

## Nutritional Immunology:

# Mineral Mastery: Your Best Sources for Iron and Calcium

## 礦物質，您獲取鐵和鈣的最佳源泉

The science of Nutritional Immunology stresses the importance of the phytochemicals, antioxidants and polysaccharides found in whole plant foods to support the immune system, but did you know that whole plant foods are also your best source for vital minerals, such as iron and calcium?

### Calcium: The Body's Most Abundant Mineral

There is more calcium in your body than any other mineral, and more than 99 percent of it is stored in bones and teeth where it supports structure. The body stores the rest in blood, muscle, and the fluid between cells, where it is used for muscle contraction, blood vessel contraction and expansion, the secretion of hormones and enzymes, and sending messages through the nervous system. The body maintains a constant level of calcium in body fluid and tissues so vital body processes function efficiently. Muscle cramps, joint pains or arthritis, tooth decay and high blood pressure can all result from low calcium levels. Calcium regulates heartbeat, blood clotting, transmitting messages in the brain, and stimulating hormone secretions and enzyme activity.<sup>1</sup> Calcium also helps maintain healthy blood cholesterol levels, and research shows that a higher intake of calcium decreased the risk of kidney stone formation in younger women.

Bone, just like any other body tissue, constantly changes as the body absorbs and deposits calcium from its stores. The balance between bone reabsorption and deposition changes as people age. Children experience a higher amount of bone formation (deposition) and less reabsorption. As adults, these processes are relatively equal. In older adults, particularly postmenopausal women, bone reabsorption exceeds deposition, which can result in bone loss and an increased risk of osteoporosis.

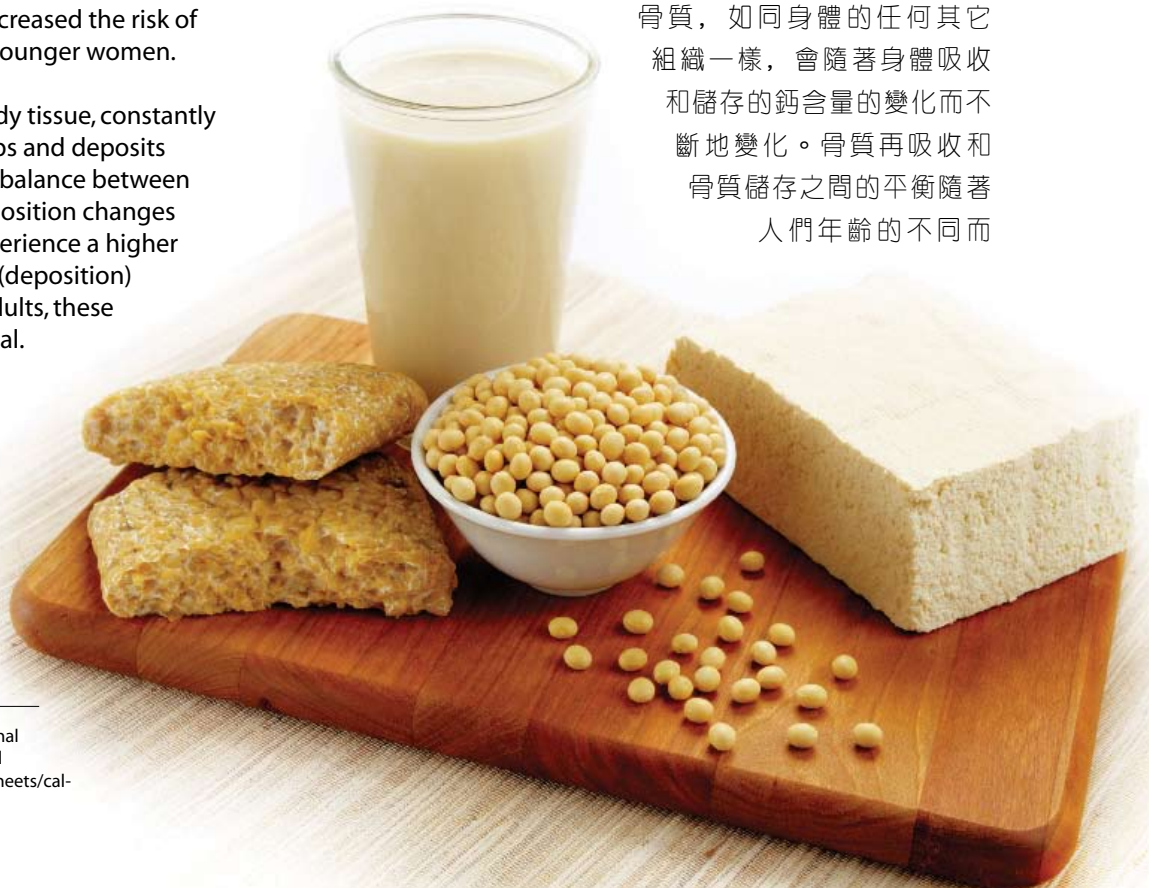
Osteoporosis is a 'silent' disease,

營養免疫學一向強調完整性植物食品中的植物性營養素、抗氧化劑、和多醣體對強化免疫系統所起的重要作用，但是，您是否知道，完整性植物食品亦是您獲取必不可少的鐵和鈣這些礦物質的最佳資源。

### 鈣質：人體內含量最大的礦物質

您身體內鈣的含量高於任何其它種類的礦物質，而百分之九十九的鈣質都儲藏在您的骨骼和牙齒中，支撐著您的身軀。體內其它的鈣質分佈在血液、肌肉、和細胞之間的體液中，用以協助肌肉的伸縮、血管的張收、荷爾蒙和酵素的分泌，以及向神經系統傳送信號。人體在其體液和組織中保持著固定份量的鈣質，使得關鍵性的人體功能可以有效地運轉。肌肉抽筋、關節疼痛或者關節炎、齲齒、高血壓這些病症，都可能源於缺鈣。鈣質可調解心跳、凝結血液，傳遞大腦信息，刺激荷爾蒙分泌並激活酵素。<sup>1</sup> 鈣質亦有助於維持健康的膽固醇水平；研究顯示，年輕女性攝取較多的鈣質，其形成腎結石的風險就會降低。

骨質，如同身體的任何其它組織一樣，會隨著身體吸收和儲存的鈣含量的變化而不斷地變化。骨質再吸收和骨質儲存之間的平衡隨著人們年齡的不同而



<sup>1</sup> Office of Dietary Supplements, National Institutes of Health, Bethesda, Maryland 20892 USA. <http://ods.od.nih.gov/factsheets/calcium.asp>.



which often progresses without symptoms, until a fracture occurs, most often in the hip, spine and wrist. Insufficient calcium increases the risk of osteoporosis. The World Health Organization notes with concern that 20 percent of hip fractures are fatal and 50 percent result in permanent disability.<sup>2</sup>

Animal products that contain calcium, such as milk, yogurt and cheese, also contain a high level of animal proteins, which increase the excretion of calcium from the body, thus robbing us of much of the vital calcium they contain. Hence, it is important to get calcium from plant sources. Foods such as soy, wakame, spinach and pearl are excellent sources of calcium that are easily absorbed by the body. Unlike calcium from animal products or calcium supplements, it is hard to overdose on calcium from these natural sources. The best and safest source of calcium comes from wholesome plant foods.

#### **Iron: A Delicate Balancing Act**

A lack of iron decreases physical performance, causes poor attention span and increases susceptibility to infections. Iron is a main component in red blood cells, which carry life-giving oxygen to every cell of the body. If iron is unavailable, the body cannot produce enough

改變。一般兒童的骨形成(儲存)量更高，再吸收量更低；相對而言成人的吸收和儲存量是相等的，而年老者，尤其是更年期之後的女性，骨質再吸收超過了儲存，因此容易導致骨質流失，增加罹患骨質疏鬆症的風險。

骨質疏鬆症是一個“無聲殺手”，病發前毫無症狀，直到發生骨折（通常發生在髖部、脊骨和手腕等部位），人們才發現患上了骨質疏鬆症。缺乏鈣質會增加罹患骨質疏鬆症的風險。世界衛生組織慎重指出，有20%的髖骨骨折導致死亡，50%造成永久性殘疾。<sup>2</sup>

動物性食品富含鈣質，如牛奶、酸奶、奶酪等，這些動物性食品雖然富含鈣質，同時它們也富含大量的動物蛋白，加劇了鈣質從人體中流失，將它們所含的重要的鈣質又從我們的體內洗劫而去，因此，從植物資源中攝取鈣質就



<sup>2</sup> Prevention and Management of Osteoporosis, Report of a WHO Scientific Group, WHO Technical Report Series, No 921. <http://www.who.int/bookorders/WHP/detart1.jsp?sesslan=1&codlan=1&codcol=10&codcch=921>.

red blood cells, making you feel constantly tired because your body's tissues are starved of oxygen, leading to a medical condition called anemia. Iron also keeps the immune system operating at peak efficiency. Research shows that early iron deficiency may even lead to irreparable damage to brain cells. Those most at risk for iron deficiency are infants, children, adolescents and women of childbearing age, especially pregnant women.

There are two main sources of iron in our food—heme (pronounced hēm) and nonheme. Heme is short for hematin, a compound formed in the decomposition of hemoglobin, which is the oxygen-carrying pigment that makes blood red. Heme iron is present in animal products while nonheme iron is present in plant foods. Wholesome plant foods actually provide superior iron content than animal products or supplements because our bodies easily absorb iron from plant foods and take only as much as needed.<sup>3</sup> The body regulates the amount of nonheme iron it absorbs, taking as much as it needs to maintain healthy levels and eliminating the rest. Ingesting too much heme iron, on the other hand, may lead to iron overdose and result in iron toxicity. High stores of iron in the body also raise the oxidative stress levels of the body. Therefore, maintaining the appropriate levels of iron is a delicate balancing act, and

*Soybeans, spinach, asparagus, beet greens, turnip greens—in fact greens of most types—are good sources of nonheme iron.*

顯得更加重要。食品中的大豆、裙帶菜、菠菜和珍珠都是鈣質的極佳來源，這些來自自然資源中的鈣質既極易被人體所吸收，又不會像從動物性食品或者鈣質補充劑中攝取鈣質那樣容易吸收過量。因此，完整性植物食品是獲取鈣質安全又質優的源泉。

### 鐵：需要小心保持平衡的礦物質

缺乏鐵質會降低身體的活力，產生精神渙散、易感染發炎等症狀。鐵是血液中紅血球中的主要成份，為體內的每一個細胞輸送提供活力的氧氣。假如缺乏鐵質，身體就難以生產足夠的紅血球，您就會由於身體組織缺氧而持續感到疲倦，最終導致貧血症。此外，鐵還可以使免疫系統保持在最佳的運作狀態。研究顯示，早期缺鐵甚至會造成腦細胞永久性受損。缺鐵的高風險人群包括嬰兒、兒童、青少年及育齡期婦女，尤其是懷孕婦女。

食物中的鐵主要分為兩種，即血紅素鐵和非血紅素鐵。血紅素鐵缺少高鐵血紅素，是在血紅素的分解過程中形成的一種混合物，它是輸送氧氣、使血液呈現紅色的元素。血紅素鐵存在於動物性食物中，非血紅素則蘊藏在植物性食物中。與動物性食品 and 營養補充劑相比，完整性植物食品其實為我們提供了更多的鐵質，因為我們的身體更容易吸收植物食品中的鐵，並且只會根據我們身體的需求量攝取一定量的鐵質。<sup>3</sup>

人體會依據對鐵的需求量適量吸收非血紅素鐵，自動排除多餘的非血紅素鐵，從而維持健康水平。假如攝取了過多的血紅素鐵，即意味著可能引起過量攝取鐵質而導致鐵中毒。體內的鐵含量過高還會增加氧化

<sup>3</sup> Hunt, J.R. 2006. Absorption of nonheme, but not heme iron, is substantially reduced with high iron stores [abstract]. Journal of the American Dietetic Association. 106(8):S2:A-42.

**Minerals are vital to the effective functioning of our systems, and the only way we can receive them is through the foods we eat.**

nonheme iron allows the body to maintain that perfect balance.

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#### **Iron and Calcium Interaction**

Single-meal studies seem to indicate that calcium may inhibit iron absorption. However, when calcium is part of a long-term, whole diet, it does not inhibit iron absorption. Long-term studies have found that daily consumption of 1,200 mg of calcium over a six-month period had no effect on functional iron or iron stores and did not appear to increase the risk of iron deficiency in non-anemic people. Single-meal studies have been shown to overestimate the effect of dietary iron absorption modifiers and, therefore, do not reflect iron bioavailability in the context of a long-term, whole diet.

The human body requires minerals to work properly. These minerals are vital to the effective functioning of our systems, and the only way we can receive them is through the foods we eat. However, we need to be sure that we are receiving the minerals we need in the most effective form. Whole plant foods provide a safer, healthier source of minerals that our body readily absorbs and easily uses.

壓力。無論如何，我們須小心謹慎地讓體內的鐵質保持在適當均衡的定量上，而非血紅素鐵可使我們的身體得以維持在完美的均衡狀態。

大豆、菠菜、蘆筍、甜菜、蕪菁葉等，事實上，大多數的綠色蔬菜都是非血紅素鐵的極佳來源。

#### **鐵和鈣之間的相互影響**

對某一單餐飲食的研究，似乎顯示鈣質會抑制鐵質的吸收。然而，當鈣質作為完整飲食的一部分長期食用時，是不會妨礙鐵質的吸收的。長期的研究發現，無貧血症狀的人士在超過六個月的時間內每日攝取1200克鈣質，其體內鐵質的能效和鐵質的儲存均未受到影響。單餐飲食的研究夸大了鈣質對飲食中鐵質吸收的影響，因此並不能反映長期食用完整性食品時的鐵的生物有效性。

我們需要一定量的礦物質來保證身體能夠正常地運作。礦物質是我們身體系統有效運轉的關鍵要素，而可以獲得礦物質的唯一途徑就是我們攝取的食物。因此，我們應該確保自己以有效的方式獲取那些必要的礦物質。完整性植物食品是礦物質比較安全、比較健康的來源，十分容易被我們的身體吸收利用。



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