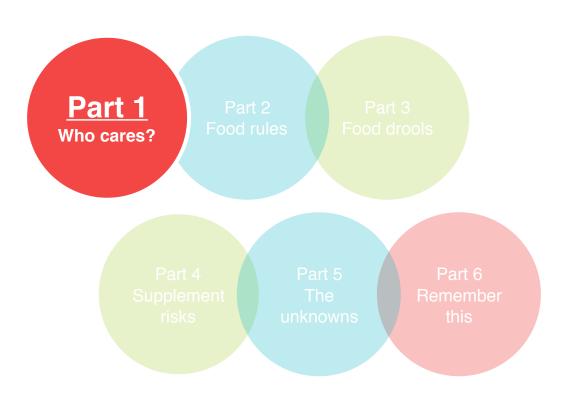
#### Food versus supplements

... the facts and the fallacies

Kamal Patel Director, Examine.com



"I believe that you can, by taking some simple and inexpensive measures, lead a longer life and extend your years of well-being. My most important recommendation is that you take vitamins every day in optimum amounts to supplement the vitamins that you receive in your food."

-Linus Pauling

"The strongest thing I put into my body is steak and eggs. I just eat. I'm not a supplement guy."

-Jim Thome





# Don't lose the forest for the trees

- Bottlenecks
- Can supplement any area
- "Holistic" health provider pros and cons



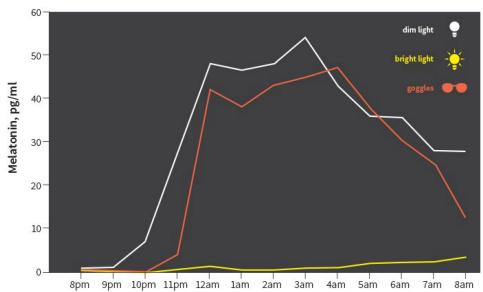
# And don't forget age!

- Eli has a stilldeveloping microbiome, you don't
- Eli has great hair and skin, you may need help
- Life extension is a real possibility, but so is inadvertent harm
- Free radical theory of aging vs spare mitochondrial reducing free radical leakage (birds and exercisers)

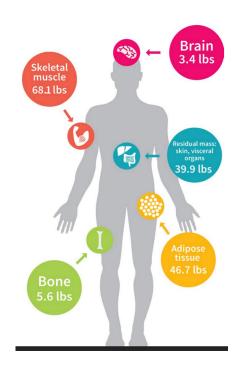
#### 

## Microbiome madness!

Figure 2: Effect of light and blue-light blocking glasses on melatonin

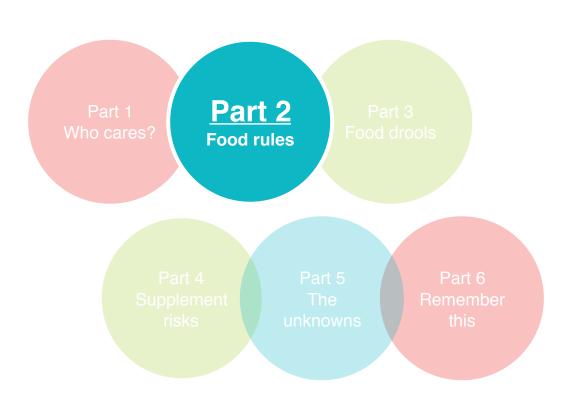


### amber glasses for sleep



### mass vs essentiality

- protein, fat, calcium
- trace minerals?
- vitamins?





### why do people like meat so much?

- large game
- taste
- india





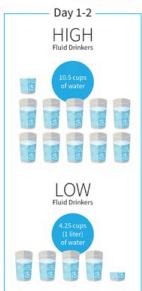
### basic instincts

- protein hunger
- salt hunger
- MSG

#### **Before Trial**



#### During Trial No fluids other than mineral water allowed





#### water and mood

Figure 1: Incidence of severe headaches by diet and sodium intake



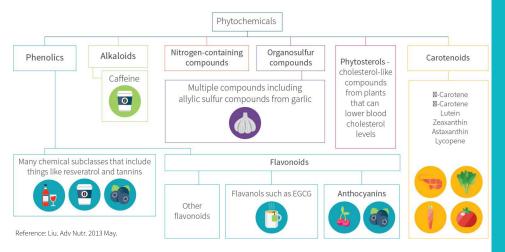
### salt and headaches

#### Common Sources Safflower oil Flaxseed oil Corn oil Walnuts Sunflower oil Chia Seeds Nuts & Seeds Linoleic Acid Alpha-Linolenic Acid (omega-3) 20:4n-6 ^ Docosahexaenoic Acid (DHA) Arachidonic Acid Eicosapentaenoic Acid (EPA) Eggs Oily fish Meat Products Algal oil

Reference: Monteiro, J, et al. Food and Function. 2014 Jan.

### foods have essential fats

- "parent fats"
- ARA research
- oxidized supplements



### phytochemic als

- no megadoses
- synergy carotenoids/ flavonoids
- tomato vs lycopene







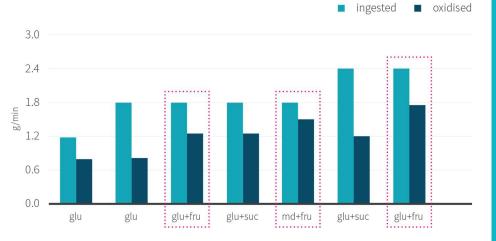




#### phytochemicals part 2

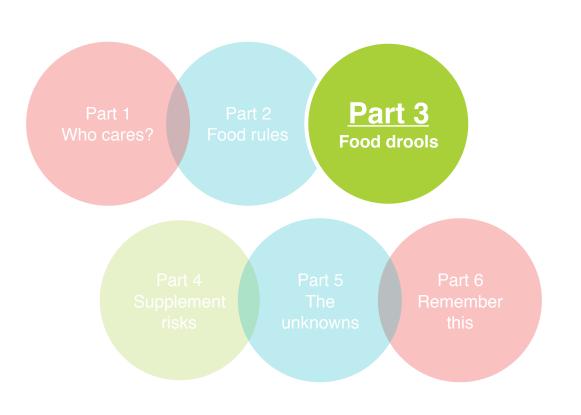
- ORAC
- hormesis
- superfoods

#### Mixed carbohydrate intake can improve oxidation rate



#### mixed carbs

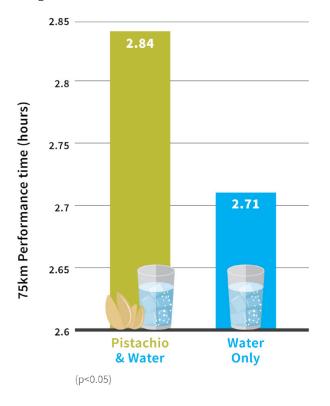
- transporters
- GI distress
- ratios in fruit





# Vitamin C and RSD

Figure 2: Performance time for 75-km trial



### pistachio fuel failed

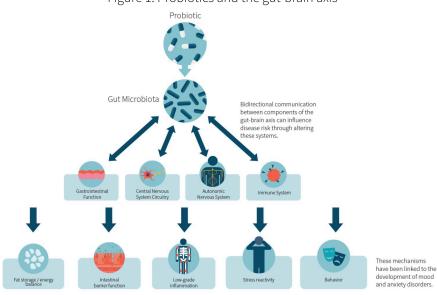
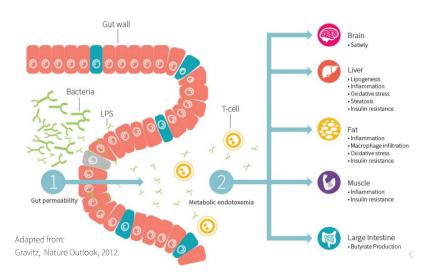


Figure 1: Probiotics and the gut-brain axis

Probiotics for the gut AND brain?

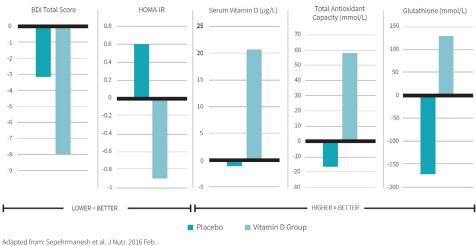
- Rheumatoid arthritis finding last week
- Hygiene hypothesis and helminths
  - Low level inflammation
- Killed bacteria helps too?



#### Fat and LPS

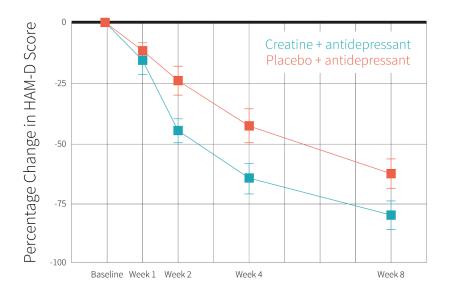
- Chylomicrons
- Butyrate VS other fats
- Tight junction nutrients

Figure 3: Changes in Beck Depression Inventory (BDI) and metabolic markers



#### vitamin d may help depression

- endorphins
- Pilot "survival situation" trial for hormesis



#### creatine: not just for meatheads

- brain energetics
- · rich club connections

# PURE PROTEIN KOSER

#### **BRAND REDACTED**

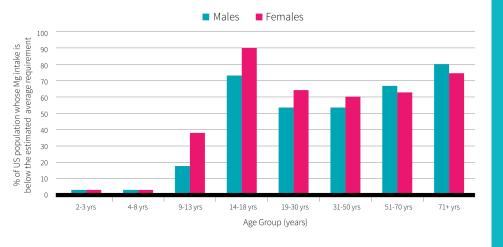
Courtesy of the obsessively objective nerds at Examine.com



# Enforce the structure - gelatin

ucii

Figure 3: Much of the US population is not meeting the estimated average requirement of magnesium intake



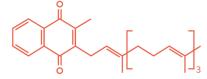
### it's an uphill battle

- soil, water
- not ubiquitous
- multivitamins

Phylloquinone (Vitamin K1)



Menaquinone (Vitamin K2)



Menaquinone 7 (MK-7)



Found in leafy greens



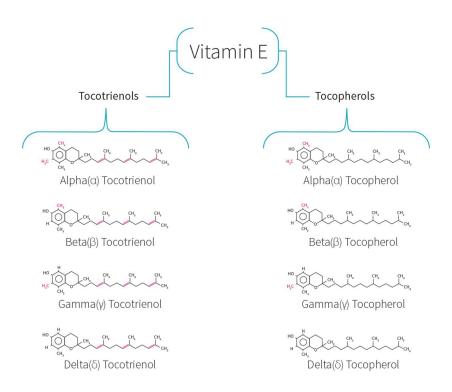
Found in meat and cheese



Found in natto

# ... especially for less-known research

- dietary mismatch
- no upper limit
- oncosis and autophagy



### ... and special populations

- RDA too high?
- impact of fat intake
- impact of body weight

#### a-GOS is found in legumes such as...

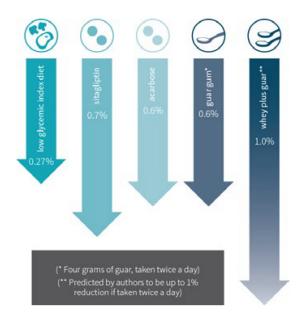




#### supplements vs lentil gas machine

- alpha galactooligosaccharides
- appetite
- gut benefits

Figure 2: Glyosylated Hemoglobin
Reductions from Different Interventions



#### does easy mean sustainable?

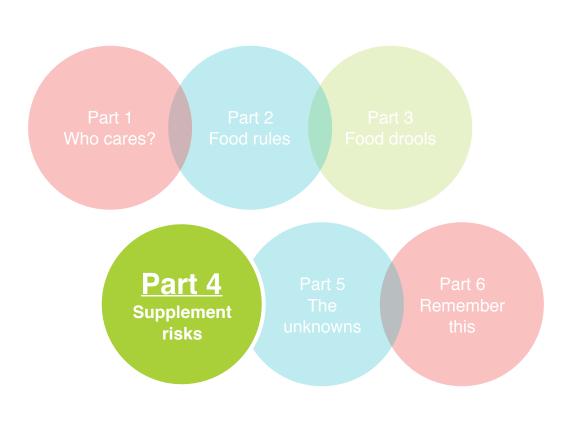
- the problem with adding fat+protein
- mechanism
- long-term compliance

1000 900 800 700 EGCG (ng/mL) 600 500 400 300 200 100 240 300 330 360 390 Time (min) Capsule on an empty stomach ---Capsule with breakfast ---Strawberry sorbet -

Figure 2: Plasma EGCG levels for the three groups

#### egcg isn't absorbed well with food

- quicker and higher peak
- explains some
- in-between dosing schedules?





ER visits attributed to supplements each year: 23,000 (for comparison, 350,000 ER visits each year are attributable to pharmaceuticals)



Average age of patient sent to ER due to supplements: 32 (with woman being in the slight majority)



Percent of supplement-related ER visits due to accidental ingestion by children: 20%



Percent of people over 65 who needed to be hospitalized after supplement-related ER visit 16% (vs. 9% for the general population)



Percent of supplement-related ER visits due to micronutrient supplementation in adults: 32% (the top three products being multivitamins (or unspecified vitamins), iron, and calcium)



Percent of supplement-related ER visits due to problems attributable to weight loss supplement use in women: 30% (versus 18% in men)



Percent of supplement-related ER visits due to problems attributable to sexual or muscle-building supplement use in men: 14% (number of women using these supplements too low in this sample to estimate a percentage)

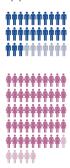
#### safety by the numbers

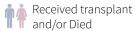
- fat, hormone, and muscle supplements
- Rx-like effects without Rx-like safety info
- stack danger

#### Bodybuilding Supplements



Non-Bodybuilding Supplements



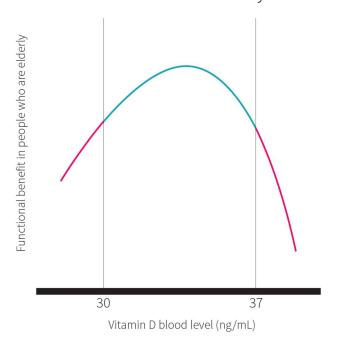


#### especially lifting supplements



#### Speaking of red meat and iron ...

Figure 3: Optimal vitamin D levels found in this study



# vitamin d risk curve

#### Low vitamin D increases cardiovascular mortality

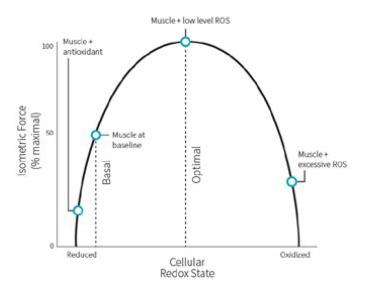


### Excessivly high vitamin D increases cardiovascular mortality



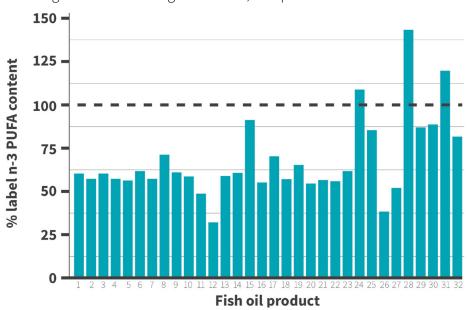
### vitamin d impact hard to estimate

Figure 1: Biphasic Effect of ROS on Muscle Force Production



### antioxidants bad for exercise

Figure 2: Actual omega-3 content, compared to claimed content



### fish oil label fail

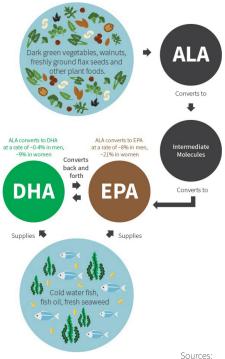


Figure 1: Frequency of risk alleles in intervention group

Dietary Component	CAFFEINE	VITAMIN C	ADDED SUGARS	SODIUM
Gene	CYP1A2	GSTM1 GSTT1	TAS1R2	ACE
Von-Risk Allele Risk Allele	4896 5296	43% 57%	55% 45%	30% (09)
Associated Risk	Increased risk of myocardial infarction and hypertension when consuming above 200 mg of caffeine/day	Increased risk of serum ascorbic acid deficiency when consuming below the RDA for Vitamin C	Increased risk of over-consuming sugars	Increased risk of sudium-sensitive hypertension when consuming above the Al forsodium

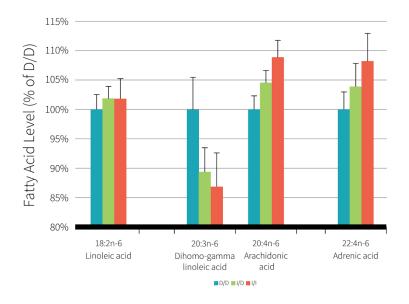
#### unknown genetic interactions

Figure 1: ALA to DHA conversion



Burdge, Curr Opin Clin Nutr Metab Care, 2004 Burdge, Wootton, Br J Nutr, 2002

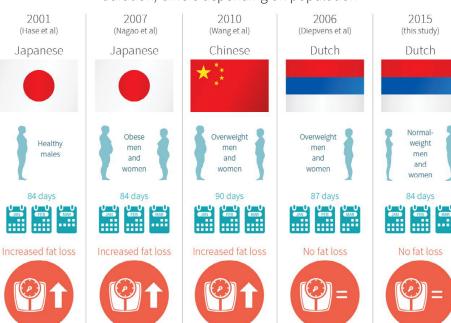
# spice increases dha in brain, regional adaptation?



# What we don't know would fill volumes

- Not aligned with modern diets
- Practical impact?

Figure 3: Green tea catechin fat loss (medium duration) differs depending on population

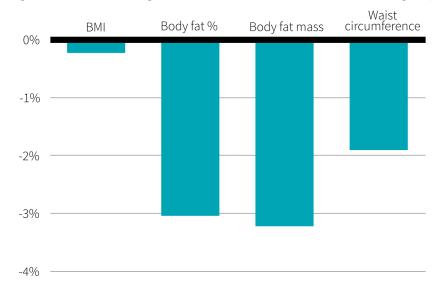


green tea fat loss depends on geography?

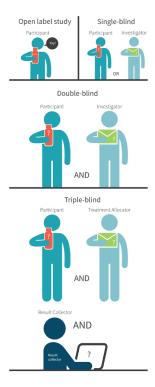
### milk H H O C-OH Seperate Milk Bacterial Fermentation Churn cream or milk Butter (82% fat) Remove moisture

# mfgm missing from whey

Figure 2: Percent changes from baseline in the heat-killed LP28 group

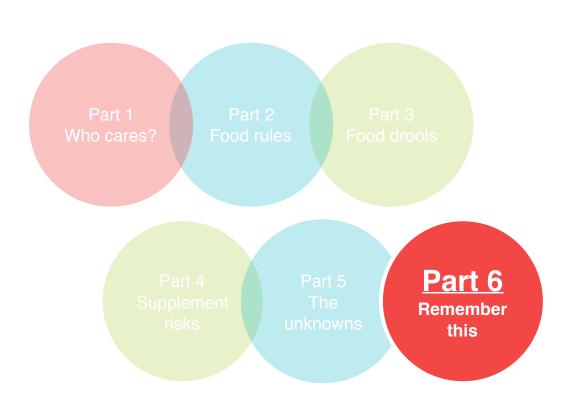


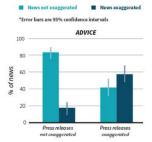
# dead bacteria work too

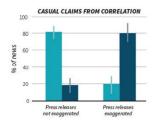


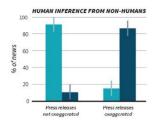
## Blinding meat studies

- Hydrolyzed beef powder
- SF vegan meat companies

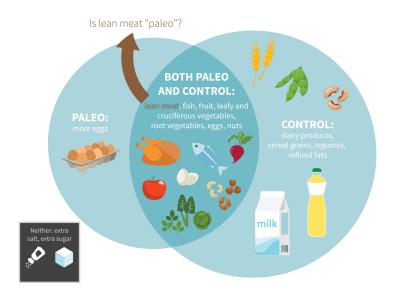








# Where does the confusion originate?



# Focus on the big picture

Heat compounds? Oxidized eggs?