




# Health-promoting effects of RED PALM OIL


Palm Oil Health Awareness Evening Forum & Dinner  
18th February 2023  
Riverside Majestic Hotel, Kuching, Sarawak



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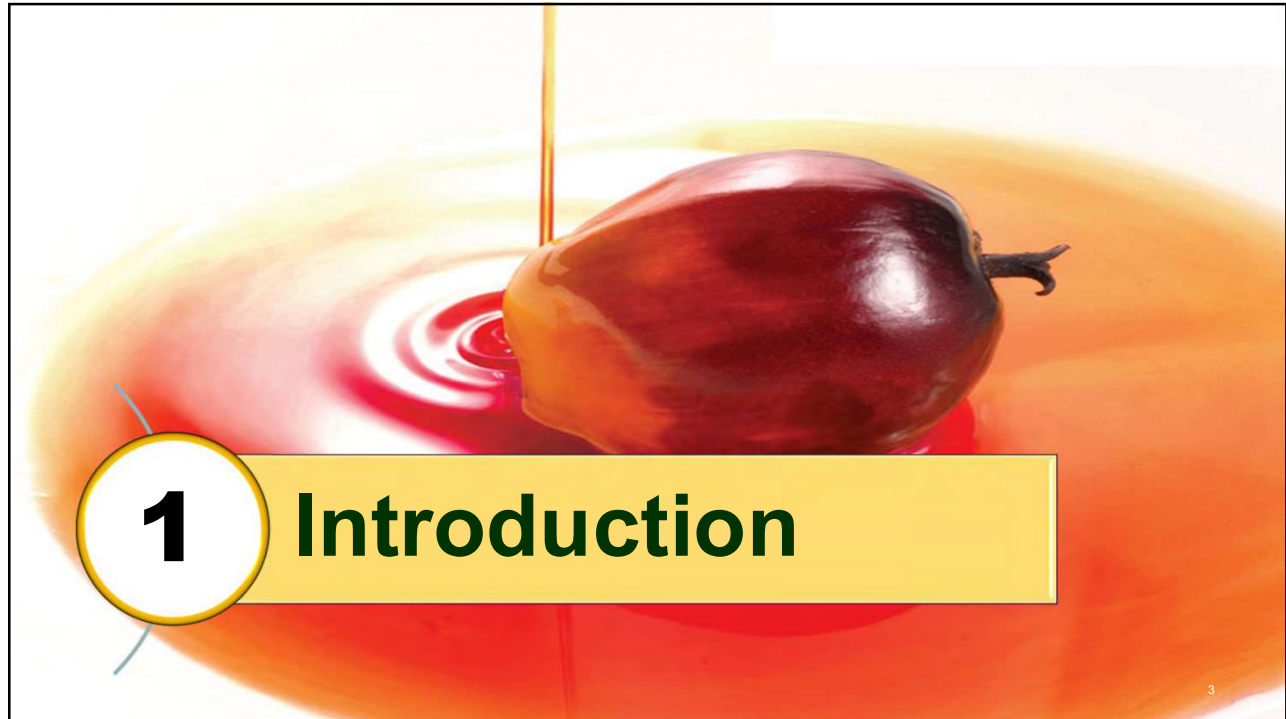
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## PRESENTATION OUTLINE



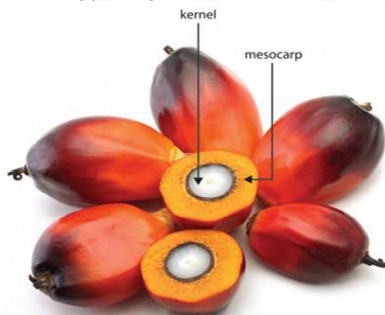
- 1 Introduction
- 2 Phytonutrients in red palm oil
- 3 Dietary guidelines
- 4 Red palm oil as a natural source to combat vitamin A deficiency
- 5 Cardioprotective role of red palm oil
- 6 Application of red palm oil in our daily diet



# 1 Introduction

## Red palm oil originates from the fruit of the oil palm tree (*Elaeis guineensis*)

Palm oil from the deep red-orange pulp (mesocarp) and palm kernel oil from the kernel.



**5-10X** more vegetable oil yield per hectare

How many hectares are needed to produce 1 ton of vegetable oils?




Source: www.juon.org


giz



## Antiquity of Red Palm Oil



Virgin or red palm oil is known for its versatility as both a food and health remedy for centuries



**FUN FACT!**

Do you know that crude palm oil was valued as a sacred food by the pharaohs of ancient Egypt?






The oil was so highly valued that it was entombed with the pharaohs so that they would have access to it in the afterlife

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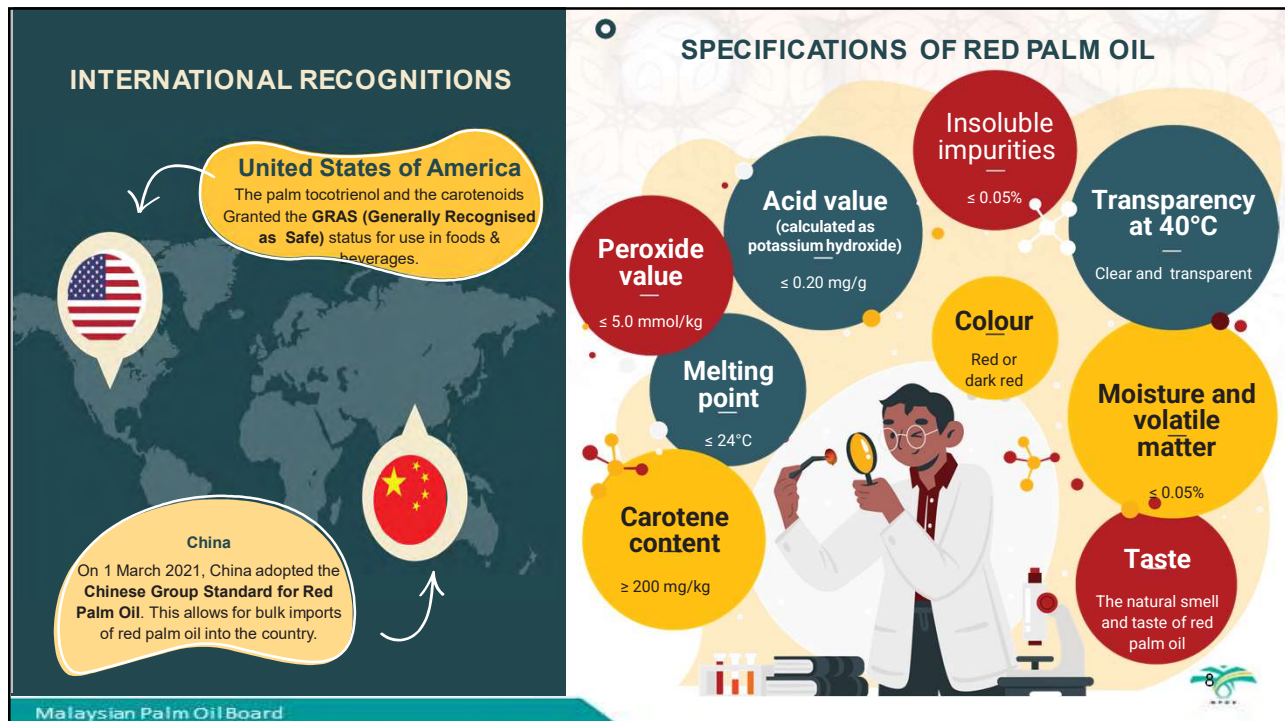
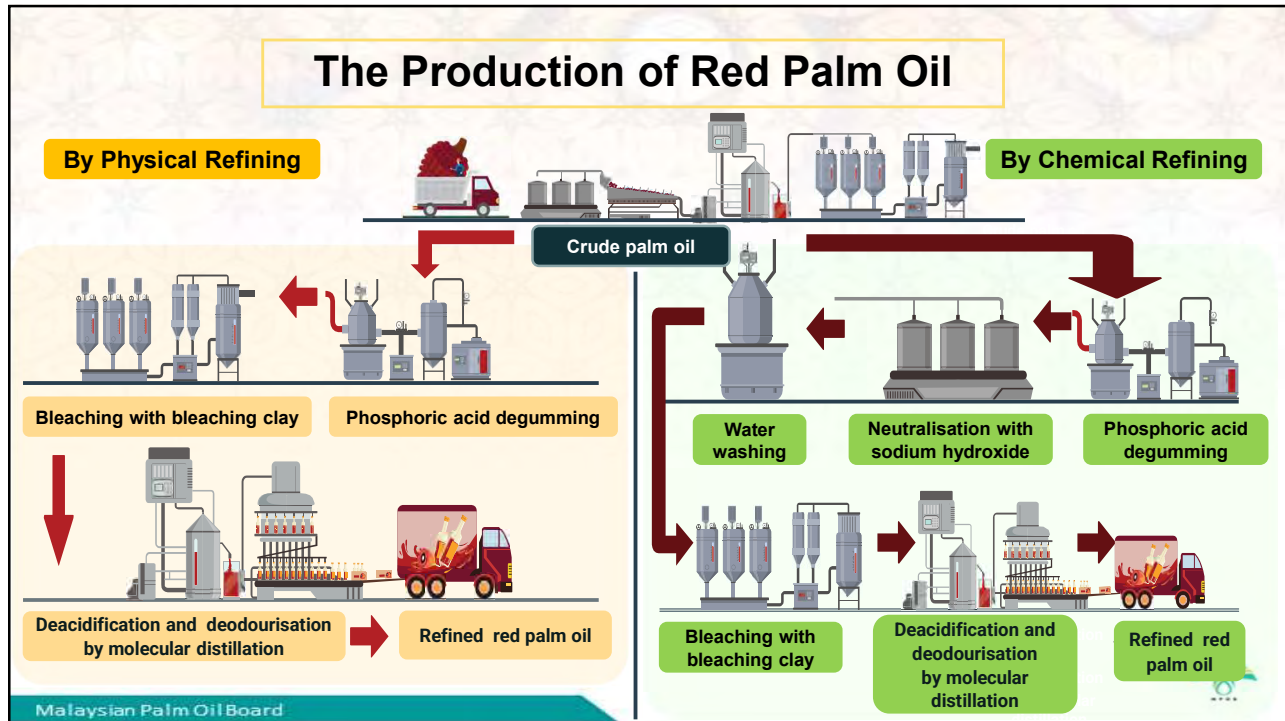


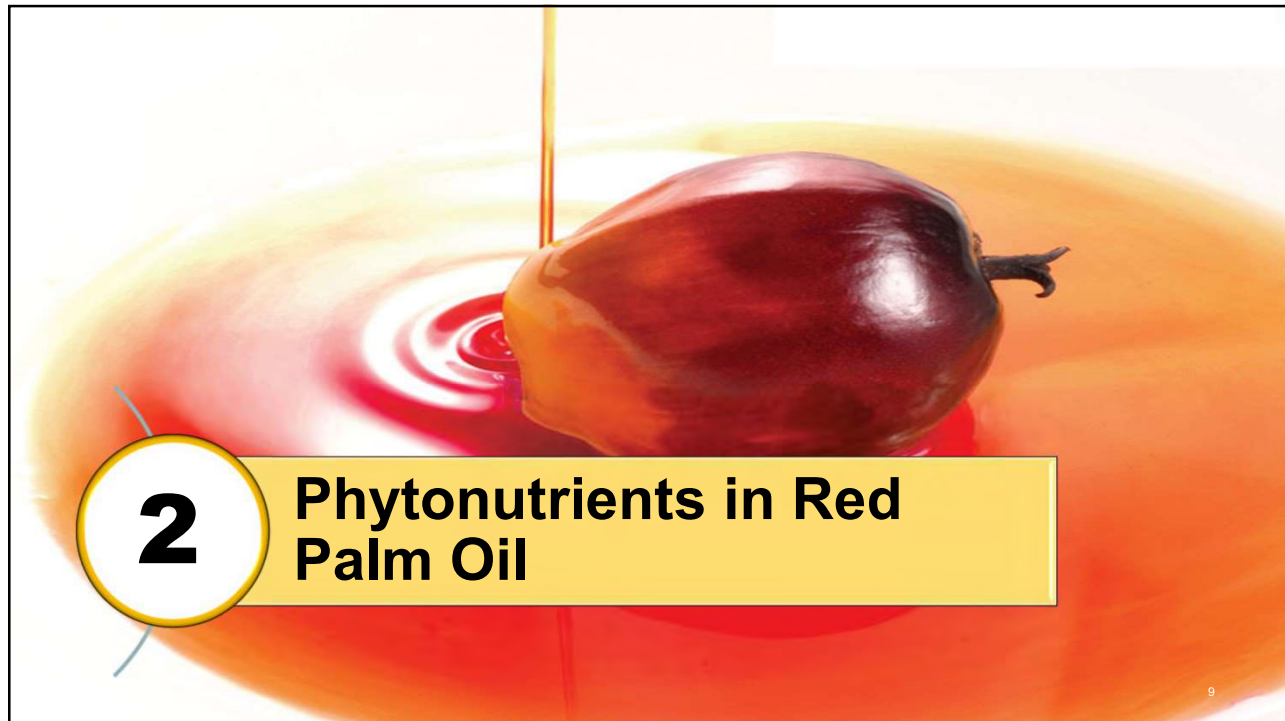
## What is the difference?

 <p><b>Palm Oil</b></p>		 <p><b>Red Palm Oil</b></p>
<p><b>Refined, bleached and deodorised (RBD)</b></p>	<p><b>Process</b></p> 	<p><b>Molecular distillation method at low temperature</b></p>
<p><b>Carotenes are decomposed meanwhile other phytonutrients are retained</b></p>	<p><b>Yield</b></p> 	<p><b>80% carotenes and vitamins present in crude palm oil could be retained</b></p>

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**Vitamin E**  
(717–863 ppm)

**Carotenoids**  
(600–750 ppm)

**Phytosterols**  
(325–365 ppm)

**Squalene**  
(14–15 ppm)

**Co-enzyme Q10**  
(18–25 ppm)

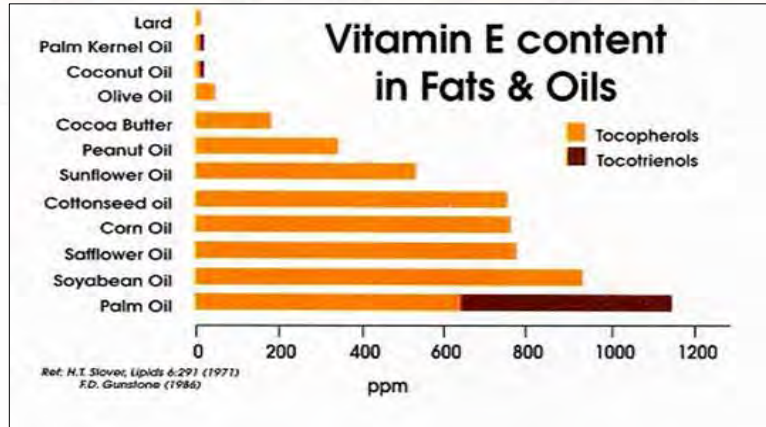
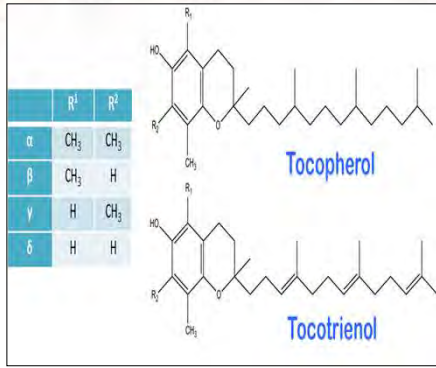
**FUN FACT!**

Every tablespoon of red palm oil is packed with assortment of phytonutrients

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# Vitamin E



# Vitamin E

Every tablespoon of red palm oil provides 10.5mg of vitamin E

Below are health benefits of vitamin E based on clinical trials; -

- anti-cancer i.e pancreatic** (Springett et al., 2015)
- antioxidant** (Fairus et al., 2020)
- cardioprotective effects: cholesterol lowering properties & anti- atherosclerosis** (Qureshi et al., 1997; Qureshi et al., 1991; Qureshi et al., 2001, 2002; Tomeo et al., 1995; Yuen et al., 2011)
- diabetes management** (Baliarsingh et al., 2005)
- immune modulation and anti-inflammatory effects** (Jubri et al., 2013; Mahalingam et al., 2011)
- neuroprotection** (Gopalan et al., 2014; Mustapha et al., 2020)



As little as 1 tablespoon of red palm oil has equivalent vitamin E content compared to :








- 1 avocado fruit**
- ¾ cup of groundnuts**
- ¼ cup of sunflower seeds**
- 1-2 cups of spinach**



## Carotenoids

Every tablespoon of red palm oil provides 8.7mg of carotenoids

Below are health benefits of carotenoids based on clinical trials; -

-  provitamin A activity (Canfield et al., 2001; Paine et al., 2005)
-  cardioprotective effects: anti-atherosclerosis (D'Odorico et al., 2000; Dwyer et al., 2004; Hozawa et al., 2007) and hypertension (Hozawa et al., 2009)
-  functional vital sign: walking speed (Alipanah et al., 2009)
-  anti-cancer i.e. lung (Ito et al., 2003; Yuan et al., 2001), breast (Epplein et al., 2009; Kabat et al., 2009; Rock et al., 2005), prostate (Chang et al., 2005; Key et al., 2007; Jianjun Zhang et al., 2007), colorectal (Jiang et al., 2005; Steck-Scott et al., 2004), gastric (Jenab et al., 2006; Persson et al., 2008; Yuan et al., 2004), cervical (Nagata et al., 1999; Schiff et al., 2001), aerodigestive tract (Nomura et al., 1997)
-  neuroprotection: cognitive function (Akbaraly et al., 2007)
-  diabetes management (Akbaraly et al., 2008; Coyne et al., 2005; Hozawa et al., 2006; Suzuki et al., 2002)
-  eye protection (age related maculopathy and cataract) (Delcourt et al., 2006)



**FUN FACT!**

As little as 1 tablespoon of red palm oil has equivalent carotenoids content compared to :



10 hard boiled eggs



12 slices of cheddar cheese



12 tomatoes



12 papayas

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## Phytosterol

Every tablespoon of red palm oil provides 4.2 mg of phytosterols

Below are health benefits of phytosterols based on clinical trials; -



cardio-protection: lowers cholesterol (Andersson et al., 2004; Lerman et al., 2008; Lin et al., 2009; Plana et al., 2008)



anti-cancer activity (Berges et al., 1995)



immune modulation and anti-inflammatory activity (Desai et al., 2009; Devaraj et al., 2011)



**FUN FACT!**

As little as 1 tablespoon of red palm oil has equivalent phytosterols content compared to:



1½ cup of watermelon



2 slices of bread



¾ cup of grapes



1 egg








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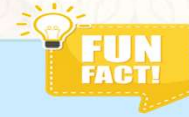
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# Co-enzyme Q10




Every tablespoon of red palm oil provides 0.3 mg of co-enzyme Q10

Below are health benefits of co-enzyme Q10 based on clinical trials; -

-  cardio-protection: improved cardiac bioenergetics (Hart et al., 2005; Lodi et al., 1999), helps ataxia (Cooper et al., 2008; Meier et al., 2012), improve cardiac hypertrophy (Buyse et al., 2003), improve neurological and cardiac function (Di Prospero et al., 2007; Drinkard et al., 2010; Velasco-Sánchez et al., 2011), anti-hypertension (Burke et al., 2001; Hodgson et al., 2002), anti-atherosclerosis (Kuettner et al., 2005; Singh et al., 2003)
-  neuroprotection: i.e prevents migraine headache (prophylaxis) (Sándor et al., 2005), helps in Parkinson's disease (Shults, 2005; Shults et al., 2002)
-  improve dental disease (Hanioka et al., 1994; Littarru et al., 1971)
-  immune modulation and anti-inflammatory effects (Díaz-Castro et al., 2012; Yubero-Serrano et al., 2012)
-  diabetes management (Henriksen et al., 1999; Hodgson et al., 2002)
-  reduce risk of pre-eclampsia (Teran et al., 2009)
-  anti-cancer activity i.e. breast (Premkumar et al., 2008)



As little as 1 tablespoon of red palm oil has equivalent co-enzyme Q10 content compared to:

-  ¼ cup of broccoli
-  ¾ salmon fish fillet
-  2 whole apples
-  2½ cans of sardines

# Squalene

Every tablespoon of red palm oil provides 0.014-0.015 mg/g of squalene.

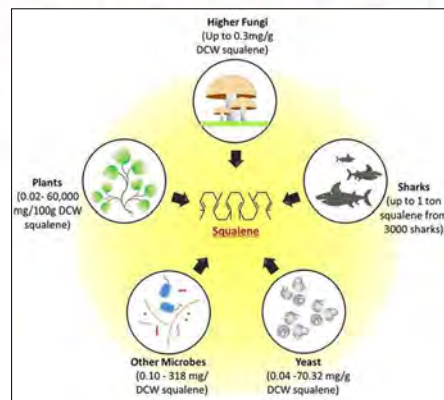
Below are health benefits of co-enzyme Q10 based on clinical trials; -



cardioprotection: cholesterol-lowering properties (Chan et al., 1996)

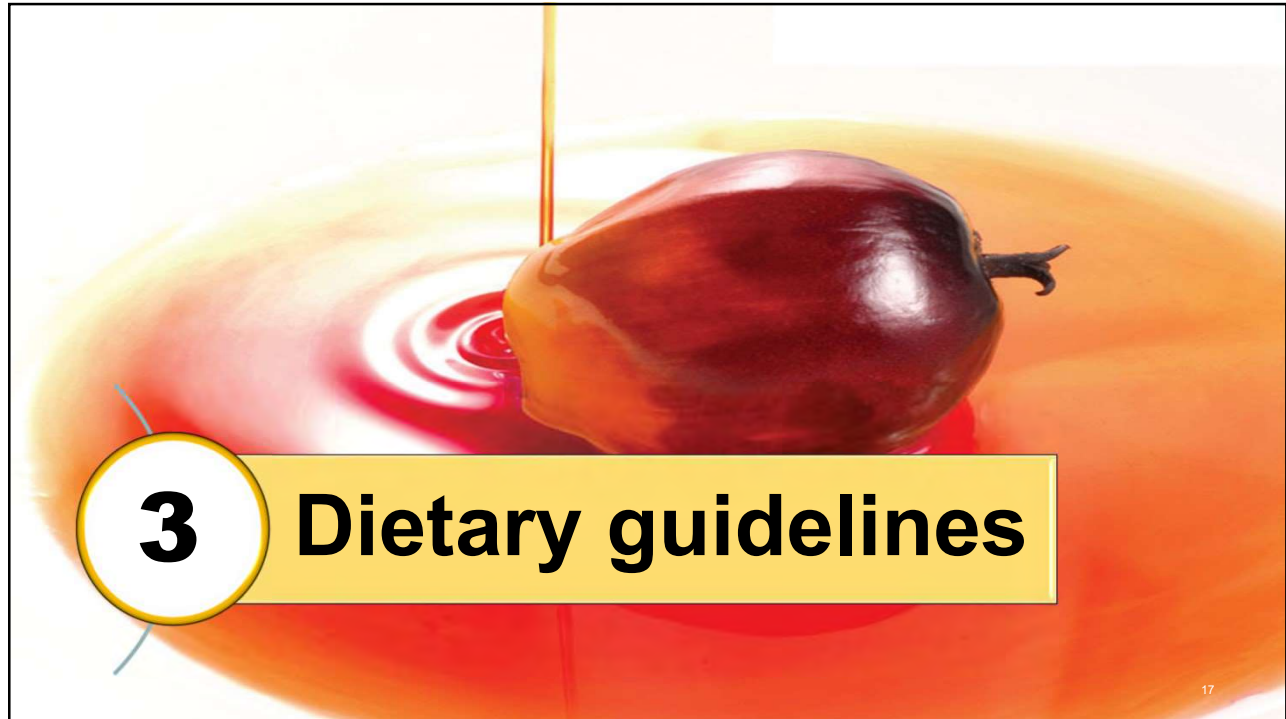


skin protection: anti aging (Cho et al., 2009; Kohno et al., 1995)







Gohil et al, Front. Bioeng. Biotechnol., 2019






Based on the Recommended Dietary Allowance (RDA) for vitamin A, the recommended servings for red palm oil are:

## Red palm oil is beneficial for all age category

	<b>Infant and child</b> 1 teaspoon
	<b>Adults</b> 2 teaspoons - 1 tablespoon
	<b>Expecting mothers</b> 2 teaspoons
	<b>Lactating mothers</b> Highest requirement of 4 teaspoons



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## Two types of vitamin A



**Provitamin A carotenoids**  
naturally found in fruits and vegetables.

### Preformed vitamin A

found in animal products such as meat and dairy foods.



### RICHEST NATURAL SOURCE OF PROVITAMIN A



1 tablespoon red palm oil



12 large hard-boiled eggs



6 cups of spinach



2 medium cooked carrots



12 large tomatoes



12 small papayas

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**Red palm oil as natural source to combat vitamin A deficiency**


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## The importance of Vitamin A







Promotes bone health




Preservation of good vision



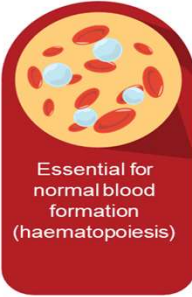
Aids fetal development




Improves immune system




Aids male and female reproduction




Essential for normal blood formation (haematopoiesis)



Maintains healthy skin, kidney, bladder and lung function, and mucous membranes



Helps brain development and cognitive ability

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## Strategies to address VAD

### Vitamin A supplementation




**Oral administration of preformed vitamin A**

Protective effect of high-dose vitamin A supplements only **up to 3 months** in children who have **low dietary intake** (Palmer *et al.*, Public Health Nutrition, 2012).


### Food-based strategies




**Fortification of staple foods**



**Multi-micronutrient powders**



**Selective breeding and biofortification**



**Diet diversification & improvement**

(Bruins & Kraemer, Community Eye Health, 2013) 

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## Provitamin in Red Palm Oil are Highly Bioavailable

Which one has the most bioavailable carotenoids?



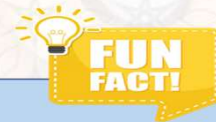
Raw carrots/  
carrot juice



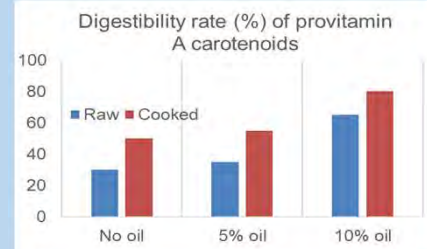
Stir-fried carrots



Carrot juice with  
milk



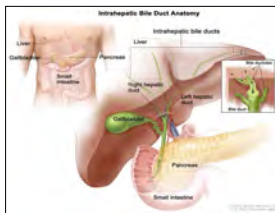
Do you know that cooked carrots with oil is *more* nutritious than consuming raw?



Cooking and eating raw carrots with inclusion of fat (oil) increases the bioavailability of provitamin A carotenoids ([Homero-Méndez and Mínguez-Mosquera, 2007](#))



## What causes Vitamin A deficiency?



Insufficient intake of carotenoids/  
vitamin A

Abnormal bile production or  
release

Poor lipid absorption

Chronic exposure to oxidants



## Vitamin A deficiency among children

According to the World Health Organization, about 190 million preschool children in underdeveloped countries, especially Africa and Southeast Asia, are vitamin A deficient (World Health Organization, 2011).

Infants and children need higher amounts of vitamin A to promote rapid growth and strengthen immunity to combat infections.

WHO reports 2 classes of indicators for detecting vitamin A deficiency among preschool-aged children:



**CLINICAL EYE SIGNS OF DISEASE (NIGHT BLINDNESS OR XEROPHTHALMIA)**



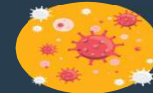
**LOW SERUM RETINOL CONCENTRATIONS**

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## Vitamin A deficiency in children causes:



Visual impairment and blindness



Risk of infection



Stunting



Anaemia



Respiratory diseases



Increased mortality due to common childhood infections such as diarrhoea and measles

## Red palm oil studies

There are several red palm oil studies conducted in South Africa, India and China among a sample of school children. Results are as follow:

### Serum retinol improvement

#### 1 SOUTH AFRICA

With supplementation of:

- Red palm oil vs synthetic  $\beta$ -carotene fortified biscuits (Van Stuijvenberg et al., 2001)
- Red palm oil fortified lunch vs vitamin A capsule (Zeba et al., 2006)



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#### INDIA

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- Red palm oil fortified snacks vs vitamin A (Manorama et al., 1997; Mahapatra & Manorama, 1997)
- Red palm oil fortified lunch (Seshadri, 1997)

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**3 CHINA**

A study conducted by the Institute of Nutrition and Food Hygiene, Lanzhou University and the National Institute for Nutrition and Health, Beijing in Gansu Province, China, showed that the incidence of Vitamin A deficiency among the school children reduced from 21.6% to 6.1% after feeding of biscuits made from red palm oil for 6 months (Liu et al., 2018; Guo et al., 2018)

**Improve vision**

**INDIA**

- Bitot's spots disappearance
- Conjunctival impression cytology was pronounced normal upon 6 months of red palm oil supplementation (Seshadri, 1997)

**Improve haemoglobin levels**

**INDIA**

(Aparna & Manorama, 2009)

**Improve anthropometric status**

**CHINA**

Height and weight improved (Liu et al., 2018; Guo et al., 2018)

**Vitamin A deficiency among school children**

21.6% → 6.1%

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## Vitamin A deficiency pregnant and lactating mothers

According to WHO, about 19 million pregnant women are vitamin A deficient in underdeveloped countries, especially Africa and Southeast Asia (World Health Organization, 2011).

Women are vulnerable to vitamin A deficiency during pregnancy and lactation as additional vitamin A is required to support maternal and fetal tissue growth and compensate for lactation losses.

## Vitamin A deficiency in pregnant women causes:

- Blindness
- All-cause infant mortality
- Fetal loss
- Low birth weight
- Impaired physical work capacity
- Preterm birth
- Maternal illness and mortality
- Impaired cognitive function

Illness (incidence and/or severity) due to diarrhoea, measles, acute respiratory infections and malaria

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## Role of red palm oil in combating vitamin a deficiency among pregnant and lactating mothers



Xanthophylls are present in the eye macular pigment, it is known to protect photoreceptor cells against photooxidative damage.



Lactating mothers are encouraged to supplement their diet with carotenoid-rich red palm oil to promote retinol in maternal serum or breast milk (Lietz et al., 2000).



Serum retinol levels in mothers and their infants (Radhika et al., 2003; Canfield et al., 2001; Zagre et al., 2003) also improved, with reduced incidence of maternal anaemia (Radhika et al., 2003).



A significant amount of retinol and xanthophylls were found in the breast milk of nursing mothers who supplemented their diet with red palm oil (Lietz et al., 2006).

## Vision impairment due to vitamin A deficiency in children

An estimated 2.8 million preschool-age children are at risk of nutritional blindness or active xerophthalmia due to Vitamin A deficiency in low-income countries (World Health Organization, 2011).

Approximately 250 000 to 500 000 children suffering from vitamin A deficiency become blind yearly, and half of them died within a year of losing their vision (World Health Organization, 2011).

The clinical features of eye disease secondary to vitamin A deficiency in children as graded by WHO are:



Night blindness



Corneal scarring



Bitot's spots



Corneal xerosis



Conjunctival xerosis



Corneal ulcers/keratomalacia

## Role of red palm oil in improving ocular manifestation of vitamin A deficiency

- Marked clinical improvement with red palm oil treatment was observed within 2 weeks in infants and children with keratomalacia or corneal ulceration (Aykroyd and Wright, 1937)
- Two studies in India have reported a reduction in Bitot's spots after red palm oil supplementation (Sivan YS et al., 2001)
- Children with conjunctival impression cytology had normal findings after 6 months of red palm oil supplementation (Seshadri, 1997)
- Studies in Indonesia have reported red palm oil to cure night blindness among children (Roels et al., 1963) (Lian et al., 1968).



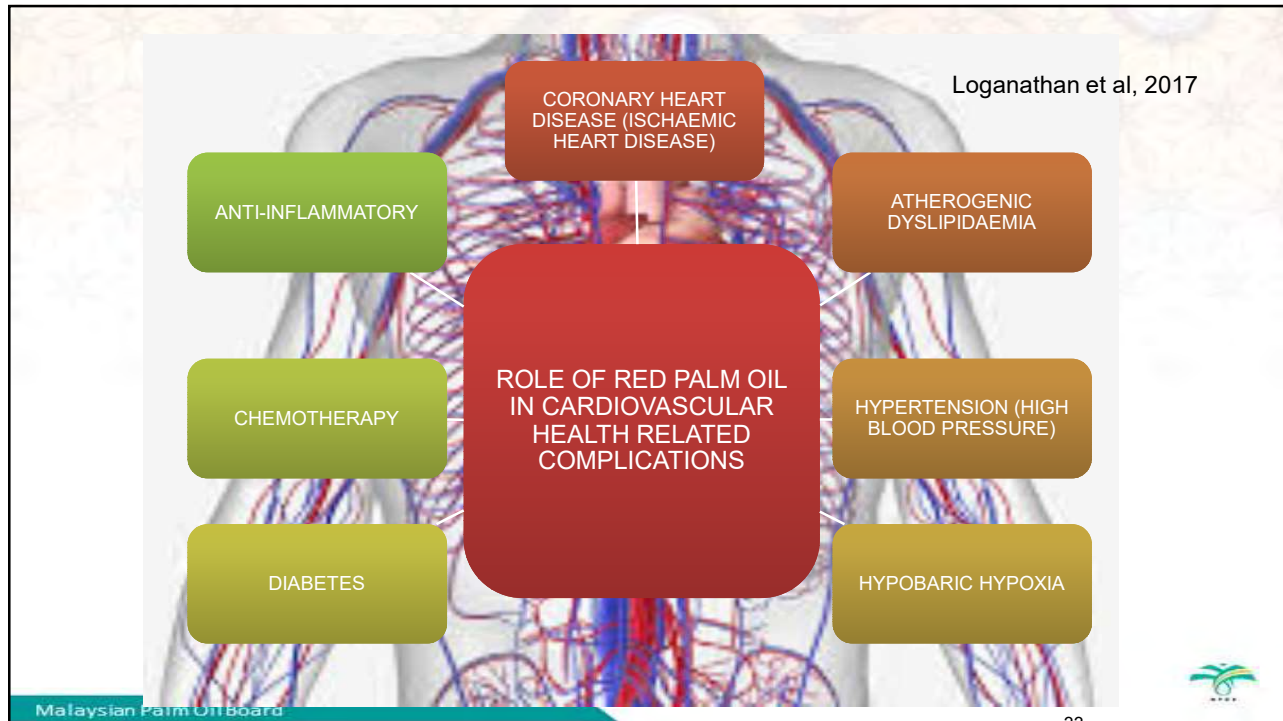
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**Cardioprotective Role of Red Palm Oil**

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## Cardioprotective Role Of Red Palm Oil: Coronary Heart Disease (Ischaemic Heart Disease)

- o Extensive animal studies on red palm oil have documented the cardioprotective role of red palm oil against ischemic reperfusion injury in the heart
- o Some of the cardio-protective mechanisms identified by red palm oil feeding in animals include: -
  - activation of cardioprotective signals (Kruger et al., 2007), (Szucs et al., 2011) (Bačová, 2012);
  - enhancement of pro-survival signals (Engelbrecht et al., 2006; Engelbrecht et al., 2009);
  - attenuation of cell death markers (Engelbrecht et al., 2006; Kruger et al., 2007); and
  - reduction of cardiac tissue injury (Bester et al., 2010)

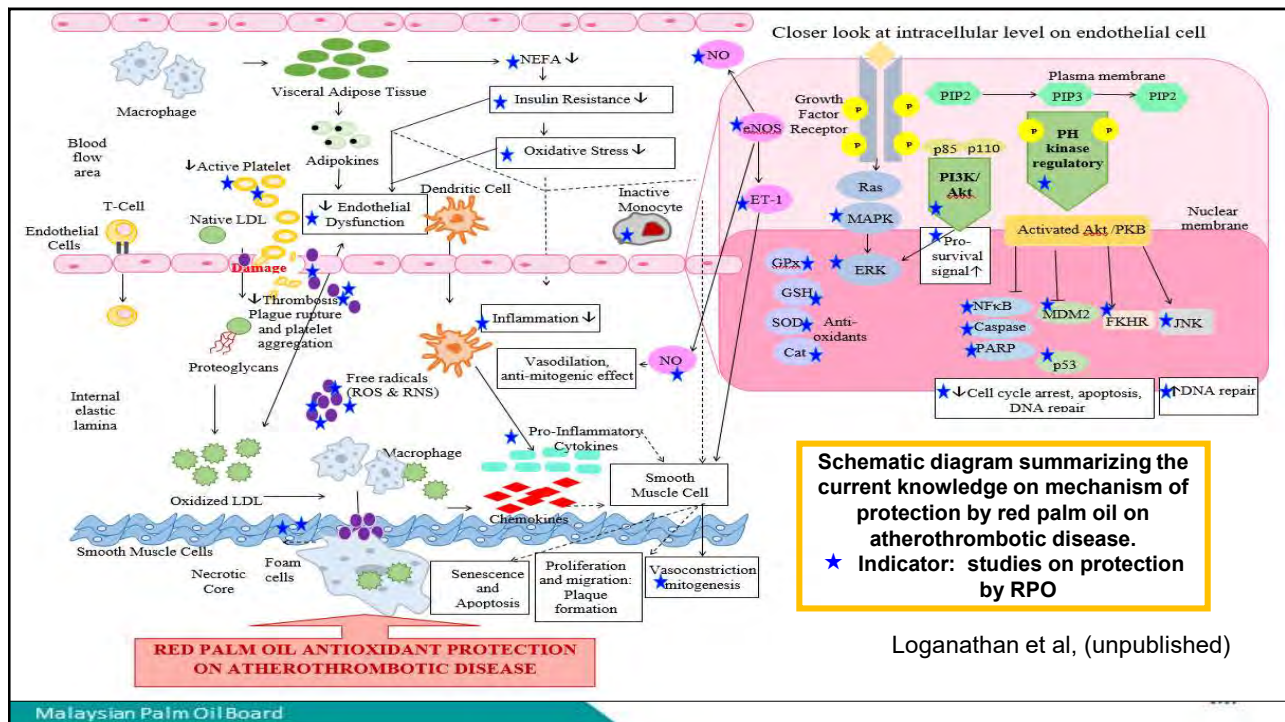
**FUN FACT!**

Ischemia-reperfusion injury or reoxygenation injury, is the tissue damage caused when blood supply returns to tissue after a period of ischemia or lack of oxygen (hypoxia)

**FUN FACT!**


Coronary heart disease is the leading cause of death globally in middle and high income countries (World Health Organization, 2017). Coronary heart disease is a condition that occurs due to insufficient blood supply to the heart muscle

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## Cardioprotective Role Of Red Palm Oil: Atherosclerosis

- o Red palm oil was reported to have anti-atherogenic properties evidenced from both human (Zhang et al., 2003) (Scholtz et al., 2004; Loganathan et al., 2018) and animal (Dauqan et al., 2011) (Wilson et al., 2005) studies.
- o In addition, the aortas of hamsters fed with red palm oil had least evidence of atherosclerosis (Wilson et al., 2005).



**FUN FACT!**

Atherosclerosis is a disease where plaque builds up inside your arteries. This plaque is made up of fat, cholesterol, calcium, and other substances found in the blood. Over time, plaque hardens and narrows your arteries. This limits the flow of oxygen-rich blood to your organs and other parts of your body.

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**How do I incorporate red palm oil in my diet?**

- Consume directly
- Cooking and light frying
- Bakery fats and confectionery
- Natural colorant
- Dipping sauce for salad / "ulam"
- Seasoning for soup or porridge

NO ARTIFICIAL COLORS

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## Is red palm oil suitable for normal cooking practices?

Red oil palm is suitable for common cooking practices but may not be suitable for longer heating processes as carotene retention is of concern (Loganathan et al., J. Oleo Sci., 2020)



Sautéing ✓

Stir-frying ✓

Roasting ✓

Baking ✓

Light Microwave Cooking ✓

Deep-frying ✗



## Good oil storage practices at home to maintain the oil quality

**Away from heat**  
*Not near the stove!*



**Away from light**  
*Do not place it on your kitchen bench or near the window facing direct sunlight*



**Store the oil inside your kitchen cabinet**  
**(Protect from heat and light)**



(Loganathan et al., J. Oleo Sci., 2020)

## Summary

Red palm oil:

- Rich in an assortment of **phytonutrients**
- Beneficial for **all age categories**
- **Natural source of carotenoids (provitamin A)** to address vitamin A deficiency
- Possess **cardioprotective** effects
- Suitable to be incorporated into our daily diet
- Suitable for common cooking techniques

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## Manufacturers and suppliers

**Carotino (CAROTINO® Premium)**

Email: info@carotino.com  
Tel: +607 -522888  
Fax: +607-2522999

**Sime Darby Plantation Berhad (Golden Joma™ Red Palm SuperOlein)**

Email: communications@simedarbyplantation.com  
Bulk Products: gbb@simedarbyplantation.com  
Packed Products: sdfoods@simedarbyplantation.com  
Tel: +603-7848 4000  
Fax: +603-7848 4172 / +603-7848 5361

**Excelvite (EVOlein™)**

Email: info@excelvite.com;  
Tel: +605-2014192  
Fax: +605-2014213

**Profes Lipid Sdn Bhd (Harvist)**

Email: enquiry@harvist.com.my  
Tel: +6011-1117 2899 / +6018-984 7128

**SOP Foods (Merris Red Palm Oil)**

Email: sopfoods@sop.com.my  
Tel: +6085-420869  
Sales Team Hotline: +6085-420869  
Sales Team Fax Number: +6085-439699

**United Plantations Berhad (Unitata Product group - Nutrolein)**

Email: unitata@tm.net.my / mbn@plantations.biz  
Fax: +605-6411760



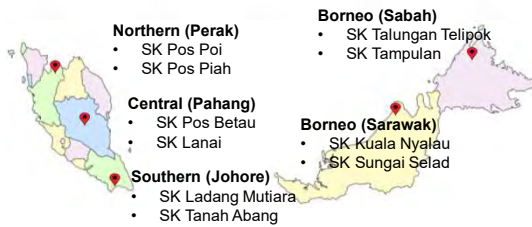
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# Red palm oil study in Malaysia

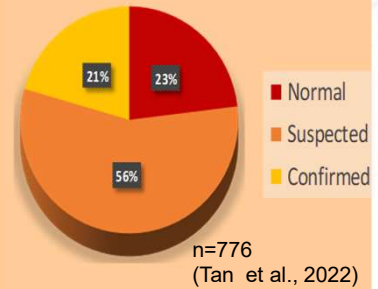
To assess the nutritional status, ocular status, intestinal parasitic infections and gut microbiota of vitamin A deficient primary school children before and after supplementation of red palm oil-fortified biscuit.

## Rural schools (P1 areas)



Ethical Approval: Medical Research Ethic Committee (MREC), Ministry of Health Malaysia (MOH) with National Medical Research Register ID (NMRR No: NMRR-16-1905-32547);  
 Guidelines: Declaration of Helsinki;  
 The trial was registered at ClinicalTrial.gov (NCT03256123).

Vitamin A deficiency is a **SEVERE** public health problem among the rural community in Malaysia !!



Classification of vitamin A deficiency

- Confirmed: <math>< 0.7 \mu\text{mol/L}</math>
  - Suspected: <math>\geq 0.7 - < 1.05 \mu\text{mol/L}</math>
  - Normal: <math>\geq 1.05 \mu\text{mol/L}</math>
- VAD Public Health Problem
- Mild: <math>\geq 2 - \leq 10\%</math>
  - Moderate: <math>> 10 - < 20\%</math>
  - Severe: <math>\geq 20\%</math>
- (WHO, 2009)

# The complete story will be presented at PIPOC 2023!



See you there!

## PIPOC 2023 MPOB International Palm Oil Congress and Exhibition

Navigating Uncertainties  
Building Resilience

7-9 NOVEMBER 2023  
Kuala Lumpur Convention Centre





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