

Diet and Skin Health



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1

Disclosures

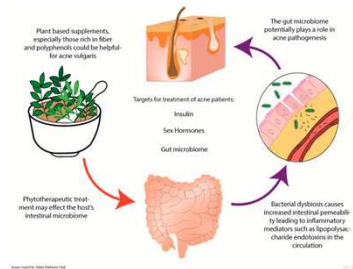
- LearnHealth – Scientific Advisor
- Arbonne – Scientific Advisor
- Burts Bees – Consultant
- Regeneron Pharmaceuticals – Honoraria
- Abbvie – Honoraria
- Almond Board of California

2

2

Objectives

1. Photoaging
2. Gut-Skin Axis
3. Nutrition and the Skin
4. Almond Study Results



Clark AK, Haas KN, Sivamani RK, Int J Mol Sci. 2017

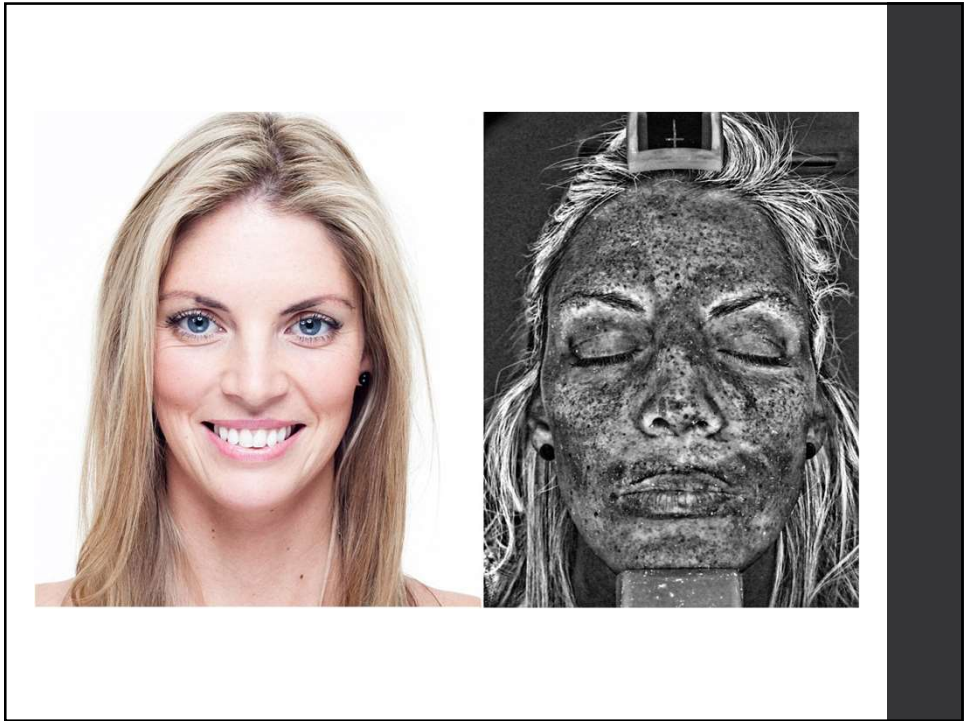
3

Photoaging

- Molecular
 - Activity of melanocytes
 - Degradation of collagen
 - Oxidative stress
- Clinical/Physical
 - Wrinkles
 - Dyspigmentation
 - Leathery Skin
 - Loss of texture



4



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Aging



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Facial Aging: Four Factors

- 1) Fine lines and wrinkles
- 2) Redness
- 3) Skin tone
- 4) Texture



8

8

Can We Influence Aging?



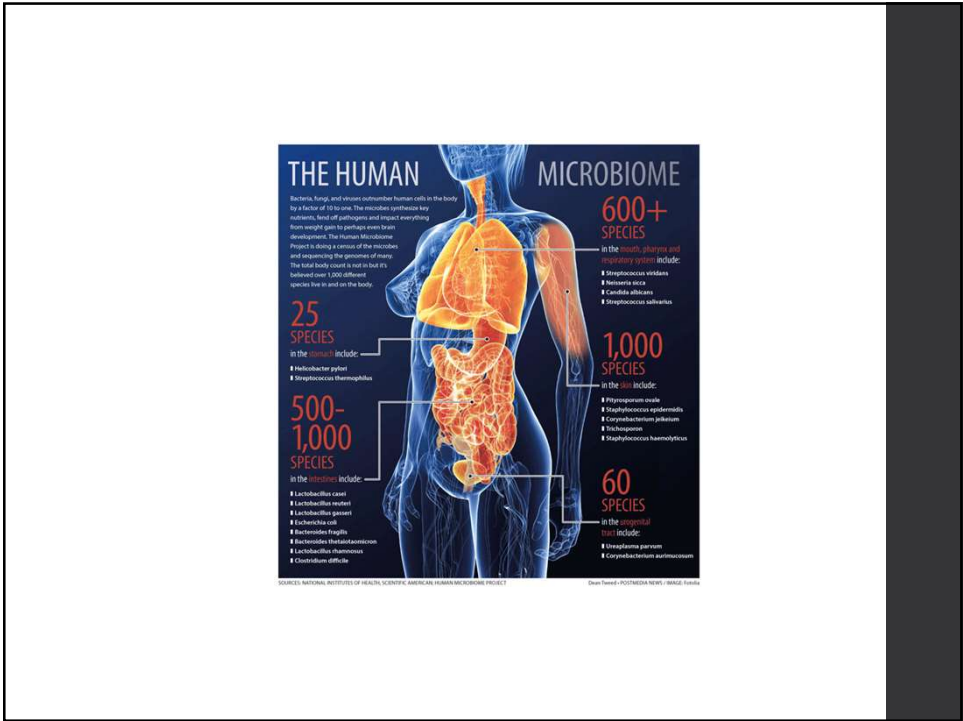
YES!

9

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Gut-Skin Axis

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11



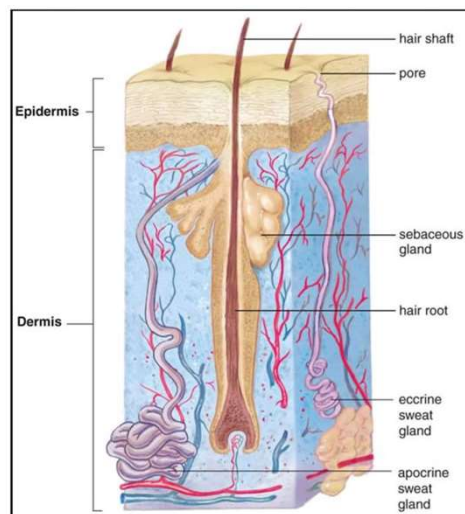
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Gut-Skin Axis Mechanisms

- 1) Direct absorption
- 2) Modulation of the immune system
- 3) Modulation of hormones
- 4) Signaling from the gut to the skin
 - Short Chain vs Long Chain Fatty Acids
 - Lipopolysaccharides



13



14

Nutrition and the Skin

15

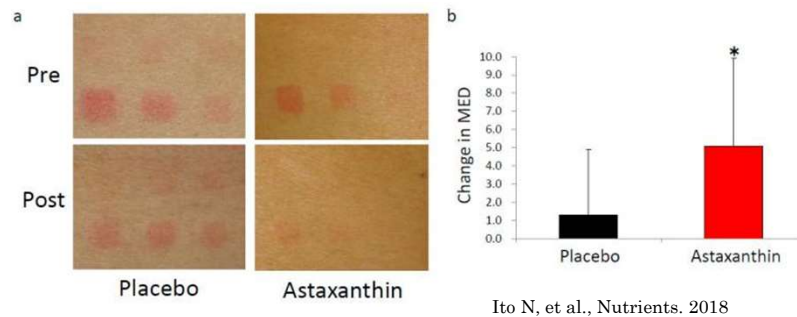
Connecting Nutrition and Skin

- Carotenoids
 - Lycopene
 - Beta-carotene
 - Astaxanthin
- Herbals
- Vitamins
 - Niacinamide
 - Tocopherol
- Whole foods (?) → Almonds

16

Astaxanthin Supplementation

- Astaxanthin 4 mg daily increases MED by ~10%



17

17

Herbs

Polypodium leucotomos

- Fern that can be applied topically or taken as an oral dietary supplement at 240 mg three times a day
- Increases MED by ~2.9 (SPF of 3)



González S, et al, Photodermatol Photoimmunol Photomed. 1997

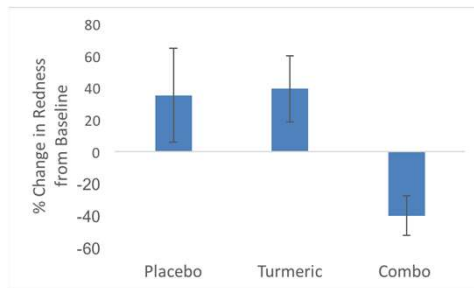
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Herbs

Turmeric (*Curcuma longa*)

- Popular yellow spice used widely in India and in Ayurvedic medicine



Vaughn AR, et al., J Integr Med. 2019

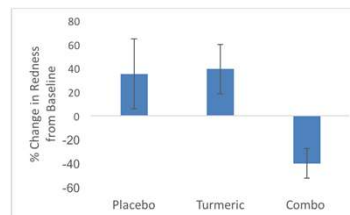
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19

Herbs

Combination Pill: 500 mg twice daily

- Hemidesmus Indicus root (Anantamul), *Hemidesmus indicus*
- Indian Madder root (Manjistha), *Rubia cordifolia*
- Neem leaf, *Azadirachta indica*
- Gotu Kola leaf (Brahmi), *Centella asiatica*
- Indian Tinospora stem (Guduchi), *Tinospora cordifolia*
- Turmeric root, *Curcuma longa*
- Amla fruit (Amalaki), *Embilica officinalis*
- Licorice root, *Glycyrrhiza glabra*
- Phyllanthus Amarus herb (Bhumyamalaki), *Phyllanthus amarus*



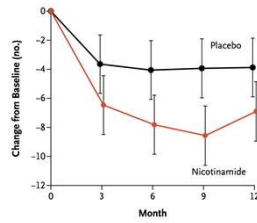
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20

Vitamins - Niacinamide

For patients with lighter skin who may be struggling with actinic keratoses or nonmelanoma skin cancers

Consider adding Niacinamide 500 mg twice daily



Subgroup	Placebo mean no. of lesions/person	Nicotinamide mean no. of lesions/person	Rate Ratio (95% CI)	Relative Difference, % (95% CI)	P Value
12-mo intervention period					
NMSCs	2.4	1.8	0.75 (0.55 to 1.0)	23 (4 to 38)	0.02
BCCs	1.7	1.3	0.76 (0.55 to 1.0)	20 (-6 to 39)	0.12
SCCs	0.7	0.5	0.71 (0.45 to 1.1)	30 (0 to 51)	0.05
6-mo postintervention period					
NMSCs	0.8	0.8	1.0 (0.75 to 1.3)	-17 (-59 to 14)	0.33
BCCs	0.6	0.5	0.83 (0.55 to 1.2)	-6 (-53 to 26)	0.73
SCCs	0.3	0.3	1.0 (0.65 to 1.5)	-59 (-163 to 4)	0.07

Chen AC et al, NEJM, 2015

21

21

Vitamin E: Antioxidant System Is Important

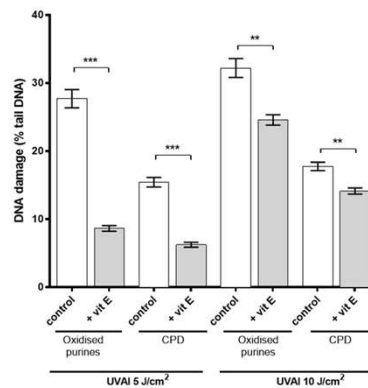
SCIENTIFIC REPORTS

OPEN

Vitamin E inhibits the UVA1 induction of "light" and "dark" cyclobutane pyrimidine dimers, and oxidatively generated DNA damage, in keratinocytes

Received: 7 April 2017
Accepted: 20 December 2017
Published online: 11 January 2018

George J. Delinasios¹, Mahsa Karbaschi¹, Marcus S. Cooke^{1,2*} & Antony R. Young²

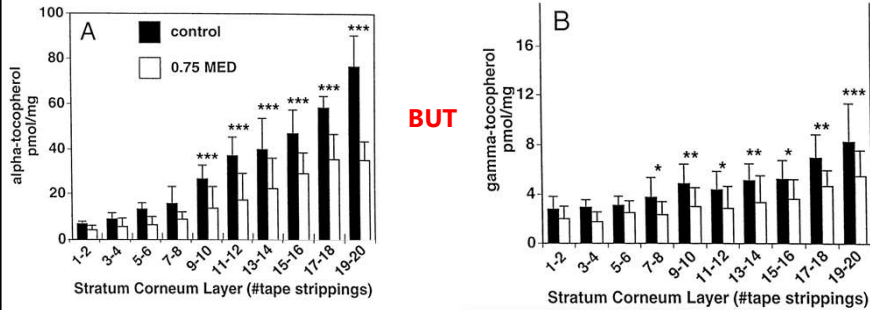


22

22

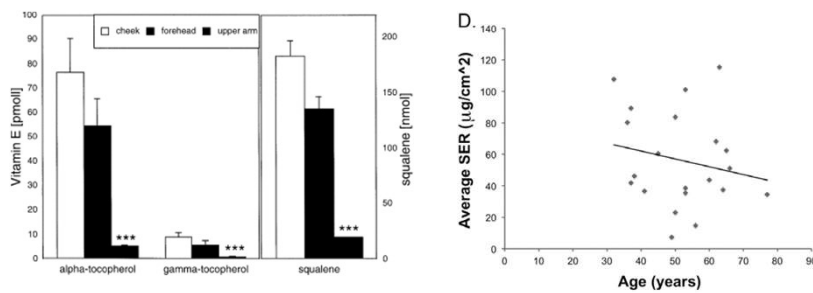
Antioxidant System in the Skin

Natural antioxidant system like vitamin E (tocopherols)



Thiele JJ, et al. J Invest Dermatol. 1998

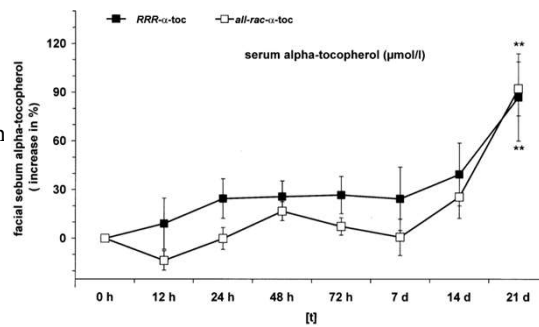
Vitamin E is Enriched on the Face



Packer L et al, J Invest Dermatol 1999
 Foolad N et al, Dermatol Online Journal, 2015

Antioxidant Supplementation - Vitamin E

- Supplementation with oral tocopherol (vitamin E) at 400 mg



Ekanayake-Mudiyanselage S, et al., Ann N Y Acad Sci. 2004

25

25

What about whole foods?

- Lycopene vs Tomato based foods
 - Tomato based foods were better for LDL oxidation and for protection of protein and DNA against oxidative damage
 - Review concluded that clinical evidence supported tomato based foods as first line approach over lycopene for cardiovascular health

Whole Food versus Supplement: Comparing the Clinical Evidence of Tomato Intake and Lycopene Supplementation on Cardiovascular Risk Factors^{1,2}

BRIE M. BURTON-FREEMAN^{1*} and HOWARD D. SESSO^{2*}
*Center for Nutrition Research, Institute for Food Safety and Health, Illinois Institute of Technology, Bedford Park, IL; ¹Department of Nutrition, University of California, Davis, Davis, CA; ²Division of Preventive Medicine and Aging, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, MA; and ³Department of Epidemiology, Harvard School of Public Health, Boston, MA

Burton-Freeman BM, Sesso HD. Adv Nutr. 2014

26

What about almonds?

Based on a one-ounce portion	ALMOND	BRAZIL	CASHEW	HAZELNUT	MACADAMIA	PECAN	PISTACHIO	WALNUT
Calories	163	186	157	178	204	196	159	185
Protein (g)	6.0	4.1	5.2	4.2	2.2	2.6	5.8	4.3
Total Fat (g)	14.0	18.8	12.4	17.2	21.5	20.4	12.9	18.5
Saturated Fat (g)	1.1	4.3	2.2	1.3	3.4	1.8	1.6	1.7
Polyunsaturated Fat (g)	3.4	5.8	2.2	2.2	0.4	6.1	3.9	13.4
Monounsaturated Fat (g)	8.8	7.0	6.7	12.9	16.7	11.6	6.8	2.5
Carbohydrates (g)	6.1	3.5	8.6	4.7	3.9	3.9	7.8	3.9
Dietary Fiber (g)	3.5	2.1	0.9	2.7	2.4	2.7	2.9	1.9
Potassium (mg)	200	187	187	193	104	116	291	125
Magnesium (mg)	76	107	83	46	37	34	34	45
Zinc (mg)	0.9	1.2	1.6	0.7	0.4	1.3	0.6	0.9
Copper (mg)	0.3	0.5	0.6	0.5	0.2	0.3	0.4	0.5
Vitamin B6 (mg)	0	0	0.1	0.2	0.1	0.1	0.5	0.2
Folate (mcg)	14	6	7	32	3	6	14	28
Riboflavin (mg)	0.3	0	0	0	0	0	0	0
Niacin (mg)	1.0	0.1	0.3	0.5	0.7	0.3	0.4	0.3
alpha-tocopherol (mg)	7.4	1.6	0.3	4.3	0.2	0.4	0.7	0.2
Calcium (mg)	75	45	10	32	24	20	30	28
Iron (mg)	1.1	0.7	1.9	1.3	1.1	0.7	1.1	0.8

www.almonds.com

27

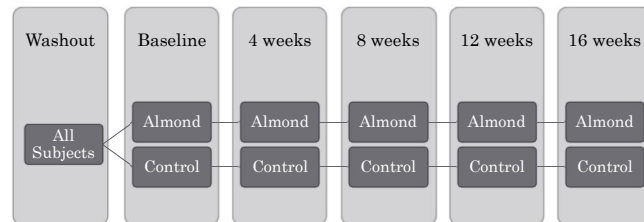
Almonds and the Skin

28

We wanted to know if consumption of almonds will slow the development of wrinkles



29



Almond Group

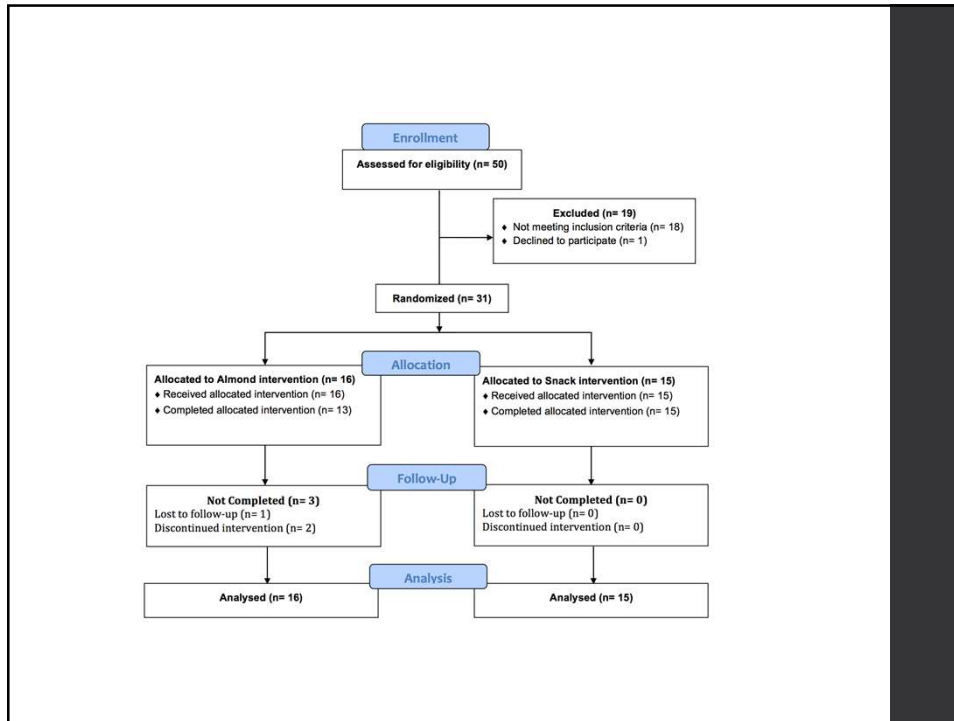
Raw almonds supplying 20% of total daily energy
(~handful of almonds)

Control

Nut-free calorie matched snacks
(a cereal bar, a small granola bar, and pretzels)

ClinicalTrials.gov: NCT02954315

30



31

Demographics

Demographic Factor	Almond group (n=16)	Control Group (n=15)
Age, mean±SD	63.63 ± 7.09	58.93 ± 6.10
Sex, Female	16	15
Body Mass Index (kg/m ²), mean±SD	30.7 ± 7.31	29.7 ± 7.66

32

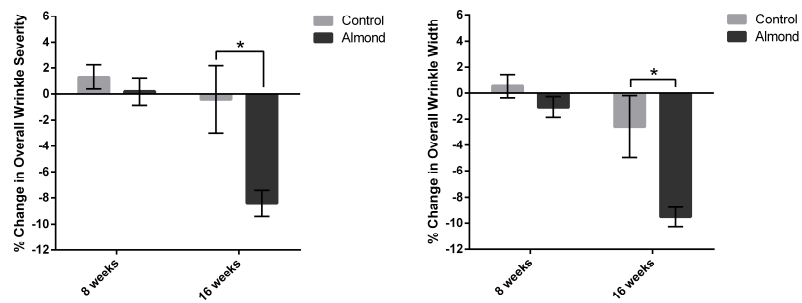
Measures

- High Resolution Images
- Blood lipids
- Sebum excretion rate and lipids



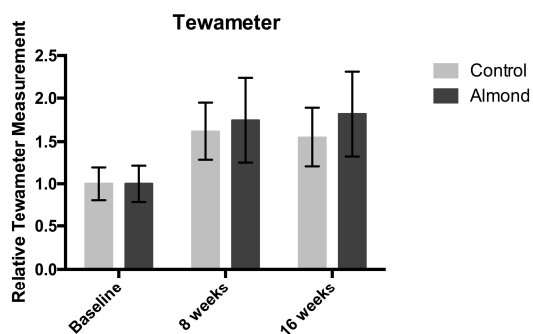
33

Results: Wrinkles



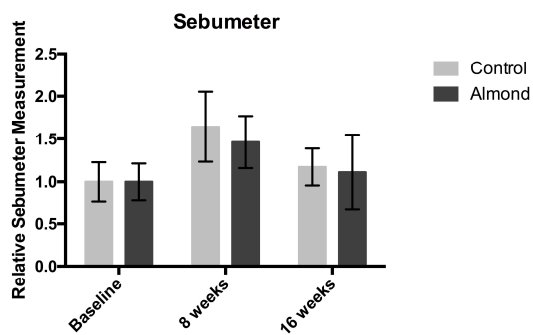
34

Results: Skin Barrier – Transepidermal Water Loss



35

Results: Sebum Excretion Rate



36



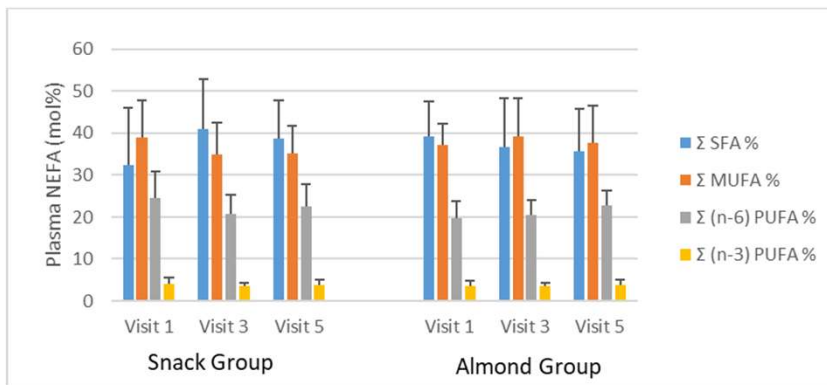
Baseline



16 weeks

37

No Change in Plasma Lipids



38

No Side Effects

39

Overall Results

- Wrinkles were improved in the almond supplementation group
- Not due to change in sebum production or change in skin barrier function
- Lipids in the blood stream did not change

40

Further Work

- Expanded the population to 60 subjects and 6 months and study completed and under analysis
- Gut microbiome shifts
- Blood short chain fatty acids and inflammatory markers

41

UC Davis Dermatology

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- Aunna Pourang, MD
- Waqas Burney, MBBS

Sacramento State

- Robert Crawford, PhD

UC Davis Nutrition

- Francene Steinberg, RD PhD
- John Newman, PhD

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42