

Multivitamins for Life(span): What does everyone know that they are not telling me?

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 **University at Buffalo** The State University of New York



Disclosures

Conflicts of Interest: None

Funding:

Department of Veteran Affairs

National Institutes of Health

State of New York

Indian Trail Foundation

Supplements:

Daily: Vitamin D

Kinda daily: Nicotinamide riboside (~B3)

Sporadically: Zinc, B12, K2, Melatonin

Rarely: Multivitamin

Acknowledgements

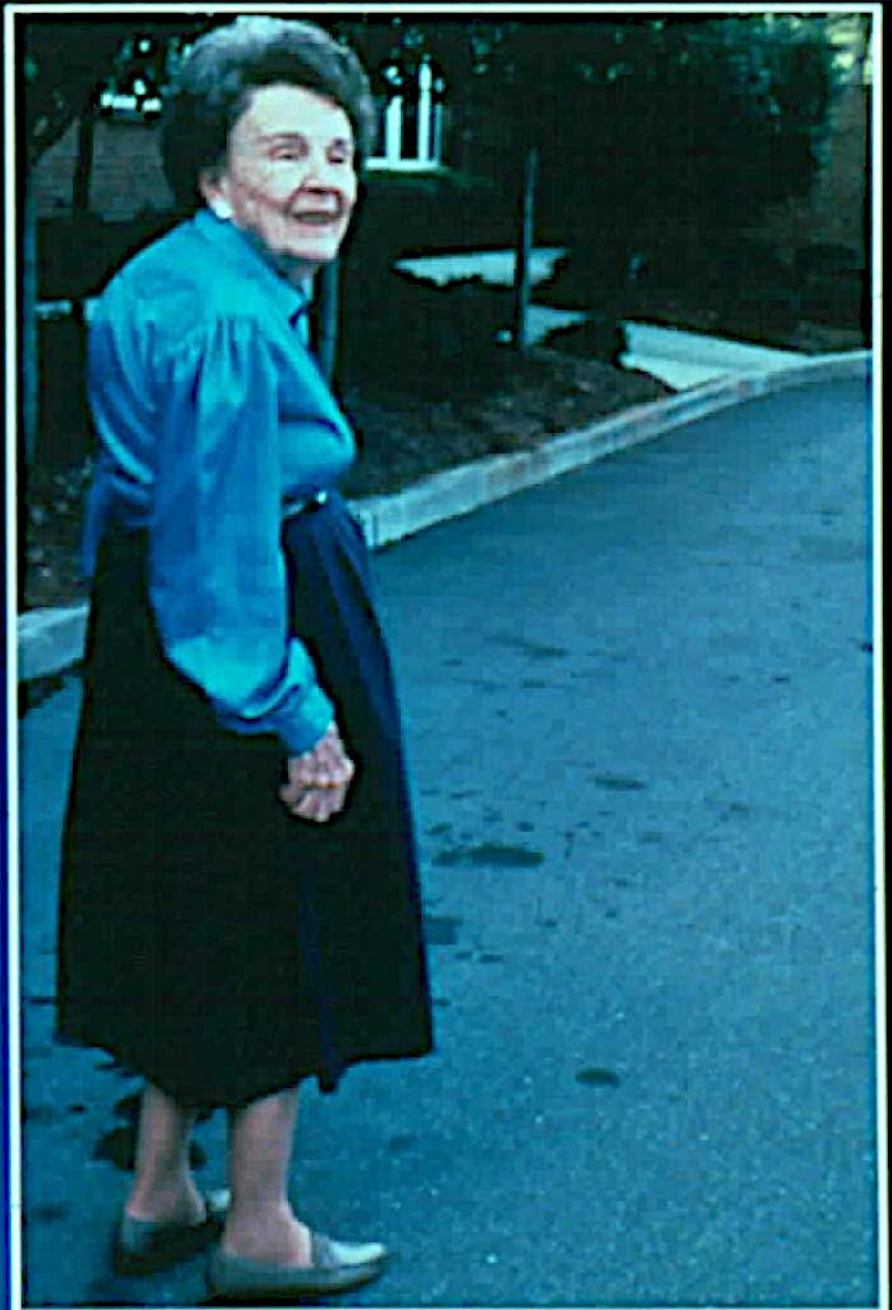
Lab

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The Mystery of Successful Aging



© Washington Post/Getty Images

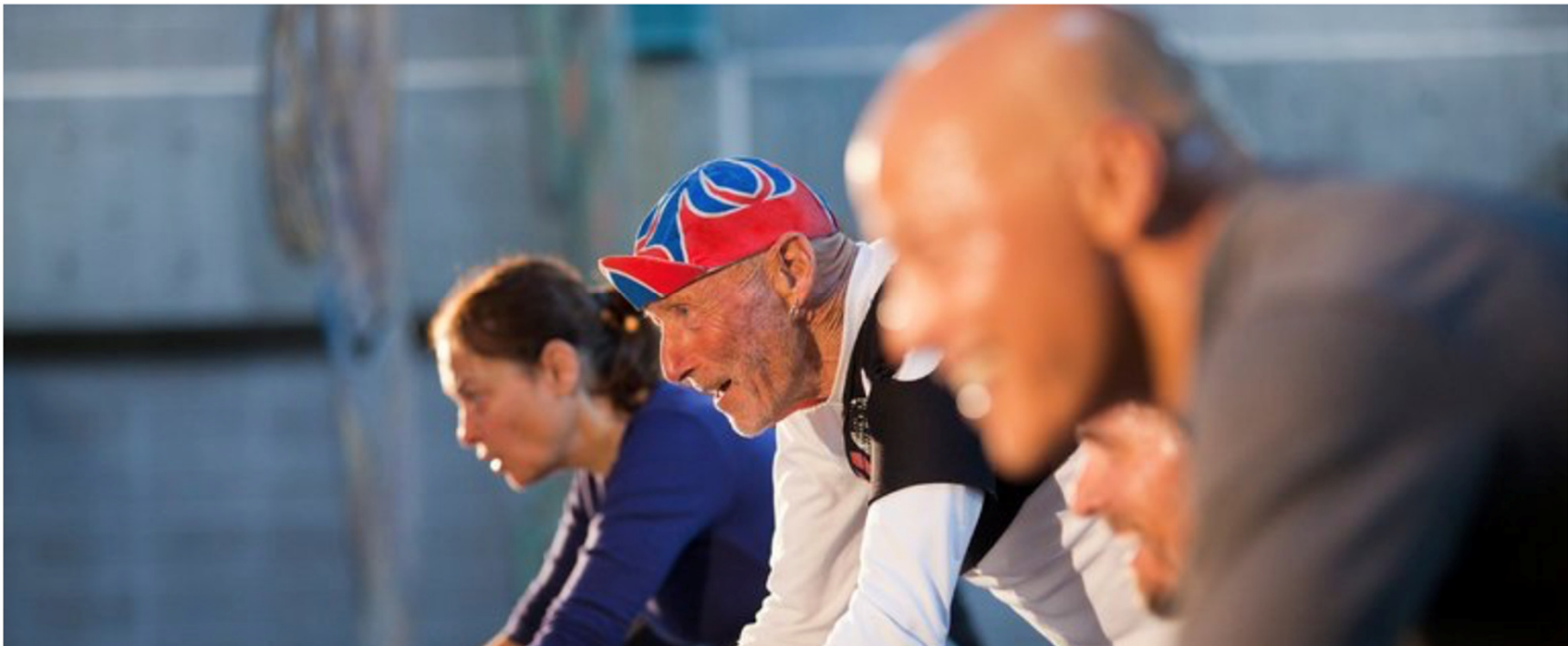


Healthspan

High-Intensity Workouts May Be Good at Any Age

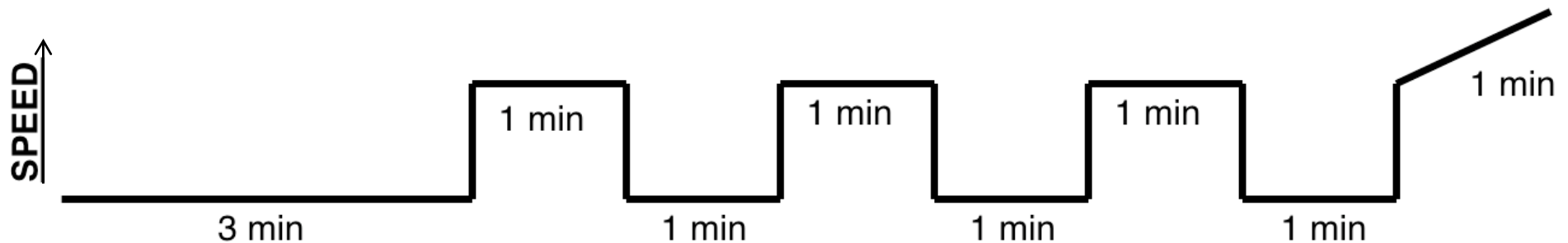
Phys Ed

By **GRETCHEN REYNOLDS** JULY 12, 2017



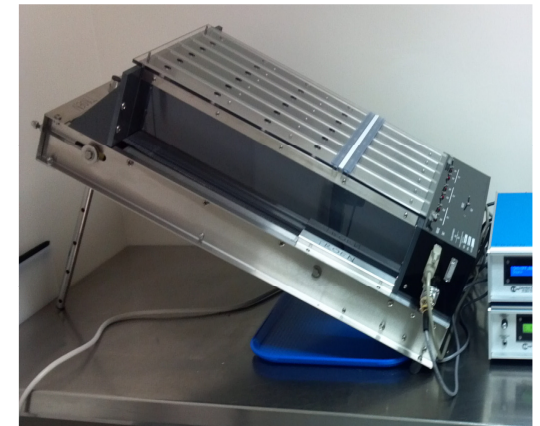
Seldeen et al. J Gerontol 2017

High intensity interval training program for mice



Session Time: 10 minutes
Frequency: 3 times a week

Speeds increase every two weeks
Intensity customized to the mouse



HIIT Boosts Healthspan

**



**Grip
Strength**



**Treadmill
Endurance**

**



**Uphill Sprint
Endurance**



**Gait
Speed**

To The Bedside

THE BUFFALO NEWS

WESTERN NEW YORK

REFRESH

HEALTH + FITNESS + NUTRITION + FAMILY



SATURDAY, NOVEMBER 30, 2019

INTENSITY BOOSTS FITNESS

Older WNY veterans lead the way in showing its effectiveness.

Page 8

...ven a single...
...a few days a week can have benefits." — Kenneth Seldeen, research assistant professor of geriatric medicine in the University at Buffalo Jacobs School of Medicine & Biomedical



maximum oxygen measured during on a treadmill at "All of these at to functional capacity," Troen said. Veterans continue the same battery visit, with an eye results change. Veterans are 6 minutes while riding bike three times a by pedaling for 3 maximum oxygen by 1 minute at 80 at 50% three times another minute to the end.

This involves 2 of high-intensity. "I think they 3 times, but I felt ir the 85-year-old M complained a little felt awake, wanted exercise."

He wasn't alone and Bill Pichuskie they participated Minor, 66, who Belt neighborhood Marine Corps fire truck driver — with exercise-type per diabetes and is a survivor. He no longer carrying groceries to his second-floor getting out of his living TV to do squ start fitness trail

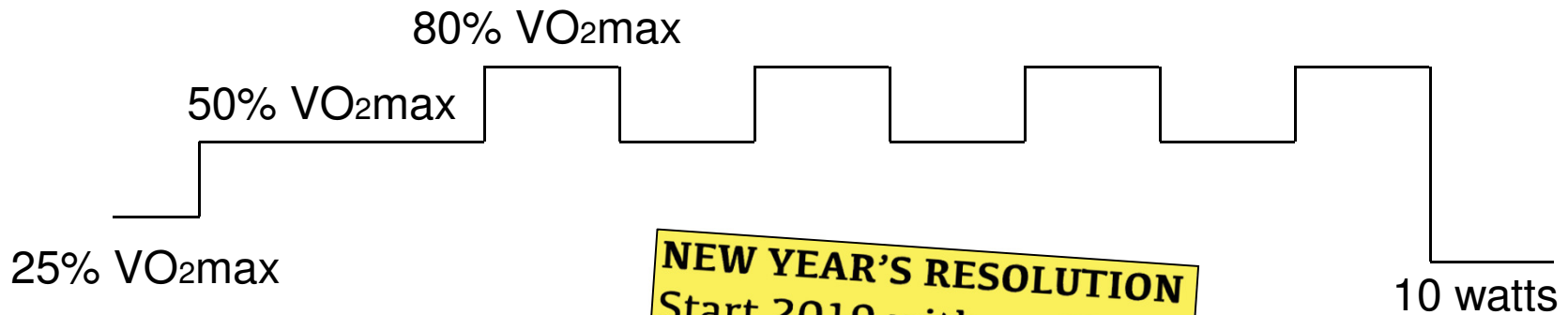
Pichuskie, 62 is a former Marine who spent 20 years the Reserves. He has a stent in a coronary artery and rheumatoid arthritis. Nonetheless, he runs cross-country ski with his wife, Nancy, who told him about the "I did it to see myself and really I could. I felt great. He boosted his

Photos by Robert Kirkham/Buffalo News
...sts the strength of his grip. Above, Nikhil Mador work with Marine veteran Bill Pichuskie at the Veterans Medical Center, 1000 Bailey Avenue.

See Study on Page 8

To The Bedside

Pilot study to examine recruitment and administration of HIIT in older Veterans



Participants:

N = 42: 34 male and 8 female
Age: 70.3 ± 7.4 years
61.9% white /
38.1% African American
18 non-frail, 20 pre-frail, 4 frail

HIIT 3X week for ~3 months

NEW YEAR'S RESOLUTION
Start 2019 with
a **HIIT!**

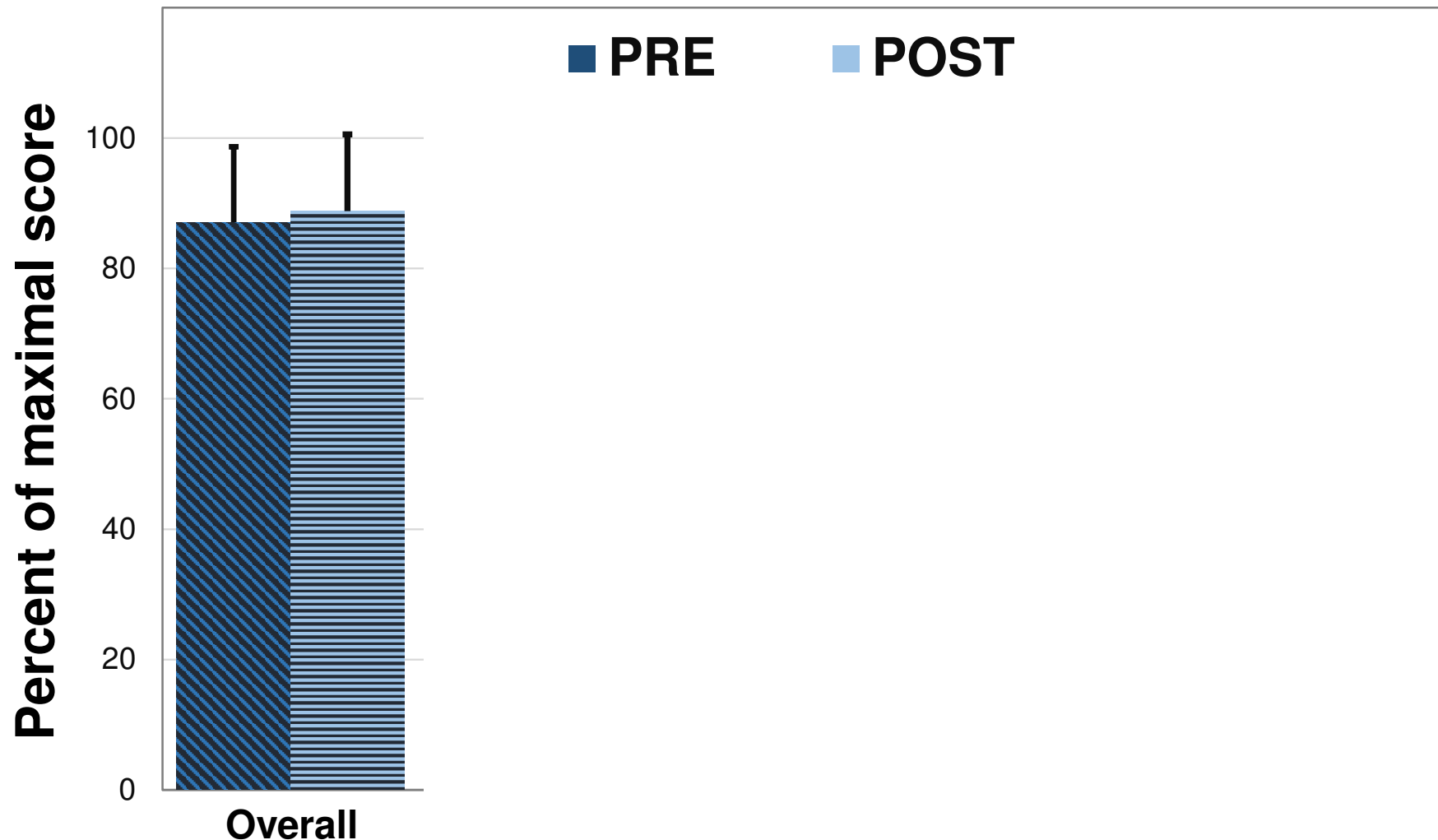
Enrolling now!
Call now to see if you qualify.

Veterans Interval Training (VET-IT) is a research study conducted at the VA medical center to explore the health benefits of short exercise sessions:

Sessions: ~10 minutes given 3 days a week
Duration: 12 weeks
Age: Men and women between the ages of 65 - 85.



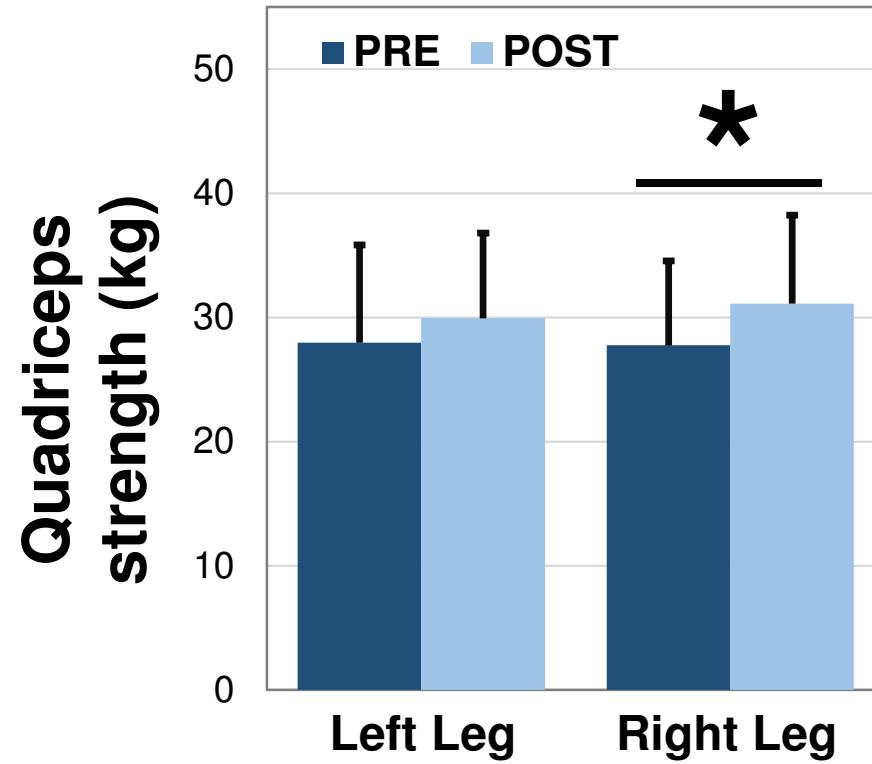
HIIT is well tolerated and viewed favorably



Physical Activity and Enjoyment
Scale (PACES) Survey

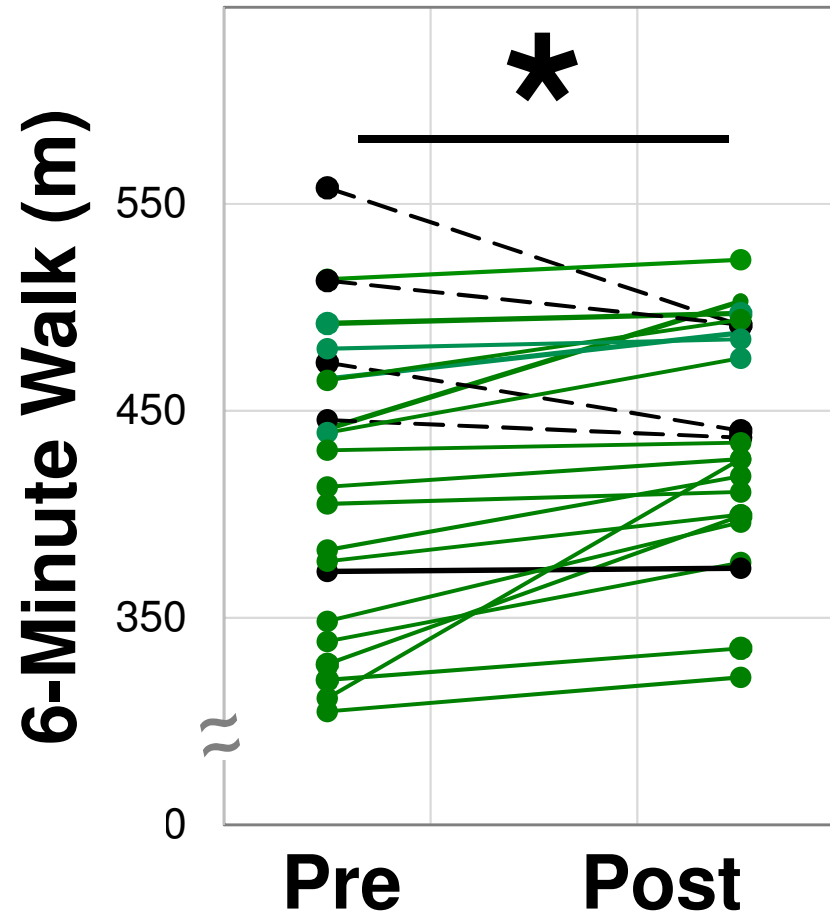
Seldeen & Troen, unpublished

HIIT increases strength



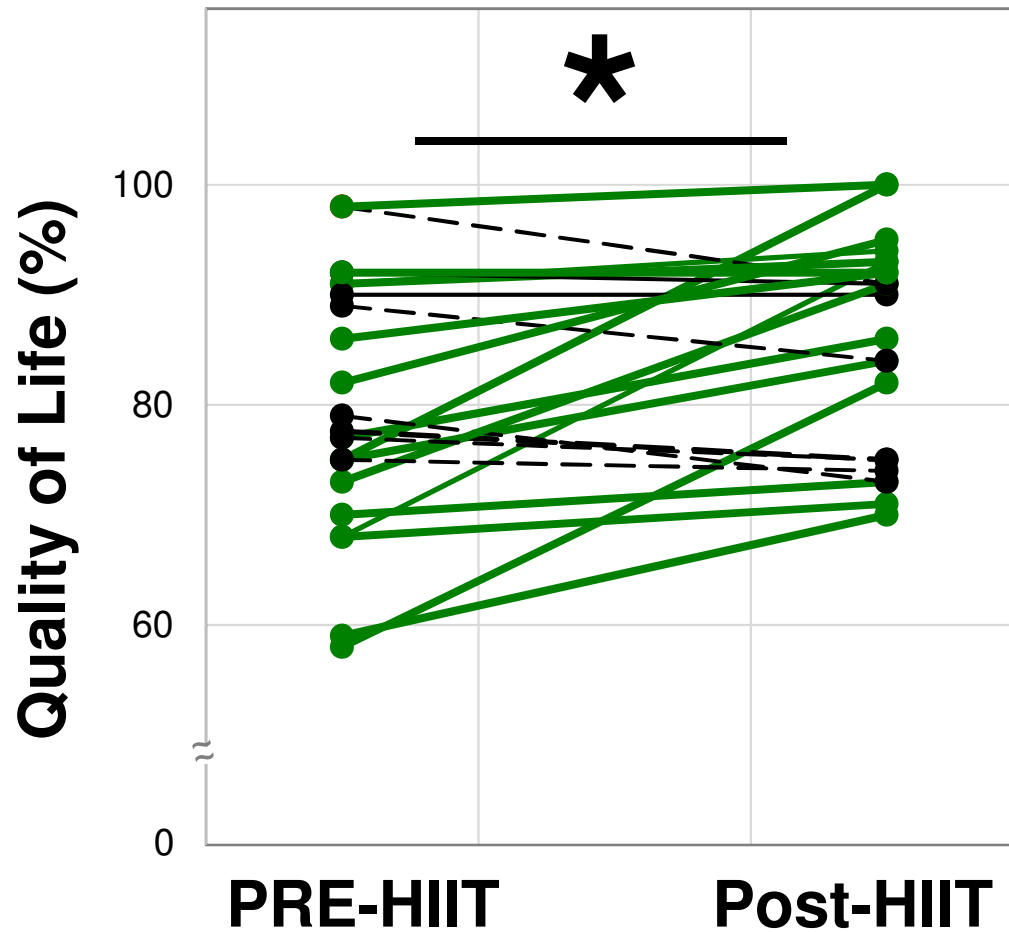
Seldeen & Troen, unpublished

HIIT increases endurance



Seldeen & Troen, unpublished

HIIT increases overall quality of life



Quality of Life, Enjoyment, and Satisfaction
Questionnaire – Short Form (Q-LES-Q-SF)

Seldeen & Troen, unpublished

But... who likes exercise?

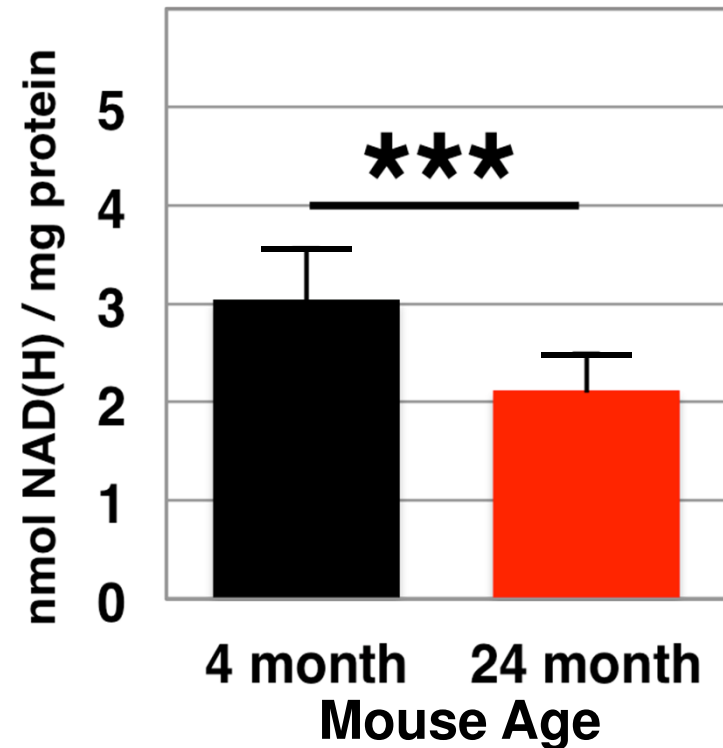
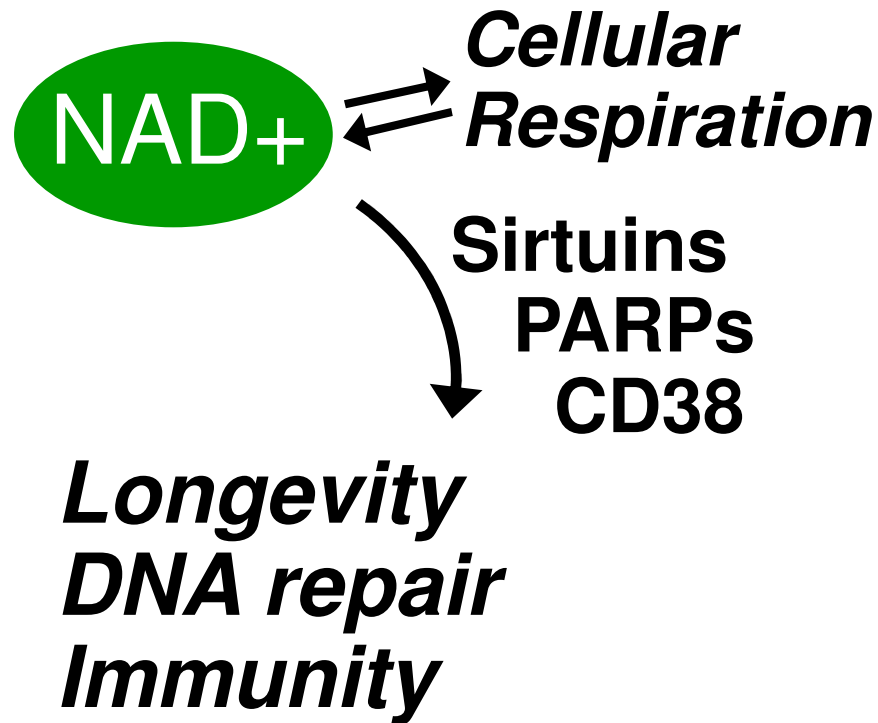
Achieved exercise guidelines:

Age 65-74	15.3%
Age 75+	8.7%

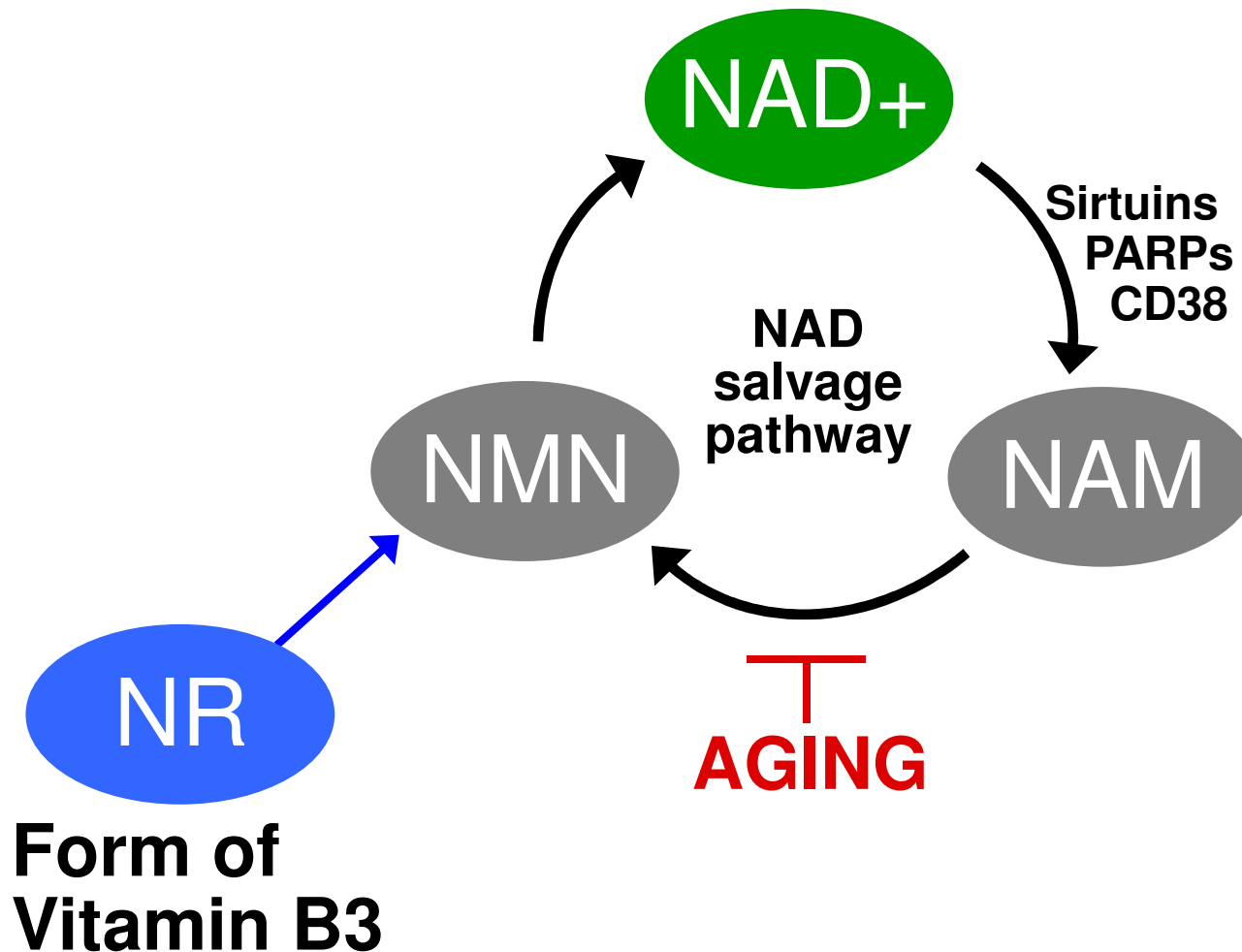
CDC 2016



Boosting NAD⁺ to enhance performance



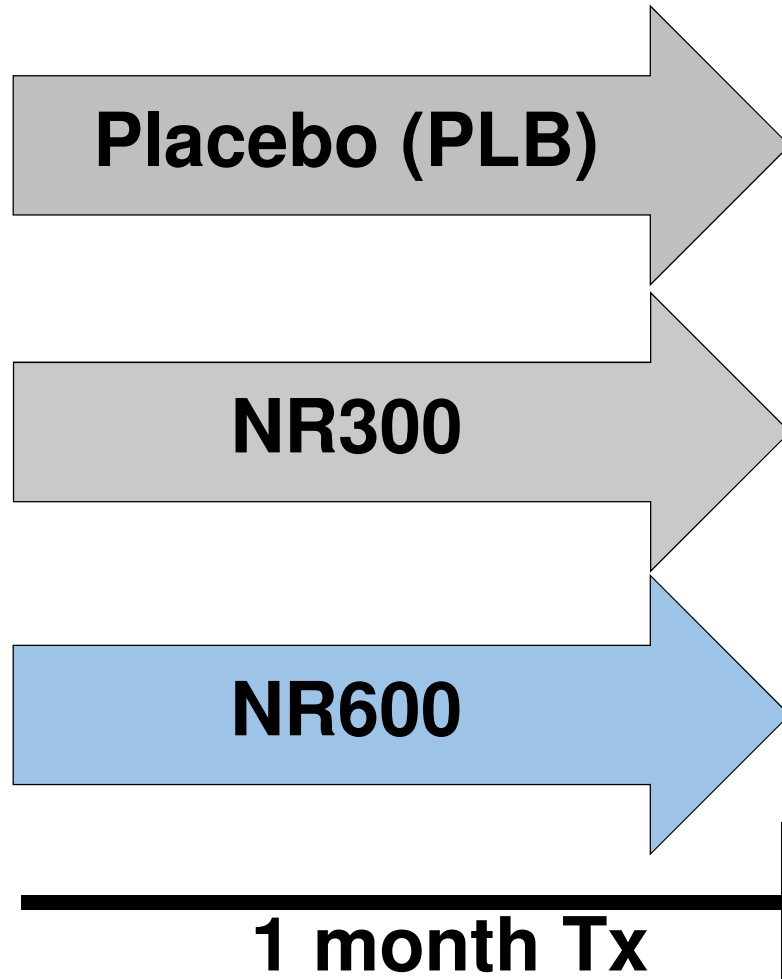
Nicotinamide Riboside (NR) can replenish NAD!



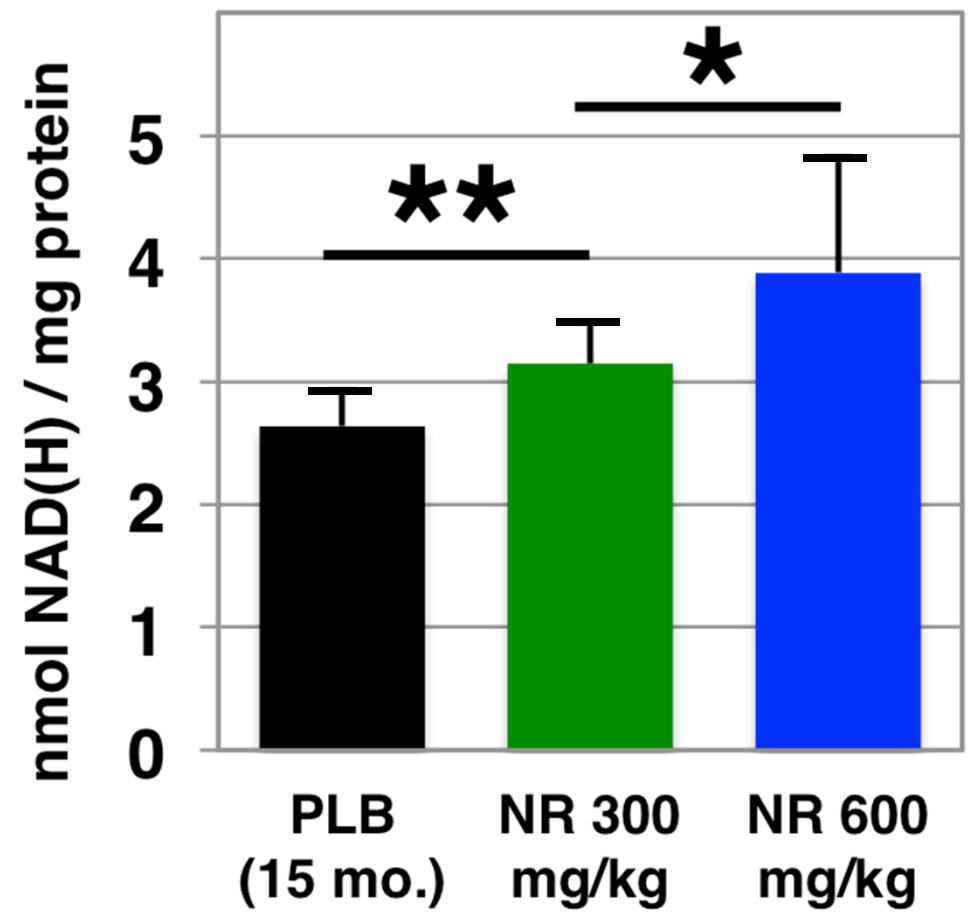
Does NR Work?



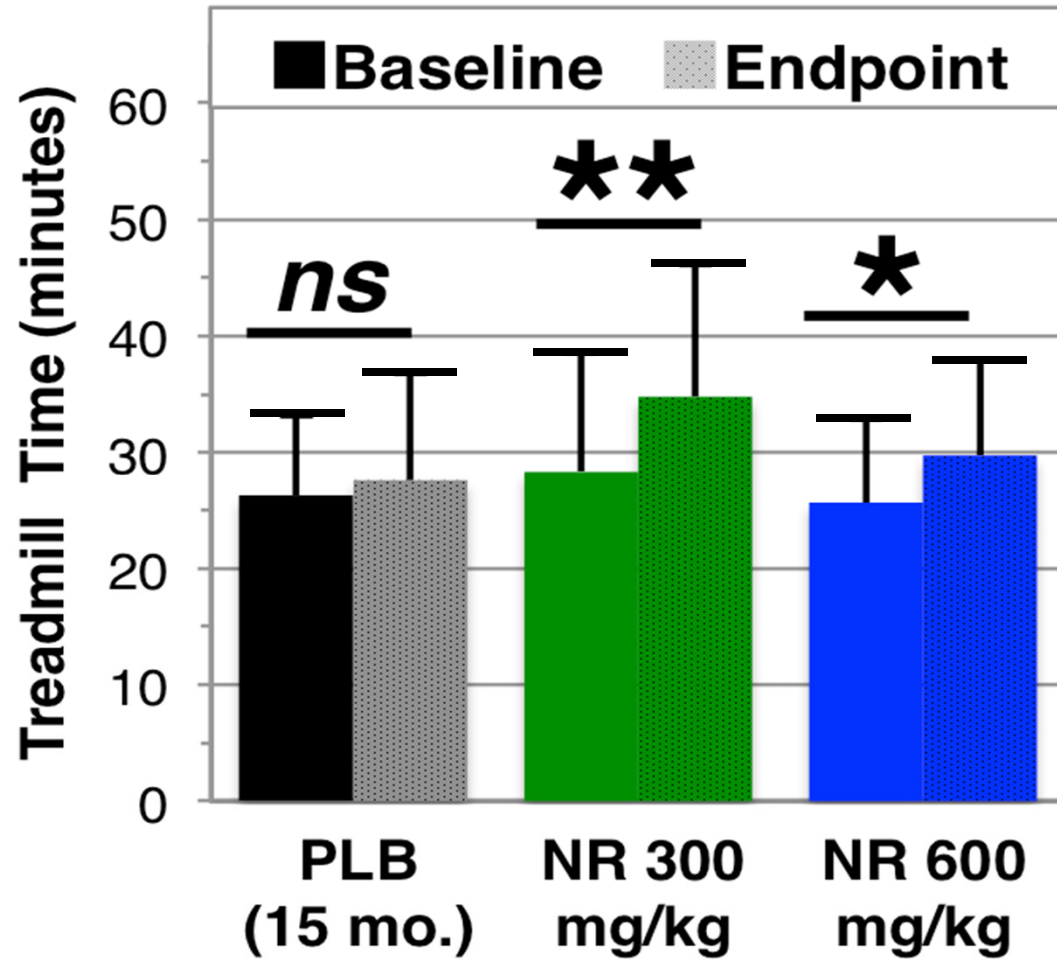
C57BL/6
Male mice
15 Month old
(~45-50 y.o. person)



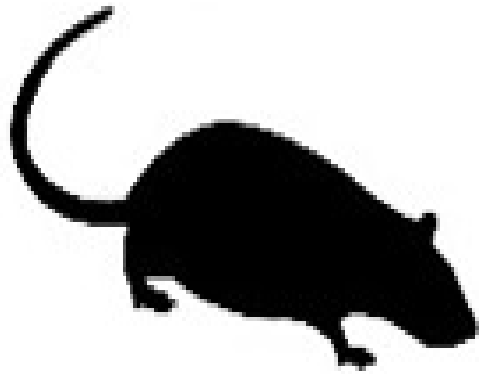
NR increases muscle NAD⁺



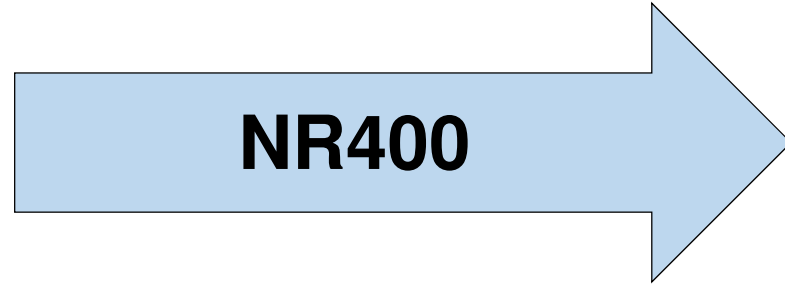
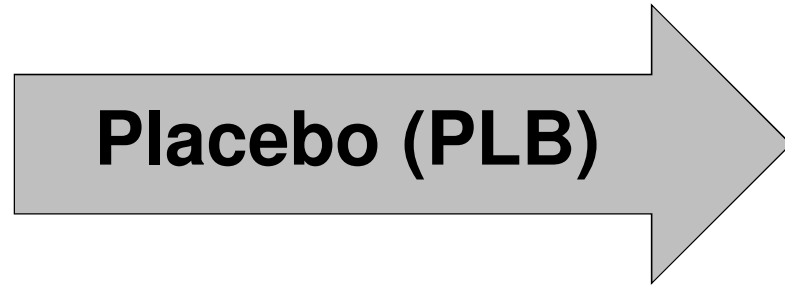
NR increases endurance



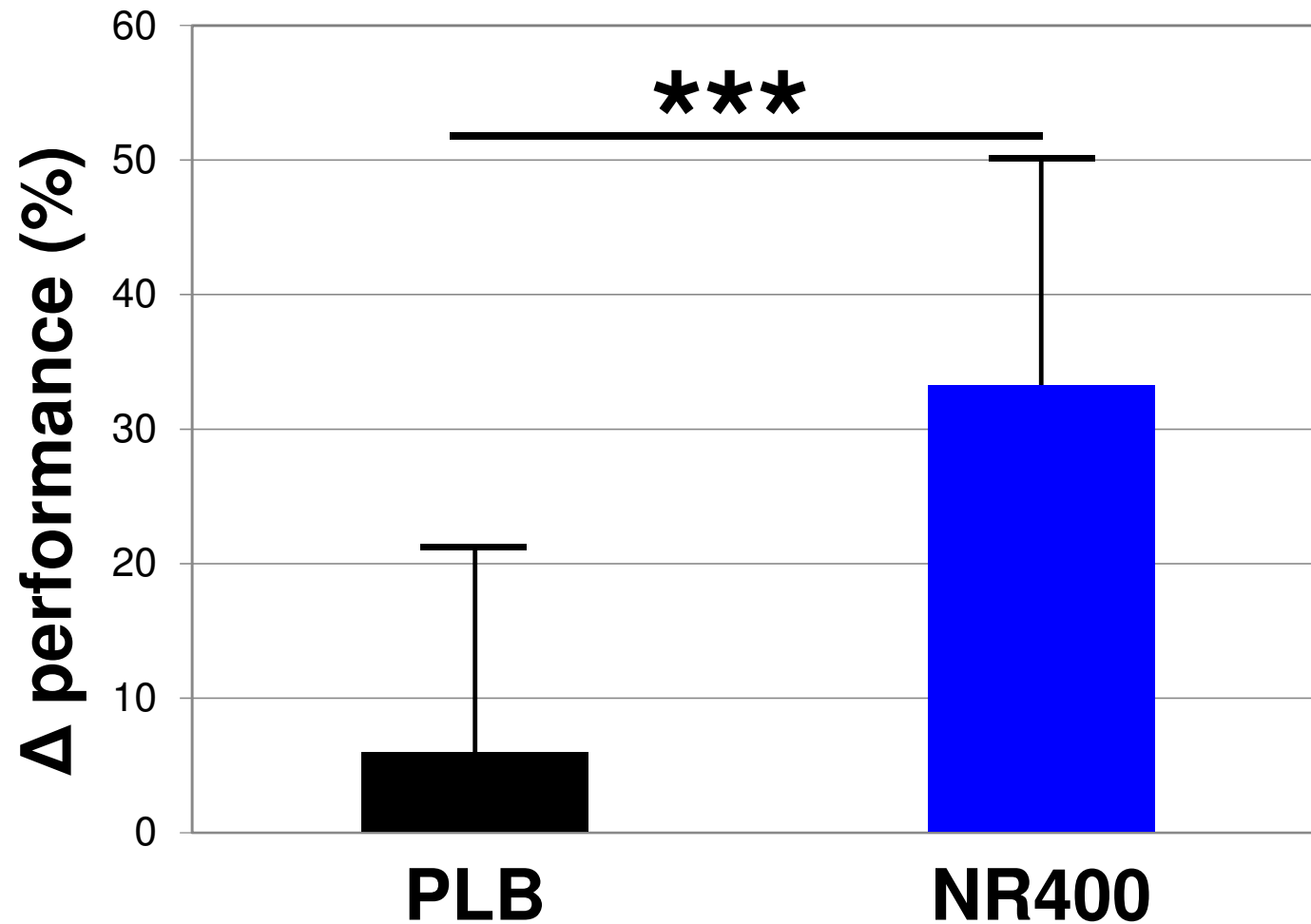
Is this for real?



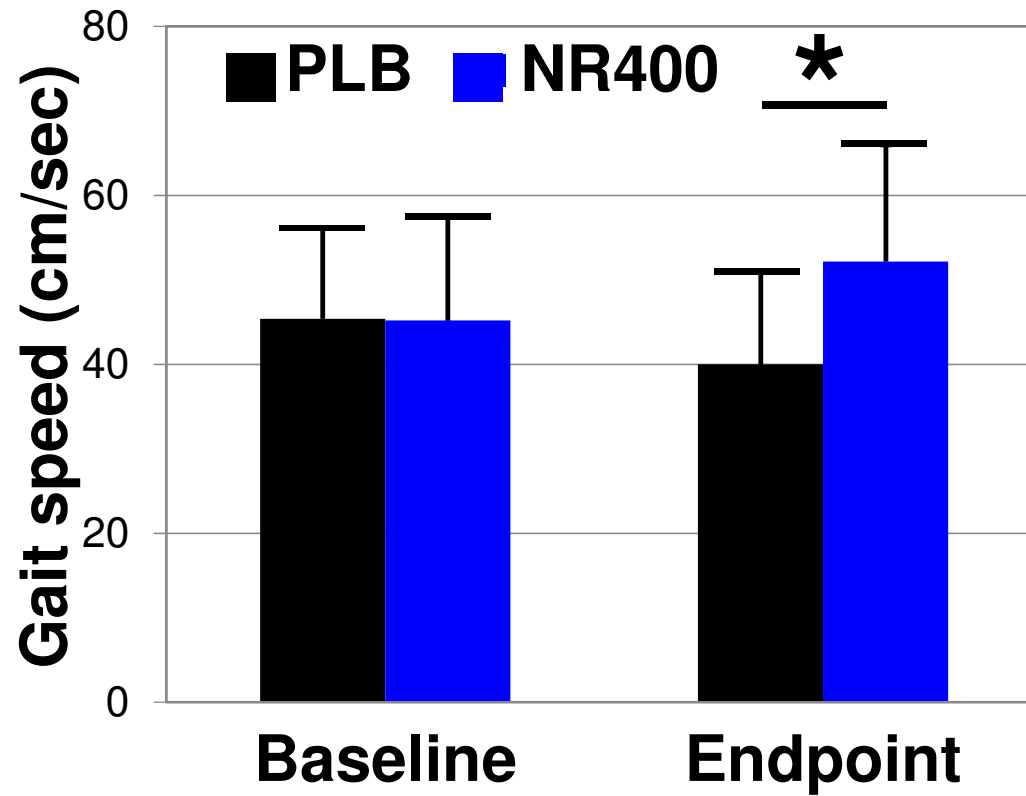
C57BL/6
Male mice
21 Month old
(~60 y.o. person)



NR increases endurance, again!



NR Improves Gait Speed



NR-VETs Trial

Study to examine efficacy of NR supplementation in older Veterans for functional capacity

Participants:

N = 144: 72 male and 72 female

Age: 65-85 years

Any race

Non-frail / pre-frail

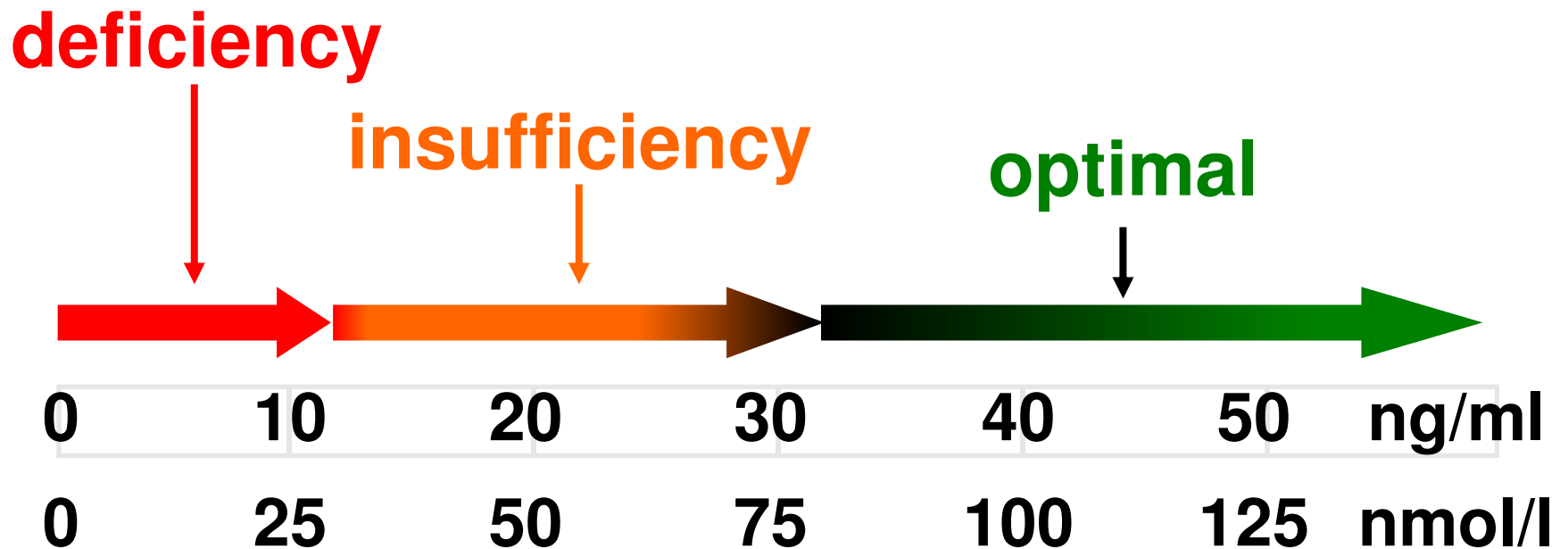
VETERANS (or spouses)

**[ClinicalTrials.gov/show/
NCT04691986](https://clinicaltrials.gov/show/NCT04691986)**

Starting April 2021

**For more information please contact:
Seldeen@buffalo.edu**

Does vitamin D status impact healthspan?



25-OH Vitamin-D Insufficiency Spectrum

1. Heaney RP. *Am J Clin Nutr.* 2004;80(suppl):1706S-1709S.
2. Thomas MK et al. *N Engl J Med.* 1998;338:777-783.

Vitamin D Insufficiency “The stealthy epidemic”



~ **50%** below **< 30 ng/ml**¹



> **70%** estimated to be
< **30 ng/ml** nationally²



➤ **90%** below **30ng/ml**³

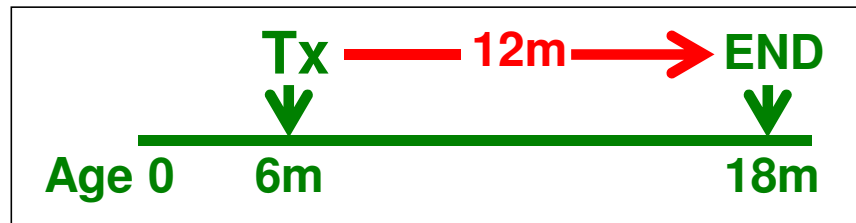
1 Zhang et al. Clinica Chimica Acta 2015

2 Wei et al. Mol Nutr Food Res 2010

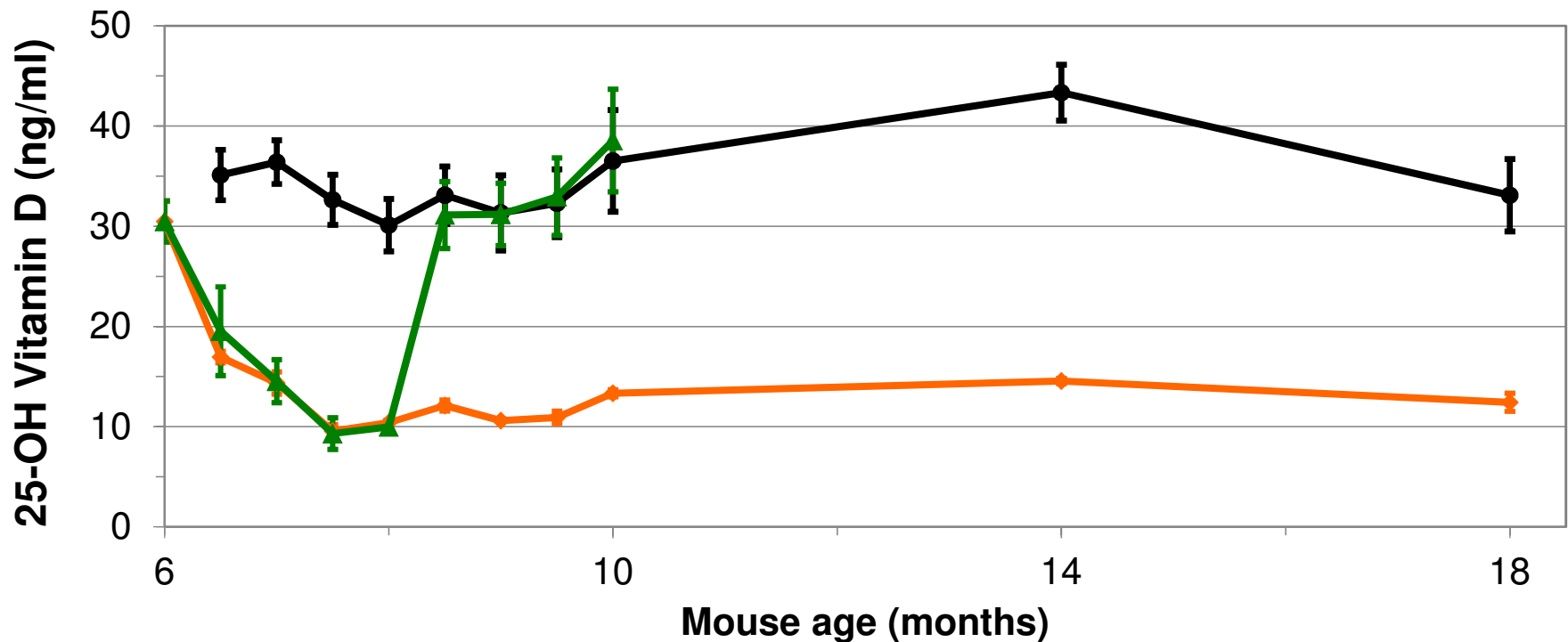
3 Cherniack et al. J Am Geriatr Soc 2011

Low vitamin D supplementation establishes chronic insufficiency

Male C57BL/6J

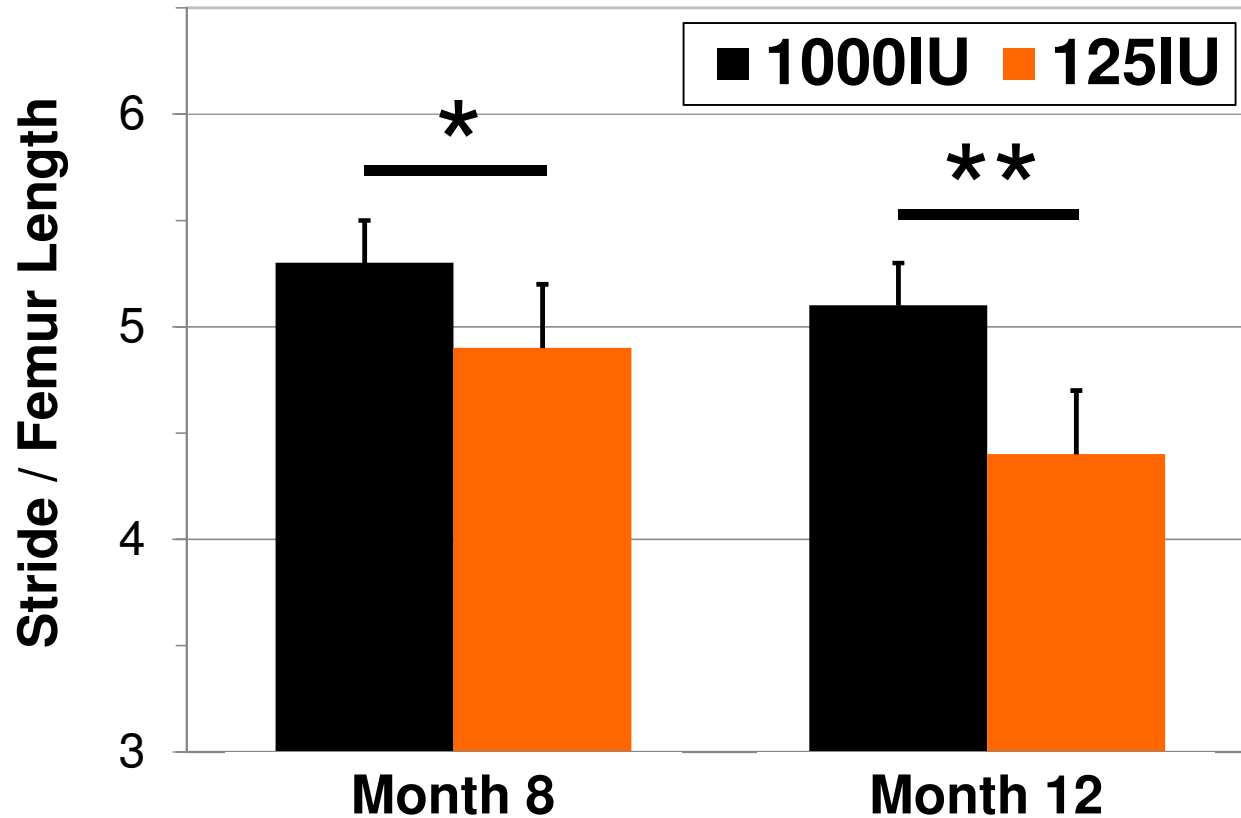


● 1000IU ◆ 125IU ▲ 125IU → 1000IU



Seldeen et al. unpublished

Chronically vitamin D insufficient mice exhibit shorter stride length



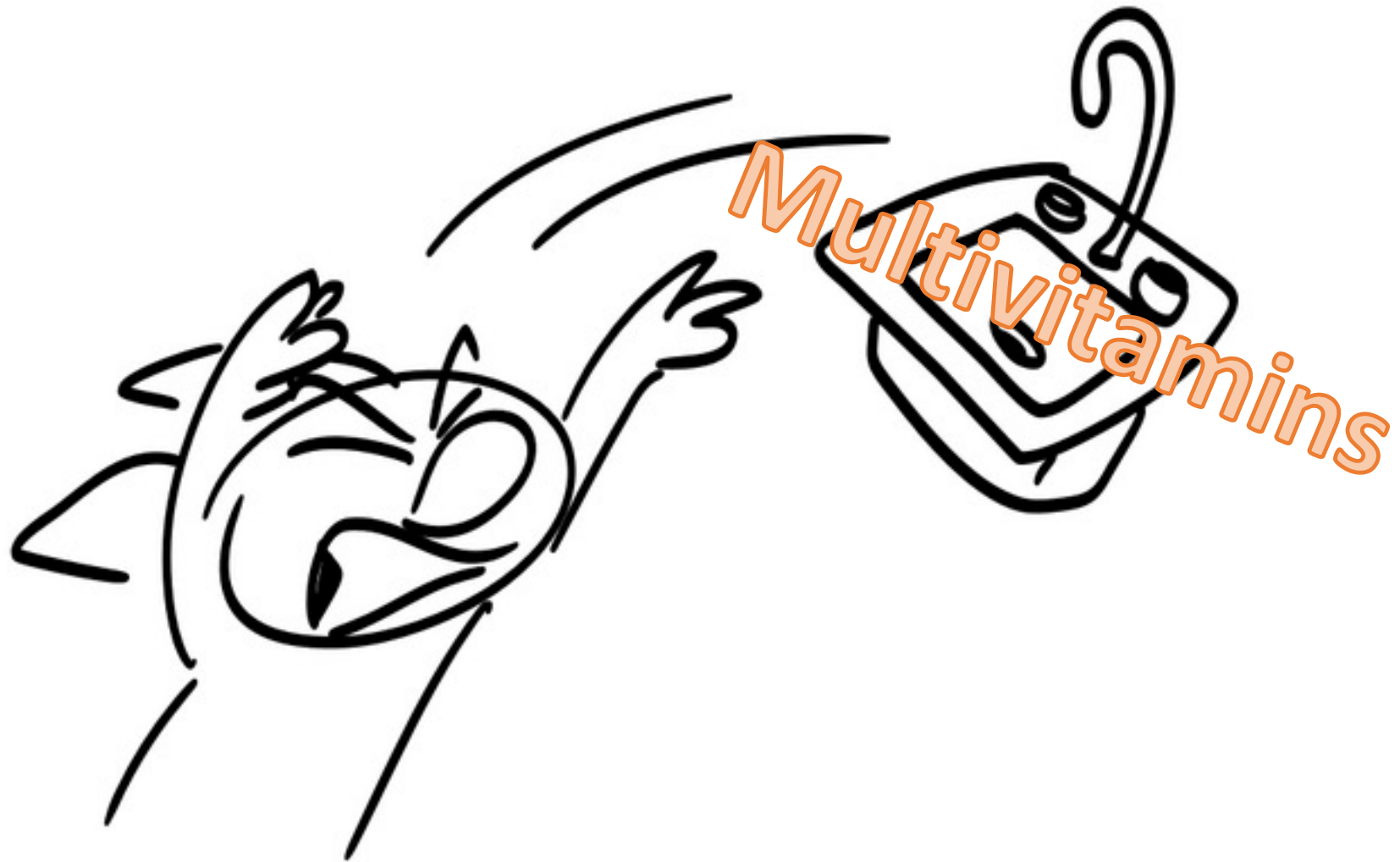
↓ Vitamin D \Rightarrow ↑ COVID-19 severity in VA patients

		COVID-19 Negative (N=51,492)	COVID-19 Positive (N=4,549)
25(OH)D ng/ml	< 20	8,757 / 17%	876 / 19%
	20-29	14,018 / 27%	1,266 / 28%
	≥ 30	28,717 / 56%	2,407 / 53%

- 25(OH)D < 20 & 20-29 \Rightarrow ↑ hospitalization
- 25(OH)D < 20 \Rightarrow ↑ ICU
- 25(OH)D < 20 \Rightarrow ↑ mortality
- No sig association with pneumonia/ARDS

Seldeen, Troen, et al. 2020 (unpublished data)

Individual vitamins may do good things... but what about...



Multivitamins: Should you take them or not?



MOST STUDIES, and there have been many, say that there's not really a benefit to taking those multivitamins, no matter what your age is. "There is limited evidence that [multivitamins] offer any significant health benefits," said a September 2018 article in *Harvard Health Publishing*. Harvard Medical School and Johns Hopkins researchers point

things like global trends versus a medical doctor's treating individuals.)

"When you look at most studies, the answer as to whether a multivitamin reduces cardiovascular and cancer risk, is 'no,'" says Seldeen. "There are not many benefits for healthy individuals, and a lot of people find that surprising."

Statistics show that fifty percent of

every day is the place to get your vitamins and minerals. "If you have a balanced diet, you're probably getting everything you need from the foods you eat. People should look at what the best diet for them is as they age," he notes. "There are a lot of opinions about what's a 'healthy' or 'the healthiest' diet, but one common thread through every diet is a high intake

Jana Eisenberg

Multivitamins are widely popular

- **Approximately 50% of US adult population use supplements (NHANES III)**

Gahche *et al* (2011) NCHS Data Brief, PMID: 21592424

- **64% of older adults use supplements**

Qato *et al* (2016) JAMA Intern Med, PMID: 26998708

- **83% of rural older adults use supplements**

Shade *et al* (2019) J Clin Nurs, PMID: 30589152

- **Supplement industry has sales of over \$30 Billion in the US and \$100 Billion globally**

Hannon *et al* (2020) Nutr Diabetes, PMID: 32341338

- **Most common reasons, “Improve or maintain”**

Bailey *et al* (2013) JAMA Intern Med, PMID: 23381623

The History of Multivitamins



1897

Christiaan Eijkman

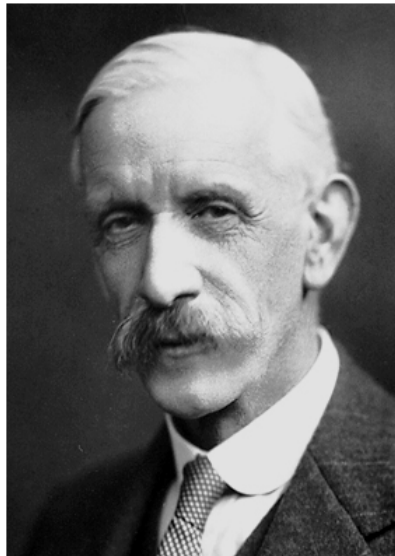
- Made keen observation that brown rice prevents beri-beri



1912

Kazimierz Funk, at age 26

- Isolated substance that prevents Beri-beri
- Coined phrase **Vitamine**
- Published an article proposing the presence of 4 vitamins
 - Beri-beri
 - Scurvy
 - Pellagra
 - Rickets



1898

Sir Frederick Hopkins

- Postulated the existence of “accessory factors”

1920's



“The claims set forth on the labels of the medicinal values of these preparations are extravagant and misleading”

-Journal of the American Medical Association, 1922

How Mastin's Yeast Vitamon Tablets Give You That Firm Flesh "Pep"

Strengthen the Nerves and Invigorate the Body—Easy and Economical to Take—Results Quick.

To at once put some firm, healthy, "stay-there" flesh on your bones, increase energy and nerve force and clear your skin and complexion, simply by taking one of Mastin's Yeast VITAMON Tablets with each meal and watch results.

Mastin's VITAMON Tablets contain highly concentrated yeast-vitamins as well as the two other important vitamins (Fat Soluble A and Water Soluble C), all of which are regarded as absolutely essential for perfect health, vigor and proper physical development. By a special process of concentration a **yeast** dose of all of the three known vitamins is contained in an active state in Mastin's VITAMON Tablets.

Mastin's VITAMON Tablets by aiding with your food help it to digest and provide the health-giving strength-building nourishment that your body needs to make firm tissue, strong nerves, rich blood, clear skin and a keen, active brain. They will not upset the stomach or cause that dreaded feeling, but on the contrary, are a great aid in overcoming indigestion or chronic constipation.

If you are thin, sunken cheeked, hollow chested, run-down and underweight you will find the simple test well worth trying: First weigh yourself and measure yourself. Next take Mastin's VITAMON—two tablets with each meal. Then weigh and measure yourself again each week and continue taking Mastin's VITAMON regularly until you are satisfied with your gain in weight and energy. Mastin's VITAMON Tablets are easy and economical to take—they are so, and they also keep indefinitely. So remarkable are the benefits from these highly concentrated tablets that entire satisfaction is absolutely guaranteed or the full amount you pay for the trial will be promptly refunded. You can get Mastin's VITAMON Tablets at all good druggists, such as Eberle's six stores, Janssen Bros., Judge & Dolph, E. A. Miller, A. W. Puckey, Wolff, Wilson, Huger's two stores.

MASTIN'S VITAMON TABLETS
THE ORIGINAL AND GENUINE YEAST VITAMINE TABLET

Are Positively Guaranteed to Put on Firm Flesh, Clear the Skin and Increase Energy When Taken With Every Meal, or Money Back.

if it isn't MASTIN'S it isn't VITAMON

World War II



- In recruitment of service for WWII it was found that one third suffered from malnutrition
- In response, President Franklin D. Roosevelt establishes the first set of recommended daily allowances (RDA) in 1941
- The first “One-a-day” supplement appears in 1943

Establishing nutritional requirements



Recommended Daily Allowances (RDA)
a.k.a. dietary reference intakes (DRI)

1941: Vitamins A, B1, B2, B3, C, and D, calcium, and iron.

1968: Vitamins E, B6, and B12, and magnesium join the list

Today: Vitamins A, B1 (thiamin), B2 (riboflavin), B3 (niacin), B5 (pantothenic acid), B6 (pyridoxine,) B7 (biotin), B9 (folic acid), B12 (cobalamin), C, D, E, K, choline, calcium, chromium, copper, iodine, iron, magnesium, manganese, molybdenum, phosphorus, selenium, zinc, potassium, and chloride.

The National Academy of Medicine



- **Review current literature**
- **Set “recommended dietary allowances (RDA)” of various nutrients broken down by age and sex**
- **Set “Adequate intake (AI)” for nutrients that have insufficient literature**
- **Set “Tolerable Upper Intake Limits (UL)” for maximal levels unlikely to cause adverse health effects**

https://ods.od.nih.gov/HealthInformation/Dietary_Reference_Intakes.aspx

2021: How does one choose?

289-306 of over 8,000 results for "multivitamins"

Amazon Prime
 prime

Delivery Day
 Get It by Tomorrow

Local Stores
 Whole Foods Market

Department
 Vitamin Supplements
 Multivitamins
 Vitamin D Supplements
 Blended Vitamin & Mineral Supplements
 Nutritional Supplements
[See All 13 Departments](#)

Avg. Customer Review
 ★★★★★ & Up
 ★★★★☆ & Up
 ★★★☆☆ & Up
 ★★☆☆☆ & Up

Brand

LIFE EXTENSION
 The Science of a Healthier Life™

Your Preferred Way to Get Your Essential
[Shop Life Extension >](#)

Limited time Deal
 \$13⁵⁰ **prime**
~~\$18.00~~ (25% off)

\$17²⁵ prime

Tropical Oasis MEGA
 YOUR VITAMINS FOR LIFE

INFUSION SCIENCES™
Youth Infusion™
 INFUSE YOUR VITAMINS

Cost per day of 25 randomly selected multivitamins:

	Low	Mean	Median	High
Cost	\$0.03	\$0.42	\$0.40	\$0.93

“No statistically significant difference was found on the basis of cost”

Jones et al (2021) J AM PHARM Assoc, PMID: 33414014

Many MVs push the limits!

%	Low	Mean	Mode	Median	High
Vitamin A	12	233	117	167	1,250
Vitamin C	20	226	67	67	1,111
Vitamin D	0	166	50	50	2,240
Vitamin E	38	229	90	133	1,000
Vitamin K	21	52	21	32	100
Thiamin	50	717	125	125	4,167
Riboflavin	46	641	131	131	3,846
Niacin	50	156	125	125	625
Vitamin B6	41	454	118	118	2,941
Folate	25	108	100	100	168
Vitamin B12	50	1178	250	292	8,333
Biotin	33	359	100	200	1,000
Pantothenic Acid	52	352	200	200	1,600
Calcium	1	14	15	14	25
Iron	11	68	100	89	100
Phosphorus	2	6	#N/A	7	9
Iodine	15	74	100	100	100
Magnesium	0	20	24	24	71
Zinc	3	83	136	100	136
Selenium	2	87	100	100	287
Copper	2	91	56	78	222
Manganese	1	112	100	100	304
Chromium	5	148	100	100	343
Chloride	3	3	3	3	3
Potassium	0	1	2	1	5
Molybdenum	22	115	100	100	333
Choline	0	2	5	1	5

And what else do you get?

Aloe Vera Gel, Alpha Lipoic Acid, Amylase, Apple Pectin, Bee Pollen, Betaine, **Boron**, Brewer's Yeast, Bromolean, Chlorine Bitartrate, Chlorophyll, **Citrus Bioflavonoids**, Co-enzyme Q-10, Colloidal Minerals, Cysteine, Echnicea, Eluthero, Ginseng, Glycine, Gotu Kola, Green tea, Hesperidin, **Inositol**, Kelp, Lacobacillus A., L-Arginine, Lecithin, Lipase, **Lutein**, Lycopene, Lysine, Methionine, Oat Extract, Octacosoanol, Omega 3/6/9 Seed Blends, PABA, Papain, Peat extract, **Proprietary Blends**, Psyllium, Quercetin, RNA, Rutin, Safflower, Silicon, **Sodium**, Spirulina, Superoxide Dismutase, Vanadium, Vitamin K2, Wheat Grass Powder

Publication interest in Multivitamins

“Vitamin D”

88,465

“Vitamin B”

41,210

“Vitamin A”

36,020

“Vitamin K”

28,023

“Vitamin C”

24,485

“Multivitamin”

4035

MVs and All Cause Mortality

Supplementation en Vitamines et Mineraux Antioxydants (SU.VI.MAX)

Hercberg *et al* (2004) Arch Internal Med, PMID: 15557412

5 component multivitamin – 13,017 participants (aged 35-60 at start)

Double blind/placebo controlled trial

7.5 year follow-up

Trend towards reduced all-cause mortality in men but not women

Physicians Health Study II

Sesso *et al* (2012) JAMA, PMID: 23117775

30 component multivitamin – 14,641 Male physicians 50 and older

Double blind/placebo controlled trial

~11.2 year follow-up

No significant reduction in all cause mortality

Linxian general population nutrition intervention trial

Wang *et al* (2013) JAMA, PMID: 23712839

5 component multivitamin – 3,318; 40-69 diagnosed with esophageal dysplasia

Double blind/placebo controlled trial

6 year supplementation and 20 years post-supplement follow-up

No significant reduction in all cause mortality

MVs and All Cause Mortality

EPIC-Heidelberg: Prospective study

Li *et al* (2012) Eur J Nutr., PMID: 21779961

Multivitamins or antioxidants – 23,943

Database mining

~11 year follow-up

No significant reduction in all cause mortality across all participants

But – baseline antioxidant users had a significant reduction!

“the sick user effect”

UK Biobank: Prospective study

Behrendt *et al* (2020) Antioxidants, PMID: 33339307

Multivitamins or antioxidants – 345,626 baseline age ~57 years

Database mining

~11.5 year follow-up

No significant reduction in all cause mortality

MVs and cardiovascular disease

Physicians Health Study II

Sesso *et al* (2012) JAMA, PMID: 23117775

30 component multivitamin – 14,641 Male physicians 50 and older

Double blind/placebo controlled trial

~11.2 year follow-up

No significant reduction in all cause mortality

Trial to Assess Chelation Therapy (TACT)

Lamas *et al* (2013) Antioxidants, PMID: 24490264

28 component multivitamins – 1,708; age 50+ years; post-MI population

Double blind/placebo controlled trial

~4.6 year follow-up

Did not reduce cardiovascular events

MVs and cardiovascular disease

Trial to Assess Chelation Therapy (TACT)

Issa *et al* (2018) Antioxidants, PMID: 29224648

28 component multivitamins – 1,708; no-statins

Double blind/placebo controlled trial

~4.6 year follow-up

“Seem” to decrease combined cardiac events

→ TACT2 upcoming

→ However - criticisms include co-investigators disciplined by state medical boards & high dropout rates, misrepresentation on informed consent (Maron 24952853)

Systematic Review: Multivitamins for CVD prevention

Kim *et al* (2018) Circ Cardio Qual Outcomes, PMID: 29991644

18 studies; ~2,019,862 participants across all studies

“MVM supplementation does not improve CVD outcomes in the general population”

MVs and Cancer

Supplementation en Vitamines et Mineraux Antioxydants (SU.VI.MAX)

Hercberg *et al* (2004) Arch Internal Med, PMID: 15557412

5 component multivitamin – 13,017 participants (aged 35-60 at start)

Double blind/placebo controlled trial

7.5 year follow-up

Lowered total cancer incidence in men but not women

Physicians Health Study II

Sesso *et al* (2012) JAMA, PMID: 23117775

30 component multivitamin – 14,641 Male physicians 50 and older

Double blind/placebo controlled trial

~11.2 year follow-up

No significant reduction in cancer

Linxian general population nutrition intervention trial

Wang *et al* (2013) JAMA, PMID: 23712839

5 component multivitamin – 3,318; 40-69 diagnosed with esophageal dysplasia

Double blind/placebo controlled trial

6 year supplementation and 20 years post-supplement follow-up

No significant reduction in cancer

MVs and Cancer

Dietary supplement use after cancer diagnosis

Kanellopoulou *et al* (2020) Nutr Cancer, PMID: 32148118

Review - Multivitamins

“mostly based on observational studies”

Lowered cancer recurrence, but, ”More RCTs needed to justify recommendation for use

Are we getting our vitamins naturally?

“HEALTHY” DAY

Breakfast: Honey nut cheerios, Whole milk, orange juice

Lunch: McDonald’s Caesar salad, fries, trail mix

Dinner: Chicken breast, salad (romaine, tomato, celery, mushroom, Italian dressing), mashed potatoes, asparagus

“SUPER HEALTHY” DAY

Breakfast: Smoothie (kale, walnut, strawberries, apple, mint, coconut water)

Lunch: Portabella salad (romaine, arugula, quinoa, portabella mushroom, heirloom tomatoes, celery, vinaigrette, 2 hard boiled eggs)

Dinner: Wild Atlantic salmon, bulgur

Dessert: Chocolate soft serve (frozen banana, cocoa powder, maple syrup, whole milk, pecans)

“FUN” DAY

Breakfast: Pancakes (butter syrup), hash browns, bacon

Snack: Caramel Frappuccino

Lunch: BK Whopper, Large Fry, Oreo Milkshake

Dinner: T-bone steak, mashed potatoes, wine

Dessert: Cherry pie

Are we getting our vitamins naturally?

% of RDA

Vitamin A

Vitamin C

Vitamin D

Vitamin E

Vitamin K

Thiamin

Riboflavin

Niacin

Vitamin B6

Folate

Vitamin B12

Pantothenic acid

Phosphorus

Calcium

Iron

Magnesium

Zinc

Selenium

Copper

Manganese

Potassium

And... the human body is quite robust

Teenager Who Only Ate Chicken Nuggets And Chips For 15 Years Finds Help From Hypnotis

JESS HARDIMAN
Published 8:30, Tuesday 03 November 2020 GMT



British teen hospitalized after eating nothing but chicken nuggets for 15 years

BY RYAN JASLOW
JANUARY 27, 2012 / 5:08 PM / CBS NEWS



Ryan Howarth has spent the last 17 years almost exclusively chomping on chicken nuggets Credit: Caters News Agency

Multivitamins are relatively safe, but...

Systematic Review: Safety

Biesalski *et al* (2012) Nutrition, PMID: 27553772

>9 component multivitamins –15 studies;

>10 years follow-up

“Safe for long term use”

2018 American Association
of Poison Control Centers:
48,630 events
1697 minor adverse events
189 moderate
5 major and no deaths.

MVM addresses nutritional deficiencies, but may reach excess

Wallace *et al* (2019) J Nutr Geron Geriatri, PMID: 31502930

Survey older adults >51 years of age

Regular MVM use decreased odds of deficiency for several nutrients, but increased risk of exceeding tolerable intake of folic acid

Vitamins, Are they Safe?

Hamishehkar *et al* (2016) Adv Pharm Bull, PMID: 28101454

Review on harmful and detrimental properties of vitamins

“Our recommendation is that taking high-dose supplements of vitamins A, E, D, C, and folic acid is not always effective for prevention of disease, and it can even be harmful to the health.”

Polypharmacy and Drug interactions

Aloe Vera Gel, Alpha Lipoic Acid, Amylase, Apple Pectin, Bee Pollen, Betaine, Boron, Brewer's Yeast, Bromolean, Chlorine Bitartrate, Chlorophyll, Citrus Bioflavonoids, Co-enzyme Q-10, Colloidal Minerals, Cysteine, Echnicea, Eluthero, Ginseng, Glycine, Gotu Kola, Green tea, Hesperidin, Inositol, Kelp, Lacobacillus A., L-Arginine, Lecithin, Lipase, Lutein, Lycopene, Lysine, Methionine, Oat Extract, Octacosanol, Omega 3/6/9 Seed Blends, PABA, Papain, Peat extract, Proprietary Blends, Psyllium, Quercetin, RNA, Rutin, Safflower, Silicon, Sodium, Spirulina, Superoxide Dismutase, Vanadium, Vitamin K2, Wheat Grass Powder

Polypharmacy and drug interactions

Changes in Prescription and supplement use 2005 v 2011

Qato *et al* (2016) Nutrition, PMID: 26998708

In-home interviews of community dwelling adults aged 62-85

“In 2010-2011, approximately 15.1% of older adults were at risk for a potential major drug-drug interaction compared with an estimated 8.4% in 2005-2006 (P < .001). Most of these interacting regimens involved medications and dietary supplements”

Prevalence of polypharmacy in border dwellers

Loya *et al* (2009) Nutrition, PMID: 19552494

Surveys of 130 participants (~71.4 years) living near the US-Mexico border

- **Polypharmacy prevalence: 72.3%**
- **Major polypharmacy: 38.5%**
- **Polyherbacy: 26.2%**
- **Estimated 31.5% at risk for drug-supplement interaction**

Discussion

- **Multis are relatively safe and inexpensive – but do not appear to confer significant long-term health benefits**
- **Multis may be good at reducing malnutrition in older adults**
- **Overall, the literature is underwhelming – particularly on the topic of polypharmacy and drug interactions**
- **Never doubt the power of placebo!**
“MVM users self-reported better overall health despite no apparent differences in clinically measurable health outcomes.”

Paranjpe *et al* (2020) *BMJ Open*, PMID: 33148746

Choosing a multivitamin

- See a dietician / nutritionist
- Evaluate your current nutritional intake:



- Avoid high dose multivitamins (or don't take daily)
- Use simpler multivitamins
- Vitamin D!

VITAMIN BEER (TAKE AS NEEDED)



↑ Revive! ↑ Focus! ↑ BALANCE! ↑ NOURISH! ↑ DEFENSE!

LUNCHBREATH



QUESTIONS?

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