

# THE FAT-SOLUBLE ACTIVATORS THE KEY TO VIBRANT HEALTH

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POWERPOINT DESIGN BY SANDRINE HAHN

# OUTLINE

- The Fat-Soluble Vitamins in Traditional Diets
- Testing Results
- Cod Liver Oil Topics



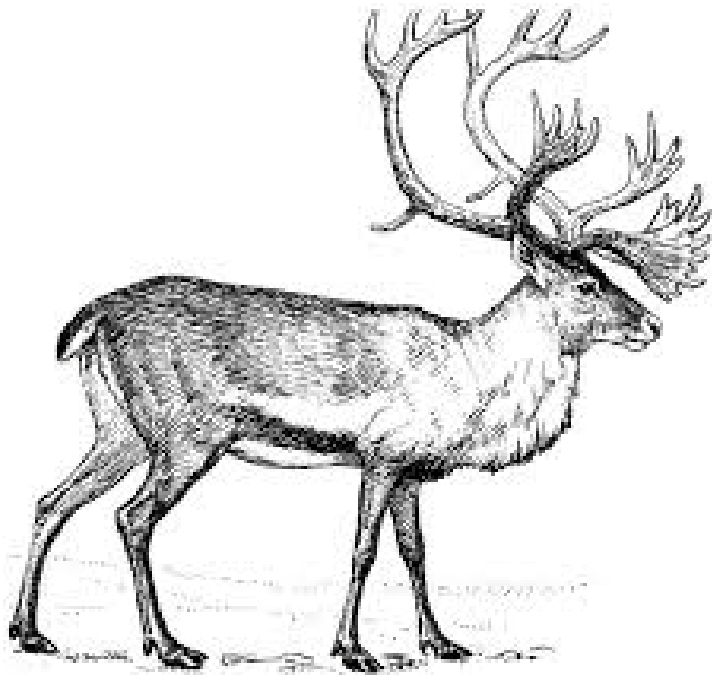
Samuel Hearne  
1745–1792



First European  
Explorer across  
northern Canada to  
the Arctic Ocean

On the twenty-second of July, we met several strangers, whom we joined in pursuit of the caribou, which were at this time so plentiful that we got everyday a sufficient number for our support, and indeed too frequently killed several **merely for the tongues, marrow and fat.**

*The Journeys of Samuel Hearne 1768*



The most remarkable dish among them, as well as all the other tribes of Indians in those parts, both Chipewyan and Cree, is **blood mixed with the half-digested food which is found in the caribou's stomach**, and boiled up with a sufficient quantity of water to make it of the consistence of pease-pottage. **Some fat and scraps of tender flesh** are also shred small and boiled with it. To render this dish more palatable, they have a method of mixing the blood with the contents of the stomach in the paunch itself, and hanging it up in the heat and smoke of the fire for several days; which puts the whole mass into a state of fermentation, which gives it such an agreeable acid taste, that were it not for prejudice, it might be eaten by those who have the nicest palates.

*The Journeys of Samuel Hearne 1768*

Of all the dishes cooked by the Indians, a *beeatee*, as it is called in their language, is certainly the most delicious that can be prepared from caribou only, without any other ingredient. It is a kind of haggis, made with the **blood, a good quantity of fat shred small, some of the tenderest of the flesh, together with the heart and lungs cut**, or more commonly torn into small shivers; all of which is put into the stomach and toasted by being suspended before the fire on a string. . . . it is certainly a most delicious morsel, even without pepper, salt or any other seasoning.

*The Journeys of Samuel Hearne* 1768

# HAGGIS

Sheep's pluck (heart, liver and lungs); minced with onion, oatmeal, suet (fat) and salt, mixed with stock, traditionally encased in the animal's stomach.

It is believed that food similar to haggis . . . perishable offal quickly cooked inside an animal's stomach, all conveniently available after a hunt, was eaten from ancient times.





## KAHAWI

Trash Fish or Sacred Food?

Consumed by Maoris when fish are **fattest**,  
stuffed with **all the organs** except the gall bladder.

Photo courtesy Kay Baxter



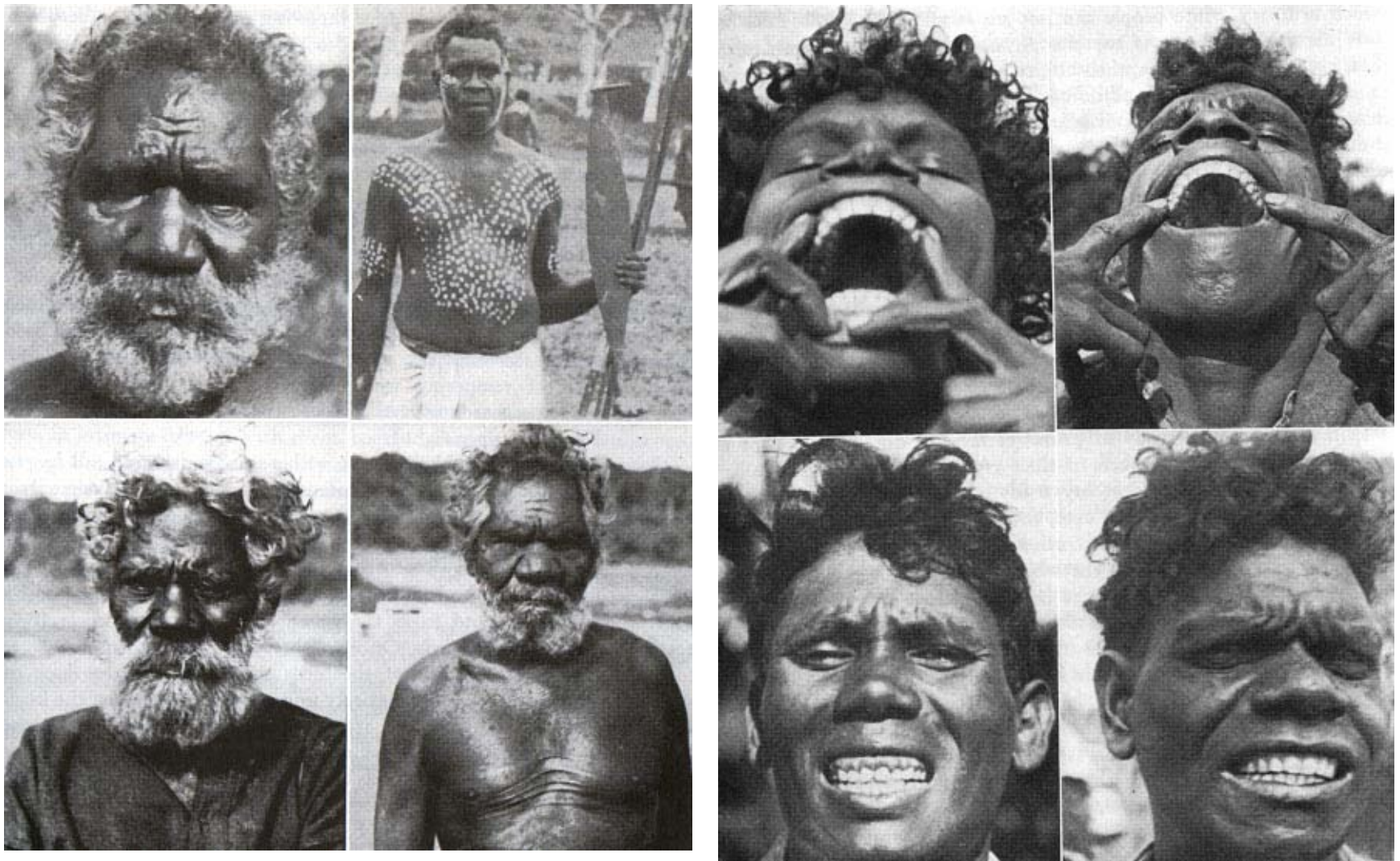


## TAHITI: SHARK STOMACHS CONTAINING FERMENTING SHARK LIVERS

Photo courtesy Kay Baxter

The diet of healthy primitive peoples  
was based on guts and grease,  
not lean meat and broccoli!





**AUSTRALIAN ABORIGINES**  
Photographed by Dr. Weston Price

# A PREFERENCE FOR FAT

Observed nature and knew when animals were fattest. During periods of abundance, animals were slaughtered ruthlessly and only the best and fattest parts of the killed game were eaten.

Kangaroos were fat when the fern leaf wattle was in flower.

Possoms were fat when the apple tree was in bloom. Highly saturated kidney fat from the possum was often eaten raw.

Other signs indicated when the carpet snake, kangaroo rat, mussels, oysters, turtles and eels were fat and at their best.

Fat from the intestines of marsupials and emus were favorites

Yellow fat of the goanna was considered a delicacy

The dugong was another source of fat available to native on the coasts

Eggs from reptiles and birds

Insects such as wichiti grubs and dugong moths were rich in fat.

## A PREFERENCE FOR FAT

For the Aborigines, foods lacking fat were “**rubbish**.”

Kangaroos that were not fat enough were **rubbish** and thrown away—not worth carrying back to camp.

A study of the Bardi people in northwestern Australia found that they fished for different species of fish when they had the most fat lining the intestines. (Unlike fish from cold regions, tropical fish have very little fat in their flesh.) This fat is painstakingly removed, melted in a shell or tin can set on the coals and then drunk or used as a dip for the flesh of the fish

The Bardi harvested rock oysters during spring tides; oysters taken at other times were **rubbish**. An analysis found that the oysters harvested during spring times were four times richer in fat.

Analysis of fat from fish guts, from fish livers, from oysters, and from turtle meat, fat and organ meats found that the predominant fat was **SATURATED** fat.



FIG. 2. *Siganus lineatus* displaying fat deposit on intestine.

Only turtles with plenty of fat in their bodies were killed and eaten.



Rouja and others. Fat, Fishing Patterns, and Health Among the Bardi People of North Western Australia. *Lipids* 2003 38(4)399-405



Entrails of a green sea turtle,  
will be cooked and eaten during a feast.



SEAL OIL: A MAJOR SOURCE OF CALORIES in the ALASKAN DIET.  
DIET CONTAINED 80 PERCENT OF CALORIES AS FAT.





FISH EGGS: A SACRED FOOD OF THE ESKIMOS,  
FOR ENSURING HEALTHY BABIES.

# THE PRINCIPLE OF NUTRIENT DENSITY

## DR. PRICE'S KEY FINDING

PRIMITIVE DIETS CONTAIN **4 TIMES**  
THE CALCIUM AND OTHER MINERALS,  
AND **10 TIMES** THE FAT-SOLUBLE VITAMINS  
COMPARED TO THE MODERN AMERICAN DIET.

# SOURCES OF VITAMINS A AND D

## SEAFOOD

FISH EGGS  
FISH LIVERS  
FISH LIVER OIL  
FISH HEADS  
SHELL FISH  
OILY FISH  
SEA MAMMALS



LAND ANIMALS  
GRASS-FED!

INSECTS  
BUTTER AND CREAM  
EGG YOLKS  
LIVER, ORGAN MEATS  
ANIMAL FAT

ESPECIALLY MONO-GASTRIC ANIMALS SUCH AS  
BIRDS, PIG, BEAR, GUINEA PIG



# THE FAT-SOLUBLE ACTIVATORS A AND D

// A question arises as to the efficiency of the human body in removing all of the minerals from the ingested foods. Extensive laboratory determinations have shown that most people cannot absorb more than half of the calcium and phosphorus from the foods eaten. The amounts utilized depend directly on the presence of other substances, particularly fat-soluble vitamins.

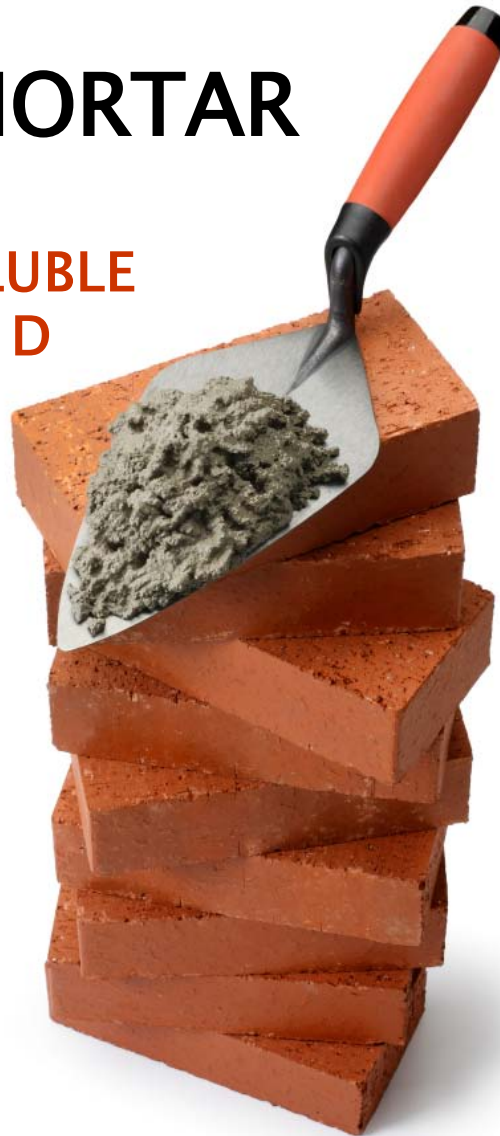
It is at this point probably that the greatest breakdown in our modern diet takes place, namely, in the ingestion and utilization of adequate amount of the special activating substances, including the vitamins [A and D] **needed for rendering the minerals in the food available to the human system.**

**It is possible to starve for minerals that are abundant in the foods eaten because they cannot be utilized without an adequate quantity of the fat-soluble activators. //**

WESTON PRICE, DDS  
*NUTRITION AND PHYSICAL DEGENERATION*

# BRICKS AND MORTAR

MORTAR = FAT-SOLUBLE  
ACTIVATORS A AND D



BRICKS = MINERALS

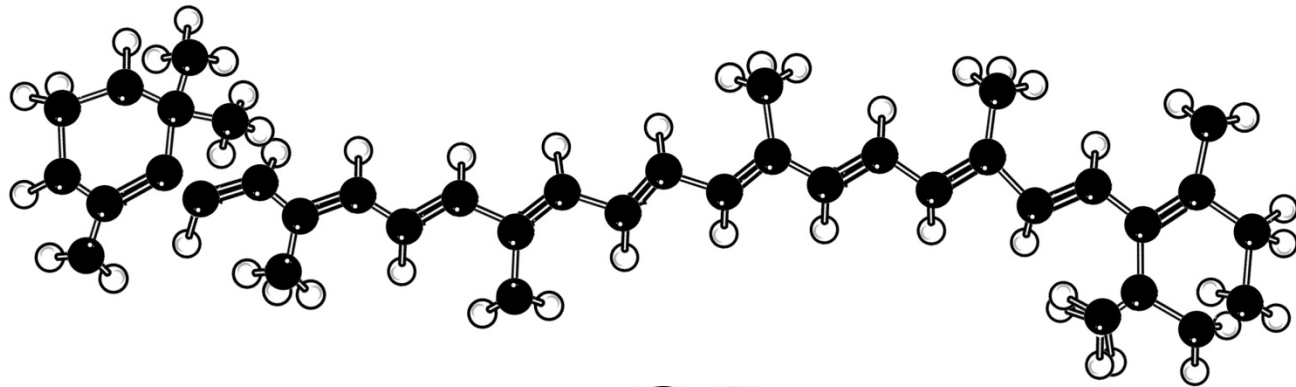
THE BODY IS LIKE A HOUSE OR TEMPLE,  
BUILT OF BRICKS AND MORTAR

# VITAMIN A **MYTH**: PLANT FOODS CONTAIN VITAMIN A

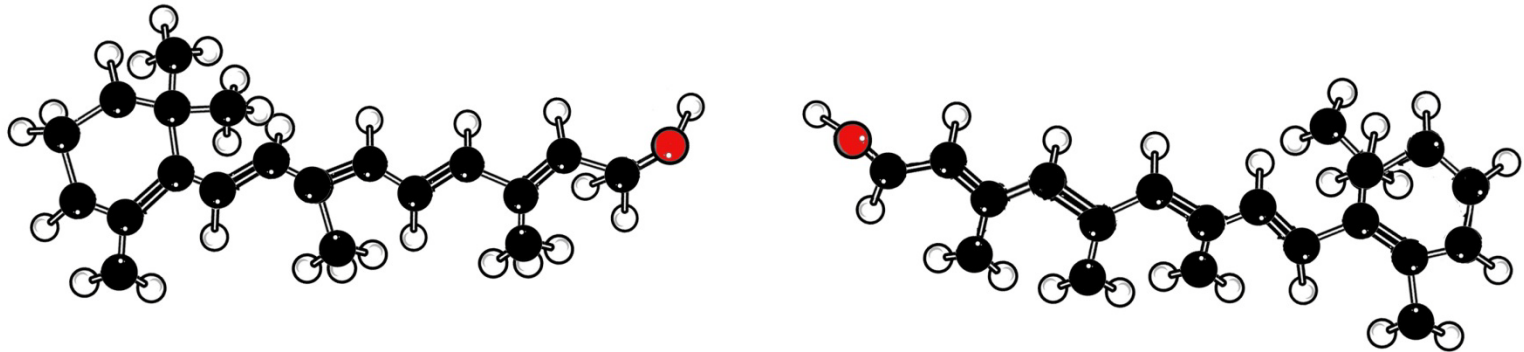


**TRUTH:** THERE IS NO VITAMIN A IN PLANT FOODS

# Conversion of Beta-Carotene to Vitamin A



+O<sub>2</sub>



# CONVERSION PROBLEMS

NEEDED TO CONVERT **CAROTENE TO VITAMIN A:**

Fats in the diet

Thyroid Hormone

Enzymes – as yet unknown

Vitamin E

**CONVERSION AND STORAGE IS DIFFICULT OR IMPOSSIBLE FOR**

BABIES AND CHILDREN

DIABETICS

Individuals with poor thyroid function

Individuals with poor liver function

Individuals with poor intestinal absorption

Individuals with high intake of sodium nitrites and nitrates

Individuals exposed to pesticides and other toxins

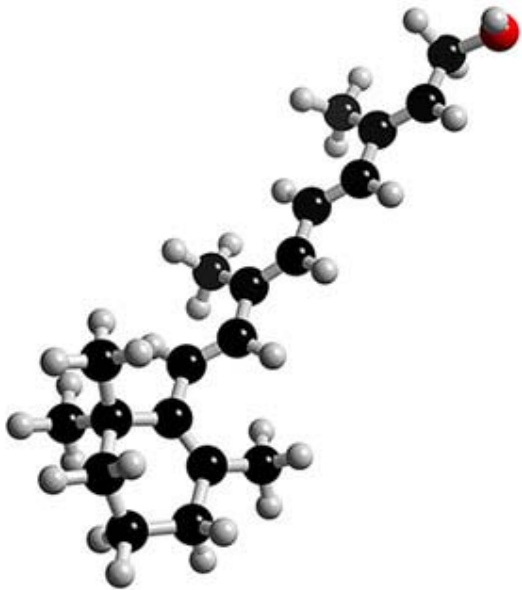
Individuals who consume lots of carotene

EVEN UNDER OPTIMAL CONDITIONS, **PLANT SOURCES OF CAROTENE**  
CANNOT SUPPLY SUFFICIENT VITAMIN A FOR OPTIMUM HEALTH.



# VITAMIN A

NEEDED FOR NUMEROUS PROCESSES IN THE BODY



PROTEIN ASSIMILATION

CALCIUM ASSIMILATION

PROPER GROWTH

PREVENTION OF BIRTH DEFECTS

PROPER FUNCTION OF THE ENDOCRINE SYSTEM

THYROID FUNCTION

IMMUNE SYSTEM FUNCTION

PRODUCTION OF STRESS AND SEX HORMONES

EYES, SKIN, BONES

# CHOLESTEROL THE MOTHER OF ALL HORMONES

ACTH

↓  
→ **CHOLESTEROL**

Pregnenolone → Progesterone

Pregnenolone → Progesterone

DHEA → Androstenedione → Estradiol

↓  
Testosterone

Corticosterone  
Aldosterone  
Corticosterone

11 Deoxycortisol → Cortisol

**REGULATE  
MINERAL METABOLISM,  
GLUCOSE LEVELS,  
BLOOD PRESSURE,  
HEALING AND STRESS**

**SEX HORMONES**

VITAMIN A IS NEEDED FOR EACH CONVERSION.

TRANS FATS INHIBIT ENZYMES THAT MAKE THESE CONVERSIONS.



# VITAMIN A

THE CONCERT MASTER  
OF FETAL DEVELOPMENT



# VITAMIN A

OUR MAIN  
PROTECTION  
AGAINST TOXINS  
AND POLLUTION

# VITAMIN A IS DEPLETED BY

STRESS

EXCESS DIETARY PROTEIN

COLD WEATHER

FEVER AND ILLNESS

PHYSICAL EXERTION

EXPOSURE TO TOXINS

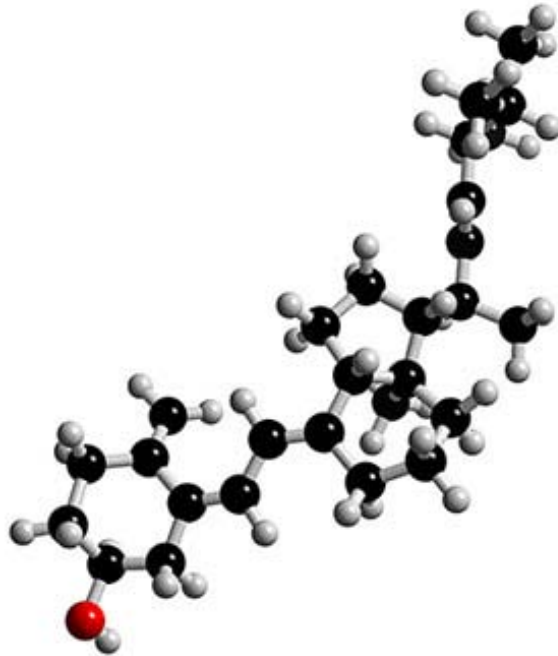
# VITAMIN D MYTH



**MYTH** – To get adequate vitamin D, just expose your face and hands to sunlight for 10 minute every day.

**TRUTH** – The body makes vitamin D out of cholesterol by the action of UV-B sunlight on the skin. However, except in the Tropics, UV-B is available only at mid-day during the summer months.

# ROLES OF VITAMIN D



HEALTHY BONES

PROPER GROWTH

MINERAL METABOLISM

MUSCLE TONE

REPRODUCTION

HEALTHY SKIN

INSULIN PRODUCTION

IMMUNE SYSTEM

NERVOUS SYSTEM

CELL FUNCTION

FEEL GOOD CHEMICALS

LONGEVITY

# ACTIVATOR X = VITAMIN K<sub>2</sub>

**ANIMAL FORM:** K2 is the animal form of vitamin K, made from K1, the plant form.

**GROWTH:** Plays important role, especially in facial development. Sign of deficiency: Underdevelopment of middle third of the face.

**BONES AND TEETH:** Needed for deposition of phosphorus and calcium in bones and teeth

**HEART DISEASE:** Prevents calcification and inflammation of the arteries.

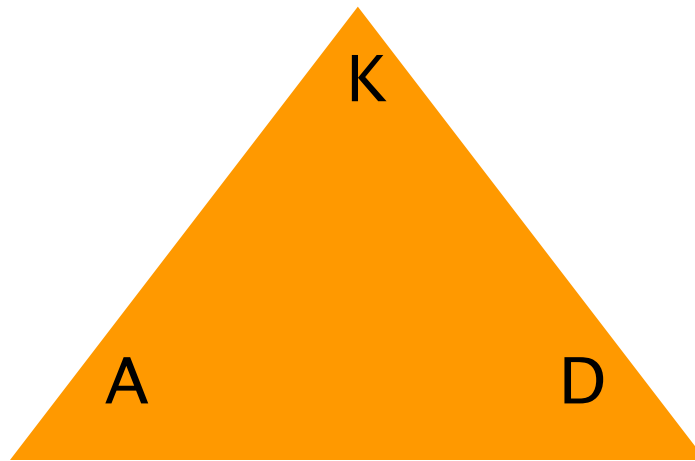
**BRAIN:** Involved in synthesis of myelin sheath; supports learning capacity.

**REPRODUCTION:** Vital for normal reproduction.



# THE SYNERGY OF VITAMINS A, D and K

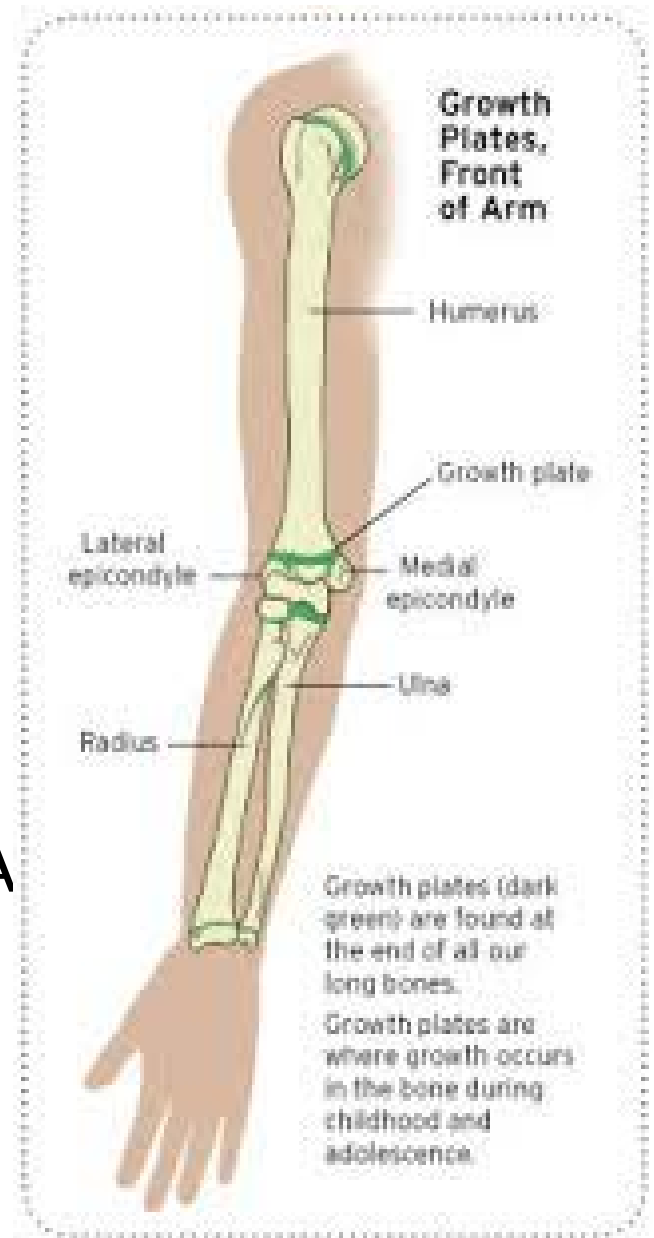
**VITAMIN K** ACTIVATES PROTEINS AFTER  
SIGNALING BY VITAMINS A AND D



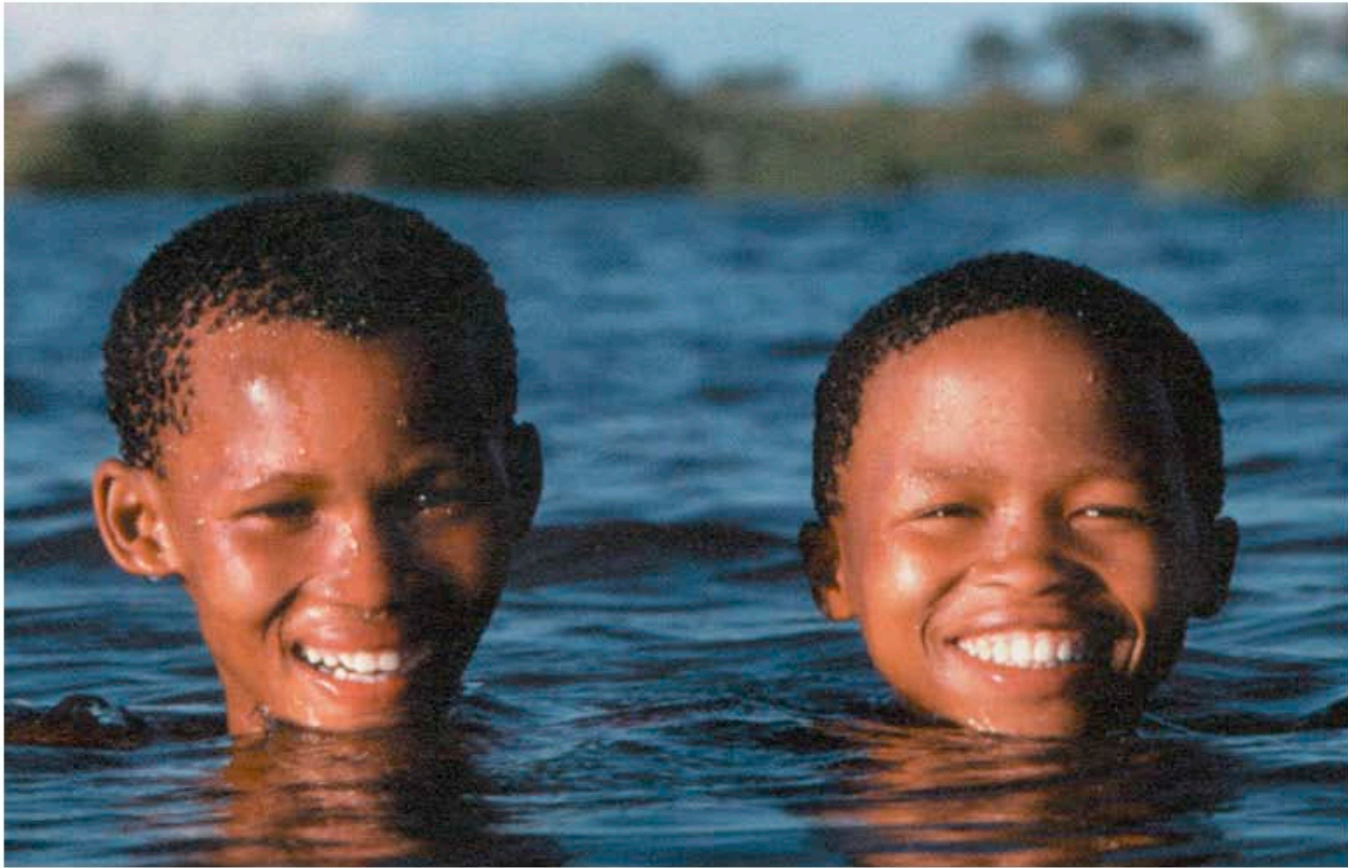
VITAMINS A AND D TELL CELLS TO MAKE CERTAIN PROTEINS



Vitamin K2, supported by vitamins A and D, prevents the growth plates from closing prematurely, including the growth plates in the maxilla.



# MODERN VERSUS TRADITIONAL FACIAL STRUCTURE



# VITAMIN TESTING RESULTS

With thanks to the

Forrest and Francis Lattner Foudation  
John Winams Memorial Fund

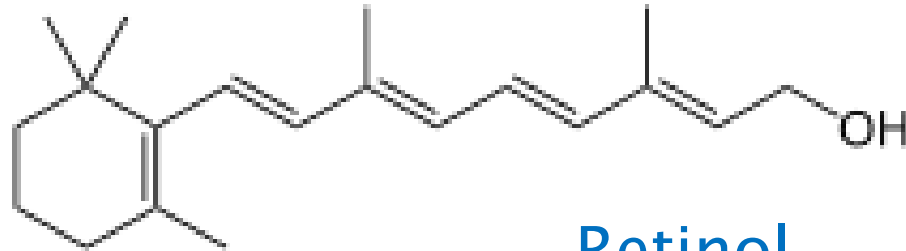




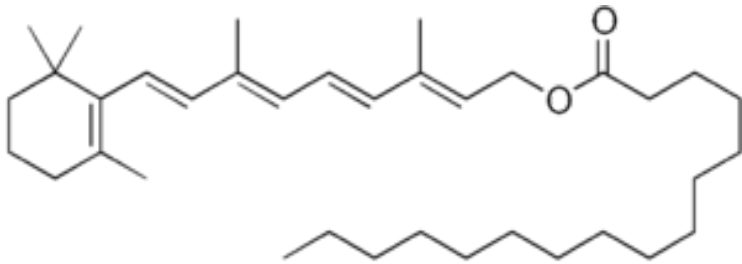
# WHAT IS AN INDEPENDENT LAB?

- The laboratory has been accredited for various types of testing by an official accreditation body such as the American Association for Laboratory Accreditation (A2LA) or the American Association of Clinical Chemists (AACC).
- Can be a private laboratory or a research lab associated with a university
- Uses testing procedures approved by the AOAC (Association of Official Analytical Chemists).
- Provides an official report of the results that includes the name and logo of the lab, the name of the person or organization requesting the test, the name of the product tested, the date and the person responsible for the testing. This is a legal document that can hold up in a court of law.

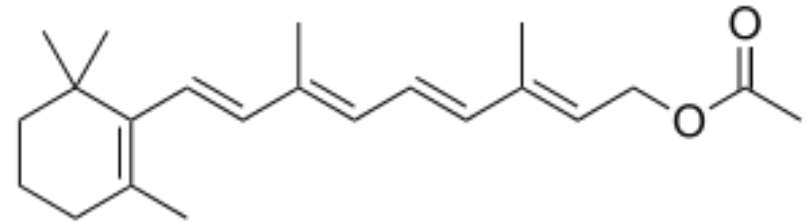
# WHAT IS VITAMIN A?



Retinol



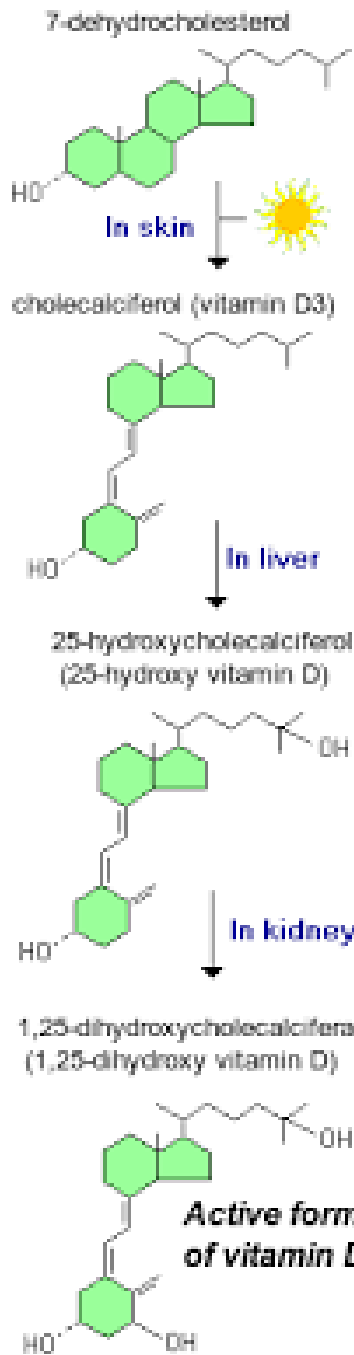
Retinol Palmitate



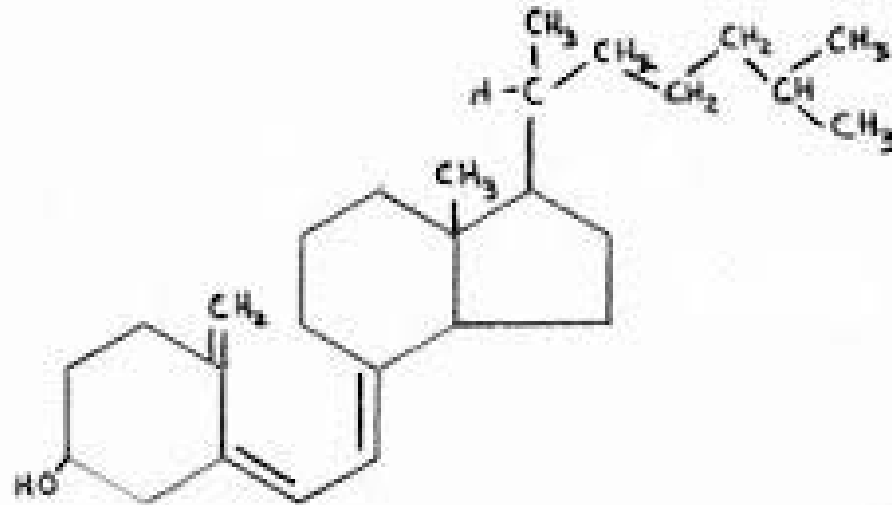
Retinol Acetate

Results usually given as total retinol  
or retinol plus retinol palmitate

# WHAT IS VITAMIN D?



About 800 forms of vitamin D in food and in the body

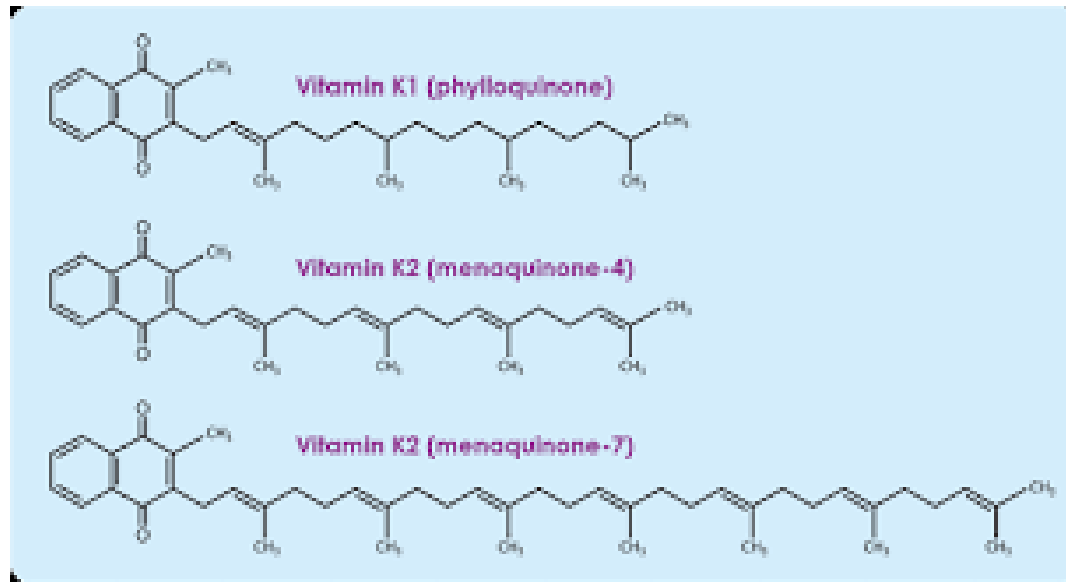


Vitamin D3 is the most common type of vitamin D found in food, but there are many others. Most lab tests do not distinguish many of the different forms.



# WHAT IS VITAMIN K?

Phylloquinone (Plants) = Vitamin K1  
Menoquinone (Animals) = Vitamin K2  
Menadione (Synthetic) = K3



M4 in animal products  
M5-10 from fermentation

# THE LABS WE USED

For Vitamin K Testing

VitaK BV in the Netherlands

For Vitamins A and D

Covance in Wisconsin

UBE Laboratories in California

- Both recommended by Hector De Luca.
- General agreement on using Covance.
- UBE more controversial because of very high results obtained in 2009.

# WHY DO DIFFERENT LABS GET DIFFERENT TEST RESULTS?

Type of solvent used.

Way the tests are read: Covance uses a method to read vitamin D that gives lower results.

Print out of results may give overlap of D2 and D3 peaks.

Training of lab technician.

And many, many other factors may influence the results.

# THE 37 FOODS WE TESTED

## SEAFOOD

- Oysters
- Salmon Roe
- Whitefish Roe
- Wild Shrimp

## CHICKEN ORGANS

- Chicken Liver, conventional
- Chicken Liver, pastured
- Chicken Blood

## EGG YOLKS

- Conventional
- Organic
- Pastured

## CHEESE

- Kraft Processed Cheese Slices
- Cabot Extra Sharp Aged Cheddar
- New Zealand Organic Cheese
- Vermont Grafton Village Raw Cheese
- P A Bowen Raw Blue Cheese
- P A Bowen Raw Cheddar Cheese
- P A Bowen Reserve Cheddar

## FATS

- Tallow, conventional
- Tallow, pastured
- Lard, Smithfield
- Lard, pastured
- Duck Fat, free range
- Emu Oil

## BUTTER

- Land O Lakes
- Organic Valley
- Farm Friend Goat Butter
- Kerry Gold Butter
- Trickling Springs Butter
- Amish Raw Butter
- Amish Raw Cultured Butter

## GHEE AND BUTTER OIL

- Pure Indian Ghee
- Purity Farms Ghee
- Extra Virgin Butter "Oil"
- Green Pasture Butter Oil

## COD LIVER OIL

- Nordic Naturals
- Rosita Extra Virgin Cod Liver Oil
- Green Pasture Fermented Cod Liver Oil

## FATS (Per 100 Grams)

Total Retinol IU	Covance	UBE
Tallow, Conventional	<100	0
Tallow, Pastured	<100	200
Lard, Smithfield	<100	2,200
Lard, Pastured	<100	1,500
Duck Fat, Free Range	362	200
Emu Oil	181	2,300

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2	UBE D3 2009
Tallow, Conventional	<4	<2	0	0	
Tallow, Pastured	<4	<2	0	0	
Lard, Smithfield	129	<2	0	0	6,040
Lard, Pastured	79	<2	0	0	74,560
Duck Fat, Free Range	<4	<2	0	0	
Emu Oil	457	<2	0	0	

## FATS (Per 100 Grams)

Vitamin K in Mcg	Vitamin K	%M4
Tallow, Conventional	5.9	100
Tallow, Pastured	8.2	100
Lard, Smithfield	13.5	100
Lard, Pastured	20.8	100
Duck Fat, Free Range	117.8	100
Emu Oil	416.5	99

## EGG YOLKS (Per 100 Grams)

Total Retinol IU	Covance	UBE	UBE A 2009
Conventional	1,490	2,500	24,320
Organic	1,580	2,500	
Pastured	2,170	3,300	27,880

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2	UBE D3 2009
Conventional	543	<2	1,400	0	9,240
Organic	410	<2	2,300	0	
Pastured	294	<2	2,700	0	69,560

Vitamin K2 in Mcg	Vitamin K	%M4
Conventional	31.7	100
Organic	33.5	96
Pastured	37.5	94

## SEAFOOD (Per 100 Grams)

Total Retinol IU	Covance	UBE
Oysters	<100	34
Salmon Roe	707	6,200
Whitefish Roe	<100	2,200
Shrimp, Wild	<100	0

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2
Oysters	<4	<2	400	0
Salmon Roe	1850	<2	12,100	0
Whitefish Roe	2170	<2	7,090	0
Shrimp, Wild	<4	<2	0	0

Vitamin K2 in Mcg	Vitamin K	%M4
Oysters	0.5	25
Salmon Roe	0.6	67
Whitefish Roe	0.1	100
Shrimp, Wild	1.3	2



## CHICKEN ORGANS (Per 100 Grams)

Total Retinol IU	Covance	UBE
Liver, Conventional	9,270	119,800
Liver, Pastured	42,200	560,400
Chicken Blood	107	2,300

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2
Liver, Conv.	<4	<2	500	0
Liver, Pastured	46.1	<2	700	0
Chicken Blood	23.1	<2	0	0

Vitamin K2 in Mcg	Vitamin K	%M4
Liver, Conv.	6.6	53
Liver, Pastured	12.3	83
Chicken Blood		

## CHEESE (Per 100 Grams)

Total Retinol IU	Covance	UBE
Kraft	629	0
Cabot	975	0
New Zealand	774	100
Vermont Grafton	993	800
Raw Blue	1,700	800
Raw Cheddar	1,710	1,200
Aged Raw Cheddar	1,160	1,500

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2
Kraft	278	<2	0	0
Cabot	<4	<2	1,300	0
New Zealand	<4	<2	3,100	0
Vermont Grafton	<4	<2	1,300	0
Raw Blue	<4	<2	1,900	0
Raw Cheddar	<4	<2	900	0
Aged Raw Cheddar	<4	<2	1,900	0

## CHEESE (Per 100 Grams)

Vitamin K in Mcg	Vitamin K	%M4
Kraft	6.7	54
Cabot	44.7	22
Nature's Promise	31.9	28%
Raw Blue	31.9	13
Raw Cheddar	15.1	24
Aged Raw Cheddar	31.5	24
Little Milk Company Irish Cheese	54.2	31%

## BUTTER (Per 100 Grams)

Total Retinol IU	Covance	UBE	UBE Vit A Palmitate 2009
Land O Lakes	2,610	10,400	
Organic Valley	2,310	1,000	
Goat Butter	2,940	6,900	
Kerry Gold	3,060	1,200	
Trickling Springs	2,240	1,010	
Amish Raw	2,100	1,200	12,794
Amish Raw Cultured	1,640	900	

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2	UBE D2 2009
Land O Lakes	<4	<2	0	0	18,800
Organic Valley	<4	<2	0	0	
Goat Butter	<4	<2	0	0	
Kerry Gold	<4	<2	0	0	
Trickling Springs	<4	<2	0	0	
Amish Raw	<4	<2	0	0	6,560
Amish Raw Cultured	<4	<2	0	0	

## BUTTER (Per 100 Grams)

Vitamin K in Mcg	Vitamin K	%M4
Land O Lakes	21.6	100
Organic Valley	21.9	100
Farm Friend Goat Butter	11.1	100
Kerry Gold	13.6	100
Trickling Springs	13.6	100
Amish Raw	9.1	100
Amish Raw Cultured	14.5	100

# GHEE AND BUTTER OIL (Per 100 Grams)

Total Retinol IU	Covance	UBE
Pure Indian Ghee	2,640	14,000
Purity Farm Ghee	2,830	10,200
Extra Virgin Butter "Oil"	2,880	8,600
Green Pasture Butter Oil	3,460	11,600

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2
Pure Indian Ghee	<4	<2	0	0
Purity Farm Ghee	<4	<2	0	0
Extra Virgin Butter "Oil"	<4	<2	0	0
Green Pasture Butter Oil	<4	<2	0	0

Vitamin K2 in Mcg	Vitamin K	%M4
Pure Indian Ghee	35.8	100
Purity Farm Ghee	27.4	100
Extra Virgin Butter "Oil"	26.0	100
Green Pasture Butter Oil	20.1/81.5	100/98

# WHAT KIND OF VITAMIN D IS IN COD LIVER OIL?

Green Pastures first tested their FCLO in the Canadian lab associated with Guelph University. Results came back D2

Then tested FCLO at UBE Laboratories—recommended by Hector De Luca. Results came back D2.

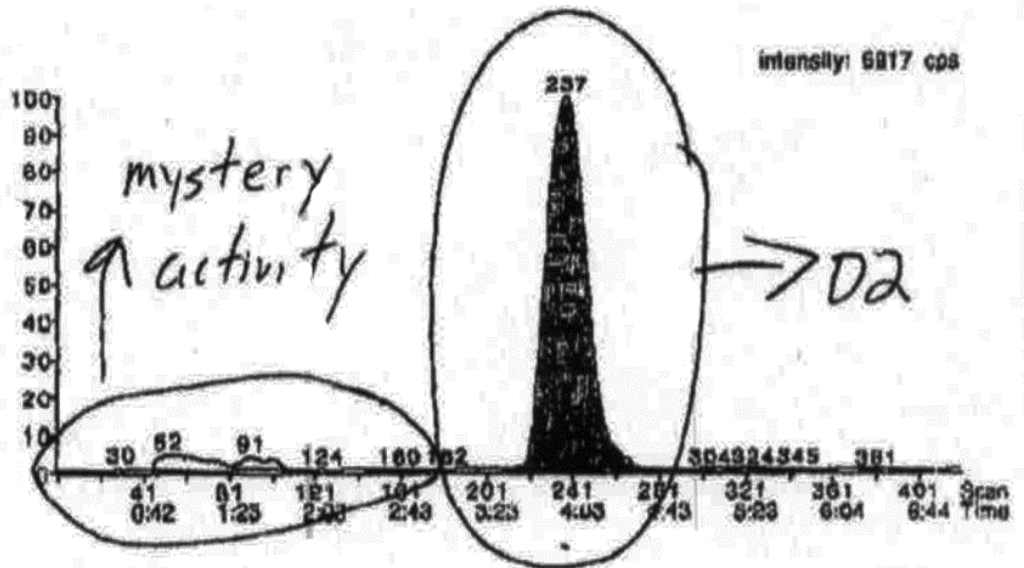
Analysis by Chris Masterjohn, PhD in *Wise Traditions* Fall 2015: The vitamin D in cod liver oil is not D3, but it is not D2 either.

Remember, there are about 800 forms of vitamin D!

7:02 in 1 period  
 VII. D2 397.3 → 379.0  
 Internal Standard: Nicotine I.S 183.0 → 84.0  
 Use Area  
 Absolute Retention Time  
 1: 6:50 MRM, 419 scans  
 397.3 → 379.0

Noise Thres.	3.0
Quant Thres.	0.3
Min. Width	10
Mult. Width	10
Base. Width	50
RT Win. (secs)	25
Smooth	5
Expected RT	4:12

Area 147748  
 Height 6917  
 Start Time 3:40  
 End Time 4:30  
 Integration Width 0:50.2  
 Retention Time 3:59  
 Integration Type A-BB





# COD LIVER OIL (Per 100 Grams)

Total Retinol IU	Covance	UBE
Nordic Naturals	6,100	17,700
Rosita Extra Virgin	37,800	46,400
Green Pasture Fermented	62,500	68,900

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2
Nordic Naturals	<4	<2	0	10,800
Rosita Extra Virgin	3960	<2	0	31,400
Green Pasture Fermented	<4	<2	0	32,900

Vitamin K2 in Mcg	Vitamin K	%M4	Results from Canadian Lab
Nordic Naturals	19.1	100	
Rosita Extra Virgin	1.5	63	
Green Pasture Fermented	0.5	36	70.6

## COD LIVER OIL (Per teaspoon)

Total Retinol IU	Covance	UBE	Retinol + Palmitate	GP Range
Nordic Naturals	305	885	1005	
Rosita Extra Virgin	1890	2320	4130	
Green Pasture Fermented	3125	3445	6080	5000–12,500

Vitamin D IU	Covance D3	Covance D2	UBE D3	UBE D2	GP Range
Nordic Naturals	<4	<2	0	540	
Rosita Extra Virgin	198	<2	0	1570	
Green Pasture Fermented	<4	<2	0	1645	1500–5500

# WHY NO VITAMIN D FOUND IN BLOOD AND BUTTER PRODUCTS?

We know that vitamin D is carried in the blood and also in breast milk (derived from blood).

Forms are likely to be 25 hydroxy and 1.25 dihydroxy (the activated form in blood).

Food testing for vitamin D does not look for these forms.

Interesting that testing found vitamin D<sub>3</sub> in cheese, but not in butter, ghee or butter oil.

These forms may also be in liver.

## EMPTY SOLID FATS?

**MYPLATE.GOV:** “Added sugars and fats load these choices with extra calories you don’t need. Some foods and beverages provide essential nutrients, but may also contain some empty calories. For example, a cup of whole milk contains about 150 calories, with over 60 of them empty calories from fat. Fat-free milk has the same amount of calcium and other nutrients as whole milk, but with less than 90 calories and no fat or empty calories.”

“Solid fats are fats that are solid at room temperature, like beef fat, butter, and shortening. Solid fats mainly come from animal foods and can also be made from vegetable oils through a process called hydrogenation.”

Along with a picture of butter on a plate, the website lists the following as empty, solid fats: **butter, milk fat, beef fat (tallow, suet), chickenfat, cream, pork fat (lard), stick margarine, shortening, hydrogenated and partially hydrogenated oils, coconut oil, palm and palm kernel oils.**

Thus “solid fats” containing trans fats and made from vegetable oils--which are rightly condemned--get lumped in with “solid fats” from animal sources, like butter and lard.

# MYTH: WE CAN'T GET ADEQUATE VITAMIN D FROM FOOD

Huffington Post on Sources of Vitamin D

Sockeye Salmon	650 IU per 3 ounces
Oily Fish	450 IU per 3 ounces
Canned tuna	154 IU per 3 ounces*
Sardines	46 IU per 2 fish
Egg Yolks	37 IU per yolk**
Swiss Cheese	6 IU per slice
Beef Liver	42 IU per 3 ounces
Mushrooms	

\*More if you eat the oil, but avoid the oil it is fat!

\*\*We found 252–486 IU per yolk

# BEST SOURCES

## From our Analysis

### VITAMIN A

Past. Chicken Liver  
Conv. Chicken Liver  
Cod Liver Oil  
Ghee/Butter Oil  
Egg Yolks  
Butter  
Emu Oil  
Lard

### VITAMIN D

Cod Liver Oil  
Salmon Roe  
Whitefish Roe  
Egg Yolks  
Cheese  
Chicken Liver  
Oysters

### VITAMIN K

Duck Fat  
Egg Yolks  
Cheese  
Ghee/Butter Oil,  
Butter  
Lard

# FOR THE FUTURE

More testing is needed!

Need testing in a research setting.

Testing of bird fats and livers.

Testing for activated form of vitamin D

Testing of traditional fat:

bear fat

beaver tail fat

caribou fat

seal oil, etc.



# RANCIDITY TESTING: Which Method is Best?

- PV Peroxide Value: Very low for FCLO.
- PA Anisdine Value: Very low for FCLO
- TBA Thiobarbituric Acid: Low for FCLO
- TBARS: More involved version of TBA. FCLO was high but not a good test for products with phenols or residual proteins.
- Free Fatty Acids: FCLO was high. Industry considers this an indicator, but not appropriate for a fermented product.
- Aldehydes: Considered best indicator by leaders in the field.

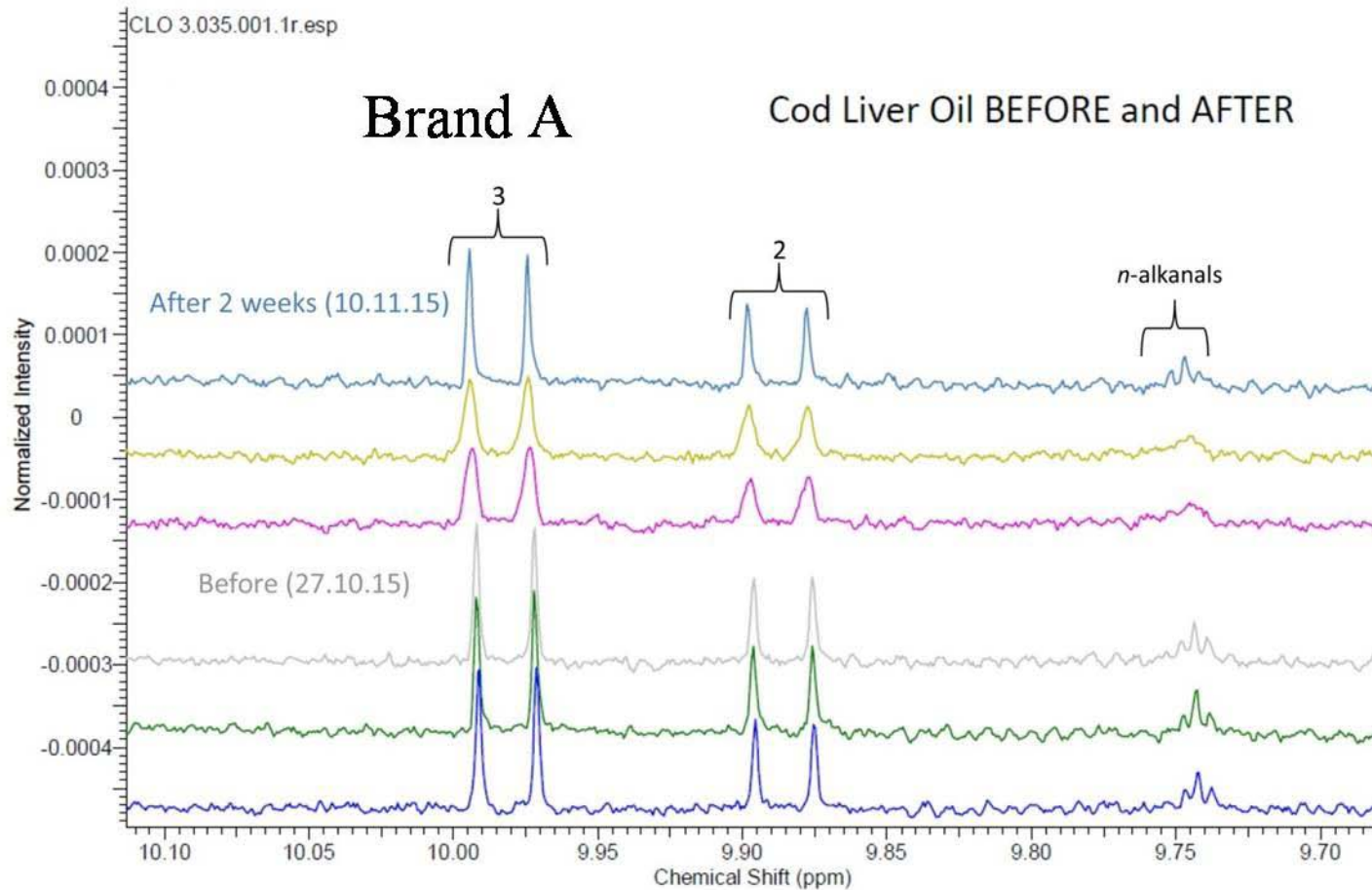


Dr. Martin Grootveld  
BSc, PhD, FIBMS, CBiol, FSB, FRSC

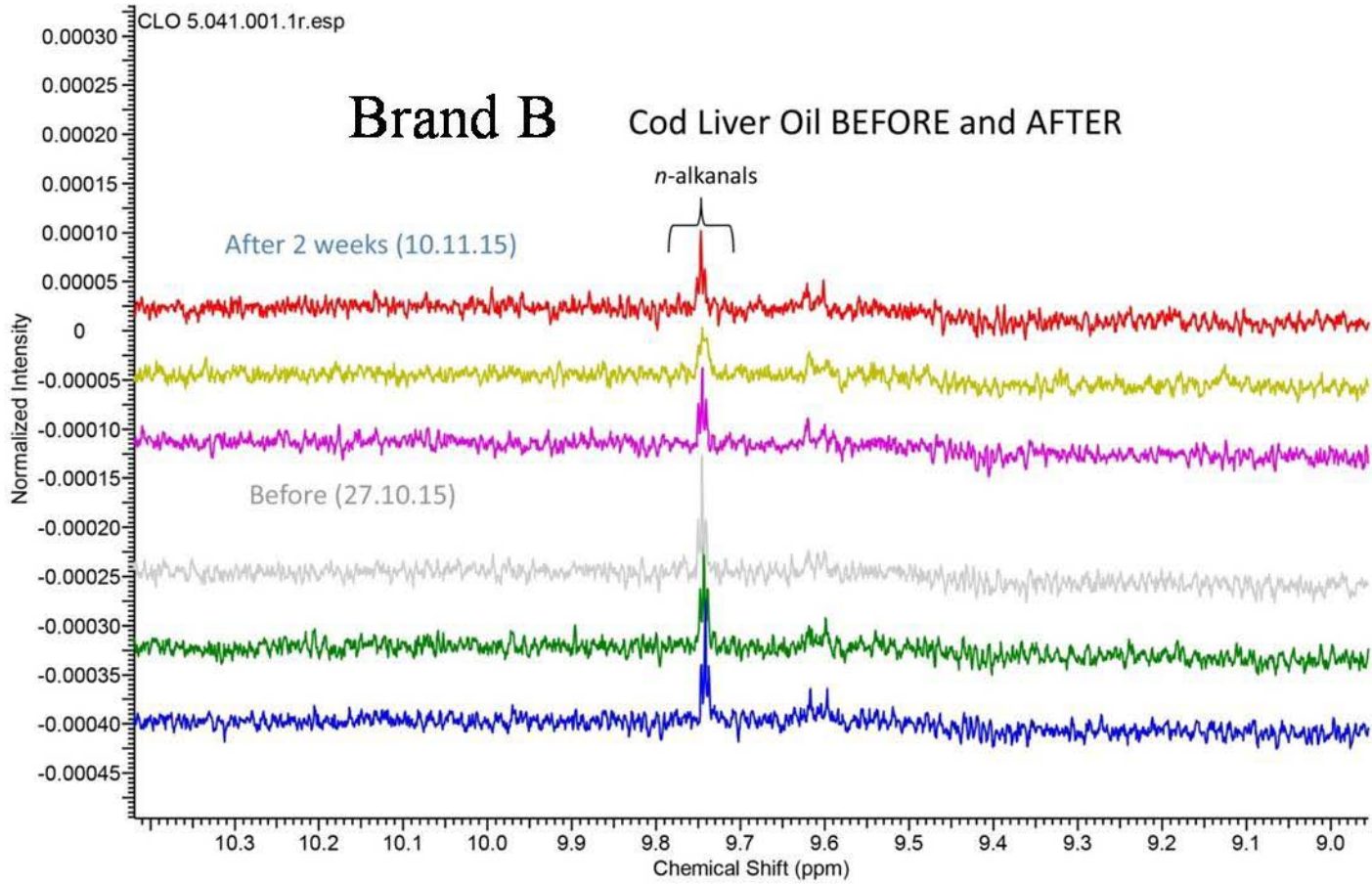
- Leicester School of Pharmacy, Faculty of Health and Life Sciences, De Montfort University, Leicester, UK.
- Fellow of the Royal Statistical Society
- Professor of Bioanalytical Chemistry and Chemical Pathology
- Chair of the Faculty of Health and Life Sciences Research Ethics Committee
- Head of Medicinal Chemistry Group, Director of Bioanalysis, Pharmaceuticals and Health Doctoral Training Programme (DTP)
- Member of the Editorial Boards of Bio Analytical Techniques and International Journal of Medical and Clinical Research.

## Dr. Grootveld's opinion on the TBARS test:

- Analytical garbage.
- Completely unreliable and serves little or no value for the estimation of rancidity.
- Test requires the heating samples for periods of about 15 minutes.
- Heating causes peroxidation of PUFAs, and hence all results derived from this heat-dependent test system represent nothing more than artifactual data.



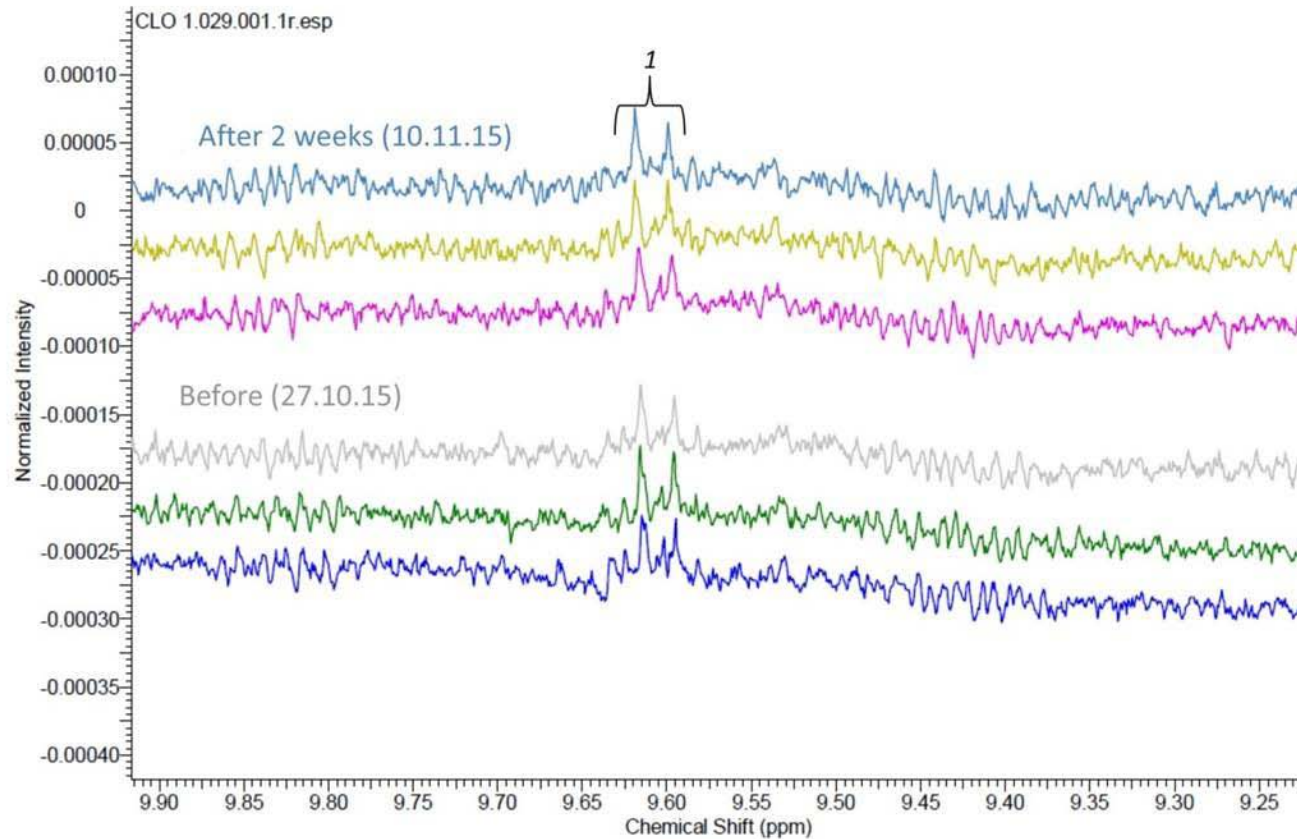
Several clear peaks showing rancidity.



One clear peak showing rancidity.

# Brand C

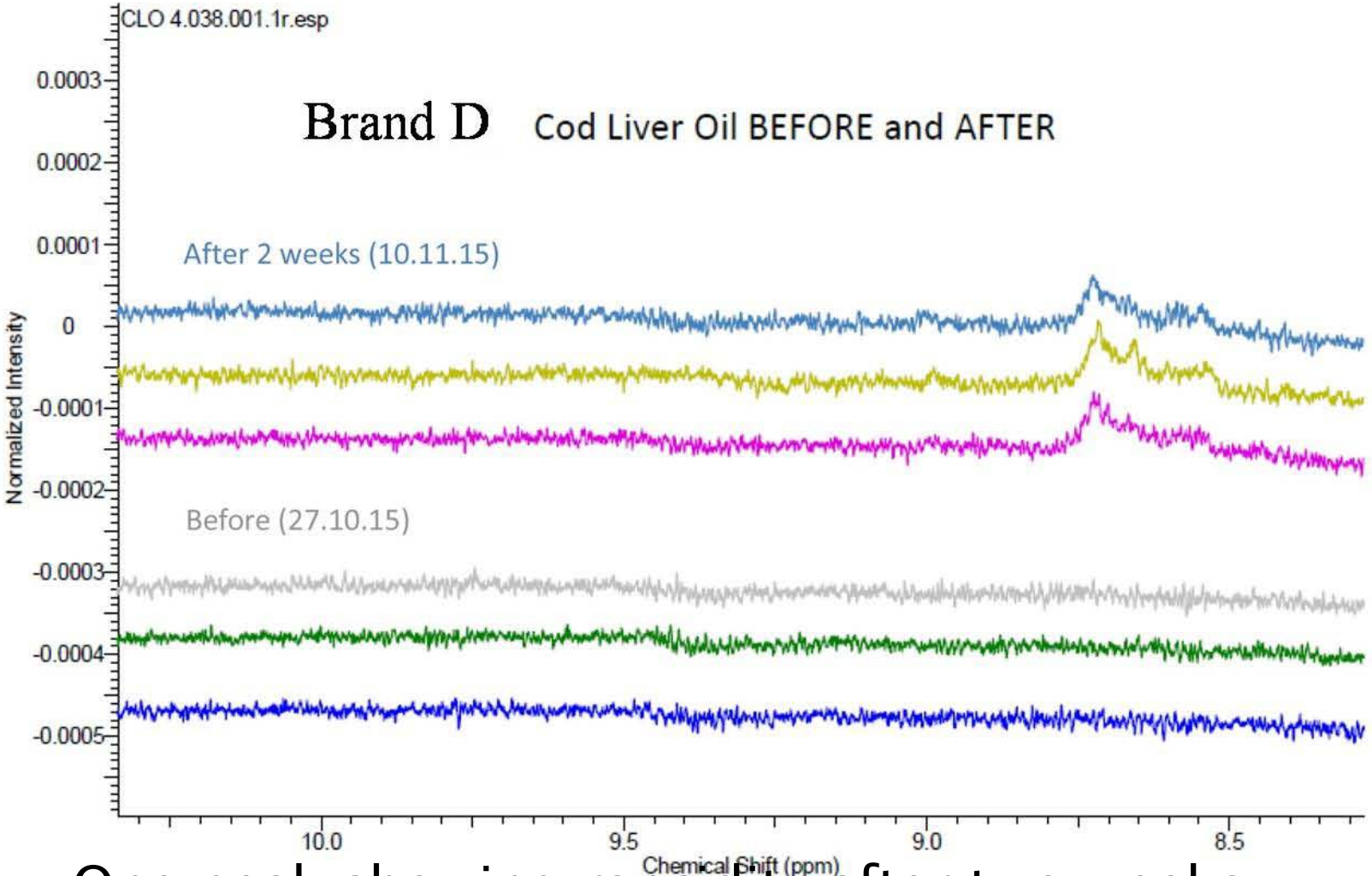
Cod Liver Oil BEFORE and AFTER



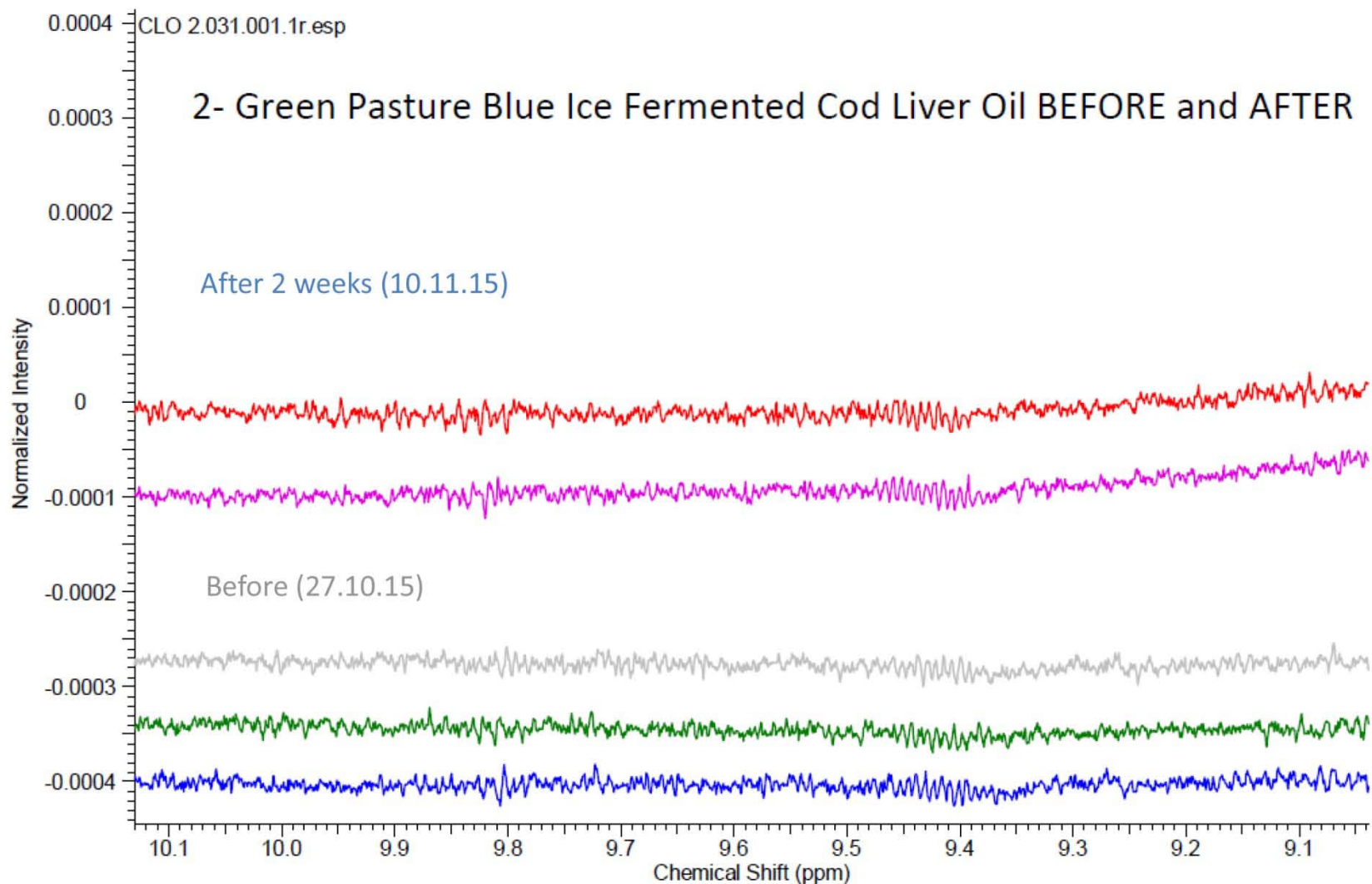
Two peaks showing rancidity. Lots of “noise.”

CLO 4.038.001.1r.esp

# Brand D Cod Liver Oil BEFORE and AFTER



One peak showing rancidity after two weeks.



No rancidity on opening nor after two weeks.

## **Trans Fatty Acids in Cod Liver Oil?**

**Small amounts of trans fats were found in all the samples of cod liver oil!**



# Biosynthesis of trans Fatty Acids in a Fungus, *Cladosporium sphaerospermum*, and Some Bacteria Isolated from Fish Viscera

Hiroshi Kawashima, Norihiko Kouzaki, Michihiko Kobayashi & Sakayu Shimizu

*Biosci. Biotech. Biochem.*, 60 (II), 1888–1890, 1996

ABSTRACT: Many microorganisms isolated from fish viscera formed *trans* fatty acids. One of them was identified as *Cladosporium sphaerospermum*. This is the first report of a fungus forming *trans* fatty acids. Several bacteria, identified as *Pseudomonas* sp., *Pseudomonas putida*, *Marillomonas* sp., and *Schewalle/la putre/aciens*, also formed trans-octadecenoic acids, which increased on growth at high temperature or with phenol. The trans-octadecenoic acids comprised a mixture of various double bond-positional isomers, such as .18, .19, .110, All, and .112.

# TAKING COD LIVER OIL

It's all about balance!

Vitamins A & D  
Highly Unsaturated  
EPA

Vitamin K  
Saturated Fats  
Arachidonic Acid/DHA



## TAKING COD LIVER OIL

It's all about balance!

**A & D without K:** Heart troubles, bone problems, tooth decay, gum disease

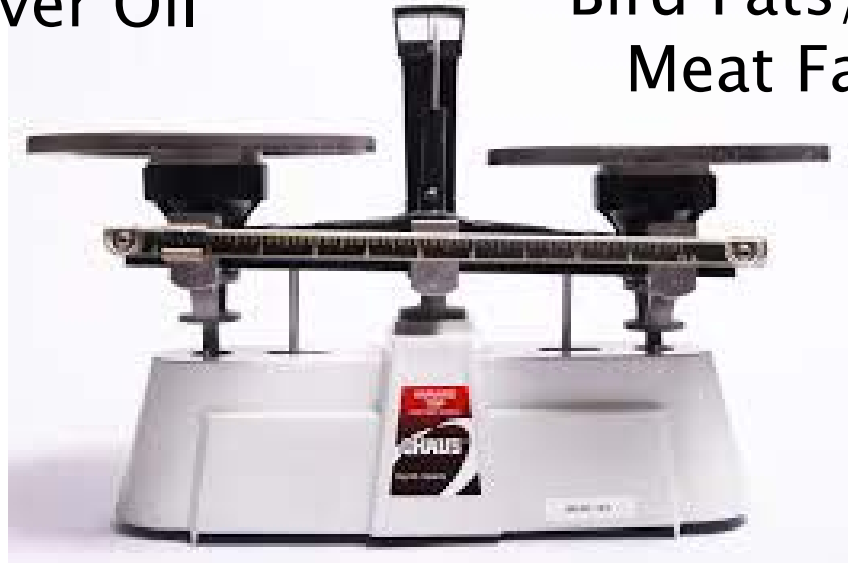
**Unsaturated without Saturated:** Artery disease, low hormone production, cancer, auto-immune and many other problems

**EPA & DHA without Arachidonic Acid:** Skin and digestive problems

# TAKING COD LIVER OIL

It's all about balance!

Cod Liver Oil



Egg Yolks  
Butter Oil  
Butter  
Cheese  
Bird Fats/Bird Liver  
Meat Fats/Liver



**COD LIVER OIL**  
Not so much a  
necessity  
as a convenience.





## HEALTHY BABIES