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10 surprising facts you probably do not know about palm oil

Anticancer effects of combination γ-tocotrienol treatment with other chemotherapeutic agents

Prof. Dr. Paul W. Sylvester - University of Louisiana at Monroe, USA

γ-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 γ-Tocotrienol with anticancer drugs may not only provide an enhanced therapeutic response, but also avoid the toxicity associated with high dose of chemotherapy drugs.

Natural vitamin E, discovered over eight decades ago, exists in eight different forms α, β, γ, δ - tocopherols and tocotrienols. At present, over 95% vitamin E research addresses one-eight of the vitamin E family - α-tocopherol - 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 α-tocotrienol protect against stroke, which is currently the third leading cause of death in the US as well as in Malaysia.

Vitamin E Content in Fats & Oils

<table>
<thead>
<tr>
<th>Fatty Acids</th>
<th>Vitamin E Content</th>
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<tbody>
<tr>
<td>Palm</td>
<td>656</td>
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<tr>
<td>Rice</td>
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<td>Sesame</td>
<td>331</td>
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<td>Sunflower</td>
<td>316</td>
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OIL PALM PHENOLICS (OPP): A BIOACTIVE TO PROMOTE CARDIOVASCULAR HEALTH

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Polyphenols are good candidates for potential bioactive properties as they may possess multifunctional properties, the ripe palm fruit kernel in the extraction process bears a rich mix of deep colours (maroon, red, orange and yellow) and are an abundance of polyphenolics and carotenoids. Indeed, palm carotenoids and palm vitamin E, enriched in tocotrienols, reside in the mesocarp, and are recovered from the extracted crude palm oil. In contrast to such lipophilic compounds present in the oil, the vegetation lipoprotein 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 action of OPP, a wide range of tests and studies like in vitro screening assays, ex vivo tissue preparation as well as preclinical testing on animals were carried out, and the results showed that OPP as a potential bioactive ingredient which may positively influence multiple cardiovascular outcomes.

ANTI-INFLAMMATORY PROPERTIES OF PALM TOCOTRIENOLS

Prof. Dr. Leun-Tek Ng – National Taiwan University, Taiwan

Tocotrienol has 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 (NOS), Cyclooxygenase-1 (COX-2) and nuclear factor kappa B (NF-kB). The result showed tocotrienol possesses potent anti-inflammatory activity by inhibition of COX-2 and NOS production as well as NO expression.

ADDITIONAL INFORMATION: Inflammation can cause immune dysfunction, cell injury or molecular reactions that is likely to increase the risk of chronic diseases such as asthma, cancer, atherosclerosis and heart disease, where mediators are substances that cause the inflammation.

Tocotrienol 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 humans.

TOCOTRIENOL AND PANCREATIC CANCER

Dr. Mokeng Malasha – 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 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 pharmacology properties including potent antioxidant effects, one pre-clinical studies identified 6-Tocotrienol (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 6-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 6-Tocotrienol and its effective dosage to treat pancreatic cancer.

TOCOTRIENOL AND PROSTATE CANCER

Prof. Y.C. Wong – The University of Hong Kong, Hong Kong, 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-hexaneoil was most potent as it is able to suppress the invasion of pancreatic cancer cells. In addition, a suppressive effect was observed when pancreatic cancer cells were treated with a combination of gamma-tocotrienol and Doxetaxel, (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 Doxetaxel to suppress the growth of pancreatic cancer.

ANTI-AGING AND TOCOTRIENOL SUPPLEMENTATION

Prof. Dr. Wan Zuirah 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 levels, tocotrienol supplementation also demonstrated improvements in protein damage, antioxidant vitamins (both vitamin E and C) and advanced-glycation end products (AGEs).

TOCOTRIENOL ON SKIN LIPID PEROXIDATION

Dr. Michiaki Murakoshi, and Hoyouki 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 carotenoid and chemically synthesized beta-carotenone on skin lipid peroxidation induced by UV irradiation in hairless mice. Interestingly, results show that intake of palm fruit carotenoid demonstrated stronger effect of suppressing UV-induced oxidation than that of synthetic beta-carotenone. Therefore this study concluded that natural palm fruit carotenoid seems to be a possible agent to prevent skin lipid peroxidation against skin cancer.

PALM FRUIT CAROTENOIDS ON TOPICAL APPLICATION

Zafarali Ahmad Azizuddin Hassan and Rosnah Ishmail – Malaysian Palm Oil Board, Malaysia

Vitamin E is known to play essential role in the defense of UV-induced skin disease. It absorbes strongly the UV-B region of sunlight that acts as a phototoxic compound in skin cell membrane against UV induced erythema. In this regard, topical applications containing tocotrienol provide an efficient delivery 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 SPF 15 sunscreen. Apart from the photoprotective benefit, tocotrienol also reduce skin inflammation in acne formulation and moisturizing effect in other cosmetic products.

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 cause 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 intensity, so why not use natural color when it is safe and beneficial?