

# **Ω7 – The Next Global Nutrient**

**CNIC2018**

**Speaker : Dr. Hywel Yuen, CEO of Puredia Corporation Limited**

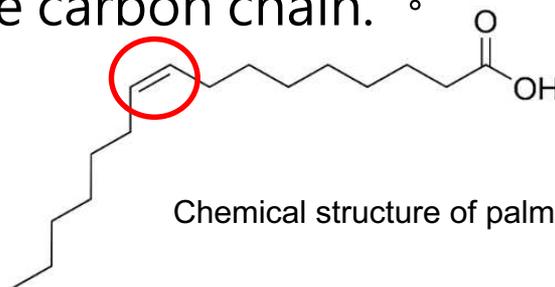
## Speech Outline

1. What is Omega 7 (  $\Omega 7$  )
2. Health benefits of  $\Omega 7$ , its mechanism and clinical experimental data
3.  $\Omega 7$  product application
4. Puredia existing products and development
5. A rich source of  $\Omega 7$  – Sea Buckthorn
6. Source of high quality Sea Buckthorn – an introduction to Puredia



## What is Omega 7 ( Ω7 ) ?

- Omega-7 fatty acids are a class of unsaturated fatty acids in which the site of unsaturation is at the seventh carbon atoms from the end of the carbon chain.



Chemical structure of palmitoleic acid

Common name	Lipid name	Chemical name
Palmitoleic acid	16:1 (n-7)	9-Hexadecenoic acid
Vaccenic acid	18:1 (n-7)	11-Octadecenoic acid
Rumenic acid	18:2 (n-7)	Octadeca-9,11-dienoic acid
Paullinic acid	20:1 (n-7)	13-Eicosenoic acid

## Omega 3

- In 1929, Burr and Burr discovered the essential fatty acid Omega 3. Since then, the benefits of Omega 3 have been continuously discovered and widely used.
- In recent years, scientists have discovered another essential fatty acid that has many health benefits like Omega 3 and can be the next global nutrient.

## Ω7 – Palmitoleic Acid

- **Palmitoleic Acid** is the most common form of Ω7 in nature and has powerful and unique health benefits. It is a new active ingredient of the health food market.
- Harvard Medical School also applied for a patent for palmitoleic acid.

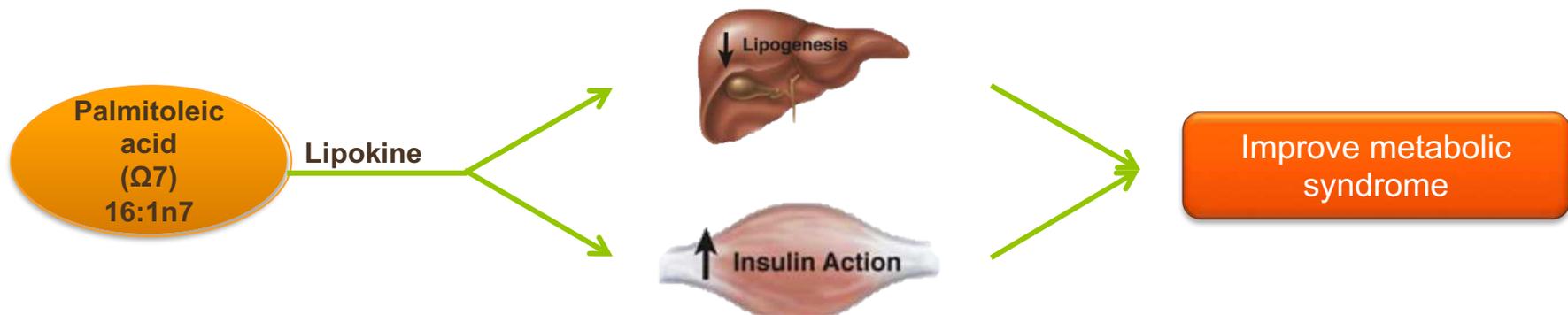
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(19) <b>United States</b>	
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<b>Cao et al.</b>	(43) <b>Pub. Date:</b> Sep. 1, 2011
(54) <b>FATTY ACID C16: 1N7-PALMITOLEATE A LIPOKINE AND BIOMARKER FOR METABOLIC STATUS</b>	<b>Publication Classification</b>
(75) <b>Inventors:</b> Haiming Cao, Bethesda, MD (US); Gokhan S. Hotamisligil, Wellesley, MA (US)	(51) <b>Int. Cl.</b> <i>A61K 31/201</i> (2006.01) <i>G01N 33/92</i> (2006.01) <i>A61P 3/00</i> (2006.01) <i>A61P 3/06</i> (2006.01) <i>A61P 5/50</i> (2006.01) <i>A23L 1/30</i> (2006.01) <i>G01N 30/02</i> (2006.01)
(73) <b>Assignee:</b> PRESIDENT AND FELLOWS OF HARVARD COLLEGE, Cambridge, MA (US)	(52) <b>U.S. CL.</b> ..... 514/560; 435/7.92; 426/648; 73/23.35
(21) <b>Appl. No.:</b> 13/062,527	(57) <b>ABSTRACT</b> The present invention provides for a novel lipokine, C16:1n7-palmitoleate, which also serves as a biomarker for metabolic status. More specifically, a low concentration of C16:1n7-palmitoleate in the free acid component of the serum indicates a risk of metabolic disease, and that de novo lipogenesis should be stimulated. Additionally, administering C16:1n7-palmitoleate to a subject (via nutraceutical or other means), positively impacts lipid metabolism.
(22) <b>PCT Filed:</b> Sep. 8, 2009	
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§ 371 (c)(1), (2), (4) <b>Date:</b> May 23, 2011	
<b>Related U.S. Application Data</b>	
(60) Provisional application No. 61/095,109, filed on Sep. 8, 2008.	

Cao, Haiming, and Gokhan S. Hotamisligil. "Fatty acid C16: 1N7-palmitoleate a lipokine and biomarker for metabolic status." U.S. Patent No. 9,239,334. 19 Jan. 2016.

# WHY Ω7 IS SO SPECIAL?

# Omega 3 vs Omega 7

Fatty Acids	Omega 3( $\Omega$ 3)	Omega 7( $\Omega$ 7)- palmitoleic acid
<b>Type</b>	Polyunsaturated fatty acid	Monounsaturated fatty acid
<b>Mechanism</b>	The combination of anti-inflammatory molecules in the human body enhances anti-inflammatory effects	As a lipid hormone signalling molecule (Lipokine), it helps promote the coordination between body fat and muscle tissue, stimulates muscle insulin action to promote glucose metabolism and inhibit fatty liver formation.



- Calder, Philip C. "Omega-3 fatty acids and inflammatory processes." *Nutrients* 2.3 (2010): 355-374.
- Cao, Haiming, et al. "Identification of a lipokine, a lipid hormone linking adipose tissue to systemic metabolism." *Cell* 134.6 (2008): 933-944.

## Health Benefits of $\Omega 7$ – Improve Metabolic Syndrome

Metabolic syndrome is a major cause of **cardiovascular disease** and **type 2 diabetes**. Symptoms of metabolic syndrome include:

- High blood sugar and insulin resistance
- Dyslipidemia (high triglycerides and low high density lipoprotein cholesterol)
- Hypertension or early hypertension
- Central obesity
- Chronic inflammation\*



\* Although chronic inflammation is not an academically standard metabolic syndrome, it is still widely regarded as the fifth major source of pathology.

# Prevalence of metabolic syndrome

- Metabolic Syndrome prevalence is present in approximately 25% of all adults with increased prevalence in advanced ages, estimated by the International Diabetes Federation (IDF)



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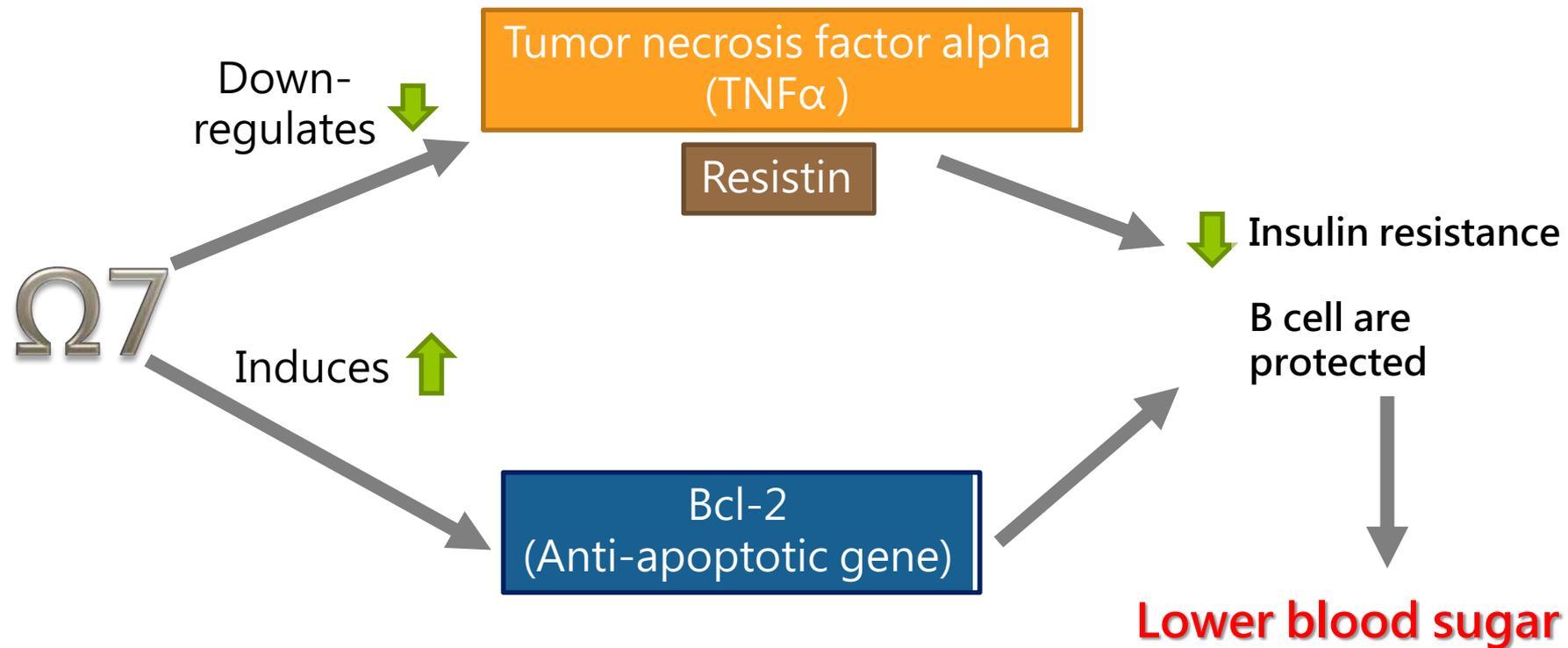
### Prevalence of metabolic syndrome and metabolic syndrome components in young adults: A pooled analysis☆☆☆

Paul B. Nolan <sup>a,\*</sup>, Graeme Carrick-Ranson <sup>a</sup>, James W. Stinear <sup>a</sup>, Stacey A. Reading <sup>a</sup>, Lance C. Dalleck <sup>b</sup>

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# Ω7 improves metabolic syndrome

Ω7 reduces insulin resistance and lower blood sugar

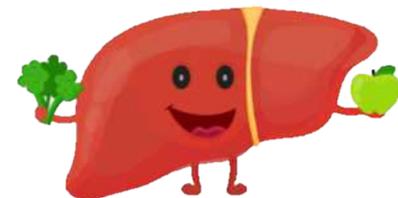
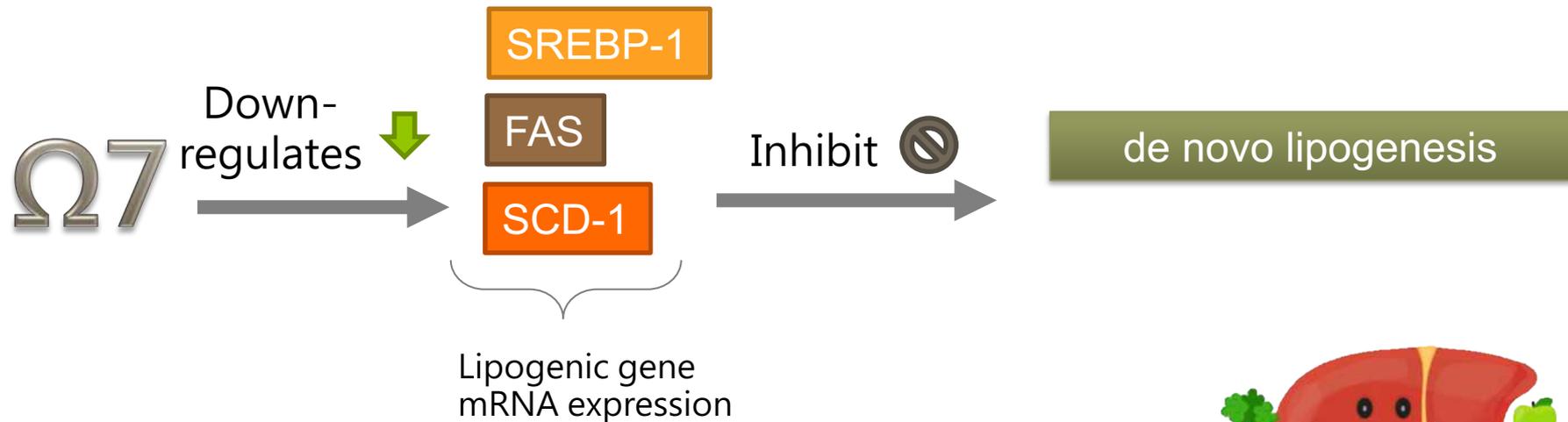


• Yang, Zhi-Hong, Hiroko Miyahara, and Akimasa Hatanaka. "Chronic administration of palmitoleic acid reduces insulin resistance and hepatic lipid accumulation in KK-A y Mice with genetic type 2 diabetes." *Lipids in health and disease* 10.1 (2011): 120.

• Mozaffarian, Dariush, et al. "Circulating palmitoleic acid and risk of metabolic abnormalities and new-onset diabetes--." *The American journal of clinical nutrition* 92.6 (2010): 1350-1358.

# Ω7 improves metabolic syndrome

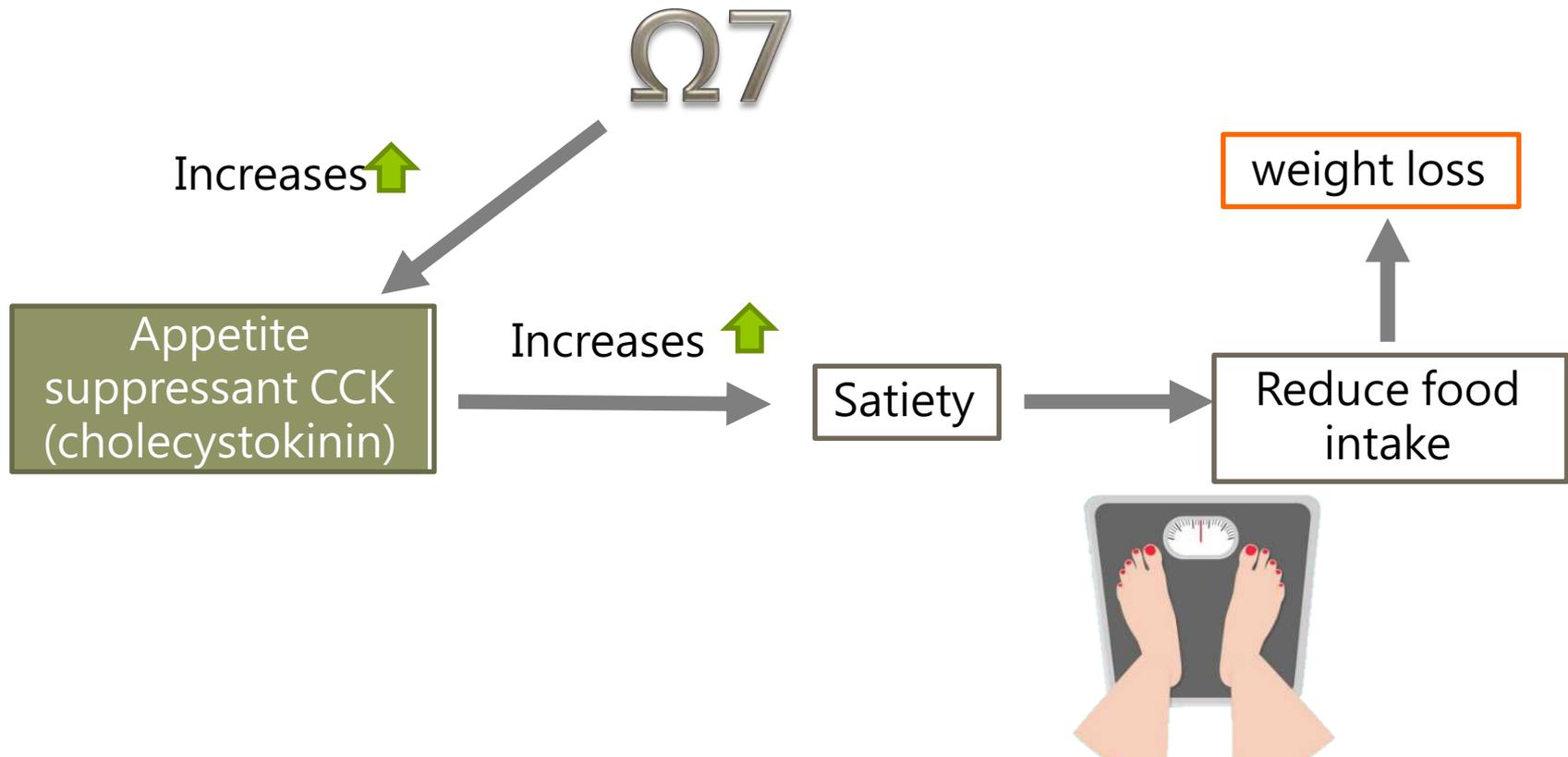
Ω7 inhibits lipogenesis and lipid accumulation



Liver lipid accumulation is closely related to obesity, insulin resistance, and type 2 diabetes.

# Ω7 improves metabolic syndrome

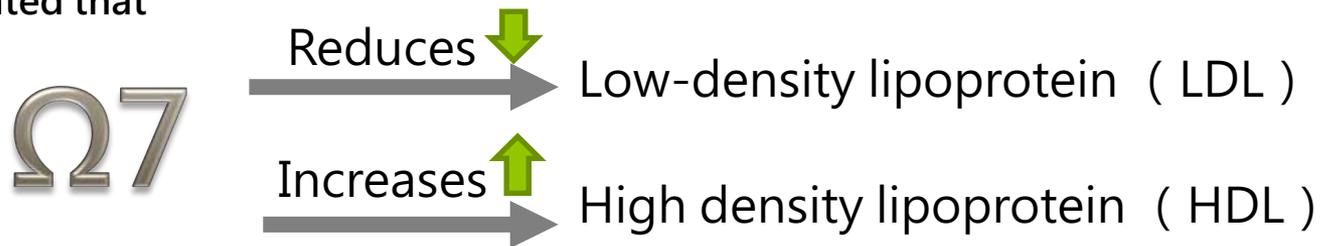
## The role of Ω7 in weight loss management



# Ω7 improves metabolic syndrome

## Ω7 improves high blood lipids level

A double-blinded, randomized, placebo controlled study of 60 patients clearly demonstrated that



- Low-density lipoprotein (LDL) cholesterol are closely related to the occurrence of cardiovascular disease, so low-density lipoprotein cholesterol was once commonly known as "**bad cholesterol**".
- High-density lipoprotein (HDL) removes cholesterol from arteriosclerotic plaques and arteries and transports them back to the liver for excretion; this is why cholesterol linked to high-density lipoproteins is sometimes called "**good cholesterol**".



# Ω7 improves metabolic syndrome

## Ω7 improves blood lipids – animal experimental data

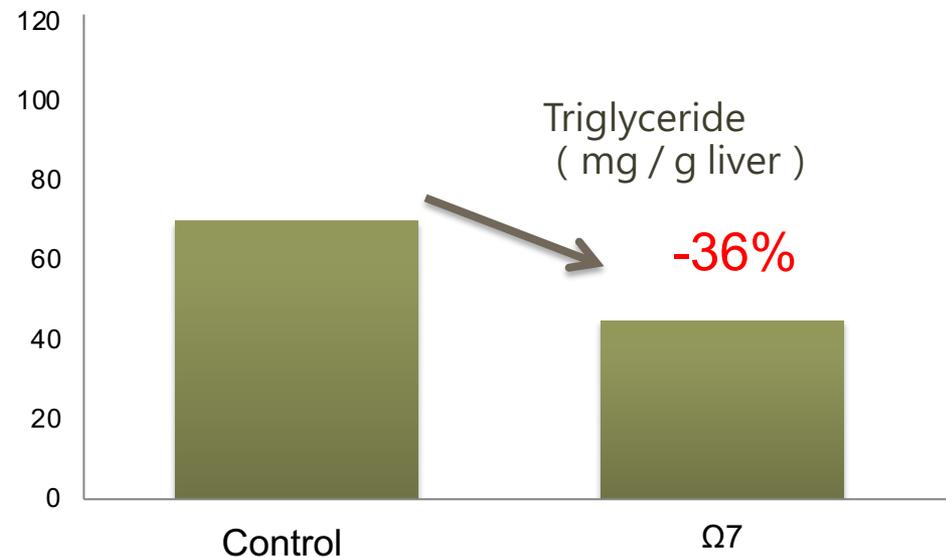
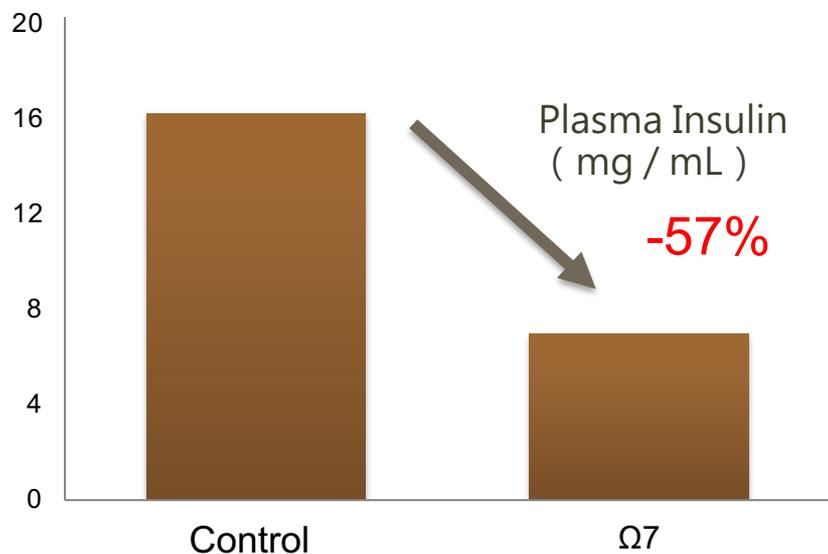


When mice with type 2 diabetes took Ω7 for four weeks, their blood glucose and triglyceride levels were reduced. At the same time, insulin resistance and fatty liver deposits were significantly reduced. Intrahepatic fat deposition is a key factor in metabolic syndrome and is responsible for non-alcoholic fatty liver disease. In the experiment, the increased weight of the mice due to diabetes and the level of inflammatory cytokines are decreased.

# Ω7 improves metabolic syndrome

## Ω7 improves blood lipids – animal experimental data

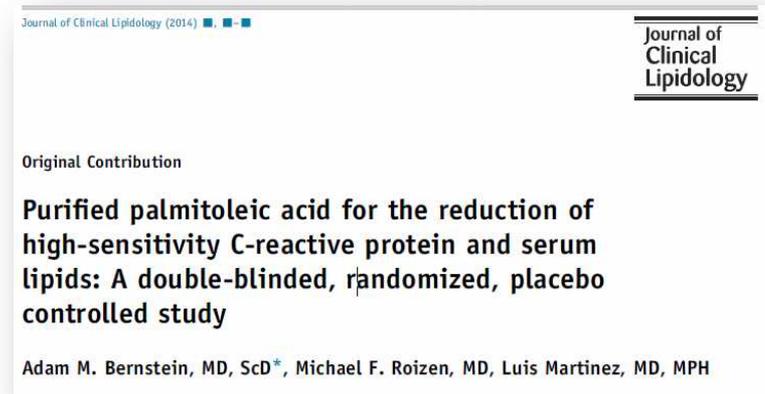
Changes after 4 weeks of Ω7 intake in type 2 diabetes mice



# Ω7 improves metabolic syndrome

## Ω7 improves blood lipids – human experimental data

- In a double-blinded, randomized, placebo controlled study, it shown that supplementing with 210 mg Ω7 for 30 days can effectively reduce triglycerides and LDL by 15% and 8%, and increase HDL by 5%.

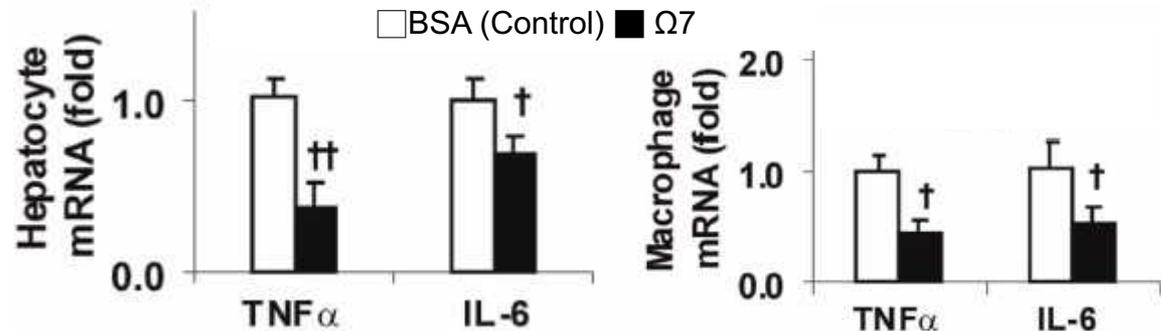
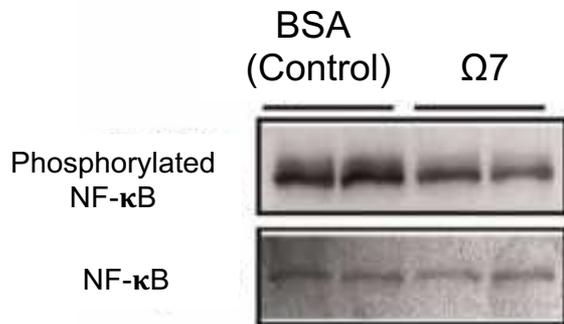


Biomarker	Intervention (n = 30)	Control (n = 30)	Effect estimate	P value
<b>Triglyceride (mg/dL)</b>				
Baseline	202.4 (11.9)	210.6 (11.0)		.70
30 day	170.3 (9.6)	207.2 (10.7)		.01
			-30.2 (-40.2 to -25.3)	<.0001
<b>Low-density lipoprotein cholesterol (mg/dL)</b>				
Baseline	114.1 (4.3)	119.6 (4.9)		.41
30 days	105.8 (3.7)	119.2 (4.3)		.02
			-8.9 (-12.0 to -5.8)	<.0001
<b>High-density lipoprotein cholesterol (mg/dL)</b>				
Baseline	45.7 (1.0)	43.3 (1.0)		.10
30 days	47.1 (0.9)	42.7 (0.9)		<.001
			2.4 (1.5, 3.3)	<.0001

# Ω7 improves metabolic syndrome

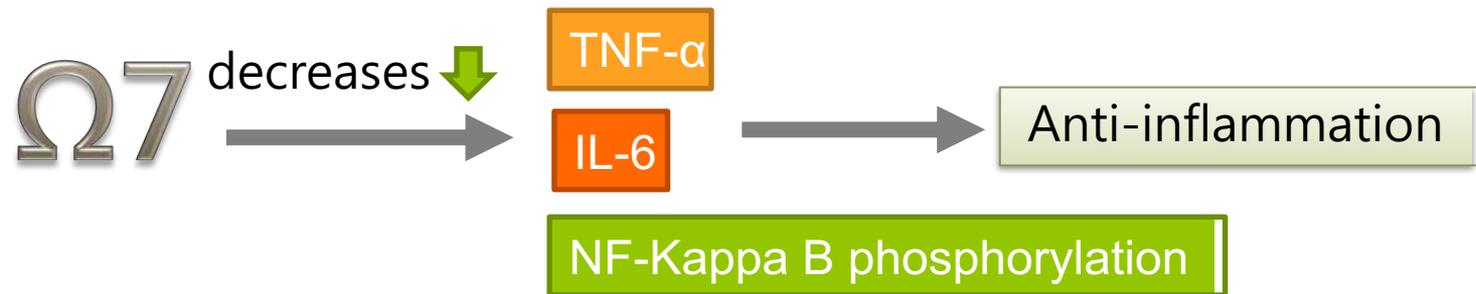
## Ω7 inhibits pro-inflammatory cytokines

Many effective anti-inflammatory effects come from Ω7, and the function of Ω7 is to mediate the main inflammatory control complex called NF-kappaB. Ω7 can also reduce the expression of pro-inflammatory cytokines TNF $\alpha$  and IL-6.



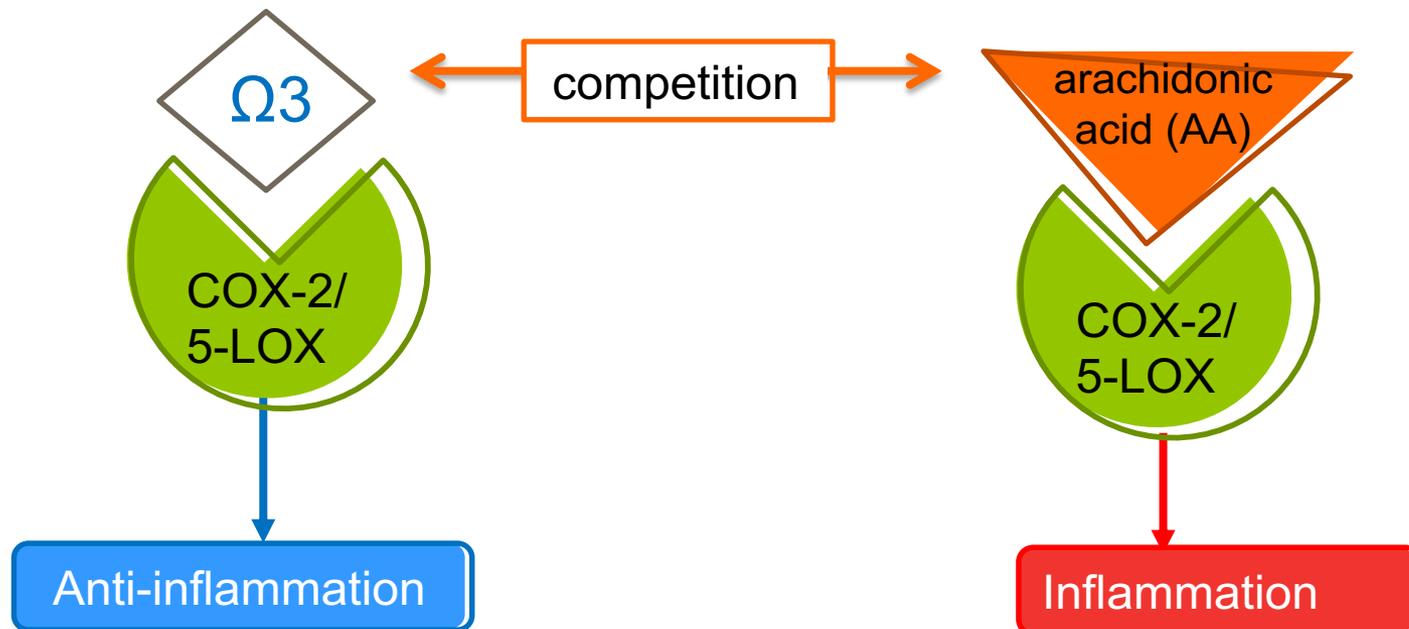
# $\Omega$ 7 improves metabolic syndrome

$\Omega$ 7 inhibits pro-inflammatory cytokines



# The mechanism of $\Omega 3$ on inflammation

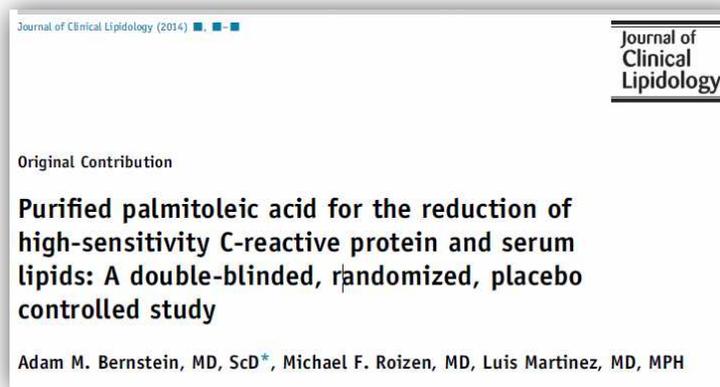
The anti-inflammatory properties of  $\Omega 3$  are due to competition with arachidonic acid (AA) as a substrate for cyclooxygenases and 5-lipoxygenase



# Ω7 improves metabolic syndrome

## Ω7 inhibits inflammation – clinical study

- Supplementation of 210mg Ω7 for 30 days can effectively reduce C-reactive protein for 44%



Biomarker	Intervention (n = 30)	Control (n = 30)	Effect estimate	P value
C-reactive protein (mg/L)				
Baseline	4.3 (0.2)	4.3 (0.1)		.88
30 day	2.1 (0.2)	4.0 (0.2)	-1.9 (-2.3 to -1.4)	<.001 <.0001

## Ω7 improves metabolic syndrome

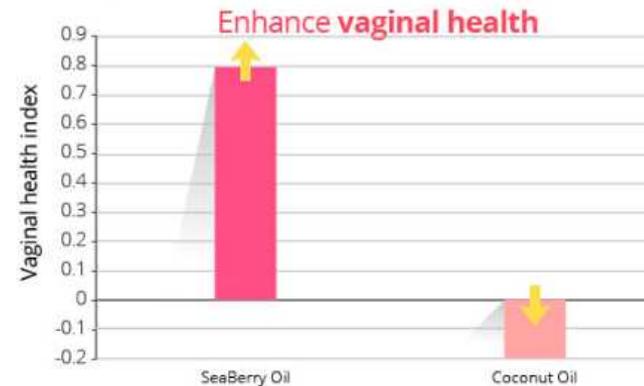
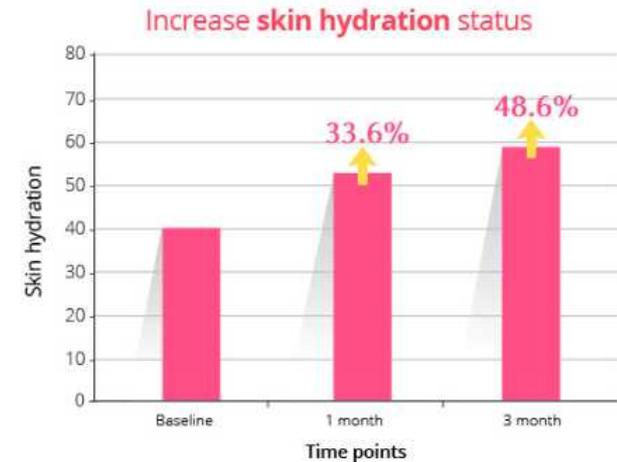
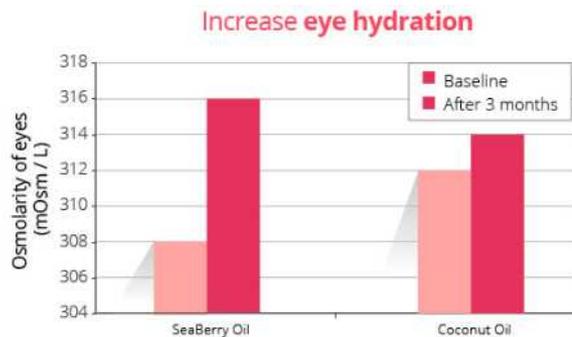
Large pharmaceutical companies have at least four classes of drugs for metabolic syndrome, but these drugs have various side effects. On the other side, Ω7 can provide natural and effective treatment for metabolic syndrome, and no side effects are reported.

Metabolic Syndrome Parameter	Statins (Lipitor® and others)	Fibrates (Lopid® and others)	Glitazones (Actos® and others)	Sulfonylureas (Glipizide® and others)	Omega-7 Palmitoleic Acid
LDL ( "bad" cholesterol)	Reduce	Reduce	Increase	No effect	Reduce
HDL ( "good" cholesterol)	Little effect- may even decrease	Increase	Increase	Decrease	Increase
Blood sugar	May increase	No effect	Reduce	Reduce (but increase insulin)	Reduce
Insulin resistance	May worsen	No effect	Reduce	May improve	Reduce
Body weight/composition	Increase weight, decrease fat-free mass	May increase weight and fat mass	Decrease fat	Increase	Reduce appetite
Inflammation	May reduce	May reduce	Reduce	No effect	Reduce
Side effects	Muscle pain (myalgia), may increase risk of diabetes	Gallstones, muscle pain	May increase risk of cardiovascular death	Increased risk of cardiovascular death	No reports

# Health benefits of $\Omega 7$ – improve skin and anti-aging

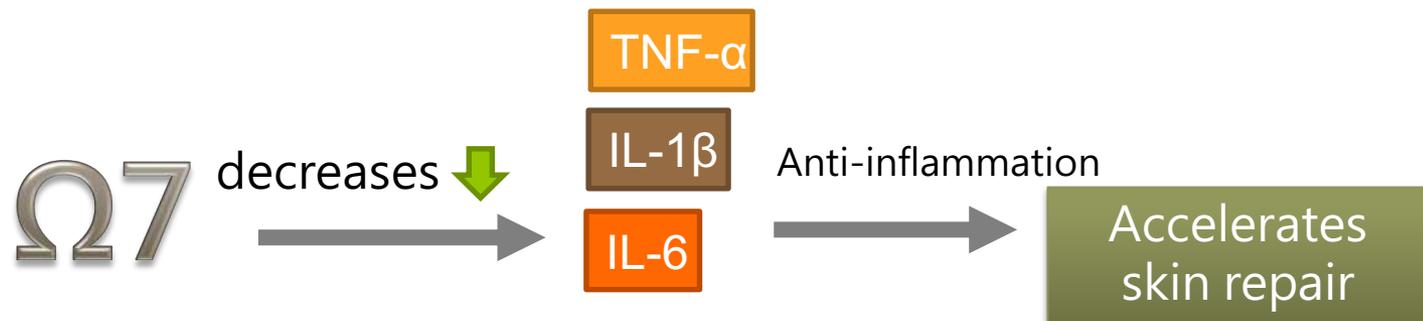
## $\Omega 7$

- increases skin elasticity and hydration
- reduces age-related symptoms such as wrinkles and skin roughness
- provides long-lasting moisturizing effects to the skin
- has the function of repairing cell mucosa, so it can significantly improve the dryness of women as a whole, including vaginal dryness, skin, mouth, nose and eyes, and promote cell secretion.



- Yang, Baoru, et al. "Effects of oral supplementation and topical application of supercritical CO<sub>2</sub> extracted sea buckthorn oil on skin ageing of female subjects." *Journal of Applied Cosmetology* 27.1 (2009): 13.
- Larmo, Petra S., et al. "Effects of sea buckthorn oil intake on vaginal atrophy in postmenopausal women: A randomized, double-blind, placebo-controlled study." *Maturitas* 79.3 (2014): 316-321.
- Larmo, Petra S., et al. "Oral Sea Buckthorn Oil Attenuates Tear Film Osmolarity and Symptoms in Individuals with Dry Eye-4." *The Journal of nutrition* 140.8 (2010): 1462-1468.

## Health benefits of $\Omega 7$ – improve skin and anti-aging



## Ω7 product applications

Ω7 products can target the following three broad categories:

### For metabolic syndrome

including cardiovascular disease, type 2 diabetes, obesity, etc

### For anti-aging

repair skin cell mucosa, help natural collagen synthesis, and promote secretion

### Nutrients for daily life

integrating Ω7 into daily life in the form of food, and preventing diseases such as metabolic syndrome. In addition, Ω7 fatty acids provide energy supplements.

# Puredia existing products and development

Puredia breaks the traditional concept of taking medicine to cure disease and focus on preventive health care. It uses natural resources to promote health in daily life

## Puredia's technology



### Formulated oil

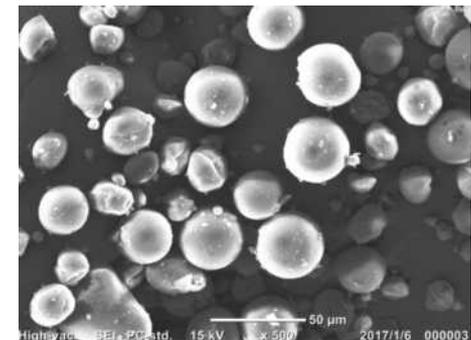
Blend oils extracted from different parts of Sea Buckthorn (such as seed and fruit oil) with other oils such as perilla oil to achieve comprehensive nutrition and more health benefits.

### Patented micro-encapsulation technology

Use microencapsulation technology to turn omega-7 fatty acids into water soluble. Water-soluble  $\Omega 7$  nutrition products can be easily integrated into daily life.

### High concentration $\Omega 7$

Using biotransformation and other technology, Puredia's can increase the  $\Omega 7$  content in products by more than 70% with the bioavailability increased as well. The field of biotransformation is vast and can continue to grow in the long run. Puredia focuses on fatty acid nutrition research and is constantly striving to develop more fatty acid products that meet human health needs.



# Puredia existing products and development

## Puredia's products

Ω7 can be safely and effectively used as functional raw materials in foods, health products, medicines, special diets, cosmetics, etc., for example:

1. For **health products**, Ω7 ingredients with 70% concentration produced by Puredia can be directly filled into soft capsules, 0.5g/capsule, and one capsule per day for adults to effectively prevent cardiovascular problems.
2. The **microcapsule powder** can be used in formula milk powder for infants, pregnant women and the elderly by blending with minerals and vitamins etc. The microcapsule powder can be blended with grains, fruits and vegetables powder (pumpkin powder, coconut milk powder, etc.), minerals, etc. to prepare diabetic meal replacement powder, and meal powder for kidney disease patients.



## Puredia existing products and development

3. 70% Omega 7, formulated and emulsified, as a functional topical cosmetic ingredient. It has a significant effect on skin diseases and scar repairing.
4. Preparation into a spray, as treatment for oral ulcers, skin burns and eczema etc.
5. The blended oil can target many health functions, for pregnant women, cancer patients, etc. Customized products can be formulated and developed according to the specific needs of the customer.



## Puredia existing products and development

Puredia's nutritional products can be easily integrated into daily life.



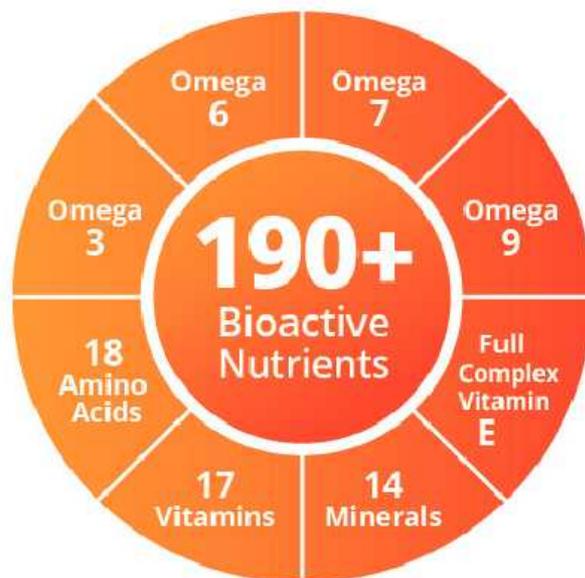
## Puredia existing products and development

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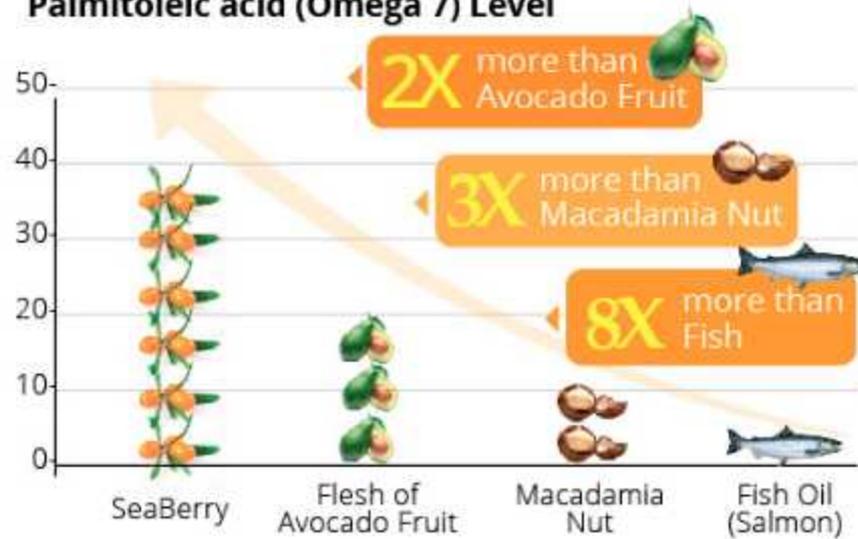
## Rich source of $\Omega$ 7– Sea Buckthorn

Despite the omega-7 could be found in fish oil and macadamia, sea buckthorn is the most abundant, plant source natural omega-7. The sea buckthorn fruit oil can provide up to 35% (Qinghai sea buckthorn can be up to 45%) palmitoleic acid, three times more than macadamia nuts. In addition, sea buckthorn contains a variety of active ingredients such as vitamin A, B complex, C, D, E and  $\Omega$ 3, 6, 7, 9 and so on. These bioactive nutrients can be coordinated and supplemented to achieve synergy and great benefit to health.



## Why SeaBerry?

### Palmitoleic acid (Omega 7) Level



# Puredia – high quality Sea Buckthorn source

Puredia is the world's largest supplier of organic Sea Buckthorn, and is a comprehensive enterprise integrating research, development, production and management of health products and functional food. With 23,000 acres of organic certified wild Sea Buckthorn forest and a production base with international standard in the Qinghai-Tibet Plateau, the safety and effectiveness of all products are strictly regulated. A series of nutritious dietary products have been produced by extracting different active ingredients from natural organic Sea Buckthorn.



# The third pole of the world – Qinghai-Tibet Plateau

- Puredia SeaBerry® is from the Qinghai-Tibet Plateau with average altitude of more than 3,000 meters above sea level, also known as the third pole. The extreme weather (sparse air, large temperature difference between day and night, long sunshine hours, etc.) has created a high level of active ingredients in plateau plants.
- The same kind of plateau plants tend to have higher nutrient content than those from low altitude areas. The content of vitamin C, organic acids, flavonoids, sugars and soluble solids in sea buckthorn fruits grown in Tibetan Plateau is 1-2 times higher than those in low altitude areas.
- Puredia's natural  $\Omega 7$  can be as high as 40%. Through advanced purification technology,  $\Omega 7$  can even reach 70%.

Location	Vitamin C (mg/100g)	Total Acids (g/L)	Total Flavonoids (%)	Altitude (m)
 Qinghai, Tibet	1487	88.9	1.58	2800
 Gansu	845	75	1.1	1700
 Shanxi	305	51.2	0.95	1380
 Inner Mongolia	248	23.9	0.9	1000
 Liaoning	424	65	0.85	800
 Russia	2-200	—	—	—
 Europe	2-200	—	—	—



# International quality certifications



EU Organic



JAS Organic



US Organic



Korea Organic



China Organic



Non GMO verified



HALAL certified



Kosher certified



## Puredia's sister company, Hugh Source (International) Ltd.

- Over 20 years of experience in the pharmaceutical industry in Hong Kong
- Established the BTXA brand (type A botulinum toxin) . Registered and developed markets in 32 countries around the world.
- It confirms Puredia mastery of international standards for pharmaceuticals and produces a range of high quality products. The vast market background provides Inavik's long-term development plan

**HUGH**

Hugh Source (International) Ltd.

**BTXA**  
Botulinum Toxin Type A

**RENOFILL™**

**RENO-OP™**

**RENO-Osteo™**



# Corporate Responsibility and Charity

## Sustainable Development

Puredia focuses on sustainable development. Farmers use sustainable methods to avoid over-harvesting.



# Corporate Responsibility and Charity

## Building a “Candle-light” school

2008 Sichuan earthquake caused huge property losses and casualties in Gansu Province. The education industry suffered unprecedented disasters in particular, with all 2,964 schools in Weinan were affected. In the same year, Dr Hywel Yuen, CEO of Puredia, donated RMB 500,000 to the Gansu Provincial Committee to build the “Candle-light” school, and to contribute to the development of education in the disaster area.



# Corporate Responsibility and Charity

## Sea Buckthorn Poverty Alleviation Fund

Puredia has established the “Seabuckthorn Poverty Alleviation Fund” in 2016 to provide employment and educational opportunities for local farmers and their children, so that the local environment and economy can be reasonably helped.



**THANK YOU!**  
ཐུགས་རྗེ་བྱེད་པ་ལེ།  
**(Tujay Shita-  
Chay**

