

Research & Development for Higher Value Coconut Products: Nutraceuticals & Cosmetics



PROFESSOR W. MCLAUGHLIN
DEPARTMENT OF BASIC MEDICAL SCIENCES
UNIVERSITY OF THE WEST INDIES, MONA

The Coconut



- *Cocos nucifera* is one of the most economically important perennial crops in the tropics
- 96% of coconut crops are cultivated by small holders worldwide
- In 2011, a total of 3.4 million coconut palms were grown in Jamaica on 15,400 hectares, producing 95 million coconuts

The Coconut



- The coconut is a multipurpose, smallholder's crop with a diverse array of products
 - copra
 - copra meal
 - coconut water
 - confectionery
 - coconut craft items
 - virgin coconut oil
 - Husk

How to be the Coke of coconut water

- Vita Coco is the kingpin of U.S. coconut water
 - made roughly \$150 M in 2012 estimates \$250 M in 2013
- Coca-Cola
\$15M acquisition of Zico (Brazil)
- Pepsi has increased its investment in O.N.E. coconut water



Coconut Oil (CNO)

- **Coconut oil** is an edible oil that has been consumed in tropical places for thousands of years
- Philippine in Feb 2013 exported 61,800 metric tons. Up 44% over the same period last year
 - Expect exports to reach 925,000 MT



Uses of CNO



Industry

- home cooking, food confectionery ice cream, commercial food processing, cosmetic, industrial fuel, medicine and pharmaceutical purposes

Health Benefits

- hair and skin care, dental care, improving bone health. weight control, detoxification, stress relief, maintaining blood cholesterol levels, enhance immunity, relief of digestive problems and metabolism, improving kidney function, protecting heart diseases, reducing hypertension, help in diabetic condition, improving health status in HIV and cancer patients, anti-microbial, anti-inflammatory, Alzheimer, epilepsy

Chemistry of Coconuts



Components	Kernel (100 g)	Green Nut (100 g)	Coconut Water (100 g)
H ₂ O	36.3 g	68 - 84 g	95.5%
protein	4.5 g	1.4 - 2.0 g	0.10%
fat	41.6 g	1.9 - 17.4	<0.1%
Total CHO	13 g	4 - 11.7 g	4.00%
fibre	3.6 g	0.4 - 3.7 g	
ash	1.0 g	0.7 - 0.9 g	0.4%
Ca	10 mg	11 - 42 g	29 mg
K		257 mg	312 mg
P	24 mg	42 - 56 mg	37 mg
Na			105 mg
Fe	1.7 mg	1.0 - 1.1 mg	0.1 mg
thiamine		0.4 - 0.5 mg	
riboflavin		0.03 mg	
niacin		0.8 mg	
ascorbic acid		6 - 7 mg	
calories		77 - 200	

Composition of Crude Coconut Oil



- Triacylglycerols
- Fatty Acids
- Phospholipids
- Tocopherols
- Trace metals
- Sterols
- Volatiles
- Mono- and di-acylglycerols

Fatty Acid Composition



Name of fatty acid	Carbon Length	% in Corn Oil	% in Coconut Oil
Caprylic	C8	0.167	6.601
Capric	C10	-	5.071
Lauric	C12	0.042	46.458
Myristic	C14	-	20.572
Palmitic	C16	12.427	9.161
Stearic	C18	11.442	2.936
Oleic	C18.1	36.994	7.211
Linoleic	C18.2	47.189	1.648
Linolenic	C18.3	1.312	-
Arachidic	C20	0.298	-
Heneicosanoic	C21	-	-
Beheric	C22	0.151	-
Tricosanoic	C23	-	-
Lignoceric	C24	-	-

Chemical Properties



- Highly stable towards atmospheric oxidation
 - Added to other vegetable oils to improve oxidative stability
- Mainly composed of medium chain fatty acids (MCFA)
- Commercially important source of MCT
 - Low molecular weight
 - Soluble in alcohols, ketones, acids

Biological Properties - MCT



- easily digested
- easily absorbed
- Provide a quick source of energy
- Excellent carriers for flavors, vitamins
- Used in research, medicine, cosmetics, food products

Global Nutraceutical Industry



- Global nutraceutical ingredients market is forecasted to record yearly growth in excess of 7% to reach almost \$24 billion in 2015
- The greatest growth is expected to come from ingredients with **clinically confirmed** health benefits that can be used in a wide range of dietary supplements, drinks, foods, and nutritional preparations for children and adults

Global Nutraceutical Industry



- Nutraceuticals are used in the prevention of potential disease and the healing of already existing diseases
- The nutraceuticals product industry is classified broadly according to functional beverages, functional food, and dietary supplements

Nutricosmetics



- Considered an emerging market in the USA
- Well-established in Asia
- Ingestible supplements designed to promote beauty from within –
- Topical products
- 2012 U.S. sales of nutricosmetics rose 9.4% last year to \$1.1 billion

Health Benefits



- Type 2 Diabetes
- Alzheimer
- Epilepsy
- Hypertension
- Anti-viral, anti-fungal, anti-bacterial
- Anti-oxidants, anti-inflammatory
- Heart Health and DHEA Support

Published Papers



- Study: Traditional Virgin Coconut Oil High in Antioxidants and Reduces Oxidative Stress in Heart, Kidney, and Liver
- Study: Virgin Coconut Oil Effective in Treating High Blood Pressure
- The Medium Chain Triglyceride diet and intractable epilepsy

Published Papers...



- Coconut Oil and Ginger Aromatherapy with Massage Improves Immune System in Cancer Patients
- Preliminary study on the In-Vitro Susceptibility of *Mycobacterium tuberculosis* Isolates to Virgin Coconut Oil
- Use of medium chain triglycerides for the treatment and prevention of Alzheimer's disease and other diseases resulting from reduced neuronal metabolism II. US Patent 6,835,750 B1

Research & Development Strategies



- Needed to developed low volume high priced products
- Nutraceuticals & Cosmeceuticals

Strategies



- Target specific disease(s)
- Develop supplements
- Laboratory testing – QC & Animal studies
- Clinical trials
- Collaboration with Universities, Research Centres and private sector
 - Worked very well with CIB- Jamaica & UWI -Mona

Research & Development

- The best way to have all the unique health benefits from CNO is by dietary supplementation
- CNO supplements take the form of concentrated soft gels
 - amino acids
 - vitamins
 - Omega -3
 - folate



Research



- More rigorous scientific studies are needed to ensure that biologic activity is maintained when ingredients are formulated together

Alzheimer Research



- Therapeutic and physiological effects of treatment with VCO in an Alzheimer's disease mouse model – Dr L. Young-Martin

VCO Cosmeceutical Uses:

- Is an effective base oil for inclusion within lotion, cream, body butter and lip product formulations.
- It can be included in hair oil formulations to condition and increase manageability and sheen
- It is suitable for use as a non-greasy, non-staining massage oil.
- Is an excellent superfatting agent for use within cold process soapmaking



Cosmeceutical



Soap

- True Body Soaps are all-natural unscented everyday bar soaps that are made without animal by-products, synthetic ingredients or chemical preservatives, and contain only five ingredients—coconut oil, palm oil, water, vegetable glycerine and sodium citrate.

Lip balm

- organic virgin coconut oil, made with fresh organic coconuts and has a higher level of antioxidants.
Available in five varieties: Cinnamon/Peppermint (spicy and cooling), Tea Tree (clean and robust), Orange/Cinnamon (spicy and refreshing), Citrus (uplifting refreshing), and Unscented (for those with allergies or sensitivity to fragrances).

Cosmeceutical R & D



- Can the active ingredient penetrate the stratum corneum and be delivered in sufficient concentrations to its intended target in the skin?
- Does the active ingredient have a known specific biochemical mechanism of action in the target cell or tissue in human skin?
- Are there published, peer-reviewed, double-blind, placebo-controlled, statistically significant, clinical trials to substantiate the efficacy claims



- http://www.nutraceuticalsworld.com/issues/Beauty-IO-2013/view_features/marketwatch-2013/#sthash.roV3rEsA.dpuf