

# THE CHRONICLE OF PINE

Palm International Nutraceutical

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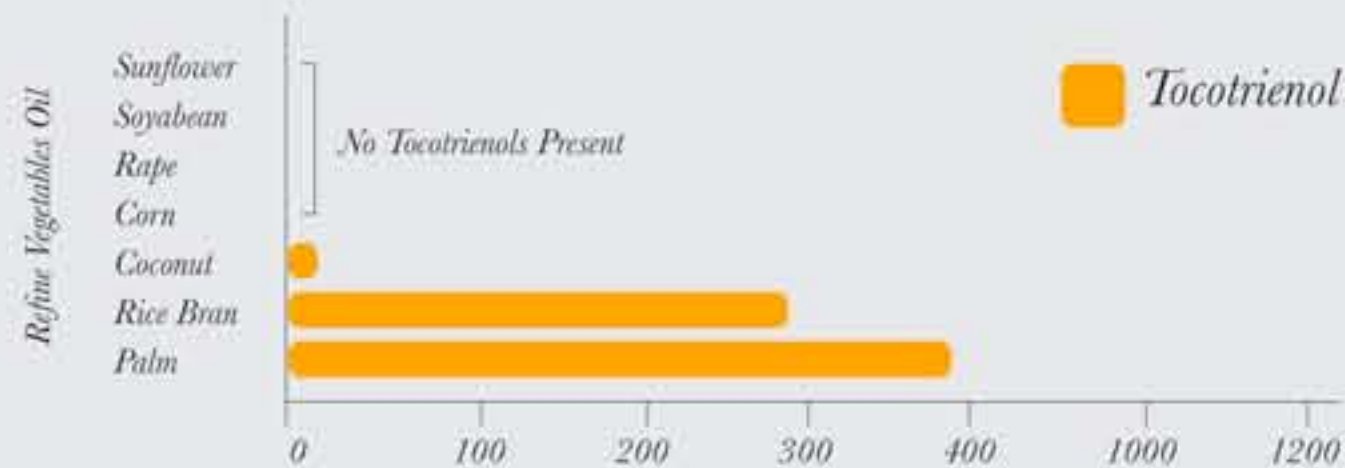
10  
surprising  
facts you  
probably  
do not  
know  
about  
palm oil



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**ANTICANCER  
EFFECTS OF  
COMBINATION  $\gamma$ -  
TOCOTRIENOL  
TREATMENT WITH  
OTHER  
CHEMOTHERAPEUTIC  
AGENTS**  
*Prof. Dr. Paul W.  
Sylvester – University of  
Louisiana at Monroe,  
USA*

$\gamma$ -Tocotrienol is a rare form of vitamin E that is naturally found in high concentrations in palm oil and displays potent anticancer effects at treatment. At present, systemic chemotherapy is the only method of treatment that provides somewhat of a chance for long term survival in patients with cancer. Recent studies show that combined treatment of  $\gamma$ -Tocotrienol with anticancer drugs may not only provide an enhanced therapeutic response, but also avoid the toxicity associated with high dose of chemotherapy drugs.

## Vitamin E Content in Fats & Oils



Ref: Ong, A.S.H (1993), Natural sources of Tocotrienols. In Lester Packer & Jürgen Fuchs (eds), Vitamin E in health and disease. Marcel Dekker, Inc; New York

Oil	Tocopherols	Tocotrienols
Palm	133	1015
Rice Bran	311	308
Soybean	1162	-
Olive	100	-
Corn	603	-
Rape (Canola)	271	-
Sunflower	636	-

## 1 $\alpha$ -TOCOTRIENOL: PEEKING INTO A WELL-KEPT PALM OIL SECRET

*Prof. Dr. Chandan K – The Ohio State University Medical Centre, USA*

Natural vitamin E, discovered over eight decades ago, exists in eight different forms  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$  - tocopherols and  $\gamma$ -tocotrienols. At present, over 95% vitamin E research address one-eighth of the vitamin E family -  $\alpha$ -Tocopherols - making this form of vitamin almost synonymous with vitamin E. Current work demonstrate that in the tocopherol sub-family, other forms of tocopherols possess unique beneficial properties. More striking progress is unfolding with tocotrienols which represents only ~1% of the current vitamin E literature. Ten years ago, our laboratory published first evidence demonstrating that extremely low concentration of tocotrienol possess potent neuroprotective functions and these functions were a mechanism by which  $\alpha$ -Tocotrienol protect against stroke, which is currently the third leading cause of death in the U.S as well as in Malaysia.

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**OIL PALM PHENOLICS (OPP): A BIOACTIVE TO PROMOTE CARDIOVASCULAR HEALTH**

**Dr. Mahinda Abeywardena<sup>1</sup>, Dr. Kalyana Sundram<sup>2</sup>, Dr. Ravigadevi Sambanthamurthi<sup>3</sup>, Dr. Yew-Ai Tan<sup>3</sup>, Soon-Sen Leow<sup>3</sup> and Datuk Dr. Mohd Basri Wahid<sup>3</sup>**

<sup>1</sup>CSIRO-Human Nutrition, Australia;  
<sup>2</sup>Malaysian Palm Oil Council,  
<sup>3</sup>Malaysian Palm Oil Board, Malaysia<sup>3</sup>

Polyphenols are good candidate molecules for potential bioactives as they may possess multifunctional properties, the ripe palm fruit used in the extraction boasts a rich mix of deep colours (maroon, red, orange and yellow) are indicative of an abundance of polyphenolics and carotenes. Indeed, palm carotenes and palm vitamin E, enriched in tocotrienols, reside in the mesocarp, and are recovered from the extracted crude palm oil. In contrast to such lipid-soluble compounds present in the oil, the vegetation liquor originating from the milling process has recently been identified as a rich source of water soluble polyphenolics compounds or oil palm phenolics (OPP). To assess the potential cardiovascular protective actions of OPP, a wide range of tests and studies like in vitro screening essays, ex vivo tissue preparation as well as preclinical trial on animals were carried out, and the results showed that OPP as a potential bioactive ingredient which may positively influence multiple cardiovascular outcomes.

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**ANTI-INFLAMMATORY PROPERTIES OF PALM TOCOTRIENOLS**

**Prof. Dr. Lean-Teik Ng – National Taiwan University, Taiwan**

Tocotrienol have been shown to possess potent antioxidant, anticancer and cholesterol lowering ability. A study was carried out to examine the effects of tocotrienol on lipopolysaccharide (LPS)-induced inflammatory through measuring various production of inflammatory mediators, such as nitric oxide (NO), nitric oxide synthase (iNOS), Cyclooxygenase-1 (COX-2) and nuclear factor-kappa B (NF-κB). The result showed palm tocotrienols possesses potent anti-inflammatory activity by inhibition of COX-2 and iNOS production as well as NF-κB expression.

**(Additional Information:** *Inflammation can cause by bacteria, trauma, chemicals or immunological reactions that is likely to increase the risk of chronic diseases such as asthma, cancer, alzheimer's disease and heart disease, where mediators are substances that cause the inflammation. Lipopolysaccharide is commonly found as the constituent of the cell walls of certain bacteria, the function is to help stabilize the overall structure and it is toxic chemical for human.)*



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**TOCOTRIENOL AND PANCREATIC CANCER**

**Dr. Mokenge Malafa – Moffitt Cancer Center, Tampa, USA**

Pancreatic cancer is one of the leading causes of cancer-related death due to its aggressive behavior and resistance to current therapies. The 5-year survival rate of pancreatic cancer is a dismal and to improve current therapies is a health research priority. Tocotrienols are naturally occurring vitamin E compounds found in barley, oats, rice bran and palm. These molecules display a diversity of biological and physiology properties including potent antioxidant effects, one pre-clinical studies identified δ-Tocotrienol (gamma-tocotrienol) as the most bioactive of the 4 natural compounds (α, β, γ, δ) against pancreatic cancer cells in vitro and in vivo. It has also been observed that δ-tocotrienol is adequately concentrated in mice pancreas after oral ingestion. Thus, future studies would be conducted in patients with pancreatic cancer aimed to investigate both the safety of δ-Tocotrienol and its effective dosage to treat pancreatic cancer.

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**ANTI-AGING AND TOCOTRIENOL SUPPLEMENTATION**

**Prof. Dr. Wan Zurinah Wan Ngah – University Kebangsaan Malaysia, Malaysia**

The free radical of aging results in increased oxidation generally suggesting a potential benefit from antioxidant supplementation. A study was conducted to establish the possible benefits of Tocotrienol by supplementing healthy older individuals with a daily dosage of 160mg for a duration of 6 months, blood sample obtained from two age groups, 35-49 years old and above 50 years old. It is found that the good cholesterol levels in tocotrienol supplemented group were elevated after 6 months thus increasing the ratio of HDL to total cholesterol levels. Apart from plasma cholesterol level, tocotrienol supplementation also demonstrated improvements in protein damage, antioxidant vitamins (both vitamin E and C) and advanced-glycosylation end products (AGEs).

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**TOCOTRIENOL AND PROSTATE CANCER**

**Prof Y.C Wong – The University of Hong Kong, HKSAR, China**

Tocotrienol from palm oil has been demonstrated to have suppressive effect on the proliferation of prostate cancer cells, this study focused on its anti-proliferative effect on pancreatic cancer cells. This study showed that the inhibitory effect of gamma-tocotrienol was most potent as it is able to suppress the invasion of pancreatic cancer cells. In addition, a synergistic effect was observed when pancreatic cancer cells were treated with a combination of gamma-tocotrienol and Docetaxel, (the only chemotherapeutic drug which has been shown to have effect on hormone refractory prostate cancer). Taken together these results suggested that the gamma-tocotrienol suppresses cell proliferation and invasion ability of pancreatic cancer cells through multiple signaling pathways. Thus this study further suggested that tocotrienol could act synergistically with Docetaxel to suppress the growth of pancreatic cancer cells.

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**PALM FRUIT CAROTENE ON SKIN LIPID PEROXIDATION**

**Dr. Michiaki Murakoshi, and Hoyoku Nishino – Kyoto Prefectural University of Medicine, Japan**

Skin lipid Peroxidation is well known example of oxidative damage in fat containing structure, such as unsaturated phospholipids, glycolipids, cholesterol present in cell membrane. This study compared the effect between palm fruit carotene and chemically synthesized beta-carotene on skin lipid peroxidation induced by UV irradiation in hairless mice. Interestingly, results show that intake of palm fruit carotene demonstrated stronger effect of suppressing UV-induced oxidation than that of synthetic beta carotene. Therefore this study concluded that natural palm fruit carotene seems to be a possible agent to prevent skin lipid peroxidation against skin cancer.

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**PALM VITAMIN E ON TOPICAL APPLICATION**

**Zafarizal Aldrin Azizul Hassan and Rosnah Ismail – Malaysian Palm Oil Board, Malaysia**

Vitamin E is known to play essential role in the defense of UV-induced skin disease. It absorbs strongly the UV-B region of sunlight, thus acts as a photoprotective compound in skin cell membrane against UV induced erythema. In this regards, topical applications containing tocotrienol provide an efficient way of enriching the skin as vitamin E that has better antioxidative activity than the tocopherol alone. The photoprotective effect of tocotrienol in topical application is found to be very similar to the SPF15 sunscreen. Apart from the photoprotective benefit, tocotrienol also reduce skin inflammation in acne formulation and moisturizing effect in other cosmetic products.

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**PALM CAROTENOIDS AND NATURAL COLORANTS**

**Dr. Sharon Ling – Carotech Ltd, United Kingdom**

Artificial colorants such as quinoline yellow, sunset yellow and tartrazine do not possess any nutritional value but causes hazardous effects like allergy and hyperactivity, natural palm carotenoids complex has been well accepted in food and beverage industry as a natural colorant that impart shade of yellow and orange, it has been widely used in the fat and dairy processing industry to standardize color of margarine, butter or edible oil. Compared to synthetic beta-carotene, less amount of palm carotenoids complex is needed to achieve the same color intensity, so, why not use natural color when it is safe and beneficial?

**The Difference Between the Tocopherol and Tocotrienol Forms**

Since the discovery of Vitamin E, 99% of medical research has been devoted to the tocopherol form. Tocotrienol is almost similar to Tocopherol chemical structurally, except for the three double bonds as pointed by red arrows. These bonds create a curl configuration which allows more mobility in the human lipid membranes. Because it has three double bonds that represent the "unsaturated" side chain that allows molecule to penetrate into lipid membrane layers of various organs, beside that, the double bond also exhibits the ability to accept electrons as an antioxidant. Vitamin E has been scientifically proven to be a more potent antioxidant as compared to tocopherol. At present moment, there is no synthetic form of tocotrienol available, hence the best source is still from palm oil.

**Tocopherol - Straight Tail**

**Tocotrienol - Curved Tail**