Nutritional Immunology:

Supporting the Immune System

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We are born with the best doctor in the world—the human immune system. When the immune system is functioning properly, it serves as a strong defense against most illnesses, but the immune system requires proper care and nutrition just as any other system in the body does. When we are healthy, wholesome nutrition can help us stay that way. Similarly, proper nourishment can stimulate the immune system to fight illness.

The science of Nutritional Immunology studies the relationship between nutrition and the immune system. Healthful foods contribute to a strong immune response, which protects us from foreign bacteria and pollutants, and removes our own damaged or compromised cells. Nutritional Immunology promotes overall attention to the maintenance of a healthy immune system through proper nutrition specifically for the immune system. It emphasizes the importance of returning to the diet that has been available to mankind for centuries – whole plant foods.

> "When the immune system is functioning properly, it serves as a strong defense against most illnesses."

Phytochemicals

Central to the study of Nutritional Immunology are phytochemicals—chemical compounds that naturally occur in the plant foods that we eat. These phytochemicals are many and varied. Science has been studying some of them for decades, but is only beginning to recognize others. They include many of what we grew up calling "vitamins"—such as ascorbic acid (vitamin C), thiamine (vitamin B_1), riboflavin (vitamin B_2), retinol (vitamin A) and tocopherol (vitamin E)—and many more recently isolated compounds, like OPC (oligomeric proanthocyanidins), lutein, lycopene and flavonoids.

營養免疫學：

強化免疫系統

我們與生具來就擁有世上最好的醫生–我們的免疫系統。當免疫系統正常運作時，它就如同一道強大的防綫，可抵禦絕大多數的疾病。然而，正如身體的其它系統一樣，免疫系統也需要得到適當的護理與滋養。當我們健康的時候，健全的營養可以幫助我們保持健康的體魄，同樣，適當的滋養亦可促進免疫系統對抗病痛的能力。

營養免疫學研究的是營養與免疫系統之間的關係。有益健康的食品有助於免疫系統產生強大的免疫反應，以保護我們免受外界病菌和污染源的侵害，並去除我們受損的或壞死的細胞。營養免疫學倡導全面地關注免疫系統，通過攝取適當的營養，尤其是有益於免疫系統的營養，來維護免疫系統的健康。它強調，我們應回歸到幾個世紀以來人類自古已有的飲食習慣：攝取完整性植物食品。

植物性營養素

營養免疫學的研究是圍繞著我們所食用的植物性食品中天然存在的化學複合物- 植物性營養素展開的。植物性營養素是多種多樣的，儘管科學界對其中的數種進行了數十年的研究，但是，對其它的種類還只是剛剛認知。它們包括許多種伴隨我們長大的稱作"維生素"的物質–如抗坏血酸(維生素C)、硫胺素(維生素B_1)、核黃素(維生素B_2)、視黃醇(維生素 A)、生育醇(維生素E)–以及更多在近期被分離出來的複合物，如OPC(前花青素)、葉黃素、茄紅素、黃酮醇等。

現在，已有上千種植物性營養素被分離出來，這些植物化學物雖然是"無營養"，却有著保護健康、防禦疾病的特性。雖然它們不是正常的新陳代謝所必要的，它們的缺失不會導致"匱乏"，但它們都會提昇免疫系統的功能，對抗擊細菌和病毒起到直接的作

More than a thousand phytochemicals have been isolated. These non-nutritive plant chemicals have protective or disease preventive properties. As such, they are not necessary for normal metabolism, and their absence does not result in a 'deficiency.' They may, however, promote the function of the immune system, act directly against bacteria and viruses, reduce inflammation, and be associated with the containment of abnormal cell growth, cardiovascular disease and any other malady affecting the health or well-being of an individual.[1]

Antioxidants

Many of these phytochemicals fall into the category of antioxidants, which defend the body against free radicals. Free radicals are atoms or groups of atoms with an odd (unpaired) number of electrons. They form when oxygen interacts with certain molecules. The body regularly produces free radicals as a by-product of normal metabolism. Once formed, these highly reactive free radicals can start chain reactions with vital cellular components, such as DNA, causing irreparable damage. Cells may function poorly or even die if this occurs.[2]

• Good sources of antioxidants •
抗氧化劑的最佳來源

Vitamin C 維生素C	citrus fruits, green peppers, broccoli, green leafy vegetables, strawberries, raw cabbage and potatoes 柑桔類水果、綠色辣椒、花椰菜、綠葉蔬菜、草莓、生捲心菜和馬鈴薯
Vitamin E 維生素E	wheat germ, nuts, seeds, whole grains, green leafy vegetables and vegetable oil 麥芽、堅果、瓜子、全穀物、綠葉蔬菜和菜籽油
Beta-carotene beta-胡蘿蔔素	carrots, squash, broccoli, sweet potatoes, tomatoes, kale, collards, cantaloupe, peaches and apricots 胡蘿蔔、瓜類蔬菜、花椰菜、甜蕃薯、西紅柿、甘藍、芥藍、羅馬甜瓜、桃和杏等

Source: Colorado State University Cooperative Extension, http://www.ext.colostate.edu/pubs/columnnn/nn000322.html

為什麼吃蔬菜特別重要？

多吃蔬菜，有益健康–多吃水果蔬菜者，其罹患某些慢性疾病的風險可降低。蔬菜所提供的營養素對身體的健康和健康的維護都至關重要。

健康效益

- 將大量水果蔬菜作為健康飲食而食用，可以降低罹患中風或者其它心血管疾病的風險。
- 多吃水果蔬菜，可以降低罹患二型糖尿病的風險。
- 多吃水果蔬菜，可以抵禦某些癌症，如口腔癌、胃癌、直結腸癌。
- 多吃富含纖維的食品，如水果蔬菜，可以降低罹患冠心病的風險。
- 多吃富含鉀的水果蔬菜，可以降低產生腎結石的風險並減少骨質流失。
- 以低熱量的蔬菜取代那些高熱量的食品可幫助降低熱量的攝取。

"科學界對某些植物性營養素已研究了數十年，但對另一些植物性營養素的研究才剛剛開始。"

Why is it important to eat vegetables?

Eating vegetables provides health benefits — people who eat more fruits and vegetables as part of an overall healthy diet are likely to have a reduced risk of some chronic diseases. Vegetables provide nutrients vital for health and maintenance of your body.

Health benefits

- Eating a diet rich in fruits and vegetables as part of an overall healthy diet may reduce risk for stroke and perhaps other cardiovascular diseases.
- Eating a diet rich in fruits and vegetables as part of an overall healthy diet may reduce risk for type 2 diabetes.
- Eating a diet rich in fruits and vegetables as part of an overall healthy diet may protect against certain cancers, such as mouth, stomach and colon-rectum cancer.
- Diets rich in foods containing fiber, such as fruits and vegetables, may reduce the risk of coronary heart disease.
- Eating fruits and vegetables rich in potassium as part of an overall healthy diet may reduce the risk of developing kidney stones and may help to decrease bone loss.
- Eating foods such as vegetables that are low in calories per cup instead of some other higher-calorie food may be useful in helping to lower calorie intake.

Source: http://www.mypyramid.gov/pyramid/vegetables_why.html

Antioxidant molecules safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. The body cannot manufacture these antioxidants, so your diet must supply them. Important antioxidants are vitamin C, vitamin E and beta-carotene.

OPC, found in pine bark and grape seeds, is another antioxidant that has 20 times more antioxidant activity than vitamin C and 50 times more antioxidant activity than vitamin E.[3]

Antioxidants are widely used in dietary supplements. However, while many studies have suggested the benefits for antioxidant supplements in laboratory experiments, several large clinical trials failed to demonstrate a definite benefit, and some even indicate that an excess may be harmful. A broad diet rich in phytochemicals yields thousands of different antioxidants. These thousands of different antioxidants may work synergistically to complement and facilitate each other, producing a far greater benefit than antioxidant supplements alone ever could.

Polysaccharides

Polysaccharides are very large molecules consisting of many—200 to 2,500—monosaccharides (sugars) joined together. Examples include starches, glycogen

用，它們可減輕炎症，並有助於遏制和預防腫瘤、心血管疾病和所有其它影響健康的疾病。[1]

抗氧化劑

在上述這些植物性營養素中，許多亦屬於抗氧化劑之列，它們保護著身體抵禦自由基的侵害。自由基是指帶有奇數(不成對)電子的原子或原子團，當氧氣與某種分子相互作用時，就會形成自由基。身體在正常的新陳代謝過程中通常亦生成副產品–自由基，這些極其活躍的自由基一旦形成，即會引起重要細胞組織的連鎖反應，如對DNA造成不可修復的破壞。自由基的存在可使細胞的運作功能失常甚至造成細胞死亡。[2]

抗氧化劑的分子可安全地與自由基相互作用，這樣，在自由基對重要的細胞組織產生影響之前，上述連鎖反應即可被終止。人體本身不能自然產生抗氧化劑，因此您必須從飲食中攝取。在各種抗氧化劑中，最重要的抗氧化劑有維生素C、維生素E、和beta-胡蘿蔔素。

前花青素(OPC)存在於松樹皮和葡萄籽中，是另外一種抗氧化劑，其抗氧化力比維生素C高20倍，比維生素E高50倍。[3]

抗氧化劑在食物補充品中被廣泛地使用。然而，盡管

and cellulose, among others. In the 1960s, scientists discovered that mushroom polysaccharides possess the ability to restrain unchecked cell growth.[5]

The most studied mushroom polysaccharides are lentinan from *Lentinus edodes* (shiitake); *grifolan* (also called GRN and grifolan LE) from *Grifola frondosa* (maitake); SSG from *Sclerotinia sclerotiorum*; PSK (also called krestin) from *Coriolus versicolor* (turkey tail); and PSP (polysaccharide peptide), also from *Coriolus versicolor*.[6]

Our Internal 'Doctor'

That doctor that we are all born with—our immune system—doesn't function in a vacuum. It is affected by everything that we eat, breathe and do—either positively or negatively. If we don't feed it nutritious food, don't exercise moderately, don't get enough sleep, our internal 'doctor' can't maintain our health. But if we do all these things—the science of Nutritional Immunology teaches us that our incredible immune system is capable of keeping us healthy and active throughout our lives.

許多實驗室研究的結果都提到抗氧化劑補充品的良好效益，但大量的臨床試驗却不能證明其效益，而一些試驗甚至指出過多的食用或許是有害的。多種富含植物性營養素的食品，可含有幾千種不同的抗氧化劑。[4] 這數千種不同的抗氧化劑可協調運作，相互補充、相互促進，產生出的效益遠遠高於單獨使用抗氧化劑補充品所產生的效益。

多醣體

多醣體是由許多-大約200到2500個-單醣(糖)連接而成的巨大粒子。許多種物質如澱粉、肝醣、和纖維素都屬於這類多醣體。在上個世紀六十年代，科學家發現菇類中的多醣體具有抑制無拘束細胞生長的能力。[5]

研究得最多的菇類多醣體是香菇(椎茸)中的香菇多醣體，舞茸(maitake)中的灰樹花多糖(亦稱為GRN或灰樹花多糖LE)，菌核菌(Sclerotinia. sclerotiorum)中的SSG，雲芝(火鷄尾)中的PSK(亦稱為多醣K)，還有雲芝中的PSP(雲芝多醣)。[6]

我們體內的"醫生"

我們每人都有與生具備的醫生-免疫系統，但是，它不可能存在於真空中，它受到我們食用的各種食物、我們所呼吸的空氣以及我們的行為的影響，這種影響可以是有益的亦可以是有害的。假如我們不食用富含營養的食物，不進行適當的運動，不保證充足的睡眠，我們的體內"醫生"就不能維護我們的健康。相反，假如我們做到了上述幾點，依據營養免疫學的理論，我們神奇的免疫系統就可以維護我們一生的健康和活力。

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1 http://en.wikipedia.org/wiki/Phytochemicals
2 Rice University, 'Antioxidants and Free Radicals,' http://www.rice.edu/~jenky/sports/antiox.html.
3 Chen, Jau-Fei. Enjoying Health & Longevity with Nutritional Immunology. China Society Press, 2004:100.
4 http://en.wikipedia.org/wiki/Antioxidants
5 Chen, Jau-Fei. Enjoying Health & Longevity with Nutritional Immunology. China Society Press, 2004: 107.
6 http://www.pdrhealth.com/drug_info/nmdrugprofiles/nutsupdrugs/myc_0033.shtml

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