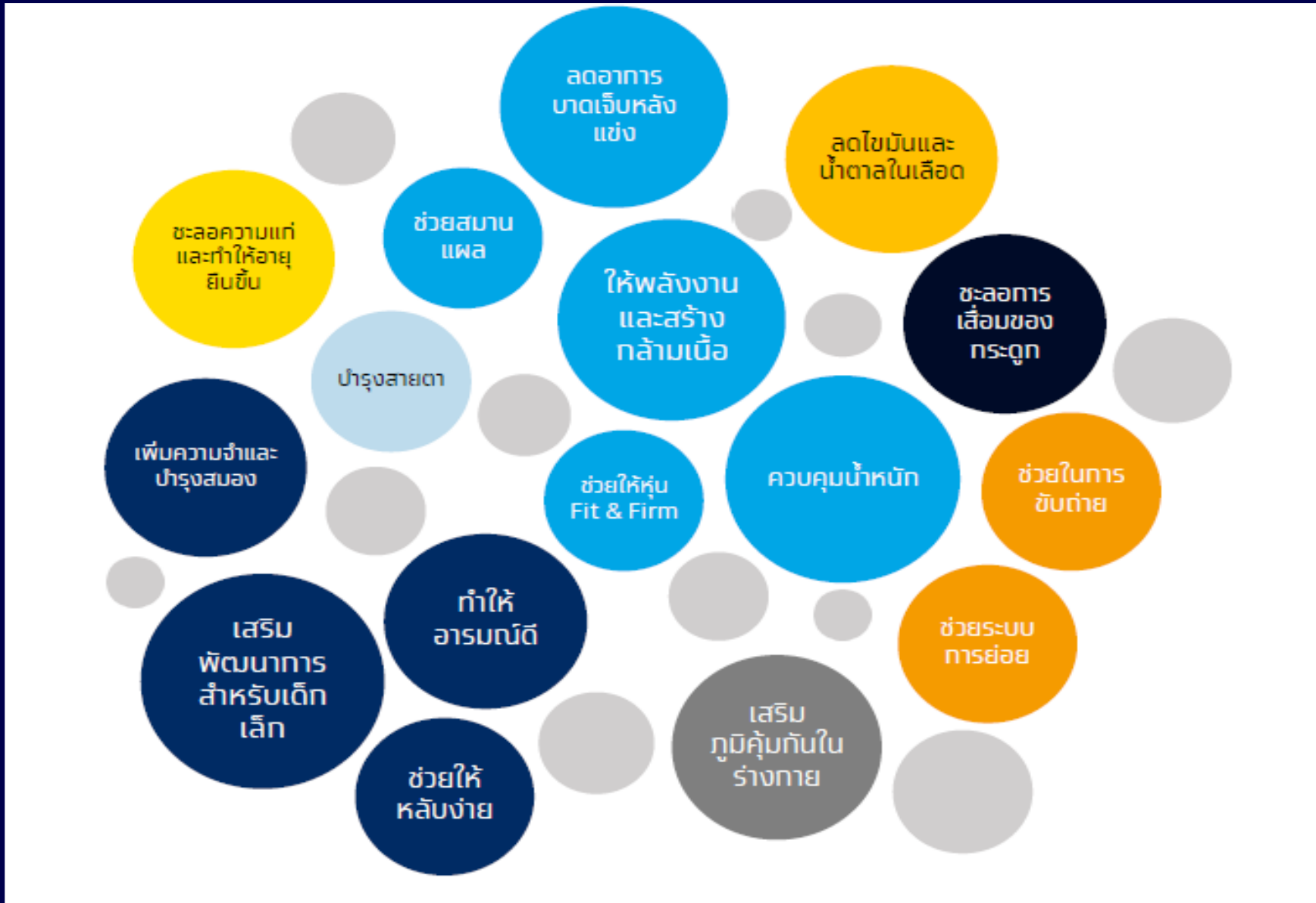
Health areas addressed through the consumption of **probiotics** in functional foods



Probiotics Review References:

1. Tiihonen K, Ouwehand AC, Rautonen N. Human intestinal microbiota and healthy ageing. *Ageing Res Rev.* 2010;9:107-116.
2. Kaur IP, Kuhad A, Garg A, Chopra K. Probiotics: delineation of prophylactic and therapeutic benefits. *J Med Food.* 2009;12:219-235.
3. Iannitti T, Palmieri B. Therapeutical use of probiotic formulations in clinical practice. *Clin Nutr.* 2010;29:701-725.

ตลาด Functional Foods



Functional Ingredients

| | | | |
|---|---|--|--|
|  | ประสาทและสมอง เช่น Omega-3, Antioxidants, Amino Acids | กล้ามเนื้อ เช่น Proteins, Amino Acids ,Minerals, Vitamins |  |
|  | หัวใจและหลอดเลือด เช่น Omega-3, phytosterols, Fibre, Antioxidants | สายตา เช่น Vitamins, Minerals, Omega 3 |  |
|  | กระดูกและข้อ เช่น Minerals, Vitamins, Protein, Amino Acids, Antioxidants, Botanicals | ผิวพรรณ เช่น Vitamins, Collagen, CoQ10 |  |
|  | ควบคุมน้ำหนัก เช่น Herb Extracts, Fibre, Proteins, Fatty Acids | ภูมิคุ้มกัน เช่น Vitamins, Minerals |  |
|  | ย่อยอาหารและระบบ ขับถ่าย เช่น Fiber, Probiotics | | |

Outline

- ❑ Definition of Functional food
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Definition of the different types of health claims by country

| Country | Definition of a <u>nutrient and other function claim</u> | Definition of a <u>reduction of disease risk claim</u> |
|---------------------------|--|--|
| Australia and New Zealand | A nutrient function claim is called a general level health claim which refers to a nutrient or substance in a food and its effect on a health function. <u>General level health</u> | A reduction of disease risk claim is referred to as a high level health claim which is defined as a nutrient or substance in a food and its relationship to a serious disease or to a <u>biomarker of a serious disease</u> |
| Canada | Nutrient function claims are a type of function claim. They describe the well- established roles of energy or known nutrients that are essential for the maintenance of good health or for normal growth and development. Function claims refer to statements about the <u>specific, beneficial effects of a food.</u> | Disease risk reduction claims are statements that link a food to a reduced risk of developing a diet-related disease, condition, or risk factor in the context of the total diet. Claims about the reduction of certain disease risk factors recognized as part of dietary management (e.g. blood cholesterol lowering) are also referred to as <u>therapeutic claim</u> |

Definition of the different types of health claims by country

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|-----------|---|---|
| China | <p>A nutrient function claims means a claim that describes the role of a nutrient component in normal growth, development and <u>normal physiological function of the body.</u></p> | <p>A health food in the "Provisions for Health Food Registration (Trial)" refers to food with claims that state certain health functions; or for the purpose of supplementing vitamins and minerals, which is <u>suitable for specific groups of people</u>, and able to affect body functions. Health foods <u>must not be for the purpose of curing diseases</u> and must not cause any acute, sub-acute or chronic effect to humans.</p> |
| Hong Kong | <p>A nutrient function claim means a nutrition claim that describes the physiological role of a nutrient in growth, <u>development and normal functions of the body.</u></p> | <p>There are no statutory requirements for reduction of disease risk claims, as long as they are accurate and not used for medicinal purposes. These claims are not subject to <u>approval by the Centre for Food Safety.</u></p> |

Definition of the different types of health claims by country

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|---------------------|---|---|
| European Union (EU) | <p>General function health claims under Article 13.1 of the EU Regulation (function claims) are health claims describing or referring to: the role of a nutrient or other substance in growth, development and the functions of the body; or psychological and behavioral functions; or without prejudice to Directive 96/8/EC, slimming or weight control or a reduction in the sense of hunger or an increase in the sense of satiety or to the reduction of the available energy from the diet. New function health claims under Article 13.5 are for claims which are based on newly developed scientific evidence and/or for which protection of proprietary data is requested. A nutrition claim is any claim which states, suggests or implies that a food has particular beneficial nutritional properties due to:</p> <ul style="list-style-type: none"> • Energy (calorific value) it (a) provides, (b) provides at a reduced or increased rate or, (c) does not provide, e.g. 'low energy'; or • <u>Nutrients or other substances</u> it (a) contains, (b) contains in reduced or increased proportions or, (c) does not contain, e.g. 'reduced sugar', 'high fibre' | <p>A reduction of disease risk claim means any health claim that states, suggests or implies that the consumption of a food category, a food or one of its constituents significantly reduces a risk factor in the development of a human disease. For reduction of disease risk claims, the beneficial physiological effect (which Regulation (EC) No 1924/2006 requires to be shown for the claim to be permitted) is the reduction (or beneficial alteration) of a risk factor for the development of a human disease (not reduction of the risk of disease). The wording of the claim should refer to the specific risk factor for the disease, for example, <u>'Plant sterols/stanols have been shown to reduce blood cholesterol levels. High cholesterol levels are a risk factor in the development of coronary heart disease.'</u></p> |

Definition of the different types of health claims by country

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|---------|--|---|
| India | <p>A health claim is one that describes the physiological role of the nutrient or substance or an accepted diet-health relationship; and contains information on the composition of the product relevant to the physiological role of the nutrient or substance or an accepted diet-health relationship unless the relationship is based on a whole food or foods whereby the research does not link to specific constituents of the food. Nutrition function claims and other function claims are based on current relevant scientific substantiation and provide sufficient evidence on the type of claimed effect and the relationship to health.</p> | <p>All reduction of disease risk claims must be made in accordance with the conditions specified in Schedule III of the Gazette</p> |

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|----------------|--|---|
| India | <p>A health claim is one that describes the physiological role of the nutrient or substance or an accepted diet-health relationship; and contains information on the composition of the product relevant to the physiological role of the nutrient or substance or an accepted diet-health relationship unless the relationship is based on a whole food or foods whereby the research does not link to specific constituents of the food. Nutrition function claims and other function claims are based on current relevant scientific substantiation and provide sufficient evidence on the type of claimed effect and the relationship to health.</p> | <p>All reduction of disease risk claims must be made in accordance with the conditions specified in Schedule III of the Gazette</p> |

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|----------------|--|--|
| Indonesia | <p>Nutrient function claims are those that describe the physiological role of nutrients for growth, development and normal functioning of the body. Other function claims are those claims that relate to specific beneficial effects of the consumption of foods or their constituents, in the context of the total diet on normal functions or biological activities of the body.</p> | <p>Reduction of disease risk claims link the consumption of food or food component in the total diet with a reduced risk of developing a particular disease or health condition.</p> |
| Japan | <p>Nutrient function claims are referred to as Food with Nutrient Function Claims (FNFC). FNFC refers to all food labelled with the nutrient function claims specified by the Ministry of Health, Labour and Welfare. The standards and specifications for indication of nutritional function have been established for 17 ingredients (12 vitamins and 5 minerals). Function Claims are referred to as Foods with Function Claims (FFC). FFC refers to all food labelled with function claims based on scientific evidence.</p> | <p>Foods for specified health use (FOSHU) refers to foods containing ingredients with a health function/effect and the claimed physiological effect on the human body has been officially approved. FOSHU includes both nutrient function and reduction of disease risk claims. FOSHU are intended to be consumed for the maintenance/promotion of health or for special health uses by people who wish to control health conditions, including blood pressure or blood cholesterol.</p> |

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|----------------|---|---|
| Malaysia | <p>A nutrient function claim is one that describes the physiological role of the nutrient in growth, development and normal functions of the body. Other function claims refer to substances that are not considered nutrients and that provide a positive contribution to health or to the improvement of a function or to modifying or preserving health by other food component.</p> | <p>Reduction of disease risk claims relate the consumption of a food or food component to the reduced risk of developing a disease or health-related condition. Reduction of disease risk claims are prohibited.</p> |
| Philippines | <p>nutrient function claim describes the physiological role of the nutrient in growth, development and normal functions of the body. Nutrient function claims can only be made about nutrients that have an established nutrient reference value (NRV) and the food which has the claim must be considered a source of that nutrient.</p> | <p>These are claims relating the consumption of a food or food constituent, in the context of the total diet, to the reduced risk of developing a disease or health-related condition. Reduction of disease risk claims are prohibited.</p> |

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|----------------|---|---|
| Singapore | <p>Nutrient function claims refer to physiological role of the nutrient in growth, development and normal functions of the body. Other function claims refer to claims concerning specific beneficial effects of the consumption of foods or their constituents, in the context of the total diet on normal functions or biological activities of the body, and relating to a positive contribution to health or to the improvement of a function. There is also a list of acceptable nutrient function claims for infant foods and foods for children younger than six years in the guide. There is also a claim for foods containing plant sterols/stanols.</p> | <p>Reduction of disease risk claims are referred to as nutrient specific diet-related health claims in Singapore. These are claims relating the consumption of a food or food constituent, in the context of the total diet, to the reduced risk of developing a disease or health-related condition.</p> |

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|----------------|---|---|
| South Korea | <p>Nutrient function claims relate to the modification of any physiological parameters associated with consumption of nutrients such as growth, development and normal functions of the human body. Other function claims relate to any positive contribution to health to the improvement of a function, or to modifying or preserving health in the context of the total diet. Biologically active function claim relates to any positive contribution to health to the improvement of a function, or to modifying or preserving health in the context of the total diet.</p> | <p>Disease risk claim relate to the reduced risk of developing a disease or health-related conditions in the context of the total diet.</p> |
| Switzerland | <p>No definitions given.</p> | <p>N/A</p> |

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|----------|--|---|
| Taiwan | N/A | <p>A health food is defined as a food with <u>specific nutrient or health maintenance effects</u> which is especially labelled or advertised and are not aimed at <u>treating or remedying human diseases</u>.</p> |
| Thailand | <p>Nutrition function claims are any claims that describe the physiological role of the nutrient in growth, development and normal functions of the body. Other function claims are any claims that <u>describe specific beneficial effects of the consumption of foods or their constituents, in the context of the total diet on normal functions or biological activities of the body; such claims relate to a positive contribution to health or to the improvement of a <u>function or to modifying or preserving health.</u></u></p> | <p><u>Reduction of disease risk</u> claims mean benefits relating the consumption of a food or food constituents, in the context of the total diet, to the <u>risk reduction of developing a disease or health-related condition.</u></p> |

| Country | Definition of a nutrient and other function claim | Definition of a reduction of disease risk claim |
|----------------|---|---|
| USA | <p>Nutrient function claims are referred to as structure/function claims which describe the effect that a substance has on the structure or function of the body and do not make reference to a disease. Structure/function claims must be truthful and not misleading and are not pre-reviewed or authorised by FDA. The focus for structure/function claims on conventional foods is on the effects taken from the nutritive value.</p> | <p>Any claim made on the label or in labelling of a food that expressly or by implication characterizes the relationship of any substance (e.g. a specific food or component of food) to a disease or health-related condition is referred to as a health claim. Health claims in the US are limited to claims about reduction of disease risk.</p> |
| Vietnam | <p>Functional foodstuffs are foods that are used to support human's organ functions, have nutrient effects, put the body at ease, increase resistance and reduce pathogenic dangers.</p> | N/A |

Summary of requirements for making health claims on foods by country/jurisdiction

| Country | Regulatory body | Can you make a health claim? | Is there a list of pre-approved health claims? | Can you apply to have a new health claim approved for use? | Requirements for health claims on imported foods | Regulatory document(s) |
|---------------------------|---|---|--|---|---|---|
| Australia and New Zealand | Food Standards Australia New Zealand (FSANZ) develops the Food Standards Code which is enforced by the Australian states and territories and New Zealand agencies | Regulated health claims are permitted. | <ul style="list-style-type: none"> • ~200 nutrient function claims; and • 13 reduction of disease risk claims listed in Standard 1.2.7 | New reduction of disease claims are subject to approval by FSANZ. Details of this process can be found in the FSANZ Act 1991. For new nutrient function claims, there is an option to self-substantiate by conducting a systematic review with a focus on human (intervention) studies. Guidance for self-substantiation can be found on the FSANZ website. | All foods imported into Australia and NZ must comply with labelling and composition standards in the Food Standards Code. | Standard 1.2.7 Nutrition, Health and Related Claims which should be used in conjunction with other relevant standards of the Food Standards Code. |
| Canada | Health Canada develops standards and policies which are enforced by the Canadian Food Inspection Agency (CFIA) | Health claims are permitted. Claims about diseases or health conditions listed in Schedule A are permitted only when listed in the Food and Drug Regulations. Claims about other diseases or health outcomes are covered by a general law that requires claims to be truthful and not misleading. | <ul style="list-style-type: none"> • Three function claims • ~65 nutrient function claims • Four pre-approved non-strain specific health claims that can be made on probiotics. • 11 eligible bacterial species • Five disease risk reduction claims in the Food and Drug Regulations • Seven disease risk reduction claims have been accepted and are available on the Health Canada website. | Premarket approval by Health Canada is required for new claims about the diseases or health conditions listed in Schedule A of the Food and Drugs Act. Manufacturers who wish to seek approval for such claims should contact the Food Directorate of Health Canada before submitting a health claim application using Health Canada's Guidance Documents for Preparing Health Claim Submissions. Claims about the diseases or health outcomes not in Schedule A are subject to the same general law as function claims, which requires claims to be truthful and not misleading. See Guidance Documents for Preparing Health Claim Submissions for more details. | All foods packaged for consumer use and imported into Canada must comply with the food labelling requirements. | Food and Drugs Act Food and Drug Regulations |

| Country | Regulatory body | Can you make a health claim? | Is there a list of pre-approved health claims? | Can you apply to have a new health claim approved for use? | Requirements for health claims on imported foods | Regulatory document(s) |
|----------------|--|--|--|--|---|---|
| China | State Food and Drug Administration (SFDA) | Regulated health claims are permitted. | <ul style="list-style-type: none"> ~65 nutrient function claims listed in the Standard for Nutrition Labelling of Pre-packaged Foods. ~27 health functions that have been approved for use for health foods. | All health (functional) foods (i.e. foods with health claims) must be reviewed and approved by the SFDA. Applications for the registration of a health food are product specific. A full list of the requirements for an application to register a health food is listed in the Provisions for Health Food Registration. | For an imported health food, the food must have been produced and marketed outside of China for more than one year. | National Food Safety Standard: Standard for Nutrition Labelling of Pre-packaged Foods and the Provisions for Health Food Registration (Trial) |
| European Union | European Food Safety Authority (EFSA) and the European Commission (EC) in conjunction with the Member States | Regulated health claims are permitted. | <ul style="list-style-type: none"> More than 200 authorised health claims (include both nutrient function and reduction of disease risk claims) | Proposals for health claims are submitted to a National Competent Authority of the Member States who then make the application available to EFSA. Guidance can be found here . | Imported foods can use the list of pre-approved health claims but will have to make an application for the scientific evaluation and authorisation of any new health claim. | REGULATION (EC) No 1924/2006 on Nutrition and Health Claims Made on Foods |
| Hong Kong | Centre for Food Safety (CFS) | Regulated nutrient function claims are permitted. There are no regulations for reduction of disease risk claims, but these are not prohibited. | <ul style="list-style-type: none"> 26 nutrient function claims that are listed as examples. | Nutrient function claims are allowed as long as they meet certain requirements. New claims do not appear to be subject to approval by the CFS. | The Centre for Food Safety encourages food importers to avoid using health claims. | Food and Drugs (Composition and Labelling) (Amendment Requirements for Nutritional Labelling and Nutrition Claim) Regulation 2008 |

Summary of requirements for making health claims on foods by country/jurisdiction

| Country | Regulatory body | Can you make a health claim? | Is there a list of pre-approved health claims? | Can you apply to have a new health claim approved for use? | Requirements for health claims on imported foods | Regulatory document(s) |
|-----------|--|--|---|---|---|--|
| India | Food Safety and Standards Authority of India (FSSAI) | Regulated nutrition function claims are permitted. | <ul style="list-style-type: none"> • ~ 9 nutrient function claims have been approved for use. • 6 Reduction of disease risk claims are also permitted. | An application of the nutrient function claims and other function claims are submitted to the FSSAI for approval. | All food products imported into India shall comply with the labelling requirements as specified in the regulations. | Food Safety and Standards (Advertising and Claims) Regulations, 2018 Food Safety and Standards (Functional Food and Novel Food) |
| Indonesia | National Agency of Drug and Food Control | Regulated health claims are permitted. | <ul style="list-style-type: none"> • ~11 nutrient function claims • ~11 reduction of disease risk claims • in the 'Control of Claims on Processed Food Labels and Advertising' | An application for approval of a new nutrient function or a reduction of disease risk claim must be made to the Head of the National Agency of Drug and Food Control. | All food products imported into Indonesia must comply with the labelling requirements. | 'Control of Claims on Processed Food Labels and Advertising' |

| Country | Regulatory body | Can you make a health claim? | Is there a list of pre-approved health claims? | Can you apply to have a new health claim approved for use? | Requirements for health claims on imported foods | Regulatory document(s) |
|-------------|---|--|--|---|--|---|
| Japan | Ministry of Health Labour and Welfare (MHLW) and the Consumer Affairs Agency (CAA) | Regulated health claims are permitted. | <ul style="list-style-type: none"> ~17 nutrient function claims listed on the MHLW website (English). Foods for Specified Health Use (FOSHU) claims are product specific. 8 FOSHU Health claims have been approved. | FOSHU claims are product specific. The safety of the food and effectiveness of the functions for health must be assessed, and the claim approved by the MHLW and CAA. More information about FOSHU can be found on the MHLW website. In a recent review of the Food Labelling Act a new system will be established to allow health claims on fresh and processed foods if the food meets certain requirements. Health claims will be allowed without government approval if industry holds a certain amount of scientific evidence on the safety and effectiveness of the food. | Given there is a specific regulatory system set up for FOSHU and food with functional claims, all claims made on imported food products must comply. The scientific requirements are very similar to those required for self-substantiated general level health claims in New Zealand. | Food Labelling Standard and Foods for Specific Health Use (FOSHU) regulations' Foods for Functional Claims (FFU) regulations' |
| Malaysia | Food Safety and Quality Division, Malaysian Ministry of Health (MoH) | Regulated nutrient function claims are permitted. Reduction of disease risk claims are prohibited. | <ul style="list-style-type: none"> ~50 nutrient function claims listed in the 'Guide to Nutrition Labelling and Claims' 29 other function claims for bioactive ingredients have been approved | The process for applying to the MoH for approval of a new nutrient function claim is outlined in Appendix 6 of the ' Key Message 14 of the Malaysian Dietary Guidelines '. The application must contain sound scientific evidence for the claim based on data from human intervention trials. | All food products imported into Malaysia must comply with the labelling regulations. | Malaysia's Food Act 1983 and Food Regulations 1985 are found here . |
| Philippines | Philippines Food and Drug Administration (FDA) which is part of the Department of Health. | Regulated health claims are permitted. | <ul style="list-style-type: none"> There is no list of pre-approved health claims. | In the Philippines, all food products must be registered with the FDA. Nutrition and health claims will be evaluated by the FDA's Product Services Division based on compliance with the Codex Guidelines. | All food products imported into the Philippines must be registered with the FDA. | The Philippines has adopted Codex Alimentarius 'Guidelines for Use of Nutrition and Health Claims' (CAC/GL 23-1997). |

| Country | Regulatory body | Can you make a health claim? | Is there a list of pre-approved health claims? | Can you apply to have a new health claim approved for use? | Requirements for health claims on imported foods | Regulatory document(s) |
|-------------|--|--|--|---|--|--|
| Singapore | Agri-Food and Veterinary Authority (AVA) and Health Promotion Board (HPB) of Singapore | Regulated health claims are permitted. | <ul style="list-style-type: none"> ~121 nutrient function claims 7 nutrient function claims (infant formula and food, and food for children) 17 other function claims 6 reduction of disease risk claims | New nutrient-function claims (not reduction of disease risk claims) are subject to approval by the AVA. Details on the application can be found on the AVA website. To use the reduction of disease risk claims, first the food must have the 'Healthier Choice Symbol' which is subject to approval by the HPB. Food manufacturers then apply to the AVA to use the claim. | All imported foods must be registered with the Director-General of the AVA. The Food Regulations require all pre-packed food products for sale in Singapore to be labelled according to the requirements specified. | 'Food Regulations' Health claims are listed in 'A Guide to Food Labelling and Advertisements' . |
| South Korea | Ministry of Food and Drug Safety | Regulated health claims are permitted. | <ul style="list-style-type: none"> List of over 100 pre-approved nutrient function and reduction of disease risk claims | New nutrient function claims are subject to approval for use as a product specific health official food or a new ingredient. | All imported foods must comply with the requirements of the Ministry of Food and Drug Safety guidelines. | 'Health Functional Foods Act' and 'Health Functional Food Code' |
| Switzerland | Federal Food Safety and Veterinary Office FSVO | Regulated health claims are permitted. | <ul style="list-style-type: none"> List of over 200 pre-approved nutrient function and reduction of disease risk claims | New nutrient function and reduction of disease risk claims not on the list of pre-approved claims are subject to approval by the FSVO. Information on this process including the application form can be found here . | All imported foods must comply with the provisions in the Ordinance on Information on Foodstuffs (FoodIO) | The Ordinance on Information on Foodstuffs (FoodIO) . |
| Taiwan | Taiwan Food and Drug Administration (FDA), Ministry of Health and Welfare | Regulated health claims are permitted. | <ul style="list-style-type: none"> ~70 nutrient function claims ~20 broad claims/slogans that are permissible 13 health effects (some are reduction of disease risk) that have been approved for use on health food products. | All health food products must be approved by the FDA; once they have been approved and registered, they receive a green TFDA 'Health Food' mark which is valid for five years. | Health claims that are not reduction of disease risk claims (nutrient function claims) can be made on foods as long as they are truthful and not misleading. If a nutrient function claim has been approved in another country, it is likely to be allowed. For a new reduction of disease risk claims an application would have to be made to the FDA for scientific evaluation and approval. | Health Food Control Act of Taiwan (Mandarin); Schedule of Vitamin or Mineral Statements (Mandarin) , an (unofficial) English version is available in Appendix 1. |
| Thailand | Thailand Food and Drug Administration (FDA) | Regulated health claims are permitted | <ul style="list-style-type: none"> <u>29 pre-approved nutrient function claims</u> | Domestic producers and importers of food can make an application to the Thai FDA (part of the Ministry of Health) to have a new nutrient function or a reduction of disease risk claim approved. In the Thai Nutrition Labelling document, it states that nutrient function claims must be based upon reliable scientific evidence. | All imported foods must apply to the Thai FDA for approval of health claims. | The (unofficial) Notification of the Ministry of Public Health (No. 182) B.E. 2541 (1998) |

| Country | Regulatory body | Can you make a health claim? | Is there a list of pre-approved health claims? | Can you apply to have a new health claim approved for use? | Requirements for health claims on imported foods | Regulatory document(s) |
|---------|---|--|---|---|--|---|
| UK | UK Nutrition and Health Claims Committee (UKNHCC) | Regulated Health Claims are permitted. | <ul style="list-style-type: none"> More than 200 authorised health claims (include both nutrient function and reduction of disease risk claims) | From 1 January 2021, proposals for health claims are submitted to UKNHCC who complete the assessment. Guidance can be found here . | Imported foods can use the list of pre- approved health claims but will have to make an application for the scientific evaluation and authorisation of any new health claim. | REGULATION (EC) No 1924/2006 on Nutrition and Health Claims Made on Foods |
| USA | Food and Drug Administration (FDA) | Regulated health claims (reduction of disease risk) are permitted. Nutrient-function claims are permitted but are not regulated. | <ul style="list-style-type: none"> There are no 'pre-approved' nutrient function claims but they must be truthful and not misleading and are not pre-reviewed or authorised by the FDA 12 authorised reduction of disease risk claims in the Federal Regulations for Food and Drugs | New reduction of disease risk claims are subject to approval if the food business can submit a petition to the FDA in which the evidence for the effect of the nutrient on the disease must meet a high standard of 'significant scientific agreement' (SSA). Details for making a petition for health claims can be found on under 'Petitions for health claims' of the Federal Regulations for Food and Drugs. The FDA has some guidance for the scientific evaluation of health claims on their website. If a health claim is reviewed under the SSA standard but does not meet the level for significant scientific agreement, the FDA can consider the health claim as a qualified health claim. | Health claims that are not reduction of disease risk claims (nutrient function claims) can be made on foods as long as they are truthful and not misleading. If a nutrient function claim has been approved in another country, it is likely to be allowed. For a new reduction of disease risk claims an application would have to be made to the FDA for scientific evaluation and approval. | Nutritional Labelling and Education Act (NLEA) Requirements (8/94 – 2/95) |
| Vietnam | Vietnam Ministry of Health | There are regulations for functional foodstuffs that contains information on making nutrient function claims. | No | An application for a functional foodstuff should be submitted to the Ministry of Health (Department of Food Safety) and include evidence of the effectiveness on human health. The clinical trials (if conducted outside of Vietnam) must be conducted at accredited medical institutions or be published in scientific journals. The functional foodstuff must also comply with the appropriate Vietnamese Food Safety Provisions. | N/A | Circular No.08/2004/TT-BYT 'Guiding the management of functional foodstuff products' (current Circular No. 43/2014 'Rules of management for functional foods' which is effective 15 May 2015 (Vietnamese) |

Outline

- ❑ Definition of Functional food
- ❑ Summary of requirements for making health claims on foods by country
- ❑ Functional foods and Dietetic Practice Point.
- ❑ Integration of Functional Food to Dietetic Practice
- ❑ Future Food

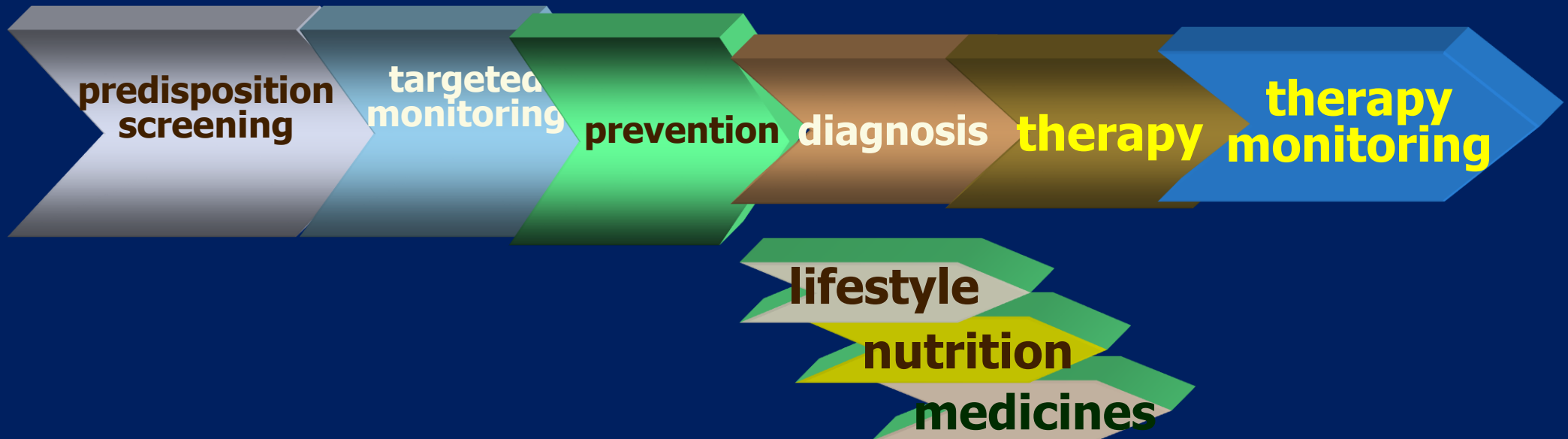


Integrated Healthcare Concepts

*from
Yesterday*



...to today



Functional Foods

- **Dietetic Practice Point:** Functional foods may be defined in various ways but have common themes:
 - Being part of the usual diet
 - Being in a food form and containing a bioactive or ingredient that is linked to a health benefit.
 - Potential for functional foods to contribute toward improved health





Foods with health claims
Foods with added nutrients
Natural and organic foods
Natural foods
Organic foods
Unrefined foods

Probiotic foods
Herbal teas



Dietetic foods
Foods for pregnant women
Foods for infants and children
Foods for diabetics
Gluten-free foods
Lactose-free foods

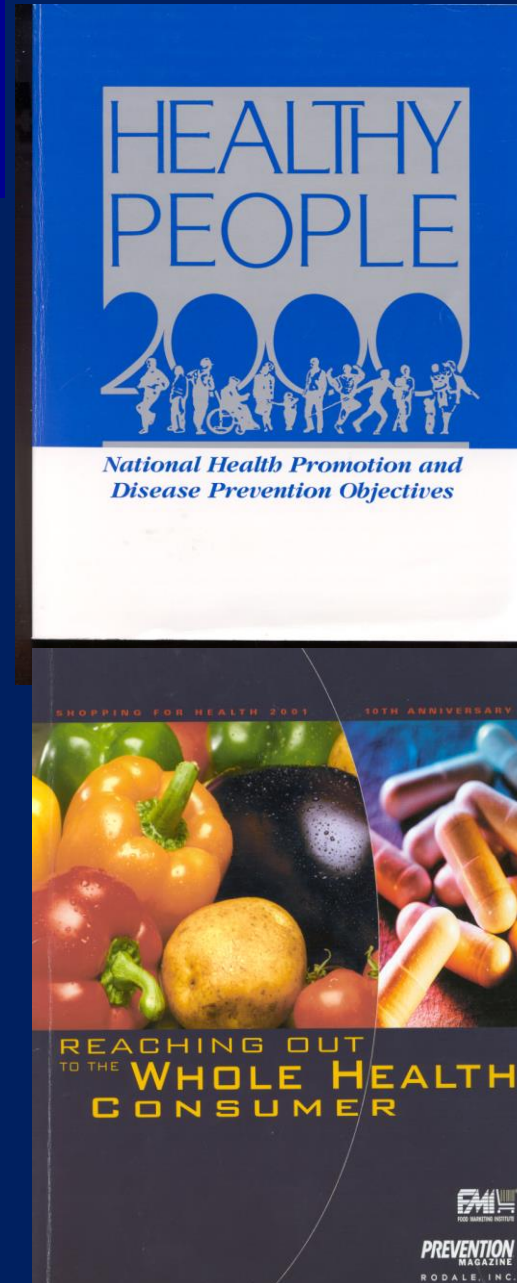


Foods for Special
medical purposes
Dietary supplements
Herbal remedies
OTC pharmaceuticals



Dietary advice and nutritional care should contribute to positive outcomes

- Prevent disease
- Improve clinical outcomes such as
 - reduced mortality,
 - reduced hospital readmission
 - reduces infections
- Reduce healthcare use and costs

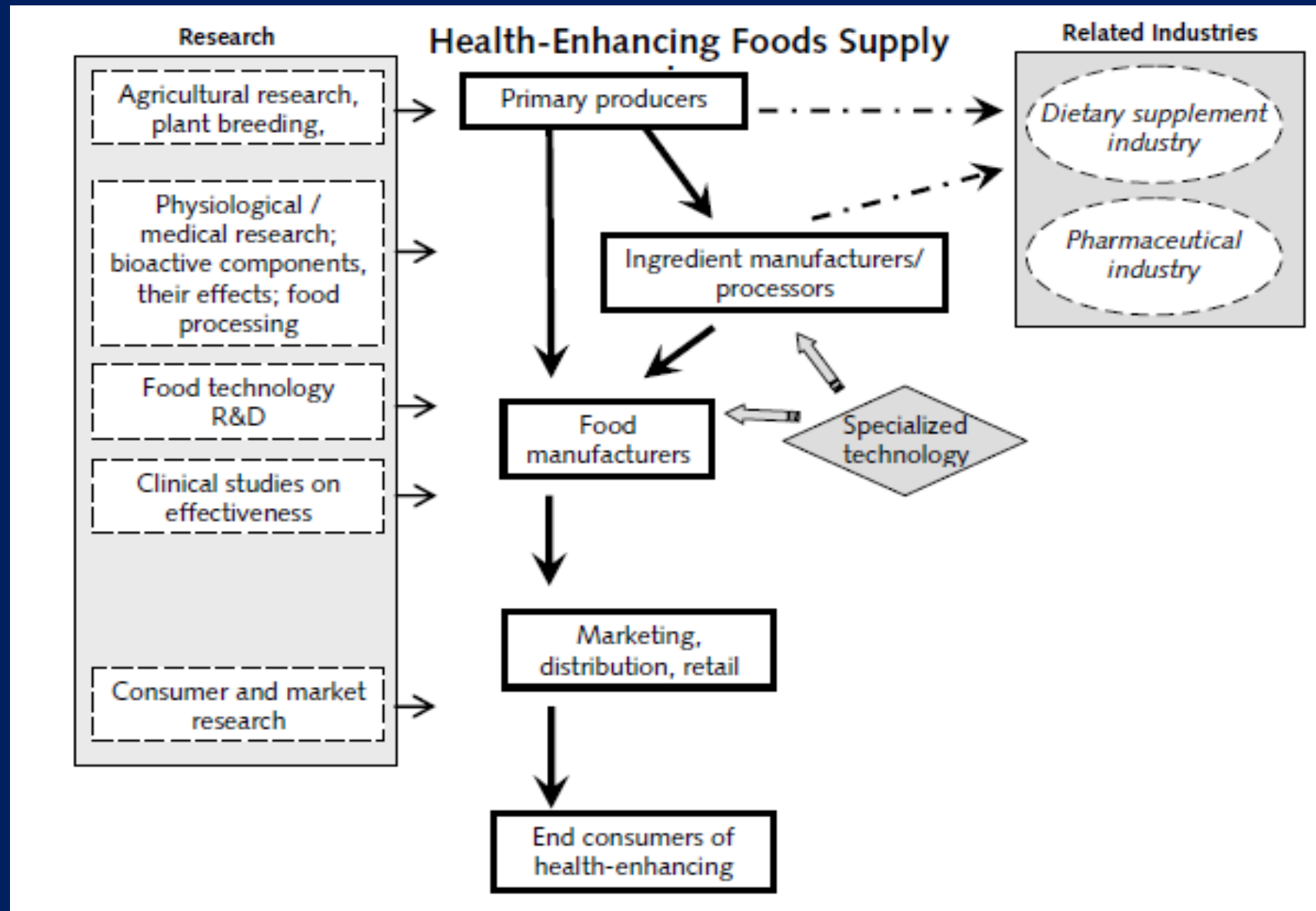


Outline

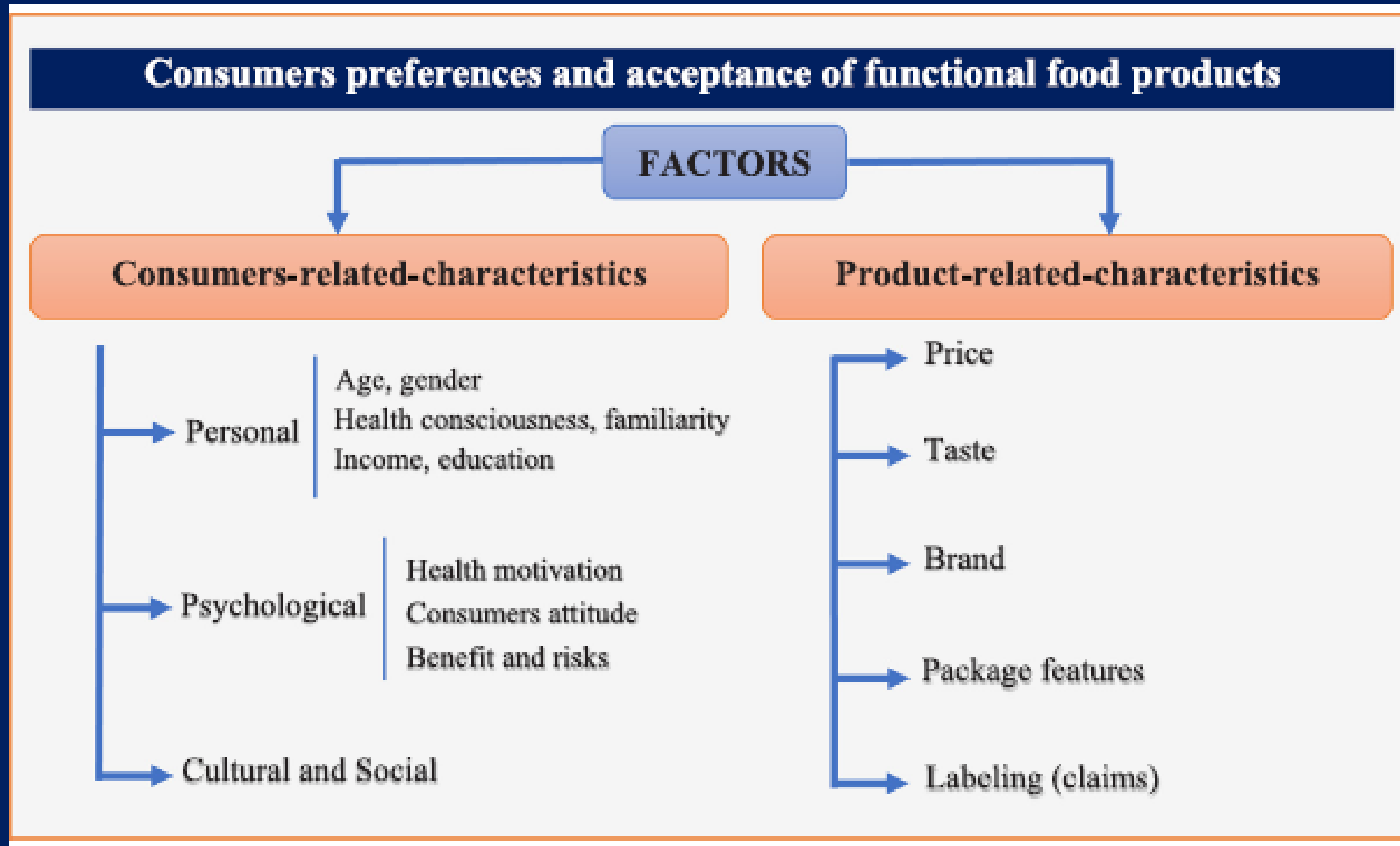
- ❑ Definition of Functional food
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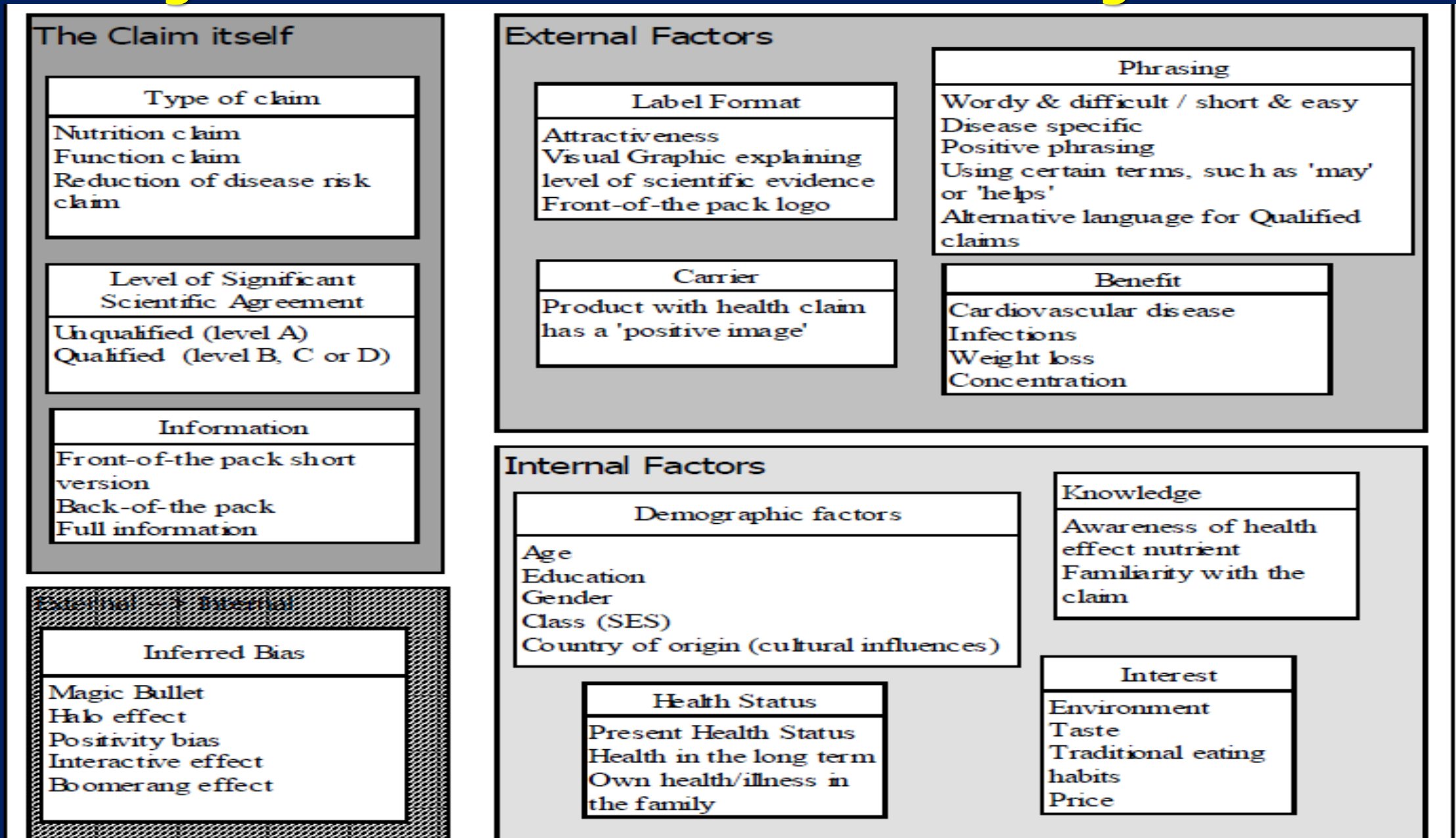
Integral areas of research in Functional Foods



General classification of factors affecting consumers preferences and functional products acceptance



Influencing factors on consumer understanding of health claims



Integrative and Functional Medicine

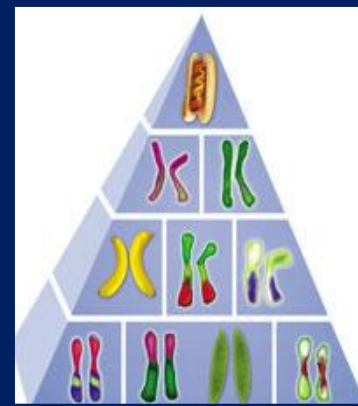
Integrative Medicine Principles²⁰

- Partnership between patient and practitioner
- Appropriate use of conventional and complementary treatments
- Consideration of genetic, environmental, and lifestyle factors
- Recognition that good medicine is based in good science
- Use of natural, effective, less invasive interventions when possible

Functional Medicine Principles²¹

- Focus on patient-/client-centered approach
- Acknowledges biochemical uniqueness of individuals
- Seeks balance between mind, body, and spirit
- Acknowledges that all body systems are interconnected and influenced by physiological and/or metabolic factors
- Identifies health as positive vitality

Integrative and Functional Nutrition in Health Care



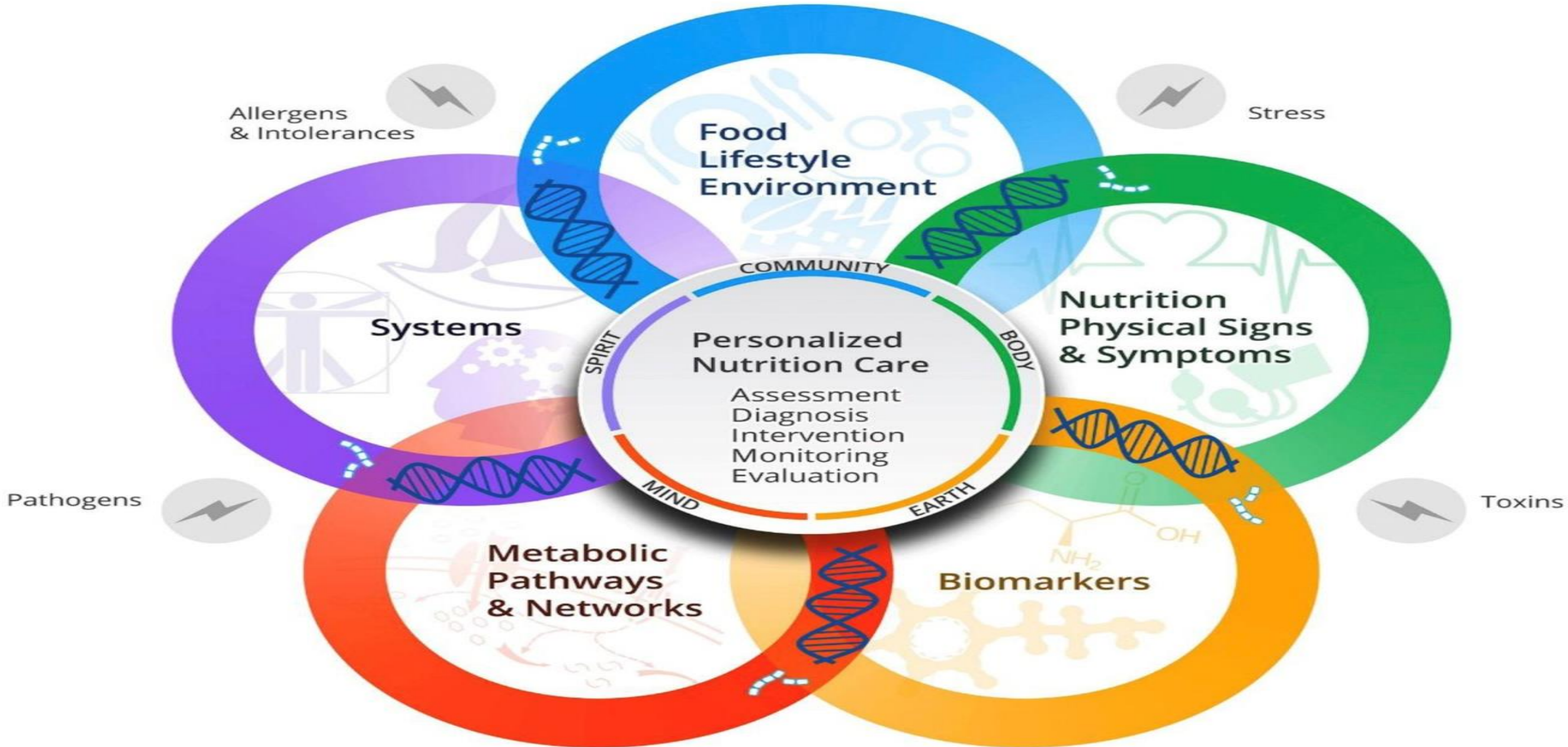
Integrative approach:

- Person-centered, prevention- and wellness-oriented
- Identifies and addresses the root cause of disease
- Integrates conventional and functional medicine interventions

Functional Nutrition approach:

- Each client is an individual with a:
 - Unique genetic makeup
 - Unique biochemistry and metabolic pattern
 - Unique environment and lifestyle
- Interactions among the individual's unique biology, environmental exposures (positive and negative), and lifestyle (Diet ,Emotion and Activities) are important to prevent, explain, and treat disease

The Radial: Integrative and Functional Medical Nutrition Therapy



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Suggested performance criteria for functional dietetics

Existing elements of entry-level competency

1.3 Demonstrates a thorough knowledge of **food science** as it relates to nutrition and dietetics

2.2 Translates **technical nutrition information** into practical advice on food and eating

3.2 Provides quantitative and qualitative **assessment of food intake data**

4.2 Prepares **plans for achieving management goals**

New elements

- ❑ Is familiar with **new research on functional food ingredients**
- ❑ Quantifies likely benefits of the use of functional foods by individuals and populations. **Develops education material explaining the appropriate role and use of functional foods**
- ❑ Evaluates the **risks of functional foods use by individuals** from non-target populations
- ❑ **Incorporates** specific functional food prescriptions into dietary advice where appropriate

Suggested performance criteria for functional dietetics

Existing elements of entry-level competency

5.2 Develops plans for dealing with **nutrition issues in the community**

6.1 Acts as an advisor and advocates on behalf of individuals, groups and the profession to **positively influence** the wider political, social and commercial environment, about factors which affect eating behaviour and nutritional standards

7.3 Applies **research and evaluation findings** to practice

New elements

- ❑ Considers and **evaluates the use of functional foods and health claims in developing public health nutrition strategies**
- ❑ Comments and advises on proposed **changes to food regulations**. Advocates for **equitable access to safe and effective functional foods** as well as maintenance of a choice of affordable, high **quality whole produce with traditional nutritional qualities**
- ❑ **Assesses own and others' practice effectiveness in relation to use of functional foods**

EX: Functional food components and their potential benefits

| Bioactive component | Source | Potential benefit |
|---|---------------------------|---|
| Proanthocyanide | Cranberries | Improve urinary tract health |
| Allyl methyl trisulphide, Dithiolthiones | Cruciferous vegetables | Lowers LDL cholesterol, maintains healthy immune system |
| Collagen hydrolysate | Gelatine | May relieve symptoms of osteoarthritis |

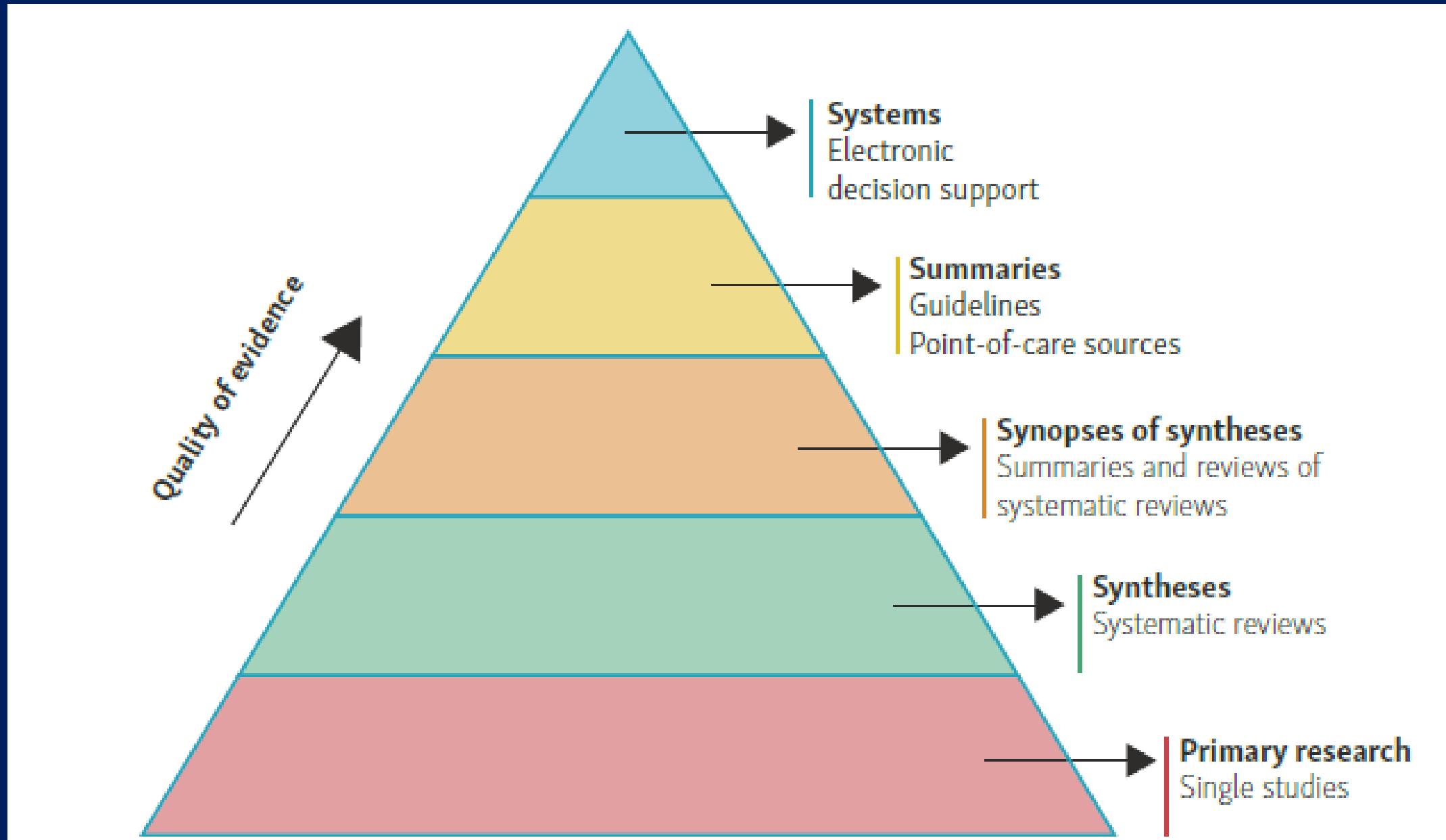
Bioactive as they Relate to Functional Foods

- It is important to consider that consumer acceptance of functional foods may vary depending on the type of bioactive, and that the efficacy of bioactive may be dependent on the food form.
- **Dietetic Practice Point:** Bioactive can be described as the component of the functional food that is specifically linked to the proposed health benefits.

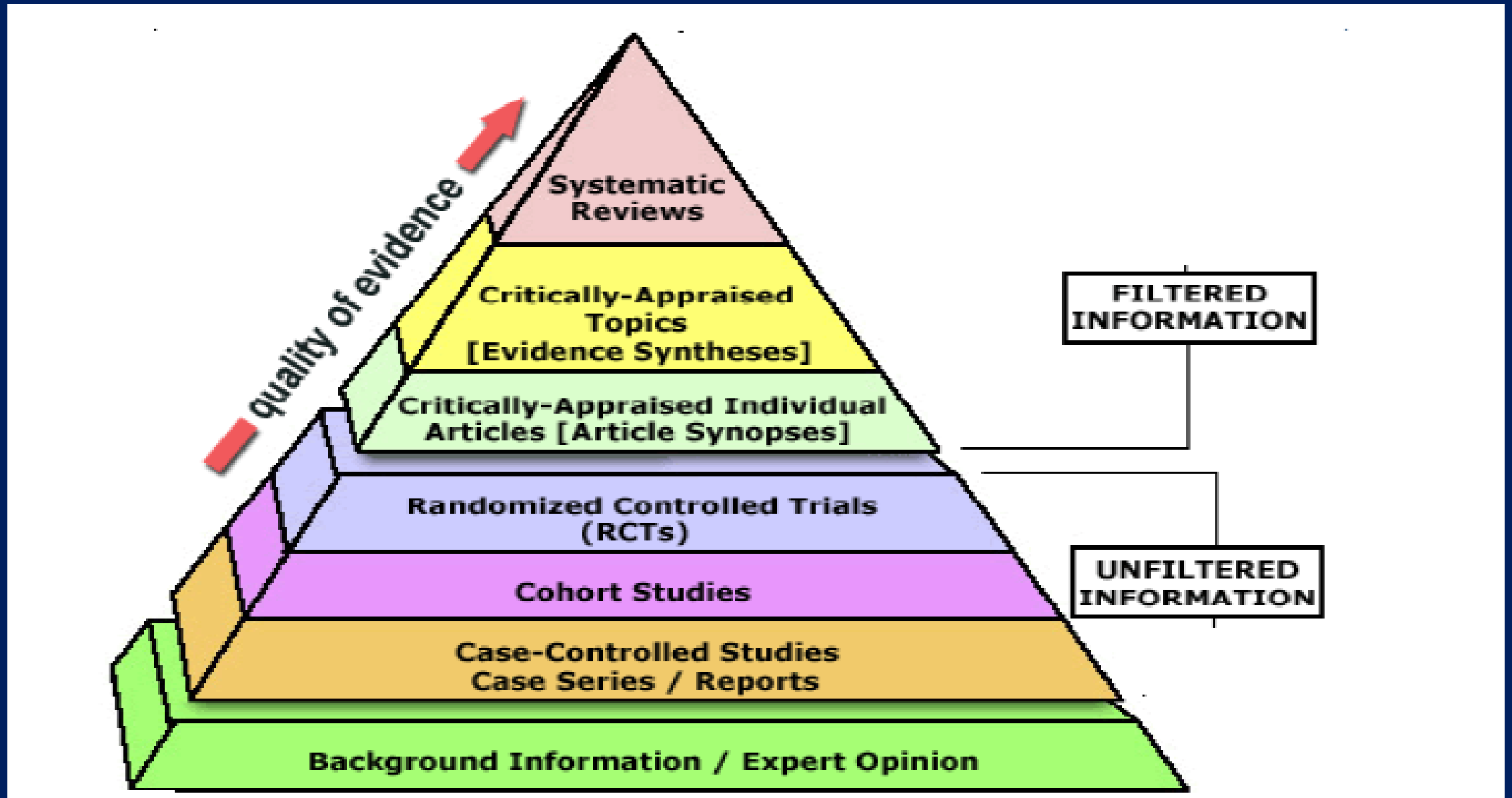
Evidence from research

- **Mechanistic studies –how does it work?**
- **Human experimental studies –can it be observed in human systems?**
- **Epidemiological evidence –are the relationships out there?**
- **Clinical trials –can the knowledge be applied?**
- **Feasibility studies –is the application realistic?**

The Haynes pyramid or the pyramid of evidence-based information resources



The Pyramid of Evidence-Based Clinical Practice Resources



| Design | Strengths | Limitations | Uses |
|-------------------------------------|--|---|--|
| Cohort studies | <ul style="list-style-type: none"> - Can study many endpoints - Examine temporal relationship (risk) | <ul style="list-style-type: none"> - Time consuming, expensive, difficult, resource intensive - Requires large sample size - Susceptible to the influence of confounding factors | <ul style="list-style-type: none"> - For examining associations and generating hypothesis |
| Case-control studies | <ul style="list-style-type: none"> - quick, easy, good for rare diseases, inexpensive | <ul style="list-style-type: none"> - Recall bias, survivor bias, limited to one endpoint, susceptible to the influence of confounding factors | <ul style="list-style-type: none"> - For examining associations and generating hypothesis |
| Randomized Controlled Trials | <ul style="list-style-type: none"> - Gold standard for evaluating treatment intervention - Extensive control, not susceptible to confounding factors | <ul style="list-style-type: none"> - Time consuming, expensive, limited in generalizability | <ul style="list-style-type: none"> - For examining causation and testing hypothesis |

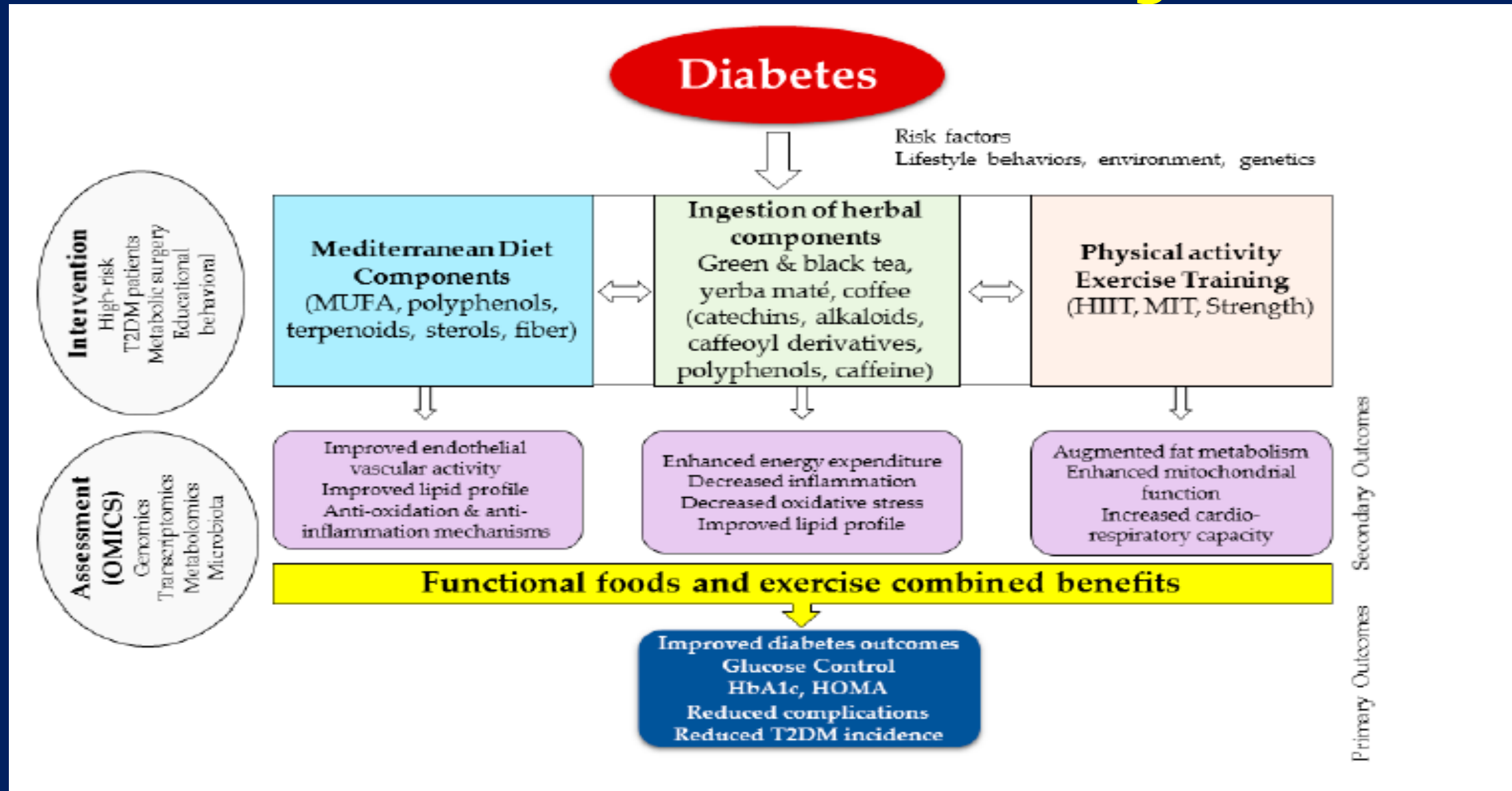
Health and point target in Human trails of orally administered probiotics

Table 1 Health and points targeted in human trials of orally administered probiotics

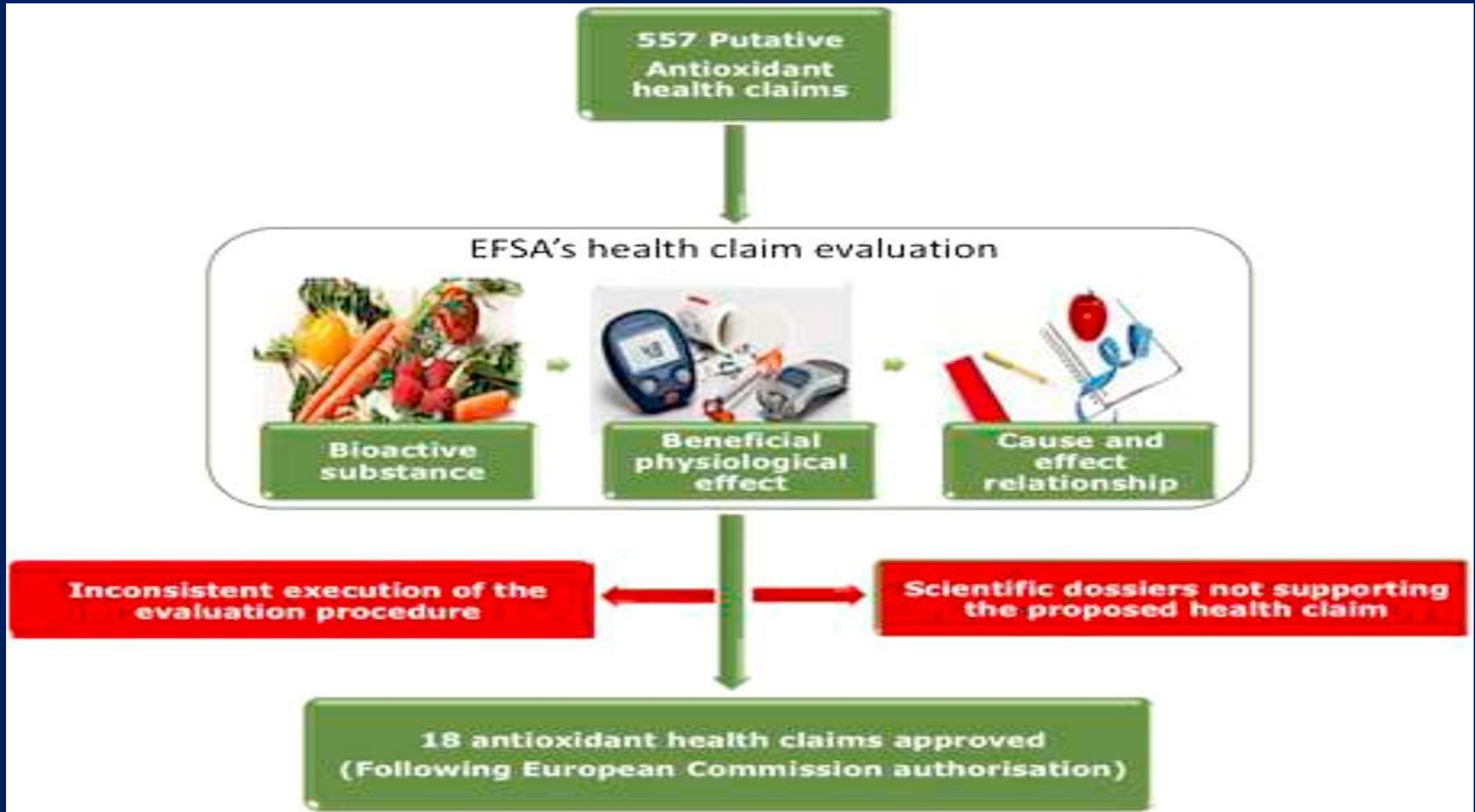
| Health end point | Prebiotic used |
|--|------------------------|
| Metabolic health: overweight and obesity; type 2 diabetes mellitus; metabolic syndrome and dyslipidaemia; inflammation | Inulin, GOS, FOS |
| Satiety | FOS |
| Stimulation of neurochemical-producing bacteria in the gut | GOS |
| Improved absorption of calcium and other minerals, bone health | Inulin, FOS |
| Skin health, improved water retention and reduced erythema | GOS |
| Allergy | FOS, GOS |
| IBD | Inulin, lactulose |
| Urogenital health | GOS |
| Bowel habit and general gut health in infants | GOS, FOS, |
| Infections and vaccine response | FOS, GOS, polydextrose |
| Necrotizing enterocolitis in preterm infants | GOS, FOS |
| IBS | GOS |
| Traveller's diarrhoea | GOS |
| Constipation | Inulin |
| Immune function in elderly individuals | GOS |

FOS, fructooligosaccharides; GOS, galactooligosaccharides.

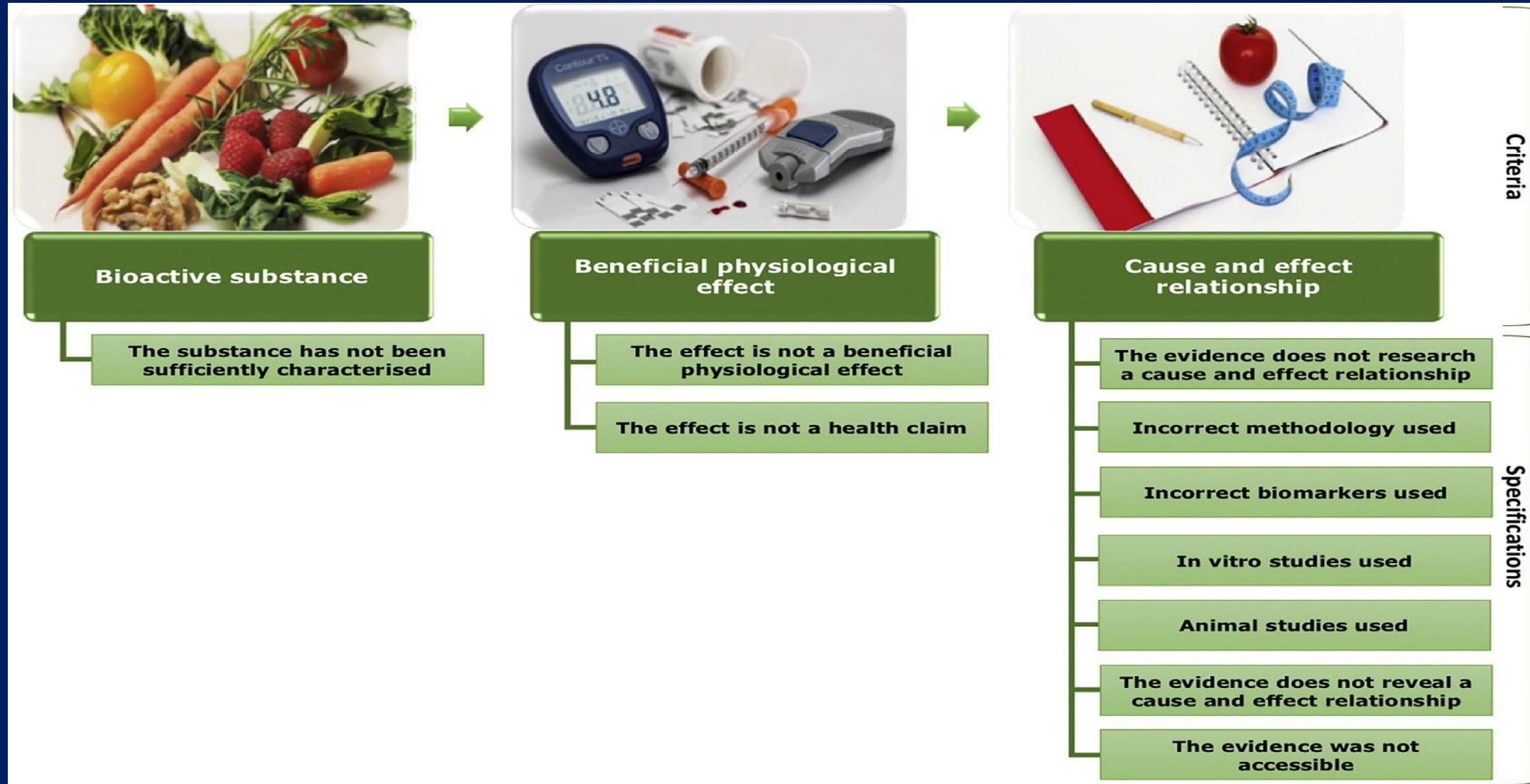
EX: Integration Model of Functional Food in Diabetes Prevention and Management



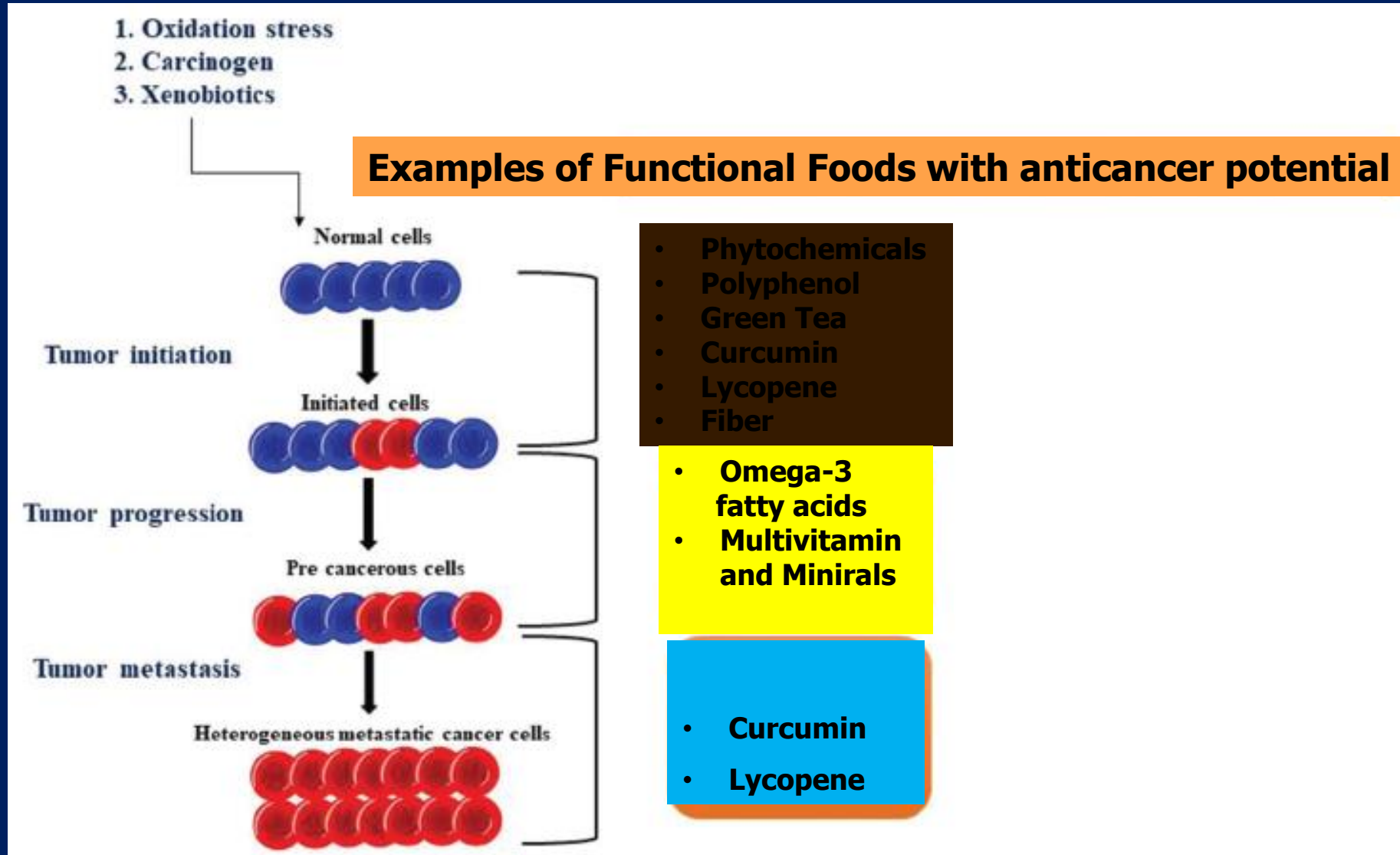
The European Food Safety Authority's evaluation



Evaluation process with specifications for rejection per criterion



The stages of tumor progression and where different functional food acts for the management



Multifocal Angiostatic Therapy

curcmin, artemsia, mistletoe, ginger, scutellaria, resveratrol, grapeseed extract, green tea, ginkgo, squalamine, Vit D, silymarin, glycine,

ginger, artemsia, mistletoe, curcumin, scutellaria

curcmin, scutellaria, cartilage, silymarin, green tea

VEGFR
EGCG, silymarin, quercetin, resveratrol, soy isoflavones, curcumin, EPA
Cu antagonists

Growth Factors
NFkB
COX-2

VEGF, AKs, bFGF, IL8, MMPs, TNF-1, heparinases, collagenases

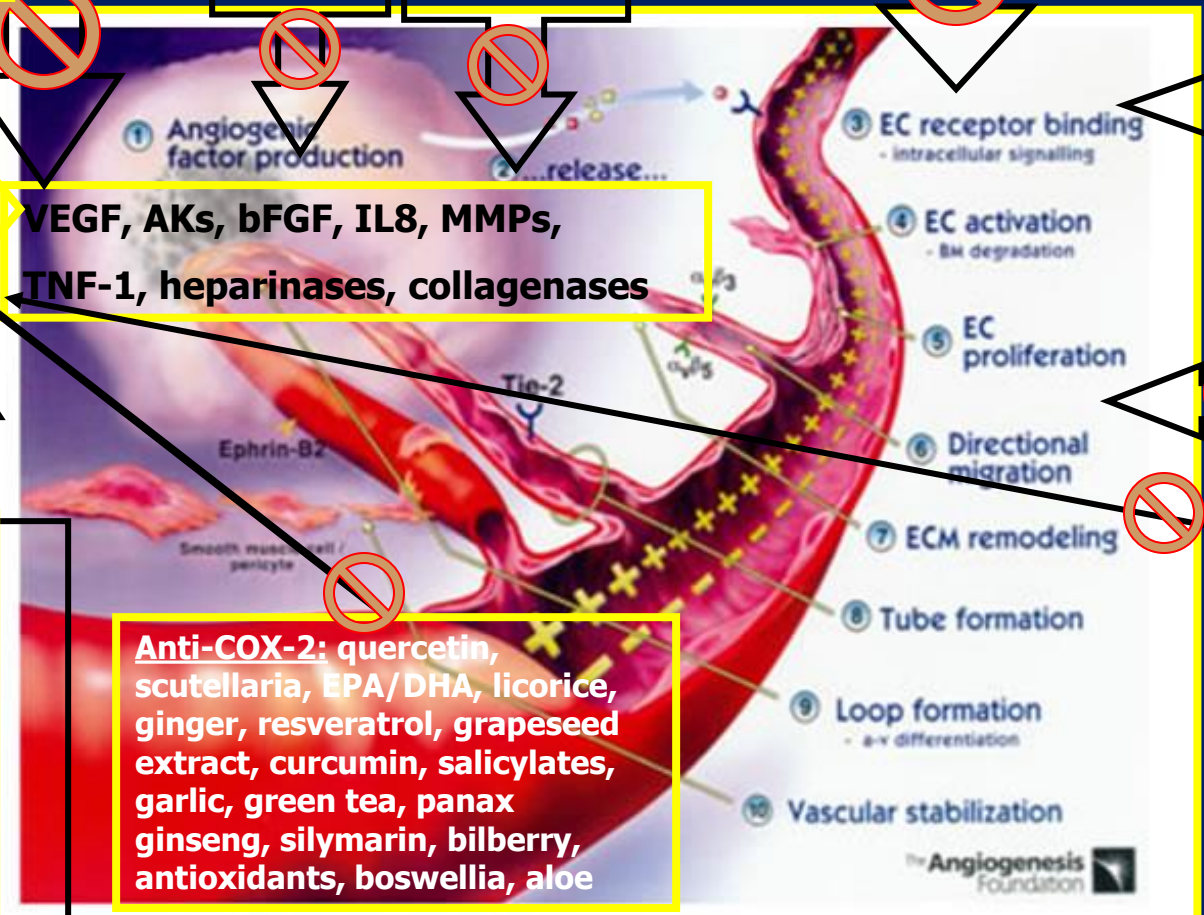
bFGFR and TNF-1:
Cu antagonists

Silymarin, Glycine, Ginger

Anti GFs:
green tea, quercetin, magnolia, resveratrol, soy, curcumin, holy basil, rosemary, ganoderma, licorice, Vit E

Anti-COX-2: quercetin, scutellaria, EPA/DHA, licorice, ginger, resveratrol, grapeseed extract, curcumin, salicylates, garlic, green tea, panax ginseng, silymarin, bilberry, antioxidants, boswellia, aloe

Anti- NFkB: poria, coriolus, ginger, resveratrol, green tea, artemsia, quercetin, carnosol, panax ginseng, silymarin, salicylates, curcumin, picentannol, basil, Cu antagonists, rosemary



พืชตระกูลหัว: Cell Detox Activity :GST(Glutathione S-Transferase)



- **Meta-analysis examines the epidemiological evidence to characterize the association between cruciferous vegetable intake and risk of developing colorectal neoplasms**

Inverse association between total cruciferous vegetable intake and risk of developing colorectal neoplasm

- **In most of the epidemiological studies the effect of cruciferous vegetables was not completely separated from the effect of total vegetable consumption**

Tse G, Eslick G Cruciferous Vegetables and Risk of Colorectal Neoplasms:

A Systematic Review and Meta-Analysis Nutrition and Cancer, 2014; 66(1), 128–139 DOI: 10.1080/01635581.2014.852686

The Crucifers: Glucosinol

G l u c o s i n o l a t e s



Isothiocyanate (ITC)



**detoxification of
carcinogens**



**inhibition of
carcinogen-activating
enzymes**



**inhibition of
angiogenesis**



**induction
of
apoptosis**

Crucifers and Breast Cancer: Nurses Health Study (NHS/ NHS II)

N= 182,145 in the Nurses' Health Study/ NHSII 1980–2013; 10,911 invasive breast cancer cases

Greater intake of total fruits and vegetables, especially cruciferous and yellow/orange vegetables, was associated with significantly lower breast cancer

Lower risk especially associated with estrogen receptor negative tumors with **2 additional servings/day**

In conclusion, higher intake of fruits and vegetables, and specifically cruciferous and yellow/orange vegetables, may reduce the risk of breast cancer, especially those that are more likely to be aggressive tumors.

ตัวอย่างอาหารฟังก์ชันกับมะเร็งเต้านม

Cabbage

Cabbage (containing Glucaric Acid, and many other Bioactives) . Biochemical pathway PI3K-AKT-MTOR Signaling(PI3K-AKT Signaling) is one of the drivers of cancer growth for ER PR Positive HER2 Negative Breast Carcinoma with treatment Tamoxifen. Glucaric Acid reduces PI3K-AKT-MTOR Signaling (PI3K-AKT Signaling).

Cauliflower

Cauliflower (containing Brassinin, Vitamin C and many other Bioactives) . Biochemical pathway Epithelial to Mesenchymal Transition is one of the drivers of cancer growth for ER PR Positive HER2 Negative Breast Carcinoma with treatment Tamoxifen. Brassinin reduces Epithelial to Mesenchymal Transition.

Broccoli

Broccoli (containing Indole-3-carbinol, Brassinin and many other Bioactives) . Biochemical pathway Estrogen Signaling is one of the drivers of cancer growth for ER PR Positive HER2 Negative Breast Carcinoma with treatment Tamoxifen. Indole-3-carbinol reduces Estrogen Signaling.

| Nutrient | Mechanism | Clinical Comment |
|------------------------------|--|---|
| Omega-3s (EPA/DHA) | Cell membrane fluidity benefits neurotransmission, enhances neurogenesis | Major depressive disorder (MDD) and bipolar depression: <u>1–2 g daily (more may be needed)</u>, mainly EPA-dominant formulations, esp. in deficient states, CVD, comorbid inflammatory conditions |
| N-acetyl cysteine | Antioxidant, anti-inflammatory, replenishes glutathione, enhances neurogenesis, modulates glutamate pathway, mitochondrial protectant | Bipolar depression, obsessive compulsive disorder, <u>addiction: 1–1.5 g twice daily (bid)</u>; may take >8 weeks for response |
| S-adenosyl methionine | Methyl donor influences metabolism and synthesis of neurotransmitters, increases phosphatidylcholine conversion | MDD: 200–800 mg bid; caution in bipolar patients due to increased switching potential; may interact with serotonergic antidepressants; expensive |

| Nutrient | Mechanism | Clinical Comment |
|---|---|---|
| L-tryptophan/ 5Hydroxytryptophan (5-HTP) | Required for conversion into serotonin in presence of vitaminB6 and magnesium via intermediary step to active form of 5-HTP | MDD: 100–200 mg 5-HTP bid (or before sleep); may be used with antidepressants; caution with higher doses; monitor for serotonin syndrome |
| Creatine | Role in brain energy homeostasis; modifies high-energy phosphate metabolism of the brain, which may be impaired in depression | MDD: <u>5 g/day</u> ; potential for activating; caution with bipolar disorder |
| St. John's Wort | Extracted from <i>Hypericum perforatum</i> ; multiple proposed mechanisms with several known biologically active components that influence hypothalamic–pituitary–adrenal axis, gene expression, and inhibit reuptake of multiple monoamine neurotransmitters | Mild MDD: 600–1,200 mg bid or three times per day; caution with bipolar disorder and schizophrenia; induces cytochrome P450 3A4; caution with drug interactions |

Science of Wellness Components

| Bioactive Component | Health Benefit | Strength of Science | Recommended Amount | Regulatory Status |
|--------------------------------|----------------------------------|---------------------|---------------------|-------------------|
| Plant sterol and stanol esters | Reduce total and LDL cholesterol | Very strong | 1.3 g/d for sterols | Health claim |
| | | | 1.8 g/d for stanols | |
| Soluble fiber | Reduce total and LDL cholesterol | Very strong | 1 g/d | Health claim |
| Protein | Reduce total and LDL cholesterol | Very strong | 25 g/d | Health claim |
| beta-glucan | Reduce total and LDL cholesterol | Very strong | 3 g/d | Health claim |
| Proantho= cyanidins | Reduce urinary tract infections | Moderate | 300 mL/d | Conventional food |

| Bioactive Component | Health Benefit | Strength Of Science | Recommended Amount | Regulatory Status |
|-------------------------------|--|------------------------------|---|--|
| n-3 fatty acids | Reduce TG, reduce heart disease cardiac deaths and fatal and nonfatal myocardial infarction | Strong to very strong | Two fatty fish meals per week; 0.5–1.8 g EPA + DHA | Qualified health claim for dietary supplement |
| n-3 fatty acids | Reduce cholesterol | Weak to moderate | Unknown | Conventional food |
| Organosulfur compounds | Reduce total and LDL cholesterol | Weak to moderate | 600–900 mg/d (dietary supplement) or approximately 1 fresh clove/d | Conventional food and dietary supplement |

| Bioactive Component | Health Benefit | Strength of Science | Recommended Amount | Regulatory Status |
|--|--|----------------------------|-----------------------------|--------------------------|
| Prebiotics/ Fructooligo- -saccharides | Blood Pressure control; Serum Cholesterol reduction | Weak | 3–10 g/d | Conventional food |
| Catechins | Reduce risk of certain types of cancer | Moderate | 4–6 cups Green Tea/d | Conventional food |

| Bioactive Component | Health Benefit | Strength of Science | Recommended Amount | Regulatory Status |
|----------------------------|--|----------------------------|---------------------------|--|
| Polyphenols | Reduced risk of coronary heart disease | Weak/ Moderate | | |
| Lutein/zeaxanthin | Reduce risk of age-related macular degeneration | Weak to moderate | 6 mg/d as lutein | Conventional food, dietary supplement |
| Lycopene | Reduce prostate cancer risk | Moderate | Unknown | Conventional food |

Source ADA white paper on functional foods/American Council of Health

| Bio Active Component | Health Benefit | Strength of Science | Recommended Amount | Regulatory Status |
|--|--|-------------------------|----------------------|--------------------------|
| CLA | Reduce Breast cancer | Weak | Unknown | Conventional food |
| Glucosinolates, indoles | Reduce risk of certain types of cancer | Weak to moderate | >1/2 cup/d | Conventional food |
| Dipeptides Anserine Carnosine | -Anti-fatigue -Promoting metabolic -Promoting postpartum lactate -anti glycemia | Moderate | Unknown | Conventional food |

Reliable sources

Reliable sources for evaluating dietary supplements and possible benefits and concerns are available at:

- Natural Medicines Comprehensive Database: Available at <http://naturaldatabase.therapeuticresearch.com/home>
- National Institutes of Health: Available at <http://www.nlm.nih.gov/medlineplus/dietarysupplements>
- Memorial Sloan-Kettering Cancer Center: About Herbs, Botanicals, and Other Products available at <http://www.mskcc.org/cancer-care/integrative-medicine/about-herbs-botanicals-other-products>

Front View

What is Dietitian looking at the products

General Health Claim: Heart shaped orange.

Dietetic Practice Points:

- Broad claims that provide dietary guidance. Includes implied health claims, which are open to interpretation by the reader.
- In this case, the heart shaped orange implies that the juice is potentially beneficial for heart health.
- Health Canada does not encourage using heart symbols unless the product has an associated Disease Risk Reduction Claim, which does appear on Side View 1 for this juice product.



Nutrient Content Claim: "120 calories/250 mL."

Dietetic Practice Points:

- Directly, or indirectly, describes the level of a nutrient in a food or a group of foods.
- A serving size of this juice is equal to 250 mL.

Food-Related Claim: "100% Orange Juice from concentrate with added plant sterols."

Dietetic Practice Points:

- Claims about the ingredient(s) (composition, quality, quantity) or origin of the food product.
- Health Canada requires these claims to be truthful and not misleading.

Therapeutic Claim: "Plant sterols help lower cholesterol" and "250 mL of Heart Wise provides 50% of the daily amount of plant sterols shown to help lower cholesterol in adults."

Dietetic Practice Points:

- Claims about the treatment or mitigation of a health-related disease or condition, or restoration, correction or modification of body function.
- Health Canada regulations specify the criteria a food must meet before a Therapeutic Claim can be made. The wording of the claim cannot be modified.
- Health Canada requires the second statement to appear on the packaging in addition to the claim "Plant sterols help lower cholesterol".

Top View

Nutrient Content Claim: “Per 250 mL Source of: Vitamin C, Folic Acid, Potassium, Magnesium, Thiamine, 2 Fruit Servings.”

Dietetic Practice Points:

- Directly, or indirectly, describes the level of a nutrient in a food or a group of foods.
- A product must meet specific nutrient compositional requirements put forth by Health Canada in order to use the claim “Source of Vitamin C, Folic Acid, Potassium, Magnesium, Thiamine, 2 Fruit Servings” (must contain at least 5% of the DV for vitamin C, folic acid, potassium, magnesium and thiamine).



Food-Related Claims: “No Added Preservatives” and “No Sugar Added.”

Dietetic Practice Points:

- Claims about the ingredient(s) (composition, quality, quantity) or origin of the food product.
- Health Canada requires these claims to be truthful and not misleading.

Dietetic Practice

- 1. Does it work?** Health claims that mention a specific disease on the food label must be supported by scientific research and approved
- 2. How much does it contain?** The optimal levels of components in functional foods.
- 3. Is it safe?**
- 4. Is it healthy?**



Post-Covid Global Food Trends 2021



1

Health

Consumers will be more conscious of their health, tailoring diets and lifestyles to meet their personal needs.



2

Convenience & technology

Online capacity has increased as a result of COVID-19 and direct-to-consumer agrifood services will continue to rise in popularity across Europe.



3

Alternative proteins

Plant-based foods and alternative proteins keep gaining grounds among consumers preferences, increasing opportunities for existing and new businesses.



4

Sustainability & reducing waste

The term 'waste' is being replaced with 'side-streams', ensuring all excess food enters into the circular economy. Other trends include buying locally and increased focus on sustainable, intelligent packaging.



5

New flavours & experiences

Consumers will seek foreign flavours and experiences in 2021 after a year of reduced travel and restrictions.

Future Food Trends 2021-22

NEW EMERGING NEED

ระยะเวลาการพัฒนาต้นแบบ 6 เดือน - 2 ปี

ระยะเวลาการพัฒนาต้นแบบ 5 - 10 ปี

RISING STAR

ADVANCE HUMANITY



Future Food in Thailand

- ❑ อาหารอินทรีย์ (Organic Food)
- ❑ อาหารฟังก์ชัน (Functional Food)
- ❑ อาหารทางการแพทย์ (Medical Food)
- ❑ อาหารจากนวัตกรรมใหม่ (Novel Food)

Alternative protein

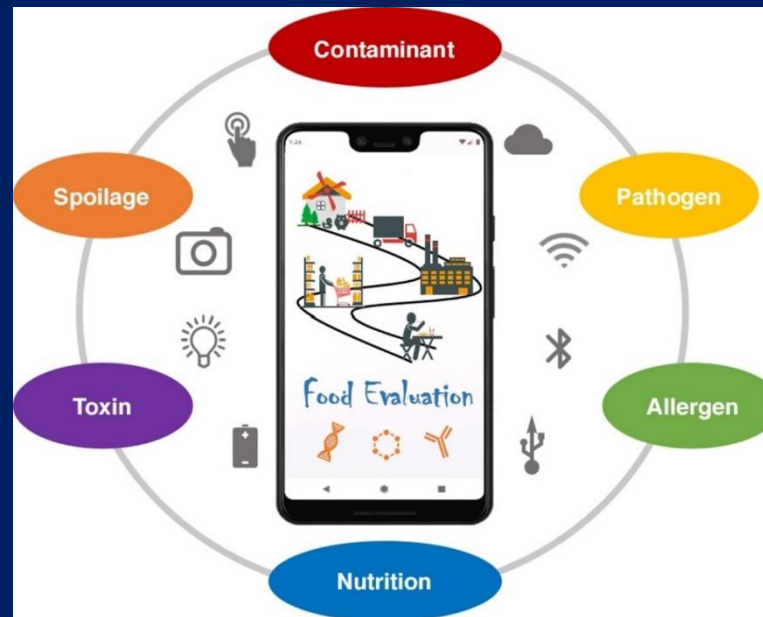
- โปรตีนจากพืช
- โปรตีนจากสาหร่าย
- โปรตีนจากแมลง
- โปรตีนจากจุลินทรีย์

FOOD INNOVATION

3D Meat Printer



Smartphone-based biosensors for portable food evaluation



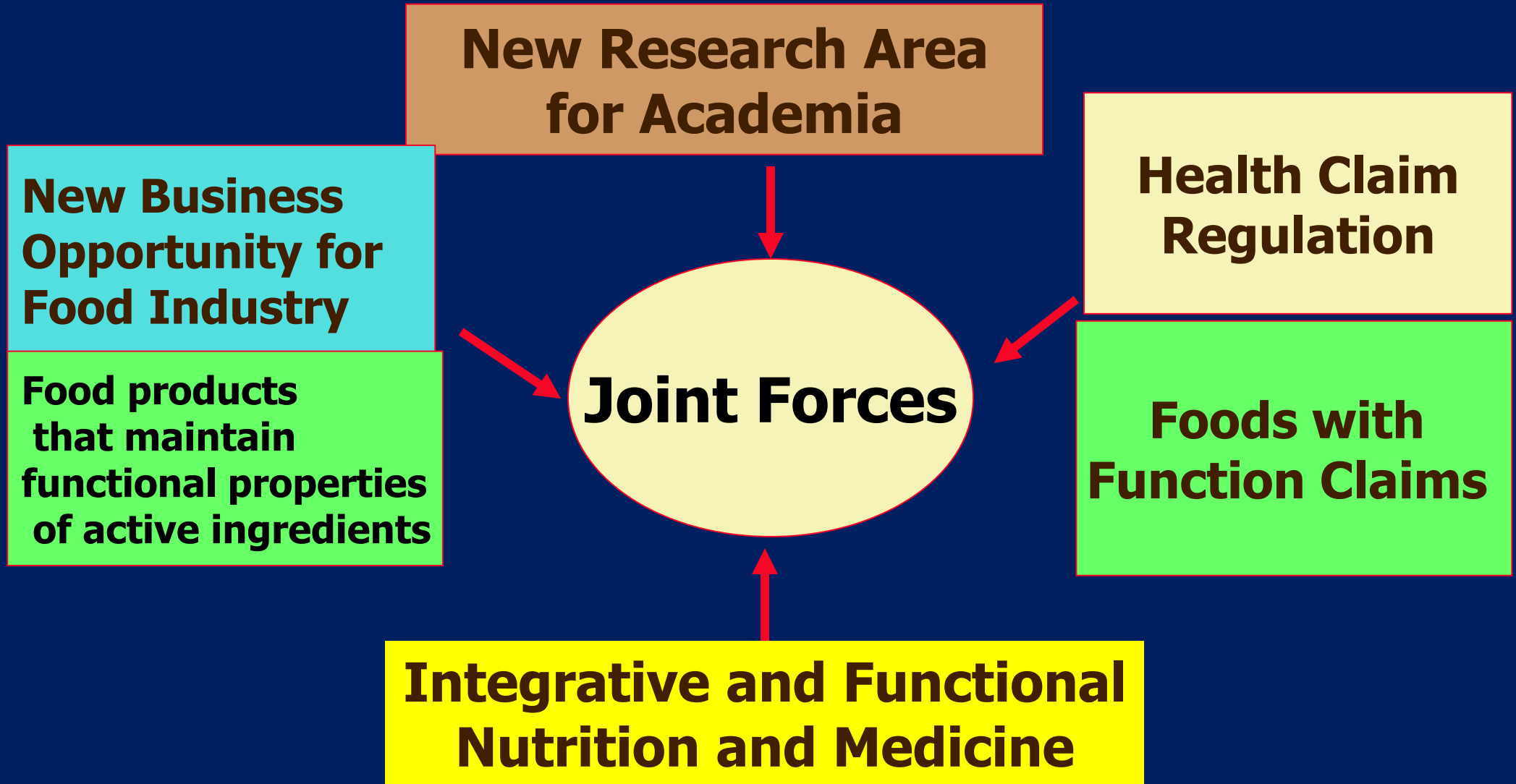
Edible packaging



Robotic food preparation



What we Need?



ขอบคุณค่ะ

