

# Nutritional Support for Wellness, Simplified

方便 健康的營養補充品

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Health Benefits of Blueberries

藍莓的健康效益

2013

# Health Benefits of Blueberries

## 藍莓的健康效益

- Reduced inflammation

降低發炎反應

- Reduced oxidation

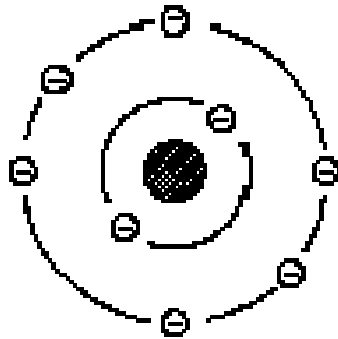
減少氧化作用



# Anti-Oxidants 抗氧化

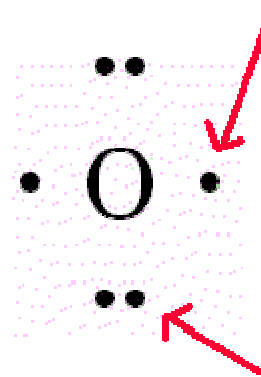
- Oxidation : “Rust” in the biological systems of the body.
- Oxidation is traditionally defined as the interaction between oxygen molecules and all the different substances they may contact, from metal to living tissue.
- Technically, oxidation came to be more precisely defined as the loss of at least one electron when two or more substances interact. Those substances may or may not include oxygen.
- 氧化：身體內生理系統的“生鏽”。
- 一般氧化的定義是指氧氣分子與其他物質 (包含金屬與有生命的組織) 之間的作用。
- 從技術上講，更精確地定義“氧化”是當兩個或更多的物質的相互作用，產生至少一個電子的損失，這些物質可以或可以不包括氧氣。

Free Radicals = Unpaired electrons  
自由基 = 不成對的電子



Oxygen atom and  
its electrons

Unpaired Electrons



Paired Electrons

# Health Benefits of Blueberries

## 藍莓的健康效益

- Demonstrated effects in multiple organ systems
  - Heart
  - Brain
  - Muscle
  - Bone/cartilage



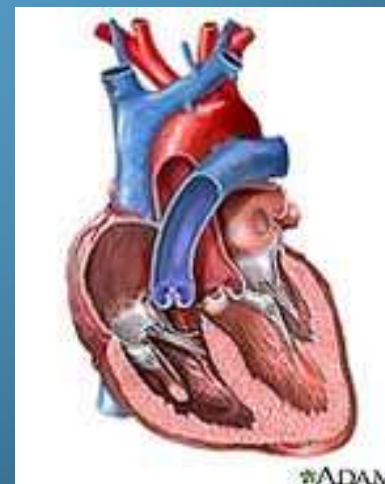
### ● 對許多器官系統已證實的功效

心臟

大腦

肌肉系統

骨骼關節系統





# Reduced Risk of Heart Attack

## 減少心臟病的風險

- The Nurses' Health Study II
- Looked at 96,300 women, 25-42 years of age
- Found that increased intake of anthocyanin-rich foods (blueberries and strawberries) was associated with a decreased risk of heart attack
- **The Nurses' Health Study II 的研究。**
- **研究對象：平均年齡25~42歲的96,300位女性。**
- **發現增加攝食含有豐富花青素的水果 (如藍莓與草莓) 的女性，能降低罹患心臟病的風險。**

Cassidy A et al. High Anthocyanin intake is associated with a reduced risk of myocardial infarction in young and middle-aged women. Circulation 127:188-96, 2013

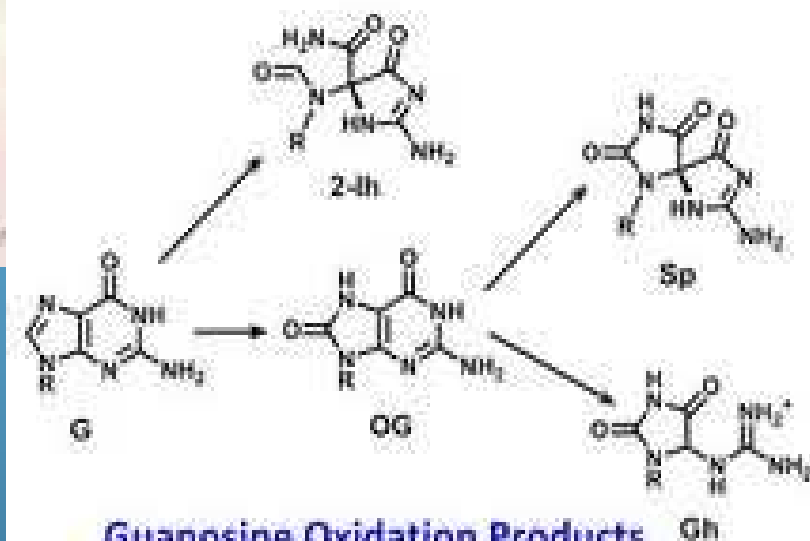
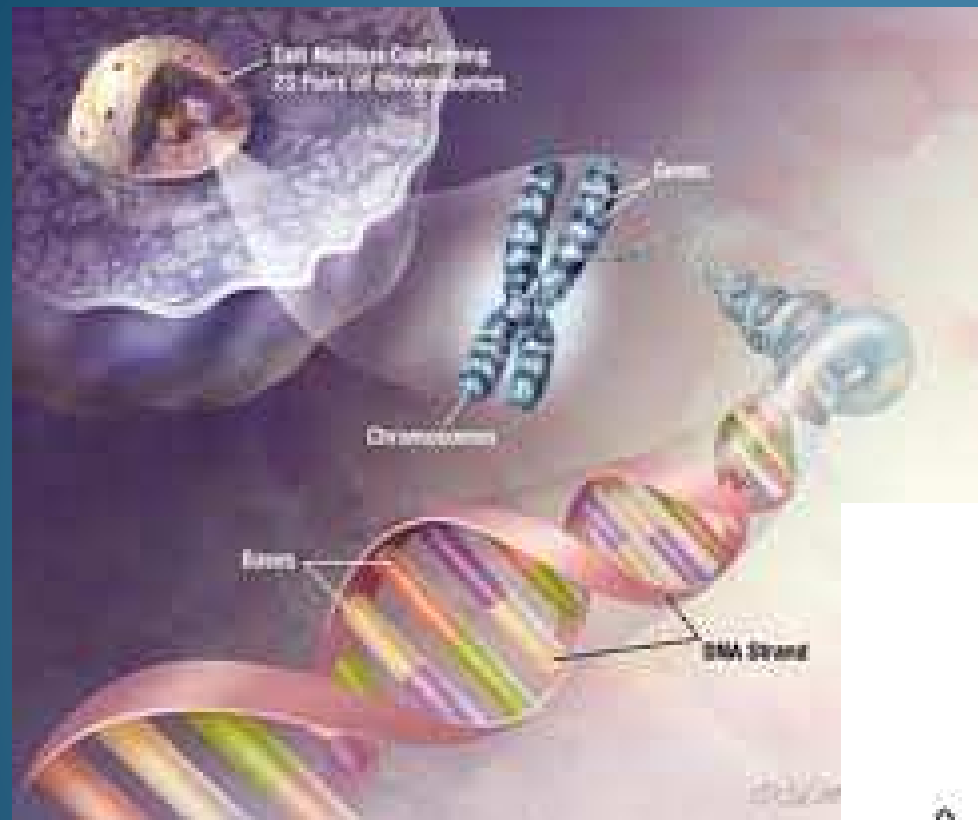
# Reduction in DNA Oxidation

## 降低對DNA的氧化作用

- 18 male volunteers, ages 48 +/- 10 years
- Consumption of a wild blueberry drink or placebo for 6 weeks
- The wild blueberry drink reduced levels of oxidized DNA bases and levels of H<sub>2</sub>O<sub>2</sub> induced DNA damage in white blood cells
- 平均48歲的18位男性的研究
- 連續6週喝野生藍莓汁與安慰劑
- 研究結果發現喝藍莓汁者降低白血球的DNA鹼基的氧化，也降低H<sub>2</sub>O<sub>2</sub>對DNA的破壞。

Riso P et al. Effect of a wild blueberry drink intervention on markers of oxidative stress, inflammation and endothelial function in humans with cardiovascular risk factors. Eur J Nutr 2012.





Guanosine Oxidation Products

鳥苷氧化的產物

# Reducing Cognitive Decline

## 降低大腦認知功能的退化

- Increased consumption of berries associated with reduction in cognitive decline in the elderly
- Blueberries and strawberries most beneficial
- 對於老年人增加藍莓的攝食能減緩大腦任功能的退化。
- 藍莓與草莓特別有效。

Editorial: Eating more berries may reduce cognitive decline in the elderly: Flavenoid-rich blueberries and strawberries offer most benefit Am J. Alzhemiers Dis Other Demen 27:358, 2012

## Reduced Rates of Cognitive Decline

# 降低大腦認知功能的退化速度

- Nurses Health Study
- 16,010 participants aged > 70 years
- Dietary questionnaires administered every four years starting in 1980.
- Cognitive assessments performed 1995-2001 and with follow-up assessments 2 years later
- Greater intake of blueberries and strawberries were associated with slower rates of cognitive decline.
- **Nurses Health Study的研究。**
- **70歲以上16,010位老年人。**
- **1980年開始進行，每4年進行一次飲食調查。**
- **多量的攝食藍莓與草莓能夠讓大腦認知功能退化的速度減緩**

# Reduced Markers of Oxidation

## 降低氧化指標

- Participants ate a high dose (75 g), low dose (35 g) or control food with matching vitamin C and sugar content to high dose blueberries, along with a high carb-low fat breakfast.
- High dose of blueberries resulted in significantly lower markers of oxidation (higher serum ORAC)
- Both doses of blueberries had lower serum lipoprotein oxidation over 3 hours after the meal.
- 參與實驗者分別吃包含有高量藍莓達到高劑量(75克)、低劑量(35 g)與控制到相當量的維生素C和糖份的食物，伴隨著高量的碳水化合物低脂肪含量的早餐。
- 高量藍莓攝食量的參與者，其氧化指標明顯降低(高ORAC值的血漿)
- 在食用早餐後3小時，發揮降低其血漿中的脂蛋白氧化作用。

Blacker et al. Consumption of blueberries with a high-carbohydrate, low-fat breakfast decreases postprandial serum markers of oxidation. Br J Nutr 31:1-8, 2012.

## Results – Adding Blueberries to a High Carbohydrate Breakfast

### 研究結果-添加藍莓的高醣類早餐

- High dose of blueberries resulted in significantly lower markers of oxidation (higher serum ORAC)
- Both doses of blueberries had lower serum lipoprotein oxidation over 3 hours after the meal.
- 添加高量藍莓的結果產生明顯的其氧化指標明顯降低(高ORAC值的血漿)。
- 在食用早餐後3小時，發揮降低其血漿中的脂蛋白氧化作用。

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# Increasing Anti-oxidant Status

## 提升抗氧化值

- Addition of 100 g of freeze-dried wild blueberry powder to a high fat meal improved serum anti-oxidant status (ORAC value) and total antioxidant status (TAS) assay.
- Measurements were made at 1 and 4 hours after the meal.
- Increased anti-oxidant status may reduce risk of chronic degenerative diseases
- 含高量脂肪的餐食中添加100g冷凍藍莓乾能提升血漿抗氧化數值(ORAC值)與總抗氧化值。
- 在餐後1~4小時測量。
- 提升抗氧化值能降低罹患慢性退化性疾病。

Kay CD, Holub BJ. The effect of wild blueberry consumption on postprandial serum oxidant status in human subjects Br. J. Nutr. 88:389-98, 2002.



# Effects on Neuronal Aging

## 對神經細胞老化的功效

- Polyphenols in Blueberries offer beneficial effects
- Lower oxidative stress
- Lower inflammation
- May directly alter signaling involved in neuronal communication, calcium buffering ability, neuroprotective stress shock proteins, plasticity and stress signaling pathways
- 是藍莓所含得多酚類所發揮的功效
- 能降低氧化壓力 / 能減緩發炎
- 直接改變神經元間信號的溝通，鈣緩衝能力，神經元蛋白的可塑性和應激信號的傳遞途徑。

Shukitt-Hale B. Blueberries and neuronal aging. *Gerontology* 58:518-23, 2012.

Shukitt-Hale B, Lau FC, Joseph JA. Berry fruit supplementation and the aging brain. *J Agric. Food Chem.* 56:636-41, 2008.

## Improved Metabolic Measures

# 促進新陳代謝的實驗

- In an animal model of metabolic syndrome, animals fed crushed blueberries showed improvements in the metabolic anomalies induced by a high-fructose diet.
- Reduced insulin resistance, improved beta cell function, reduced plasma cholesterol, plasma leptin levels and abdominal fat were observed in the treated animals
- 在動物代謝症候群測試實驗中，餵食高量果糖飲食的動物加入切碎的藍莓能改善其不正常的代謝症候群。
- 觀察到實驗的動物產生能降低胰島素抗性，促進胰島腺  $\beta$ -細胞功能，降低血膽固醇，血漿中瘦素量與內臟脂肪量。

Khanal RC et al. Effect of dietary blueberry pomace on selected metabolic factors associated with high fructose feeding in growing Sprague-Dawley rats. J Med Food 15:802-10, 2012

# Protection from Light-induced Retinal Damage 保護視網膜

- Animal model of retinal damage from light exposure – two different animal models
- Dietary supplementation with blueberry juice or placebo
- In one animal model, the blueberry juice provided significant protection from light-induced damage.
- 進行因光線造成視網膜損傷的2種不同的動物實驗。
- 分別餵食藍莓汁與安慰劑。
- 在餵食藍莓汁那一組的動物對於因光線而造成的損傷能提供明顯的保護功效。

Tremblay F et al. Prophylactic neuroprotection by blueberry-enriched diet in a rat model of light-induced retinopathy. J Nutr Biochem 2012.

# Improved Spatial Memory

## 改善記憶力

- Animal model of spatial memory performance
- Young rats were given a blueberry diet for 7 weeks and compared with those on a control diet.
- Blueberry fed rats learned faster than the control animals.
- Biochemical changes were seen in the hippocampus.
- 是用來測試記憶力的動物實驗。
- 餵食含有藍莓的年輕老鼠7週後與控制組來作比較。
- 餵食藍莓組的老鼠學習上比控制組快。
- 在生物化學上的變化是發生在大腦的海馬區內。

Rendeiro C et al. Blueberry supplementation induces spatial memory improvements and region-specific regulation of hippocampal BDNF mRNA expression in young rats. *Psychopharmacology* 223:319-30, 2012.

# Prevents loss of Collagen in Bone Matrix

## 防止骨基質內膠原蛋白的流失

- A diet supplemented with blueberries prevents collagen loss seen after ovariectomy in rats.
- The diet also inhibit the senescence (aging) pathways in osteoblasts, the cells that build up bone.
- 飲食中補充藍莓能預防已切除卵巢的老鼠膠原蛋白的流失
- 這種飲食也能抑制“成骨細胞”(建構骨質的細胞)的老化。

Zhang et al. Blueberry consumption prevents loss of collagen in bone matrix and inhibits senescence pathways in osteoblastic cells. Age (Dordr) 2012.



## Improved Muscle Recovery after Exercise-Induced Damage

# 改善復原運動所造成的肌肉損傷

- 10 woman athletes participated
- Blueberry smoothie or placebo was given 5 and 10 hours prior to and immediately after strenuous quadriceps exercise
- The “treated” group had a faster rate of recover, and a faster rate of decrease in markers related to oxidative stress.
- 10位女運動員參與實驗。
- 在運用到四頭肌的激烈運動前 5 與 10 小時以及之後立即給予藍莓飲料與安慰劑。
- 藍莓飲料組展現出恢復非常迅速，同時也檢測出其氧化壓力也快速的降低。

McLeay Y et al. Effect of New Zealand blueberry consumption on recovery from eccentric exercise-induced muscle damage. J Int Soc Sports Nutr 9:19, 2012.



# Summary

## 結論

- There is abundant evidence in the peer-reviewed literature that blueberries have a wide range of health benefits.
- Most of the cited literature was published in 2012; there is one citation from 2013. Ongoing research continues to explore the mechanisms of the many health benefits of blueberries.
- 有大量文獻資料的證據證明，藍莓具有廣泛的健康效益。
- 大部分的引用文獻的發表於2012年，也有引用2013年的。更多正在進行的研究將繼續探索藍莓的許多對於健康有益處的機制。



Nitric Oxide

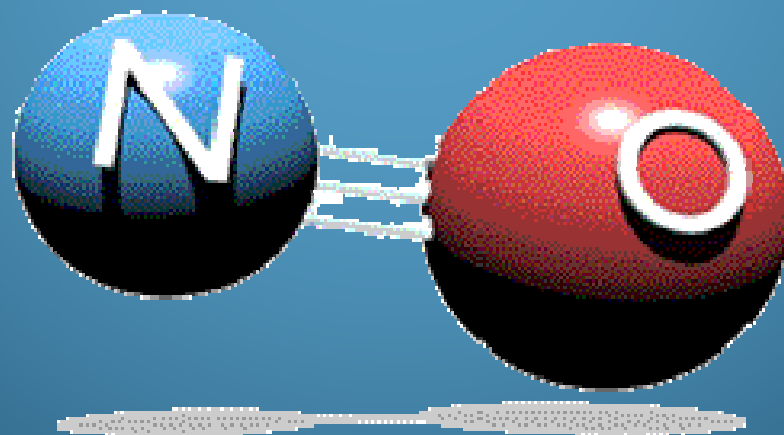
一氧化氮

# Nitric Oxide

## 一氧化氮

### “The Molecule OF LIFE”

## 生命的分子



# Nitric Oxide

## 一氧化氮

### The importance of Nitric Oxide

## 一氧化氮重要性

Underscored when three pharmacologists were awarded the Nobel Prize in Physiology or Medicine in 1998 for their research in Nitric Oxide.

三位科學家在1998年發表“一氧化氮”的研究而榮獲諾貝爾生理醫學獎，在報告中強調一氧化氮對人類生命的重要。



## Nitric Oxide Precursors

# 一氧化氮的先質

- The first recognized nitric oxide precursor was the amino acid arginine, which is converted to NO by a family of enzymes called Nitric Oxide Synthases (NOSs)
- Nitrates, Nitrite represent a second generation of Nitric Oxide precursors. They activate in seconds and are 100% arginine-free.
- 最先被發現的一氧化氮先質是精胺酸，可以經由一類稱為一氧化氮合成酶(NOSs)來生成一氧化氮。
- 硝酸鹽, 亞硝酸鹽則是另一種一氧化氮的先質，能非常迅速的生成一氧化氮，而且不需要精胺酸。

# Nitrates, Nitrites and Nitric Oxide

## 硝酸鹽, 亞硝酸鹽, 一氧化氮

- Nitrate = NO<sub>3</sub>

硝酸鹽

- Nitrite = NO<sub>2</sub>

亞硝酸鹽

- Nitric oxide = NO

一氧化氮



## Nitrates and Nitrites Are

### Recycled in the body

# 硝酸鹽與亞硝酸鹽的體內再循環

- In the mouth, some nitrates are converted to nitrites by bacteria.
- In the stomach, the nitrites are converted to NO, and the some of the nitrates are absorbed.
- Nitrates in the bloodstream are concentrated in the saliva, where they are converted to nitrites, then swallowed and converted to NO in the stomach.
- NO in the body is converted back to nitrites and nitrates, and the cycle continues
- 有些細菌能將硝酸鹽在口腔中轉換成亞硝酸鹽。
- 亞硝酸鹽在胃中轉化成一氧化氮，部分的硝酸鹽則被吸收入血液中。
- 硝酸鹽在血液中流至唾液腺中濃縮，轉換成亞硝酸鹽後分泌，經過吞嚥進入胃中再被轉換成一氧化氮。
- 一氧化氮也能轉換成為硝酸鹽與亞硝酸鹽而繼續體內的循環。

# Nitric Oxide: Effects on 一氧化氮的功效

- Cardiovascular system

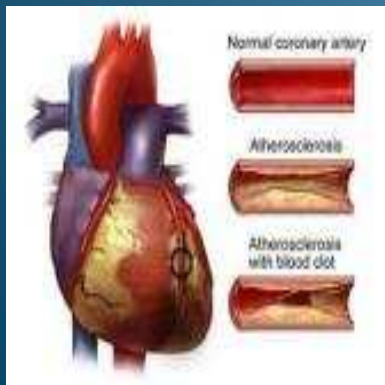
心血管循環系統

- Nervous system

神經系統

- Immune system

免疫系統



## Nitric oxide: Cardiovascular effects

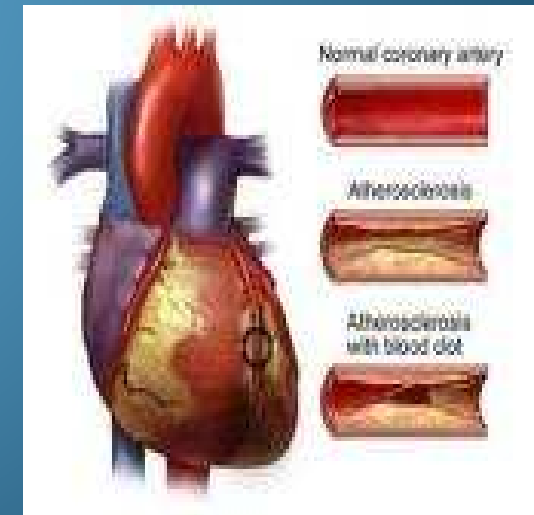
# 一氧化氮對心血管循環系統的調理

- NO signals the smooth muscle cells and induces increased compliance, enhancing blood flow throughout the vascular tree.
- Also regulates function in platelets (blood cells responsible for blood clots) to inhibit excess aggregation or blood clotting.
- 放鬆血管平滑肌，增加血管柔軟，增加血流量。
- 調節血小板的凝結作用，阻止血液凝集或結塊。

# Nitric Oxide: Cardiovascular Applications

## 一氧化氮對心血管循環系統的適用

- Arteriosclerosis (thickening and loss of flexibility)  
動脈硬化症 (管壁變厚並且失去彈性)
- Atherosclerosis (plaque build-up)  
動脈粥狀硬化(形成斑塊)
- Hypertension 高血壓
- Peripheral Vessel Disease  
周圍血管疾病
- Stroke 中風
- Heart attack 心臟病
- Diabetic vascular disease  
糖尿病併發血管疾病



## Nitric Oxide: Neurologic effects

# 一氧化氮對神經系統的調理

- Brain-derived NO affects several types of nerve cells
- Important in neurotransmitter pathways, both in the central and peripheral nervous systems.
- Regulates production and release of many hormones
- 影響中央和周圍神經系統神經細胞訊息的傳遞。
- 調節生產和釋放許多內分泌激素。



# Nitric Oxide: Neurologic applications

## 一氧化氮對神經系統的適用

- Alzheimer's disease and other dementias
- Anti-aging properties – release of human growth hormone (HGH)
- Regeneration of damaged axons of neurons
- Diabetic neuropathy



- 阿茲罕默症與其他老年癡呆症。
- 抗老化特性 - 分泌更多的生長激素(HGH)。
- 再生受損的神經元。
- 糖尿病併發的神經病變。



# Nitric Oxide: Immunologic effects

## 一氧化氮對免疫系統的調理

- Macrophage-derived NO
  - Important in the immune system
  - Helps macrophages kill bacteria and tumor cells
- 
- 活化巨噬細胞。
  - 對免疫系統非常重要。
  - 協助巨噬細胞破壞細菌與腫瘤細胞。

# Nitric Oxide: Immunologic applications

## 一氧化氮對免疫系統的調理

- Cancer

癌 症

- Bacterial and viral infection

細菌與病毒的感染

- General immunity

全面免疫力

- Inflammation

發炎反應症狀



# Nitric Oxide : More Power

## 更多能量的一氧化氮

- Significant increase in potency
  - Faster acting because of more rapid absorption
  - Longer sustained action because of higher concentration
  - Includes co-factors to increase N.O. generation and dramatically broaden the health benefit.
  - Additional ingredients: Magnesium, Niacin, Zinc, CoQ-10, Chromium and Quick-Sorb®.
- 
- 效能顯著的提高。
  - 因為更快速的吸收而更快發揮作用。
  - 因為更高的濃度而讓作用持續更久。
  - 補強輔助因子：輔酶Q-10、菸鹼酸、鎂、鋅、鉻與Quick-Sorb®，能提昇一氧化氮的生成以及增加更多的健康效益。

# 輔酶Q10 CoQ10

- A natural, fat-soluble nutrient present in virtually every cell in the body
- Vital to the production of Adenosine Triphosphate (ATP) which is 90% of the energy in the body
- Promotes cardiovascular health and improved blood flow
- Aides in strengthening the immune system and promoting good periodontal health
- 天然的脂溶性營養素，存在身體每一個細胞中。
- 對於生成腺苷三磷酸(ATP Adenosine triphosphate)是十分重要的關鍵成分。腺苷三磷酸(ATP)提供90%以上身體所需的能量。
- 提昇心血管的健康與促進血液循環。
- 強化免疫系統與幫助維護健康的牙周組織。

# 鎂 Magnesium (Mg)

- Converts carbohydrates, protein and fats to energy
  - Supports muscle relaxation and contraction as well as nerve transmission
  - Promotes healthy systolic and diastolic blood pressure
  - Promotes healthy glucose metabolism
- 
- 參與醣類蛋白質與脂肪轉換為能量。
  - 協助肌肉的收縮放鬆與神經訊息的傳遞。
  - 調節健康的收縮壓和舒張壓。
  - 促進健康的葡萄糖轉換代謝。



# 鋅 Zinc (Zn)

- A component of numerous enzymes including the enzyme that converts L-arginine into Nitric Oxide
- Plays a role in protein synthesis, blood sugar balance, wound healing and brain function
- Promotes healthy skin, and a strong immune system
- Promotes healthy fetal and reproductive health
- Promotes healthy prostate function
- 構成酶的重要成分，如一氧化氮合成酶(NOSS)。
- 在蛋白質合成血糖的平衡傷口的癒合與大腦的功能上扮演重要的關鍵成分。
- 促進健康的皮膚與良好的免疫系統。
- 維護健康的胎兒與生殖系統。
- 提昇前列腺功能的健康。

# 鉻 Chromium (Cr)

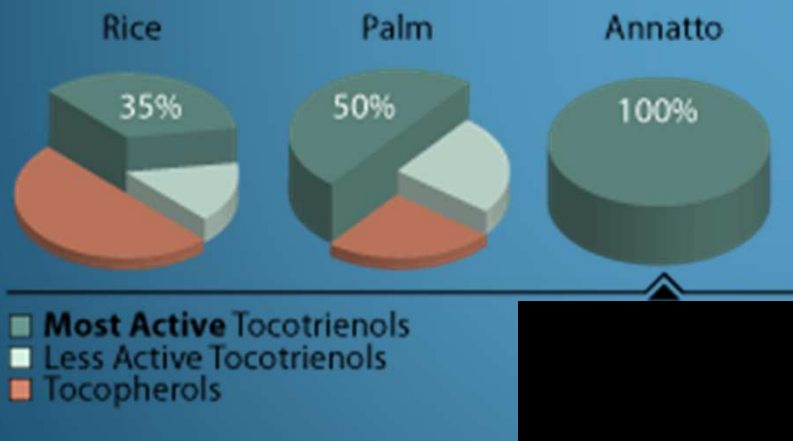
- Assists uptake of blood sugar into the cells
  - Promotes regulation of blood sugar levels
  - Reduces the risk of insulin resistance
  - Supports lean body mass
- 
- 協助血中糖分運送進入細胞內。
  - 維持血液中血糖的水平。
  - 降低胰島素抗性的風險。
  - 維持瘦體肌肉組織。

## Tocotrienols , Omega-3 fatty acids

# 生育三烯酚， $\omega$ -3不飽和脂肪酸

- Vitamin-E Tocotrienols from the seeds of the South American Annatto bush
- Omega-3 EFA's from certified Wild Alaskan Sockeye Salmon and other wildly caught fish.
- 500 mg Omega-3's in each serving
- These are lipid-soluble anti-oxidants.
- 生育三烯酚型態的維生素E 是來自南美的胭脂果樹的種子。
- $\omega$ -3不飽和脂肪酸來自阿拉斯加野生紅鮭魚與其他野生魚類。
- 每一份提供500mg  $\omega$ -3不飽和脂肪酸
- 提供脂溶性的抗氧化營養素。

# Tocotrienols 生育三烯酚



# Wild Alaskan Sockeye Salmon Oil

## 野生紅鮭魚魚油

A pure and rich source of Omega-3 fatty acids

純淨而且含量豐富的 $\omega$ -3不飽和脂肪酸





A Powerful Combination :  
Tocotrienols , Omega-3 fatty acids

超強有力的組合  
生育三烯酚， $\omega$ -3不飽和脂肪酸

The ingredients in Tocotrienols ,  
Omega-3 fatty acids have been  
shown to support a wide range of  
health benefits

生育三烯酚， $\omega$ -3不飽和脂肪酸  
對提昇健康上展現出非常廣泛的效益。

Pain & Inflammatory Disorders:

# 疼痛與發炎的疾病

Where do we stand as a nation?

我們所在的是什麼情況的國家？

Are we the *inflammation* nation?

我們所在的是發炎的國度？

Dr. Thomas Burke

USA Today May 9, 2005

USA  
TODAY

# THE fight against PAIN

abc NEWS

A new USA TODAY/ABC News/Stanford University Medical Center poll found that more than half of Americans are living with chronic or recurrent pain, and for large numbers of Americans, the pain interferes with their daily lives. The two news agencies are teaming up this week to cover the treatment of pain.



By Suzy Parker, USA TODAY

## This week in USA TODAY

### TODAY

#### The science of pain

- What causes it, and what cutting-edge treatments are on the horizon? **1A**
- The latest research on children. Young patients are just now getting treatment. **Story below**
- Exercises and other tips to relieve back pain. **7D**

**TUESDAY:** Using acupuncture to treat chronic pain. Who is turning to the treatment, and is it effective? Also, do prayer and faith help ease life's aches?

**WEDNESDAY:** Challenges that face injured veterans.

**THURSDAY:** Coping with sports injuries.



# PAIN 疼痛

“The problem is absolutely enormous,”  
says Dr. Russell Portenoy, chairman of Pain Medicine at  
New York’s Beth Israel Medical Center.

“這當然是一個很嚴重的大問題”

Russell Portenoy 博士是紐約 Beth Israel  
醫學中心疼痛科的主任。

“It rivals every serious public-health issue, whether you’re  
talking about heart disease, cancer, obesity or anything else.”

“這絕對是一個很嚴重的問題。無論你談論的是  
心臟病、癌症、肥胖或其他的問題，我們要面對  
的是非常嚴重的公共健康的問題”

# Inflammation Nation 發炎的國度

Number of Americans who suffer from inflammatory disorders

- Arthritis (all types) – 70 million
- Allergies – 39 million
- Asthma – 17 million
- Cardiovascular Disorders – 60 million

*These numbers do not include other inflammatory conditions like G.I. disorders, Neurological disorders, diabetes, cancer, etc.*

因為發炎問題而受苦的美國人

- 關節炎(所有形態) - 有 7 千萬人
- 過敏 - 有 3 千 9 百萬人
- 氣喘 - 有 1 千 7 百萬人
- 心血管疾病 - 有 6 千萬人

這些數目尚不包含其他發炎的狀況，如腸胃疾病、神經系統疾病、糖尿病、癌症..等

Challem, Jack. *The Inflammation Syndrome*.



## 1 Injury

A splinter slices through the skin, damaging cells and allowing **bacteria** and other pathogens into the body. In the world in which our bodies evolved, pain almost always signaled a microbial invasion

MAST CELLS

Damaged cells

CYTOKINES

## 2 A Cry for Help

Mast cells release **histamine** and **cytokines**, which alert the body that something is wrong. Tiny **blood vessels** respond by developing leaks that allow other immune cells to rush to the field of battle

HISTAMINE

PLATELETS

Fibrin network forms clot

A splinter no larger than the head of a pin can carry billions of bacteria

Trapped red blood cells

## 5 Healing

As the pathogens are eliminated, a new series of molecular messengers signals victory. A group of irregularly shaped cells called **platelets**, along with other substances, forms **clots** and closes the wound

NEUTROPHILS

## 4 Battle

Specialized immune cells migrate to the wound. **Neutrophils** engulf and destroy bacteria and damaged tissue, more **macrophages** appear, and **lymphocytes** intensify the immune system's firepower

LYMPHOCYTES

Immune cells

MACROPHAGES

Vessel wall becomes permeable

## 3 Counterattack

Even before reinforcements arrive, pre-stationed **macrophages** start attacking bacteria and damaged cells, using toxic chemicals like **nitric oxide**

regulates the immune system

## CHRONIC IN

The body's effort to repair damage it creates by only making more

Un  
Scien

TIM  
Text by Christine





THE LAB STUDY

臨床實驗研究

Macrophage cells are a major source of inflammatory activity

巨噬細胞是產生炎症反應的一個主要來源

Macrophages produce several compounds that induce inflammatory responses

巨噬細胞能產生許多啟動發炎反應的化合物

Some of these compounds are :

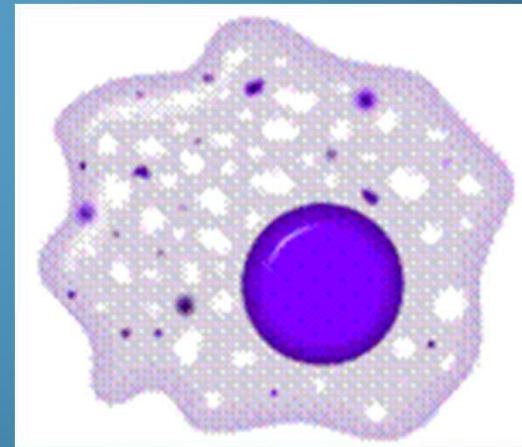
這些化合物有如：

TNF- $\alpha$ ;

IL-10;

IL-12

and IL-1 $\beta$



When macrophages were stimulated to an inflammatory state they produced 6.7 times more IL-1 $\beta$

當巨噬細胞受到發炎反應的刺激，將產生數量多6.7倍的IL-1 $\beta$ 。

This is exactly what is expected when the macrophages respond to inflammation.

這就是巨噬細胞對於發炎症狀產生時可以預期的反應。

A very large increase in IL-1 $\beta$  concentration  
IL-1 $\beta$ 的濃度將大幅度的增加。

## RESULT

### 實驗結果

When highly inflamed macrophages are treated with  
TOCOTRIENOLS , OMEGA-3 FATTY ACIDS

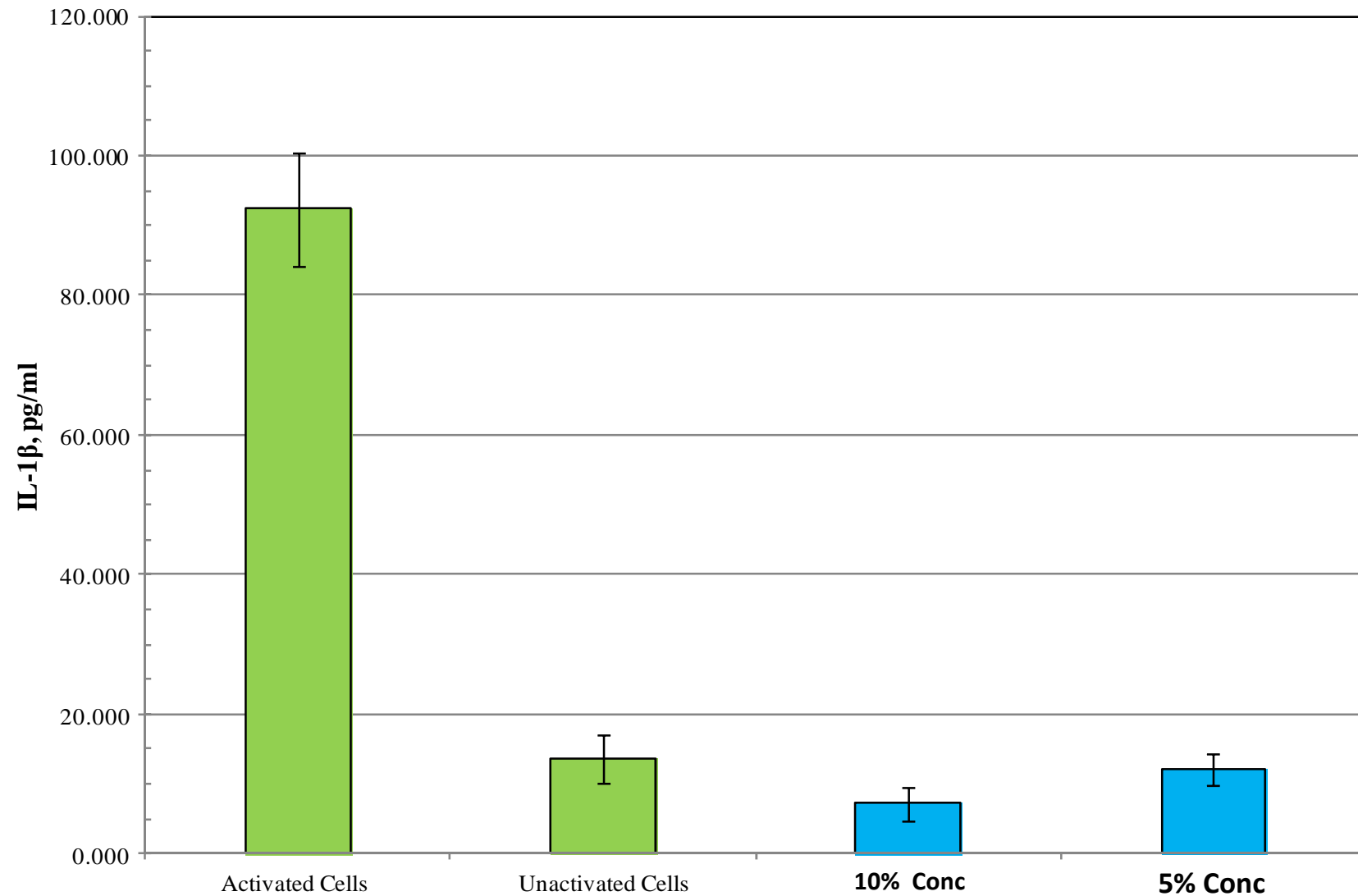
使用生育三烯酚,  $\omega$  - 3不飽和脂肪酸  
來處理嚴重發炎的巨噬細胞

The production of IL-1 $\beta$  is completely prevented

完全阻止巨噬細胞產生IL-1 $\beta$ 的反應



### Effects on the Production of IL-1 $\beta$ by Macrophages



**HIGHLY EFFECTIVE ANTI-INFLAMITORY**  
**高效能的抗發炎作用**

**EVEN AT LOW CONCENTRATIONS OF 5%**  
**AND 10%**

**即使生育三烯酚, *W*-3 不飽和脂肪酸**  
**只使用 5% 與 10% 的濃度**

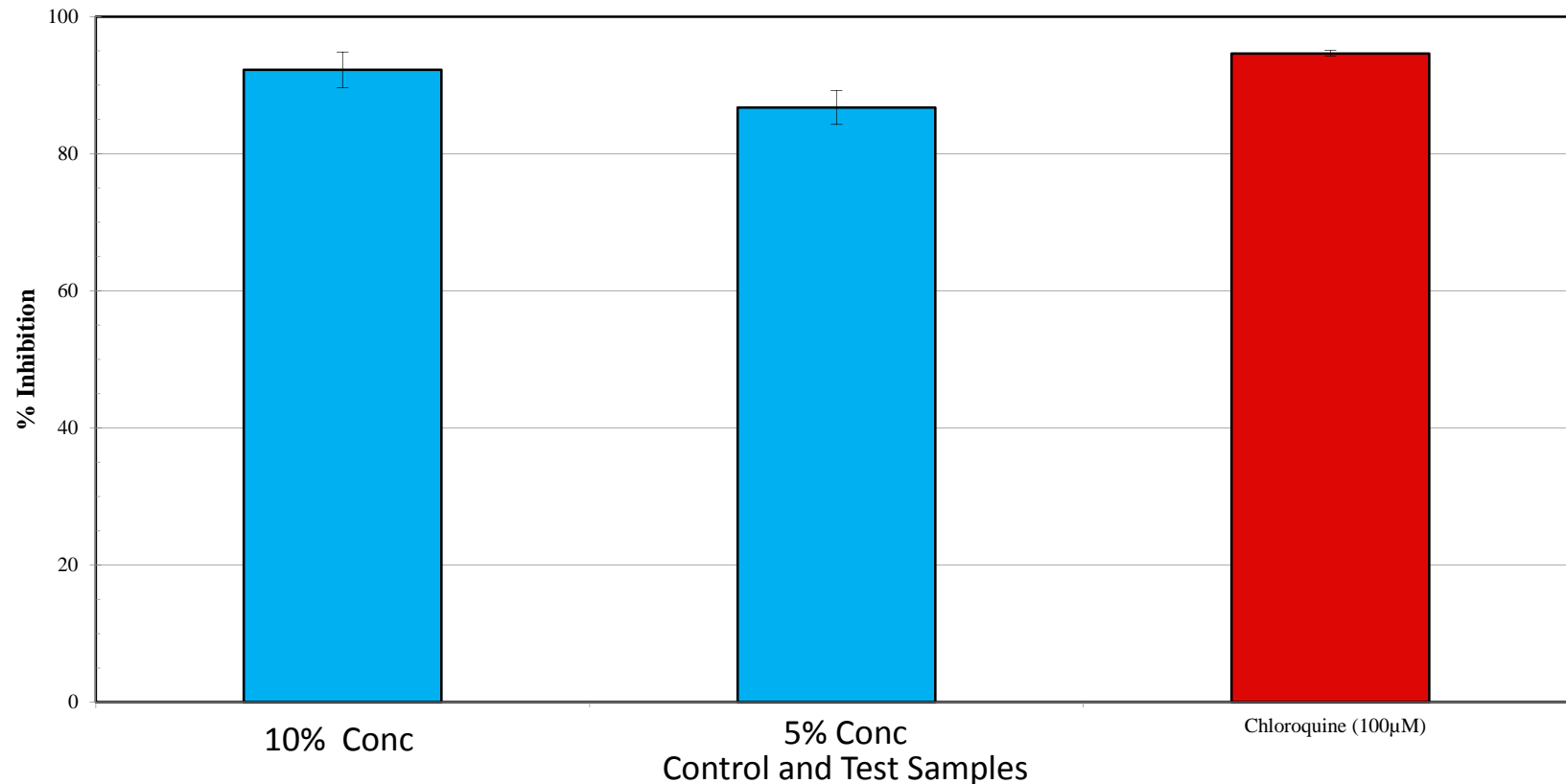
The study results are striking !

## 研究結果引人注目

Both doses of Tocotrienols , Omega-3 fatty acid  
are as good as chloroquine !

生育三烯酚,  $\omega$ -3不飽和脂肪酸兩種使用量其效果與藥物綠奎寧一樣好

Effect of Sunset on the Production of IL-1 $\beta$  by Activated Monocytes/Macrophages:  
% Inhibition



Tocotrienols , Omega-3 fatty acid are as Effective as  
Chloroquine Even at 5% and 10% Concentrations  
Without the Side Effects

即使只使用 5% 與 10% 的  
生育三烯酚,  $\omega$  - 3不飽和脂肪酸  
其效果與藥物綠奎寧一樣  
而且沒有任何副作用





# SUMMARY 結論

Tocotrienols , Omega-3 fatty acid  
生育三烯酚 ,  $\omega$  - 3不飽和脂肪酸

A very strong

Anti-Inflammatory product  
一種超強效抗發炎的產品