



Review on the Impact of Nutraceuticals on Health Care

Naveen Bhil^{1*}, Himani Tiwari³, Md. Zulphakar Ali² and Kaushal Kishor Chandrul⁴

1, Student of B. Pharm. 4th Year; 2, HOD; 3, Assistant Professor; 4, Principal

Department of Pharmacy, Mewar University, Gangrar Chittorgarh, (R.J.) - India

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Abstract

Nutraceuticals are important meals factors that have each nutritional and healing homes. The inclusion of active substances consisting of carotenoids, collagen hydrolysate and dietary fibres contributes to the health blessings of those foods. Nutraceuticals had been located to have an excellent effect on cardiovascular and immune system fitness, as well as play a position within the prevention of contamination and most cancers. Nutraceuticals are divided into instructions based totally on their nature and mechanism of motion. Diverse nutraceutical classifications and their capacity therapeutic action in disease, such as anti-cancer, antioxidant, and anti-lipid activity, will be discussed in this review. moreover, the numerous mechanisms of action, makes use of, and protection of those merchandise on clients, as well as present day trends and destiny prospects of nutraceuticals, might be included.

Key words: Health, Nutraceuticals, Impact

Introduction

Hippocrates, some 2000 years ago, nicely said, "let meals be your medication, and remedy be your food." the popularity that "nutraceuticals" play a crucial function in health enhancement has sparked a surge in worldwide hobby.

Dr. Stephen De Felice, Chairman of the foundation for Innovation in remedy, created the phrase "Nutraceutical" in 1989 via merging the phrases "vitamins" and "Pharmaceutical". "Nutraceutical" is a advertising word for a nutritional supplement sold with the intention of treating or stopping disease, and it

has no regulatory definition. As a result, a "nutraceutical" is any substance that can be seemed a meals or a factor of a meals that has clinical or health benefits, which include illness prevention and remedy. isolated nutrients, dietary dietary supplements, and diets are examples of such objects, as are genetically altered "clothier" foods, natural products, and processed foods including cereals, soups, and drinks.

***Corresponding Author**

There are already over 470 nutraceutical and functional meals objects with installed fitness advantages on the market[1]. "because of their perceived safety and possible nutritional and healing blessings, nutraceuticals and purposeful meals have attracted numerous interest." The nutraceutical and purposeful food industries are in a terrific function to take gain of consumer interest in these products. whether or not it is a huge pharmaceutical business enterprise, a nutritional enterprise, a big food multinational, or a tiny vitamin-promoting agency, all are conscious of changing styles and the growing fitness-conscious patron fashion. As a result, there may be a proliferation of these cost-delivered goods focused at no longer most effective preserving one's fitness but additionally to the prevention and treatment of a spread of conditions starting from heart sickness to most cancers [2].

Nutraceuticals have been claimed to provide physiological advantages or offer safety against the sicknesses indexed under (and/or were located to behave as) :-

- Cardiovascular retailers
- Antiobese agents
- Antidiabetics
- Anticancer sellers
- Immune boosters
- chronic inflammatory issues
- Degenerative sicknesses
- Rheumatoid Arthritis
- cholesterol decreasing
- Blood strain
- Digestive troubles
- Osteoporosis



Normal dietary dietary supplements, together with diet B supplements, are offered in pill form. A dietary complement is A liquid or capsule-based answer that consists of nutrients derived from meals which have been Focused. "A nutritional complement is a product taken by way of mouth that carries a "nutritional detail" designed to reinforce the weight loss program," according to the nutritional complement health and schooling Act (DSHEA) of 1994 within the u.s.a.[3]. nutrients, minerals, herbs or different botanicals, amino acids, and substances which include enzymes, organ tissues, glandulars, and metabolites are examples of "nutritional ingredients" in these items. dietary dietary supplements are extracts or concentrates that are available a variety of bureaucracy, such as capsules, Capsules, softgels, gelcaps, drinks, and powders. The meals and Drug management (FDA) does

No longer want dietary supplements to be permitted earlier than being marketed, but

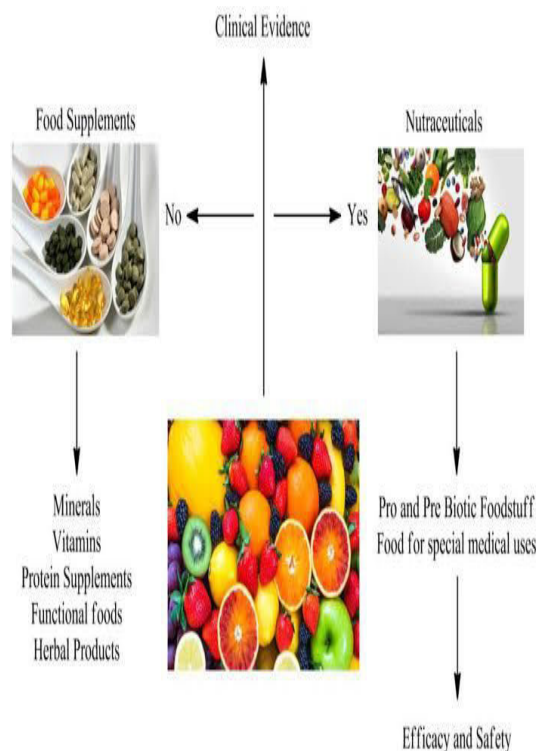
□ Selective boom component for useful micro organism.



companies need to register
Their manufacturing centers with the FDA.
Nutritional supplements may additionally best be marketed to assist the structure or characteristic of the body, and can
Now not claim to treat a disorder or condition, except for some nicely-defined exceptions. They Should also consist of a label that states: “these statements have now not been evaluated via the meals and
Drug administration. This product is not intended to diagnose, treat, cure, or save you any contamination.” It
Accomplishes this motive by making use of the efficacy of nutraceuticals in cleansing the body, preventing Vitamin and mineral shortages, and restoring appropriate digestive and consuming conduct [4].
They’re grouped on the basis of :-
Chemical Constituents
A) vitamins
B) Herbals
C) Phytochemicals
Phytochemicals essentially is plant nutrients with unique organic sports in supporting human supporting human
Fitness, they work by means of following manner-
□ Substrate for biochemical reactions.
□ Cofactors of enzymatic reactions.
□ enhance the absorption and/or balance of important nutrients.

□ Fermentation substrate for useful bacteria. □
Scavengers of reactive or toxic chemical compounds.
□ Ligands that be anxious or antagonize mobile surface or intracellular receptors.
Probiotic Microorganisms
They drive out pathogens like yeasts, different micro organism, and viruses that would otherwise purpose sickness
And shape a together useful symbiotic dating with the human gastrointestinal system. They
□ Selective inhibitors of deleterious intestinal bacteria have an antimicrobial impact by using altering the microflora, preventing pathogen adhesion to the
Intestinal epithelium, competing for nutrients required for pathogen survival, generating antitoxin,
And reversing a number of the outcomes of infection at the intestinal epithelium, including secretory adjustments
And neutrophil migration
Lactose intolerance can be cured by means of probiotics, which produce a specialized enzyme (β -Galactosidase) that hydrolyzes the offending lactose into its aspect sugars.
The subsequent factors should be considered whilst choosing probiotic benchmarks: safety, functionality,

And era, show a possible fitness advantage [5].
 Probiotics should come from human beings.



- Can survival after passage via acid and bile.
- Can adherence to the human intestinal cells and grow within the intestine.

Nutraceutical Enzymes

Enzymes are crucial components of existence; without them, our our bodies could prevent running. The ones suffering from Medical ailments including hypoglycemia, blood sugar imbalances, digestive problems, and obesity might

- Commanly gram effective organism.reduce their signs and symptoms with the aid of adding enzyme supplements to their diet. Those enzymes come from a selection

Of resources, which includes micro organism, flora, and animals.Prebiotics

Prebiotics are compounds that aren't digested by people and are a more latest addition to our Language. Rather, they function a food deliver for useful probiotic micro organism. This promotes the

Increase of probiotic bacteria in a beneficial surroundings, reducing the possibilities of risky

Microbes establishing a foothold in our digestive tract. Inulin is a prebiotic that has located its manner into

A diffusion of processed meals. It is a type of fibre that comes from the roots of flora along with chicory,

Jerusalem artichoke or even dandelions[6]Non-traditional nutraceuticals

Are synthetic ingredients organized with the help of biotechnology. Food samples contain bioactive Components which might be engineered to supply products for human- well being.

They are arranged into.

İ, Fortified nutraceuticals.

İ, Recombinant nutraceuticals.

Fortified nutraceuticals

They're enriched with nutrients, minerals, commonly at a selection as much as a hundred percentage of the nutritional

Reference consumption for that nutrient. It constitutes

Fortified meals from agricultural breeding or added nutrients and/or elements brought folic acid. Some

Examples are milk fortified with cholecalciferol used in diet D deficiency.

Recombinant nutraceuticals

Biotechnology is used to make power-giving foods along with bread, wine, fermented starch, yoghurt,

Cheese, vinegar, and others. Biotechnology lets in for the manufacture of probiotics and the extraction of

Bioactive components using enzyme/fermentation strategies, as well as genetic engineering

Business Nutraceuticals

Finding a new chemical is greater hard, high priced, and volatile than ever earlier than. Many pharmaceutical

Corporations are actually attempting to create nutraceuticals because of the considerable and swiftly developing

Market. Anti- arthritic, cold and cough, drowsing problems, digestion, and the prevention of some Malignancies, osteoporosis, blood pressure, ldl cholesterol management, ache relievers, melancholy, and

Diabetes are only some of the therapeutic areas protected via nutraceuticals. One of the maximum

Promising advances in human nutrition and ailment prevention studies inside the final 3 decades is

The popularity of fitness benefits from intake of omega-3 wealthy sea foods.

• useful food,

• nutritional dietary supplements,

• Medicinal meals,

• pharmaceuticals.

NUTRACEUTICALS AND illnesses :-

Cardiovascular diseases

The worldwide burden of continual illnesses such as coronary heart ailment, most cancers, diabetes, and obesity is quick rising.

High blood pressure (high blood stress), coronary coronary heart disease (heart assault), cerebrovascular disease

Classified as aerobic vascular sicknesses (CVD).

The general public of CVDs are preventive and conceivable. Low consumption of end result and vegetables has been

Connected to a higher mortality charge in cardiovascular sickness. A weight loss program wealthy in fruits and veggies has

Been related to a decrease danger of cardiovascular disorder in numerous studies.

Other than that, nutraceuticals consisting of antioxidants, nutritional fibres, omega-three polyunsaturated fatty

Acids (n-three PUFAs), nutrients, and minerals, as well as bodily activity, are indicated for the Prevention and remedy of CVD.

Polyphenols discovered in grapes and wine have been shown to influence mobile metabolism and Communication, that's constant with the reduction of vascular ailment.

Nutraceuticals for hypertension

Hypertension can be averted, delayed, reduced in severity, treated, and controlled thru most useful Weight loss plan, nutraceuticals, nutrients, antioxidants, minerals, weight reduction, workout, quitting smoking, limiting

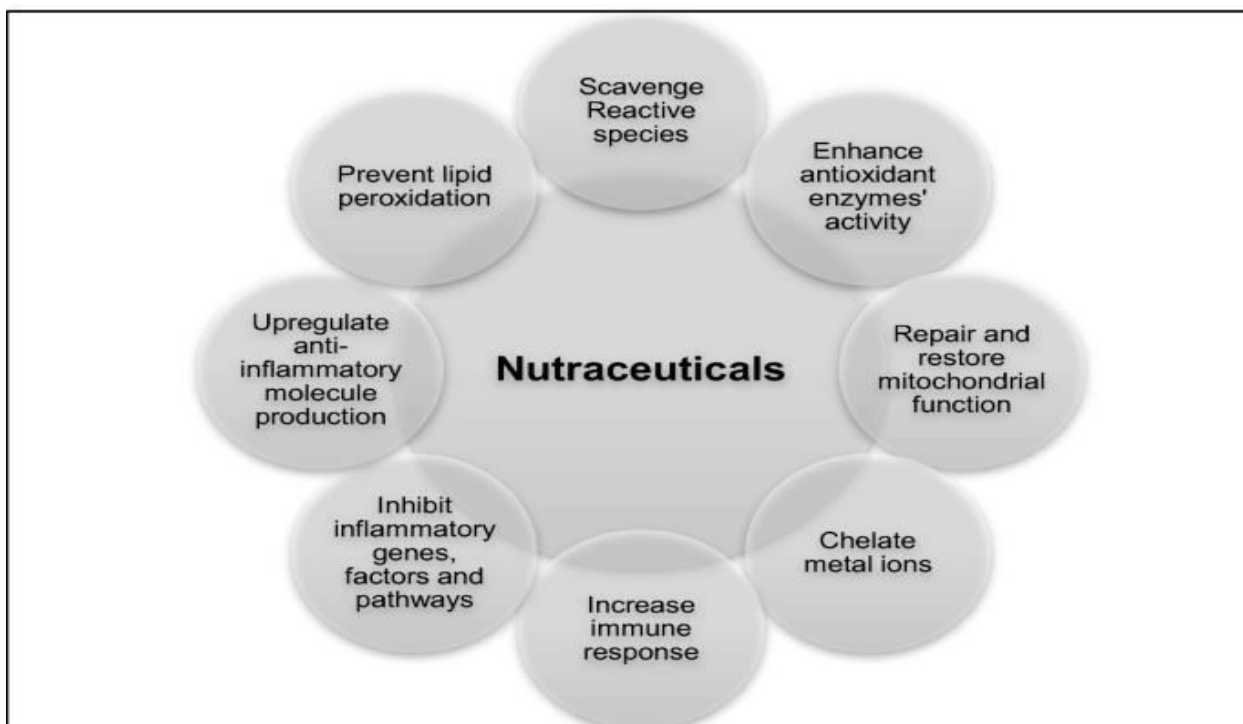
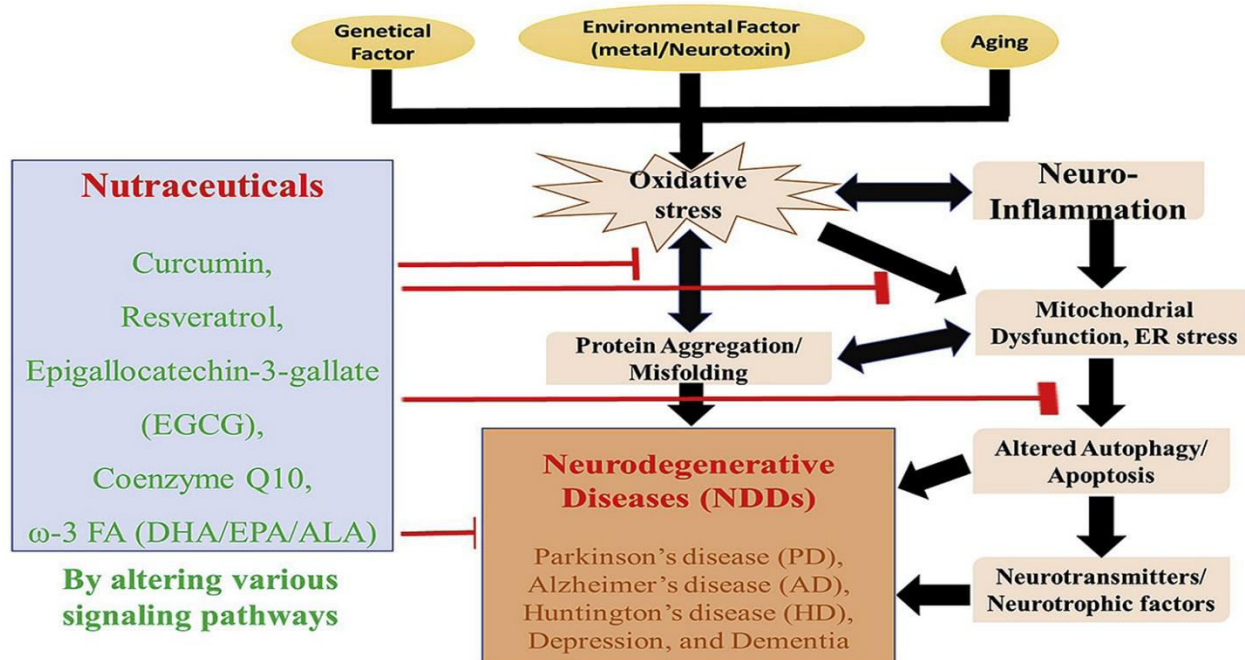
Alcohol and caffeine, and other lifestyle changes.

– Lipoic acid, magnesium, vitamin B6 (pyridoxine),



Diet C, N-acetyl cysteine, Hawthorne, Celery, - three fatty acids, and other vitamins and nutraceuticals
 Chance of high blood pressure is blended and

Beta carotene, vitamin A, and vitamin E supplementation may additionally increase mortality. The consequences of vitamin C And selenium on mortality have to be investigated

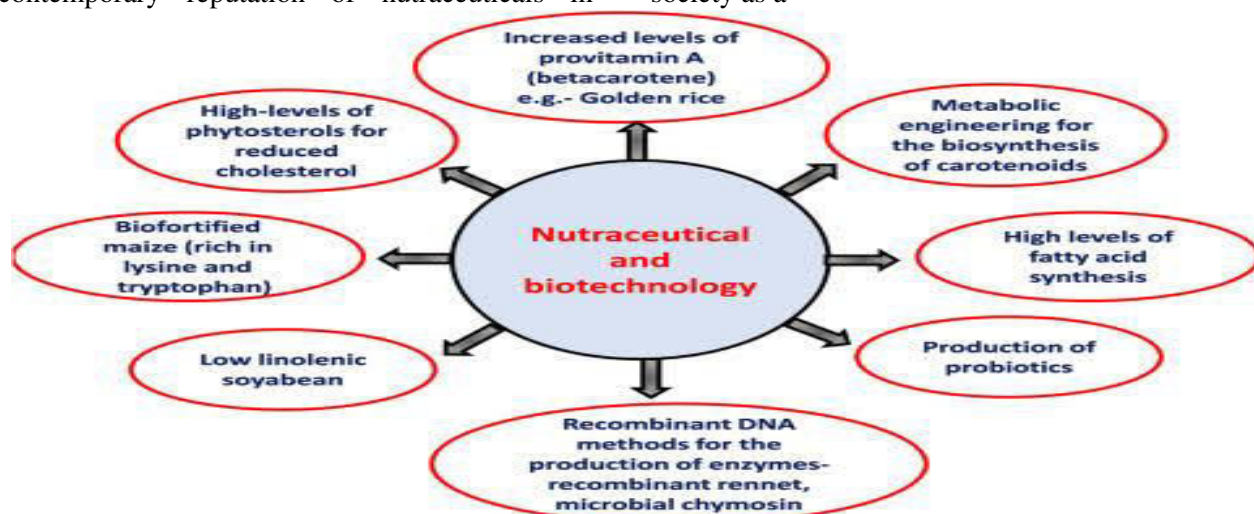


unclear and a hyperlink between calcium and the risk of pregnancy-induced high blood pressure and preeclampsia appears unlikely [9].

further. Nutraceuticals could be developed to lessen and Manage thrombosis danger in ladies who have thrombophilic gene mutations [10].

Obesity Weight problems is a 9aaf3f374c58e8c9dcdd1ebf10256fa5 danger issue for a variety of diseases, which include angina pectoris, congestive coronary heart Failure, high blood pressure, hyperlipidemia, breathing issues, renal vein thrombosis, osteoarthritis, most cancers, And impaired fertility. Obesity has end up a worldwide public fitness trouble, with an expected 315 million individuals falling into the who's obesity classifications. extended availability of high-fat, electricity-dense food is one of the key drivers of this rapid upward thrust in weight problems charges [11]. excessive intake of power-dense meals (snacks, processed ingredients, and beverages) can result in weight gain, as a consequence saturated and trans fat, as well as sweets and salt, must be limited inside the food plan. Caloric restriction and expanded physical hobby have best been observed to be marginally effective inside the treatment of weight problems. As a result, many health care humans are turning to medicinal drugs and nutraceuticals to assist them shed pounds. A tolerable and effective nutraceutical that can increase strength expenditure and/or decrease caloric intake is proper for body weight reduction. contemporary reputation of nutraceuticals in

In obese human beings, a dietary complement consisting of glucomannan, chitosan, fenugreek, G sylvestre, and nutrition C lowered body weight and increased fat discount. extra studies is wanted to decide longterm efficacy and capability aspect results. weight problems has a sizable incidence global, and vitamins and workout play a important role in its prevention and treatment. Nutraceutical treatments are presently being studied as prospectivetreatments for obesity and weight loss on a vast scale. Conjugated linoleic acid (CLA), capsaicin, MomordicaCharantia (MC), and Psyllium fibre are examples of nutraceuticals with putative antiobese properties [14]. Diabetes Diabetes mellitus is characterised by abnormally excessive blood glucose ranges, which can be because of insufficient insulin synthesis or inefficient insulin. type 1 diabetes (5 percent), which is an autoimmune contamination, and sort 2diabetes (ninety five percent), that's connected to obesity, are the 2 most frequent types of diabetes. Gestational diabetes is a type of diabetes that develops for the duration of being pregnant. Diabetes, like most continual fitness diseases, now not simplest has a sizable economic impact on society as a



obesity

complete, however it also has a widespread impact on character patients and their families.

current fame of nutraceuticals in Diabetes weight loss plan remedy is the cornerstone of gestational diabetes mellitus control. even though natural dietary dietary supplements that are thought to help kind 2 diabetes mellitus are widely used, just a few have been confirmed to do so in properly-designed randomised trials. Isoflavones are phytoestrogens which might be structurally and functionally same to human oestrogen And were ingested by humans everywhere in the world. Soy isoflavones were examined the maximum Out of all phytoestrogens. Excessive isoflavone intake (20â€“ 100mg/day) has been related to a lower hazard of Type 2 diabetes, heart disorder, osteoporosis, and some cancers [15].

Numerous nutrients within the food plan are essential for keeping a “top-quality” immune reaction, as well as The organism’s immunological popularity and susceptibility to a variety of diseases. Phyto-estrogens, a class of phytopharmaceuticals with purported hormonal hobby, are counseled for The prevention of a diffusion of disorders linked to a disrupted hormonal balance. In this regard, soy Isoflavones (genistein, daidzein, and biochanin) are receiving clean interest as capability superior Options to artificial selective oestrogen receptor modulators (SERMs), which are currently Used in hormone replacement remedy. Phytochemicals integrate hormonal ligand sports and intervene with signaling cascades; their Healing use won’t be confined to hormonal ailments only, however can also have applications in

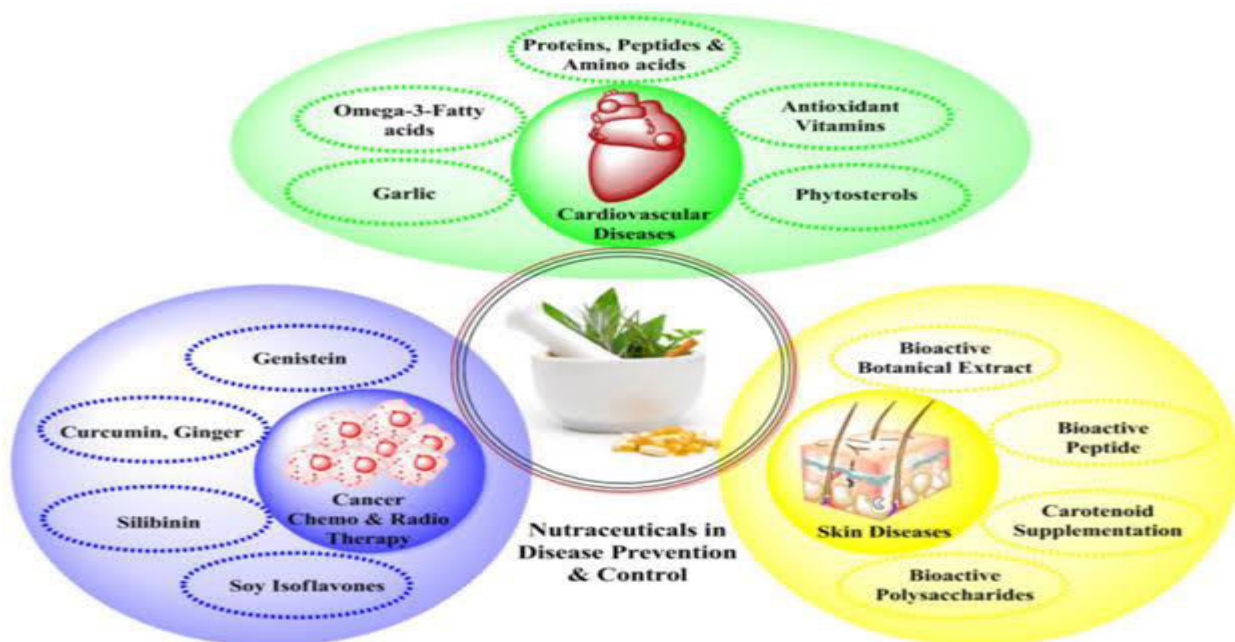


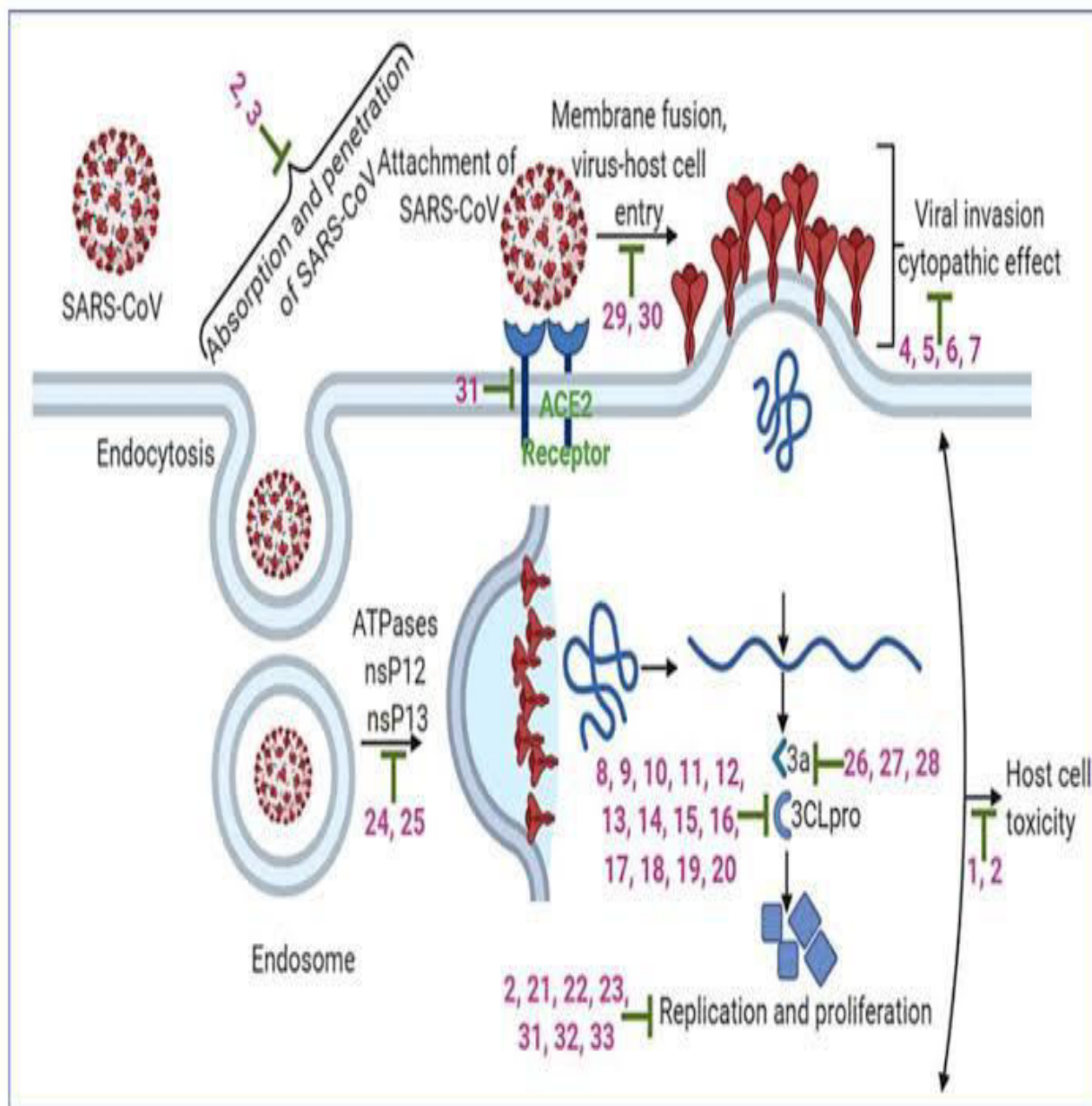
Image Source: <https://www.mdpi.com/2072-6643/14/21/4637>

Omega-3 fatty acids had been linked to a reduction in glucose tolerance in diabetic sufferers. Insulin Is required for the manufacturing of lengthy-chain fatty acids, therefore the coronary heart can be specifically Liable to their depletion in diabetes. In diabetic sufferers, ethyl esters of fatty acids can be Beneficial [16]. Immune boosters

Chemoprevention and/or certain inflammatory problems as nicely [17]. Cutting-edge reputation of nutraceuticals as Immunity boosters Nutraceuticals that belong to the class of immune boosters or anti- viral sellers are useful to enhance Immune feature and boost up wound healing. They encompass extracts from the coneflowers, or herbs of the genus Echinacea, including Echinacea purpurea,

Echinacea angustifolia, Echinacea pillida, and combos thereof extracts from herbs of the genus Sambuca, Inclusive of elderberries and Goldenseal extracts. The coneflowers specially are a popular natural remedy used within the valuable united states of america, a place to

Alkyl ketones or isobutylamides. Goldenseal is an immune booster with antibiotic interest, and consists of compounds like berberine and Hydrastine, which stimulate bile secretion and constrict peripheral blood vessels respectively. Astragalus membranaceus,

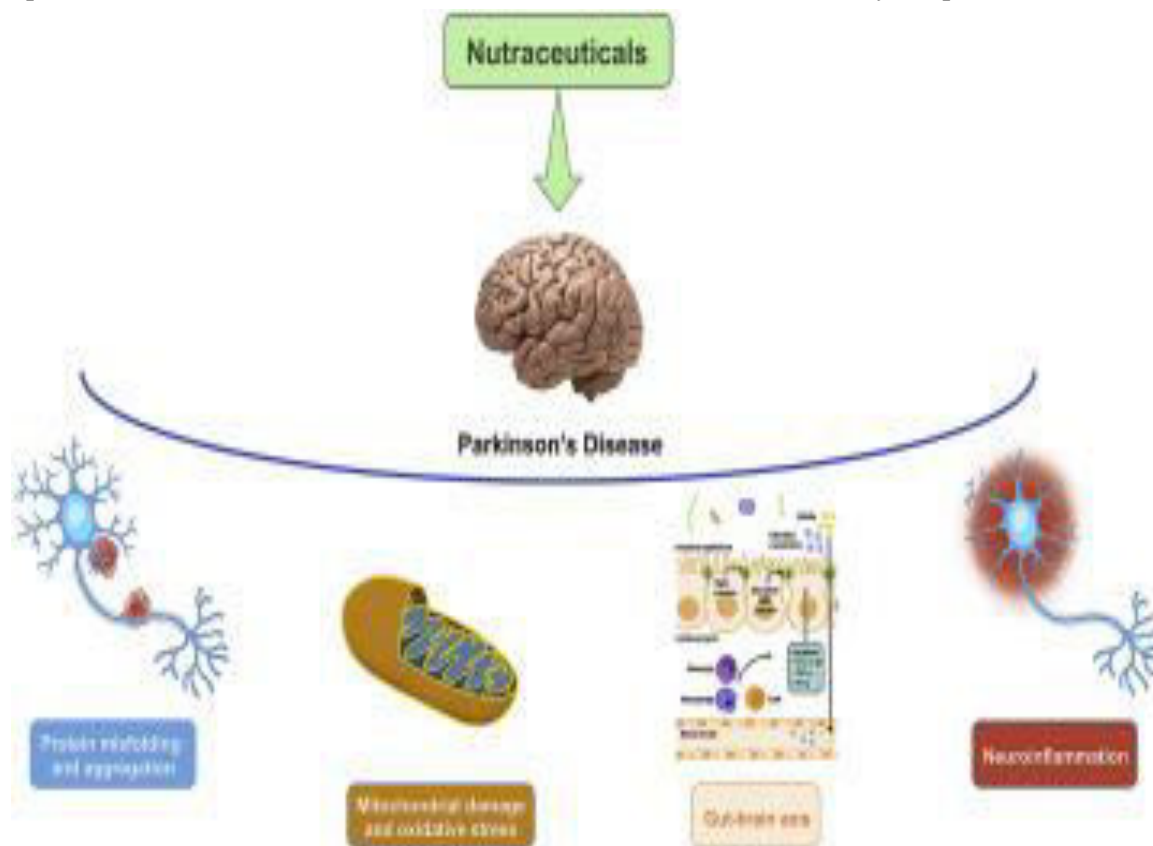


Which they're indigenous. The extract derived from the roots includes various amounts of unsaturated

Astragalus mongolicus, and other herbs of the genus Astragalus are also

Powerful immune boosters in either their herbal or processed paperwork. Astragalus stimulates development and transformation of stem cells in

feeding is powerful in Crohn's ailment. Dietary nucleotides may also enhance Boom and immunity, optimize maturation,



the marrow and lymph tissue to active immune cells. The Impact of plant and bacteria on systemic immune and intestinal epithelial cellular function has brought about new Credence for the use of probiotics and nutraceuticals in the clinical placing. The probiotics were determined to powerful in conditions like in infectious diarrhea in youngsters and Recurrent *Clostridium difficile* triggered infections. Proof is being acquired for the use of probiotics in Different gastrointestinal infections, irritable bowel syndrome and inflammatory bowel sickness. The dietary approach to allergic reaction has advanced to encompass lively stimulation of the immature immune system A good way to assist the establishment of tolerance. Supplementation with probiotics may additionally provide cytokines. Enteral polymeric

healing and feature of hastily dividing tissues. Usage of Probiotics (live feasible microbial organisms) inside the treatment of unique diseases has advanced into A really precious choice. The capability to lessen antibiotic use, the apparently very high index of safety, Maturational signals for the lymphoid tissue and enhance the balance of seasoned- and anti-inflammatory and the general public's fantastic notion approximately "natural" or "alternative" healing procedures. These products manipulated the intestinal microflora to hold the normal balance among Pathogenic and non-pathogenic micro organism. Healing consequences of maximum industrial arrangements are Unsubstantiated. Sure probiotics can be effective in the treatment or prevention of positive Situations. *Lactobacillus* has been proven to be effective inside the remedy or prevention of various

Of issues which include acute diarrhea in kids, touristsâ€™ diarrhea in adults, Crohnâ€™s sickness, and reduction of the prevalence of antibiotic-associated diarrhea in toddlers [18]. most probiotic preparations are constituted of one or more lactic acid bacteria (LAB). inside this organization, strains of *Lactobacillus*, *Bifidobacterium* sp. and on occasion *Streptococcus* are most normally used [19].

A supplementary use of oral digestive enzymes and probiotics is also an anticancer nutritional degree toward decreasing the occurrence of breast, colon-rectal, prostate and bronchogenic cancer Osteoarthritis

The maximum commonplace form of arthritis inside the america is osteoarthritis (OA), a crippling joint infection

That affects an predicted 21 million humans. Joint pain caused by OA and different joint troubles May additionally motive human beings to become less active, ensuing in an strength imbalance and weight benefit. Weight

Advantage may worsen existing issues by putting additional stress on joints.

To deal with osteoarthritis symptoms, glucosamine (GLN) and chondroitin sulphate (CS) are typically

Utilised. Those nutraceuticals have each nutrient and medicinal characteristics and they seem to modulate

Gene expression and NO and PGE2 technology, that can explain their anti- anti-inflammatory Actions [20]. Hypersensitive reaction

Allergic reaction is a condition wherein the frame has an exaggerated reaction to both a drug or food.

Modern-day fame of nutraceuticals in allergy Quercetin (QR) belongs to a collection of polyphenolic materials known as flavonoids. QR is a member

Of the class of flavonoids called flavonols. It's far broadly dispensed in the plant state in rinds and Barks.

Mainly rich sources of QR include onions, crimson wine and inexperienced tea.

QR is a herbal antihistamine and opposes the actions of the histamine inside the body. Histamines are

Chargeable for allergic and anti-inflammatory reactions. It is able to help reduce the inflammation that outcomes

From hay fever, bursitis, gout, arthritis, and allergies. QR inhibits some anti-inflammatory enzymes, which includes lipid peroxidases, and reduces leukotriene formation. QR has 07b031025f5f96dfa8443f843db463b6, antiviral, Immunomodulatory, anticancer and gastroprotective activities [21].

QR blocks an enzyme that leads to accumulation of sorbitol, which has been linked to nerve, eye, and

Kidney damage in people with diabetes. QR also possesses strong antioxidant residences. It protects LDL cholesterol from becoming broken. QR prevents damage to blood vessels with the aid of sure kinds of

Ldl cholesterol and different chemical compounds produced via the body. LDL ldl cholesterol is an underlying reason of

Heart sickness QR additionally works as an antioxidant through scavenging unfavourable debris within the frame known as unfastened radicals.

Human beings with diabetes are at better danger of blood vessel harm from loose radicals [22]. Alzheimer's disease

Alzheimer's disorder (advert) is characterised through modern dementia with memory loss as themajor scientific Manifestation. Ladies are extra affected than men at a ratio of just about 2:1 due in element to the bigger

Population of ladies who're over 70. Several lines of evidence strongly propose that oxidative pressure is

Etiologically associated with a number of neurodegenerative problems along with Alzheimer's disease [23].

Current popularity of nutraceuticals in Alzheimer's ailment

Nutraceutical antioxidants like Î²-carotene, curcumin, lutein, lycopene, turmerin and so forth might also exert

High quality effects on specific diseases via neutralizing the terrible effects oxidative pressure,

Mitochondrial disorder, and numerous forms of neural degeneration.

A notable deal of studies has pointed to deleterious roles of steel ions inside the development of

Alzheimer's disease, via the augmentation of oxidative stress by means of metallic ion. The developing trend in

Nutraceutical consumption is in part a result of the perception that they postpone the improvement of dementias

Which include Alzheimer's sickness. However, pathogenic occasions targeted on metal ions are predicted to be

Irritated with the aid of frequent nutraceutical consumption [24] Parkinson's ailment

Parkinson's ailment is a mind ailment caused by nerve damage in positive regions of over-the-counter mind, which

Reasons muscle pressure, shaking, and problem taking walks. It generally moves human beings over-the-counter over the counter mid to overdue Adolescent years.

Modern-day reputation of nutraceuticals in Parkinson's disease

In step with Canadian professionals, nutrition E in meals may shield towards Parkinson's disorder [25]. Creatine

Seems to regulate over-the-counter elements of Parkinson's disorder, as evidenced with overover the counter a lower in clinical signs [26].

Glutathione has also been investigated to see over-the-counter impacts nerves and how effective it is as an

Antioxidant. Lengthy-time period dose, destructive outcomes, and over the counter most green mode of delivery are nevertheless

unknown. over-the-counter fact that exploratory research have shown a few ability advantages with nutritional

dietary supplements, it's miles critical to remember that over-the-counter over the counter currently inadequate clinical evidence to

prescribe over the counter for Parkinson's disorder. sufferers should be informed that 2f2874cf80c036e5b52269eaf5ddfe83

medicines have negative effects, engage with other prescriptions, and are pricey

Conclusion

Nutraceuticals are currently entering popularity as being salutary in coronary heart disorder, obesity, Diabetes, cancer, osteoporosis and different ordinary and degenerative situations comparable as Parkinson's

And Alzheimer's situations. Attestations suggest that the mechanistic conduct of herbal

Composites contain a big selection of herbal techniques, together with activation of antioxidant defenses,

Signal transduction pathways, mobile survival-associated gene expression, cellular proliferation and

Isolation and maintenance of mitochondrial integrity.

It appears that these parcels play a pivotal component inside the safety in opposition to the it's veritably vital

That the vitamins plant in numerous meals, fruits and veggies are accountable for the properly-proved

Fitness benefits.

For example, beta-carotene and lycopene cover the skin from ultraviolet radiation damage, lutein and lycopene might also income cardiovascular health and lycopene may also help assist prostate cancer. Due to these

And other stated health blessings of these, it must be taken often and to lessen the hazard factors

Like excessive cholesterol, excessive blood pressure and diabetes. A number of the maximum famous nutraceutical

Products retailed moment are botanicals similar as St.John's wort, echinacea, ginkgo biloba, saw Palmetto and ginseng.

With the intention to have scientific know-how approximately the nutraceuticals, publics should be knowledgeable, where

Advocated diurnal boluses of these nutraceuticals need to be regarded via each purchaser. The listing of nutraceuticals being studied is changing continually and reflects ongoing exploration,

Request developments and consumer hobby (30).eering, Technology and Science

References

- [1] Misra, L. Traditional Phytomedicinal Systems, Scientific Validations and Current Popularity as Nutraceuticals. 2013. Available online: <https://www.semanticscholar.org/paper/Traditional-Phytomedicinal-Systems%2C-Scientific-and-Misra/7df8a6c6cc432a4cd711b8b6a96702f1908353d4> (accessed on 23 April 2020).
- [2] Helal, N.A.; Eassa, H.A.; Amer, A.M.; Eltokhy, M.A.; Edafiogho, I.; Nounou, M.I. Nutraceuticals' Novel Formulations: The Good, the Bad, the Unknown and Patents Involved. *Recent Pat. Drug Deliv. Formul.* 2019, 13, 105–156. [CrossRef]
- [3] Petrovska, B.B. Historical review of medicinal plants' usage. *Pharmacogn. Rev.* 2012, 6, 1–5. [CrossRef]
- [4] Nasri, H.; Baradaran, A.; Shirzad, H.; Rafieian-Kopaei, M. New Concepts in Nutraceuticals as Alternative for Pharmaceuticals. *Int. J. Prev. Med.* 2014, 5, 1487–1499. [PubMed]
- [5] Caramia, G.; Silvi, S. Probiotics: From the Ancient Wisdom to the Actual Therapeutical and Nutraceutical Perspective. In *Probiotic Bacteria and Enteric Infections: Cytoprotection by Probiotic Bacteria*; Malago, J.J., Koninkx, J.F.J.G., Marinsek-Logar, R., Eds.; Springer: Dordrecht, The Netherlands, 2011; pp.3–37.
- [6] Ried, K. Garlic Lowers Blood Pressure in Hypertensive Individuals, Regulates Serum Cholesterol, And Stimulates Immunity: An Updated Meta-analysis and Review. *J. Nutr.* 2016, 146, 389S–396S. [CrossRef] [PubMed]
- [7] Affuso, F.; Ruvolo, A.; Micillo, F.; Saccà, L.; Fazio, S. Effects of a nutraceutical combination (berberine, red yeast rice and policosanols) on lipid levels and endothelial function randomized, Double-blind, placebo-controlled study. *Nutr. Metab. Cardiovasc. Dis.* 2010, 20, 656–661. [CrossRef] [PubMed]
- [8] Chen, G.-L.; Chen, S.-G.; Chen, F.; Xie, Y.-Q.; Han, M.-D.; Luo, C.-X.; Zhao, Y.-Y.; Gaob, Y.-Q. Nutraceutical Potential and antioxidant benefits of selected fruit seeds subjected to an in vitro digestion. *J. Funct. Foods* 2016, 20, 317–331. [CrossRef]
- [9] Pitchaiah, G.; Akula, A.; Chandi, V. Anticancer Potential of Nutraceutical Formulations in MNU-induced Mammary Cancer in Sprague Dawley Rats. *Pharmacogn. Mag.* 2017, 13, 46–50.
- [10] Singla, V.; PratapMouli, V.; Garg, S.K.; Rai, T.; Choudhury, B.N.; Verma, P.; Deb, R.; Tiwari, V.; Rohatgi, S.; Dhingra, R.; et al. Induction with NCB-02 (curcumin) enema for mild-to-moderate Distal ulcerative colitis—A randomized, placebo-controlled, pilot study.
- [11] J. Crohn's Colitis 2014, 8, 208–214. [CrossRef] [PubMed]
- [12] Chaplin, D.D. Overview of the Immune Response. *J. Allergy Clin. Immunol.* 2010, 125, S3–S23. [CrossRef]
- [13] Carr, A.C.; Maggini, S. Vitamin C and Immune Function. *Nutrients* 2017, 9, 1211. [CrossRef]
- [14] Ruchi, S. Role of nutraceuticals in health care: A review. *Int. J. Green Pharm.* 2017, 11. [CrossRef]
- [15] Singh, J.; Sinha, S. Classification, regulatory acts and applications of nutraceuticals for health. *Int. J. Pharm. Bio Sci.* 2012, 2, 177–187.
- [16] Scrinis, G. Functional foods or functionally marketed foods? A critique of, and alternatives to, the Category of “functional foods”. *Public Health Nutr.* 2008, 11, 541–545. [CrossRef] [PubMed]
- [17] Prabu, S.L.; SuriyaPrakash, T.N.K.; Kumar, C.D.; SureshKuma, S.; Ragavendran, T. Nutraceuticals: A Review. *Elixir Int. J.* 2012, 46, 8372–8377.
- [18] Bhowmik, D.; Kumar, K.P.S.; Paswan, S.; Srivastava, S. Tomato-A Natural Medicine and Its Health Benefits. *J. Pharmacogn. Phytochem.* 2012, 1, 33–43.
- [19] Singh, B.; Singh, J.P.; Kaur, A. Saponins in pulses and their health promoting activities: A review. *Food Chem.* 2017, 233, 540–549. [CrossRef]
- [20] Smith, L.K.; Guentzel, L.J. Mercury concentrations and omega-3 fatty acids in fish and shrimp:

Preferential consumption for maximum health benefits. *Mar. Pollut. Bull.* 2010, 60, 1615–1618. [CrossRef]

[21] Heldman, D.R. *Food Science Text Series*. 1994. Available online:

<http://www.springer.com/series/5999> (accessed on 22 April 2020).

[22] Ghayur MN, Gilani, AH Afridi MB and Houghton PJ. Cardiovascular effects of ginger. *Vascular Pharmacology*. 2005; 43: 234-241.

[23] Chrubasik S, Pittler M H, Roufogalis B D

Zingiberis rhizoma: a comprehensive review on the ginger

Effect and efficacy profiles. *Phytomedicine*. 2005; 12: 684-701.

[24] Dutta P C, *Phytosterols as functional food components and nutraceuticals*, Marcel Dekker, Edinburgh, 2003.

[25] Si-quan L and Zhang, Q H. Advances in the development of functional foods from buckwheat. *Critical reviews in food science and nutrition*. 2001;41:451-464.

[26] Hamid AA and Luan YS. Functional properties of dietary fiber prepared from defatted rice bran.

Food Chemistry. 2000; 68: 15-19.

[27] Gita C. Functional Food Attributes of n-3 Polyunsaturated and Conjugated Linoleic Acid Enriched

Chicken Eggs. *Current Topics in Nutraceutical Research*. 2004;2: 113-121.

[28] Tucker G Nutritional enhancement of plants. *Current Opinion in Biotechnology*. 2003; 14: 221-225.

[29] Sirtori C R and Galli C Fatty acids and the Omega 3. *Biomedicine and Pharmacotherapy*. 2002;

56: 397-406.

[30] Sidhu KS Health benefits and potential risks related to consumption of fish or fish oil. *Regul Toxicol Pharmacol*. 2003; 38: 336-344.

[31] Kato S, Karino K, Hasegawa J, Nagasaki A, Eguchi M and Ichinose T. Octacosanol affects lipid

Metabolism in rats fed on a high fat diet. *Br J Nut.* 1995; 73: 433-442.

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