GrassrootsHealth Nutrient Research Institute

Moving Research Into Practice

2016 Humanitarian Award Recipient from the *American College of Nutrition*

Co-recipient of the *2018 NJB Award for Excellence in Education*

NBJ® NUTRITION BUSINESS JOURNAL

GrassrootsHealth
Nutrient
Research Institute

Moving
Research
Into Practice

- 501c3, started in 2007 by Carole Baggerly
- World-wide organization based in Encinitas, CA
- Tagline **“Moving Research into Practice”**
  - Vitamin D, omega-3s, magnesium, other nutrients
- **The D*action Study** – the world’s largest public health intervention trial on vitamin D
  - Approved by WCB IRB, IRB Protocol Number: 20111002
  - Sub-studies for Type 1 Diabetes Prevention, Breast Cancer Prevention, Pregnancy and more
- Nearly 20,000 participants world-wide
- Home testing, online data gathering, dissemination and education

International Scientists' Panel Formed in 2007

Ahepa University Hospital Thessaloniki ,Greece
Kalliopi Kotsa, MD, Ph.D.
Spyridon Karras , MD, Ph.D.

Baxter International
Mathew Mizwicki, Ph.D.

Boston University School of Medicine
Michael F. Holick, Ph.D., M.D.

Creighton University
Robert P. Heaney, M.D. †
Joan M. Lappe, Ph.D., R.N.

Emory University
Vin Tangpricha, M.D., Ph.D.

Harvard University
Carlos A. Camargo, Jr., M.D., Dr. P.H.
Edward Giovannucci, M.D., ScD.
Walter C. Willett, Dr. P.H., M.D.

Inova Comprehensive Cancer and Research Institute
Donald L. Trump, M.D.

Institute VitaminDelta
Raimund von Helden, M.D.

McGill University
John H. White, Ph.D.

Medical University of Graz, Austria
Stefan Pilz, M.D.

Medical University of South Carolina
Bruce W. Hollis, Ph.D.
Carol L. Wagner, M.D.

Mt. San Jacinto College
Laura P. Schoepf, Ph.D.

National Center for Global Health and Medicine
Tetsuya Mizoue, M.D., Ph.D.

Oregon State University, Linus Pauling Institute
Adrian F. Gombart, Ph.D.

Roswell Park Cancer Institute
Candace Johnson, Ph.D.

Royal National Orthopaedic Hospital, United Kingdom
Benjamin Jacobs, M.D.

Society For Medical Information and Prevention
Joerg Spitz, M.D.

Sunlight, Nutrition and Health Research Center
William B. Grant, Ph.D.

University of Albany - SUNY
JoEllen Welsh, Ph.D.

University of Alberta
Gerry Schwalfenberg, M.D., CCFP

University of Angers, France
Cedric Annweiler, M.D., Ph.D.

University of Auckland
Robert Scragg, M.D., Ph.D.

University of Birmingham
Martin Hewison, Ph.D.

University of California Davis
Bruce D. Hammock, Ph.D.
Hari A. Reddy, Ph.D.
Ray Rodriguez, Ph.D.

University of California Los Angeles
John Adams, M.D.
Milan Fiala, M.D
H. Phillip Koeffler, M.D.
Keith C. Norris, M.D.

University of California Riverside
Anthony W. Norman, Ph.D.

University of California San Diego
Richard L. Gallo, M.D., Ph.D.
Cedric F. Garland, Dr. P.H.
Frank C. Garland, Ph.D. †
Edward D. Gorham, Ph.D.
Tissa Hata, M.D.

University of California San Francisco
David Gardner, M.S., M.D.
Bernard P. Halloran, Ph.D.

University of Saskatchewan
Susan J. Whiting, Ph.D.

University of Toronto, Mt Sinai Hospital
Reinhold Vieth, Ph.D.

Vienna Medical University
Heidi S. Cross, Ph.D.

Vitamin D Council
John J. Cannell, M.D.

Wismar University of Applied Sciences
Alexander Wunsch, M.D

GrassrootsHealth Mission Statement

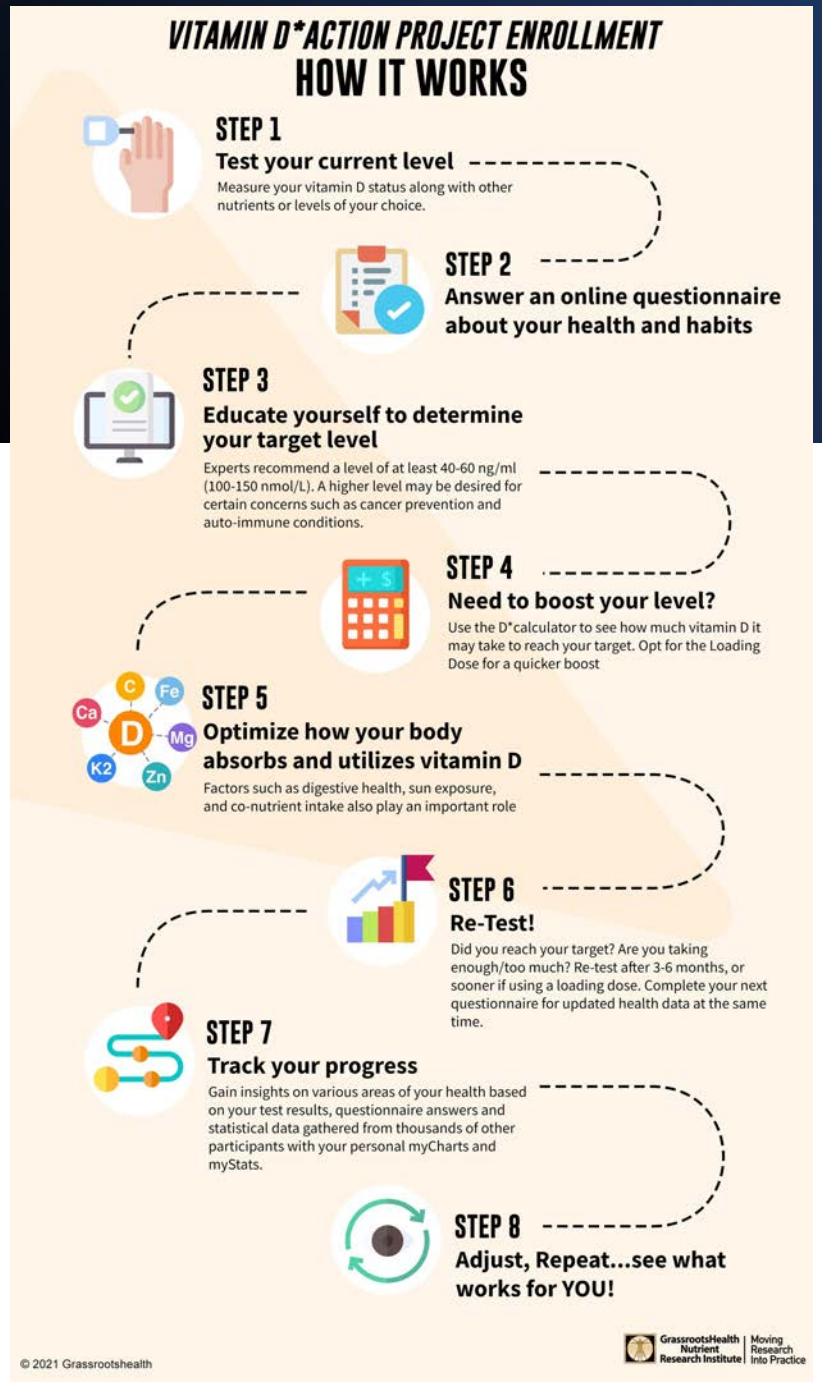
GrassrootsHealth is a nonprofit public health research organization dedicated to promoting optimal health worldwide through research, education, and advocacy, with a primary focus on the role of vitamin D. Through **evidence-based education**, **tools and resources**, and our **citizen-science approach to research**, we empower individuals to make informed decisions about their health and healthcare providers to move research into practice.

Evidence-Based Education	Citizen Science: The D*action Study	Tools & Resources
Reviews of important and latest published research with easy-to-read charts and visuals	Online data gathering with home blood spot testing, education, and guidance for taking health *action*!	Tools include the vitamin D and omega-3 dosing calculators & the Vitamin D Deficiency Risk Assessment Quiz
Scientist-led interviews, videos, and courses	Data analysis reviews, published research, and tool development have been produced from D*action data	Downloadable resources such as infographics, brochures, guides and eBooks

GrassrootsHealth
Nutrient
Research Institute

Moving
Research
Into Practice

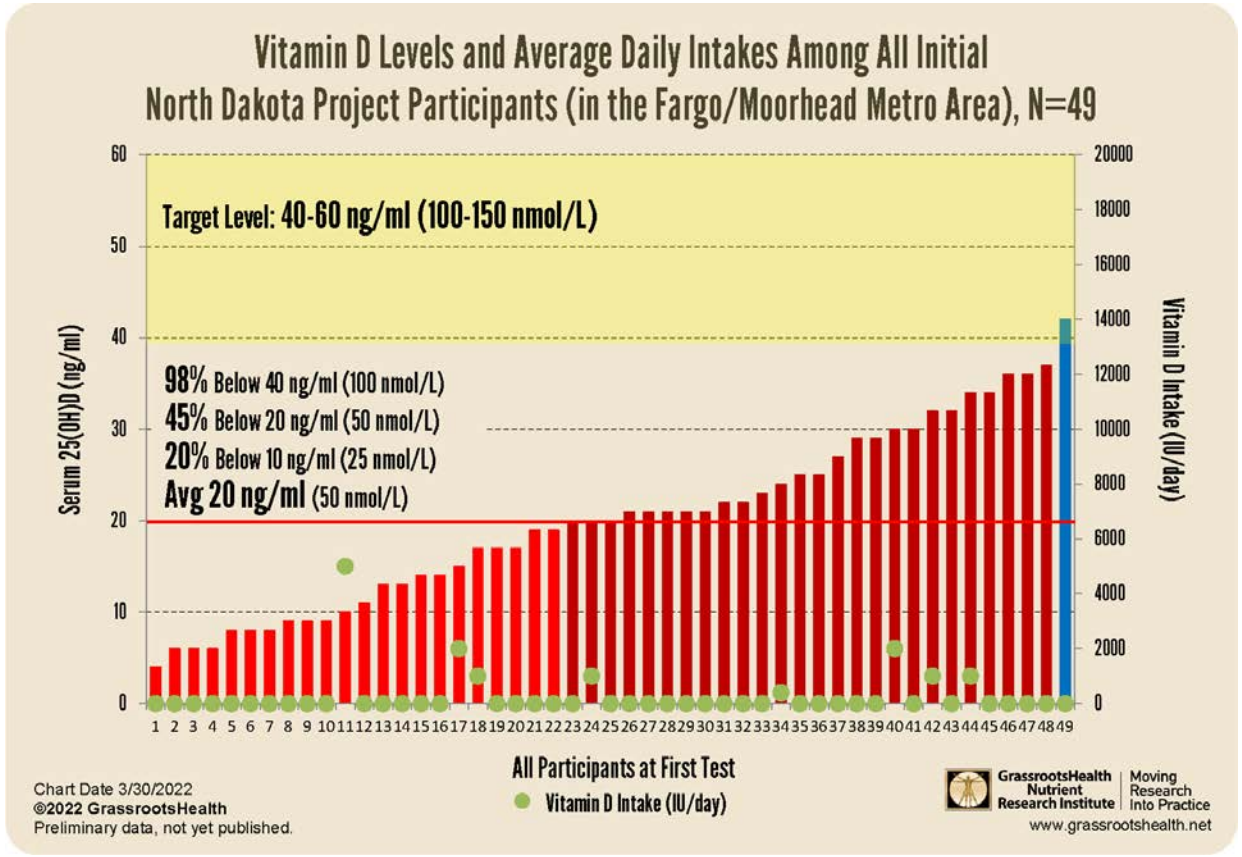
CITIZEN SCIENCE:
THE D*ACTION STUDY

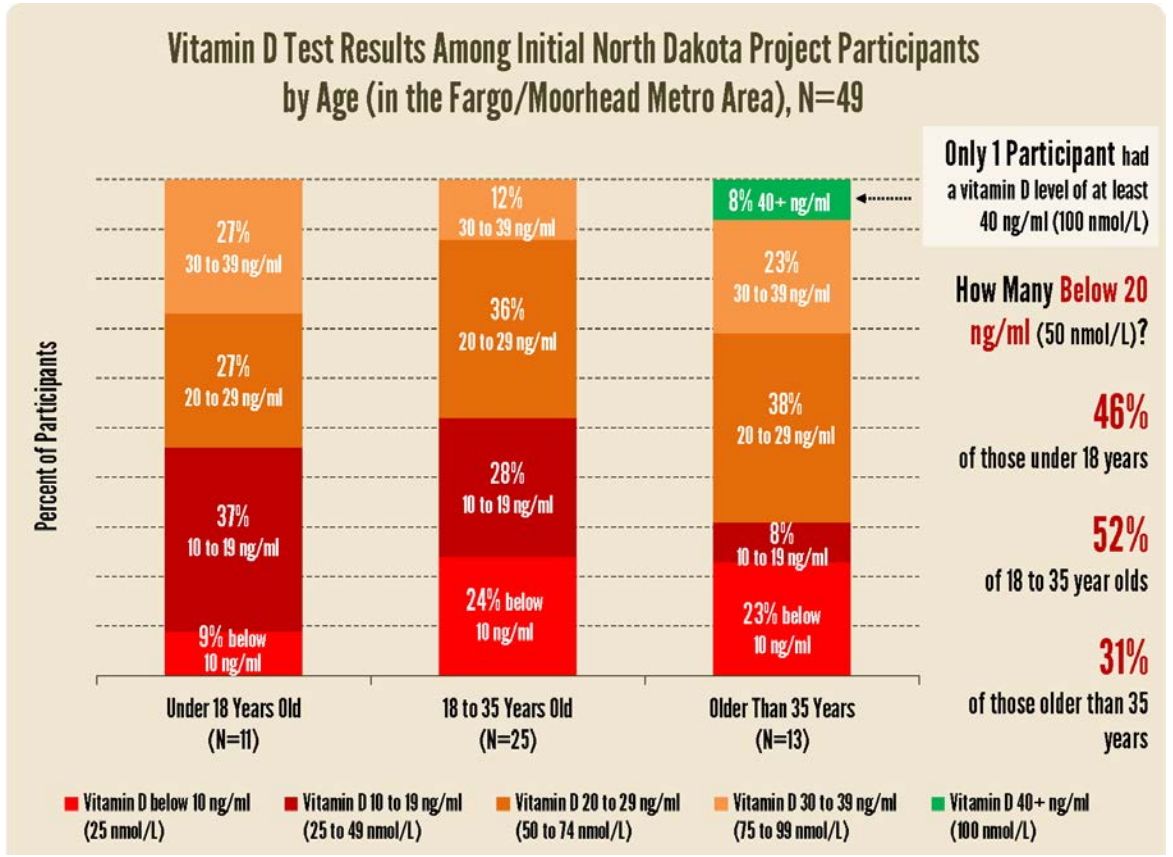


The D*action Study: A Citizen Science Approach to Research & Education

- Measuring vitamin D, omega-3, and other nutrient levels lets participants know if they are currently getting enough
- Evidence-based education on health outcomes associated with specific target levels allows participants to choose where they'd like to be
- Tracking and action steps are provided to help participants reach their goals
- Data gathered is used for further analysis, publication, and education

Testing Creates Awareness & Opportunities for Health Improvement

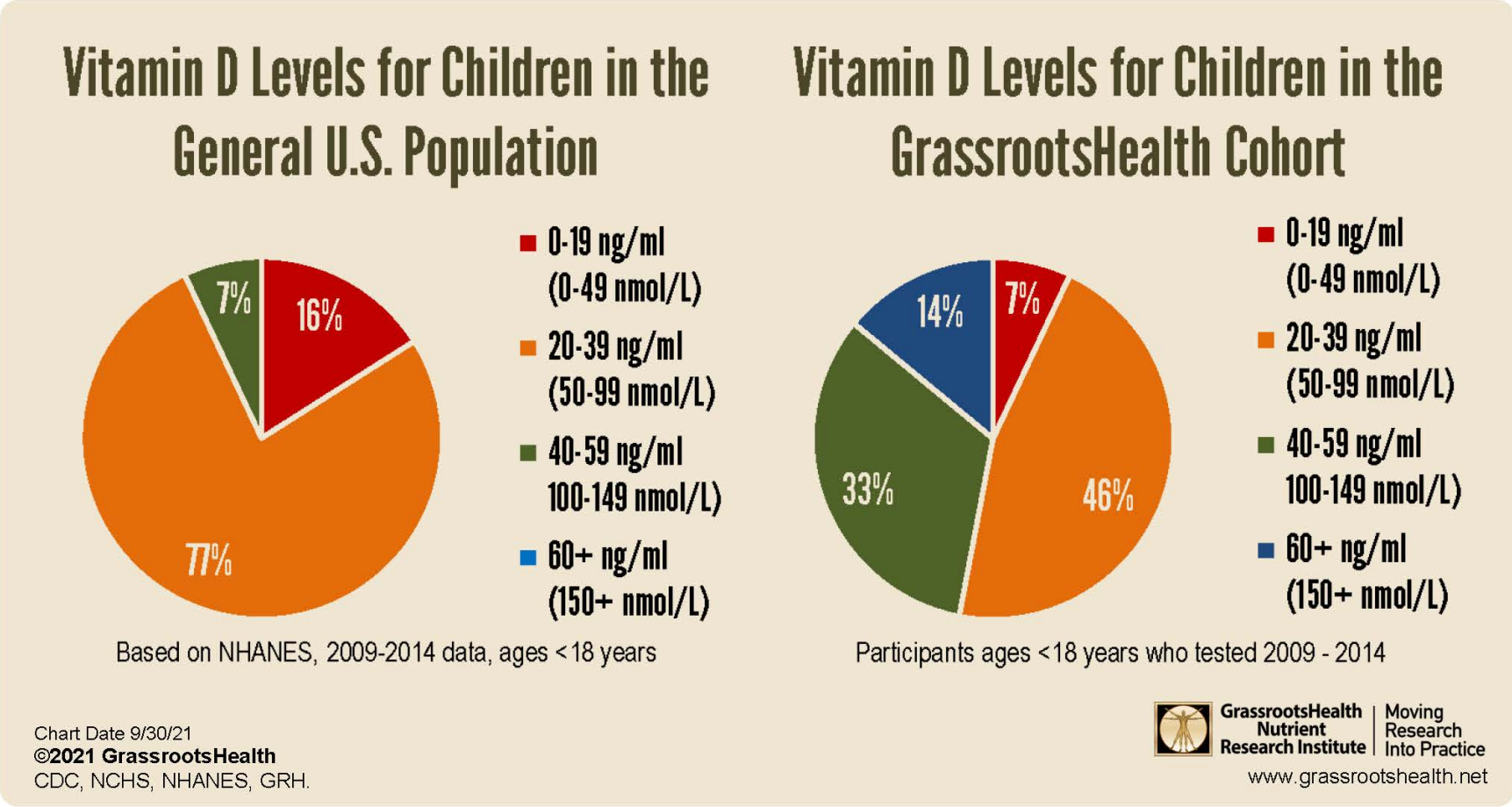




The North Dakota project enrolled 49 participants to measure vitamin D levels, with a focus on determining the extent to which certain factors affected the risk of vitamin D deficiency.

<u>Only 1 participant was in the recommended 40-60 ng/ml range for vitamin D.</u>

Over 90% of Children in the United States have Vitamin D Levels Below the Recommended 40 ng/ml (100 nmol/L)



- 93% of children in the general US population have vitamin D levels below 40 ng/ml, 16% of whom are below 20 ng/ml
- Vitamin D levels tend to drop among children and teens as they age, likely due to the need for increased intake as they grow bigger. A general requirement for vitamin D intake from all sources is around 35 IU/pound (75 IU/kg) per day, on average.
- Not testing children's levels as they age and grow can easily lead to vitamin D levels below what is recommended

While children tested in the GrassrootsHealth cohort had much better levels of vitamin D than the general population, more than 50% were still below 40 ng/ml

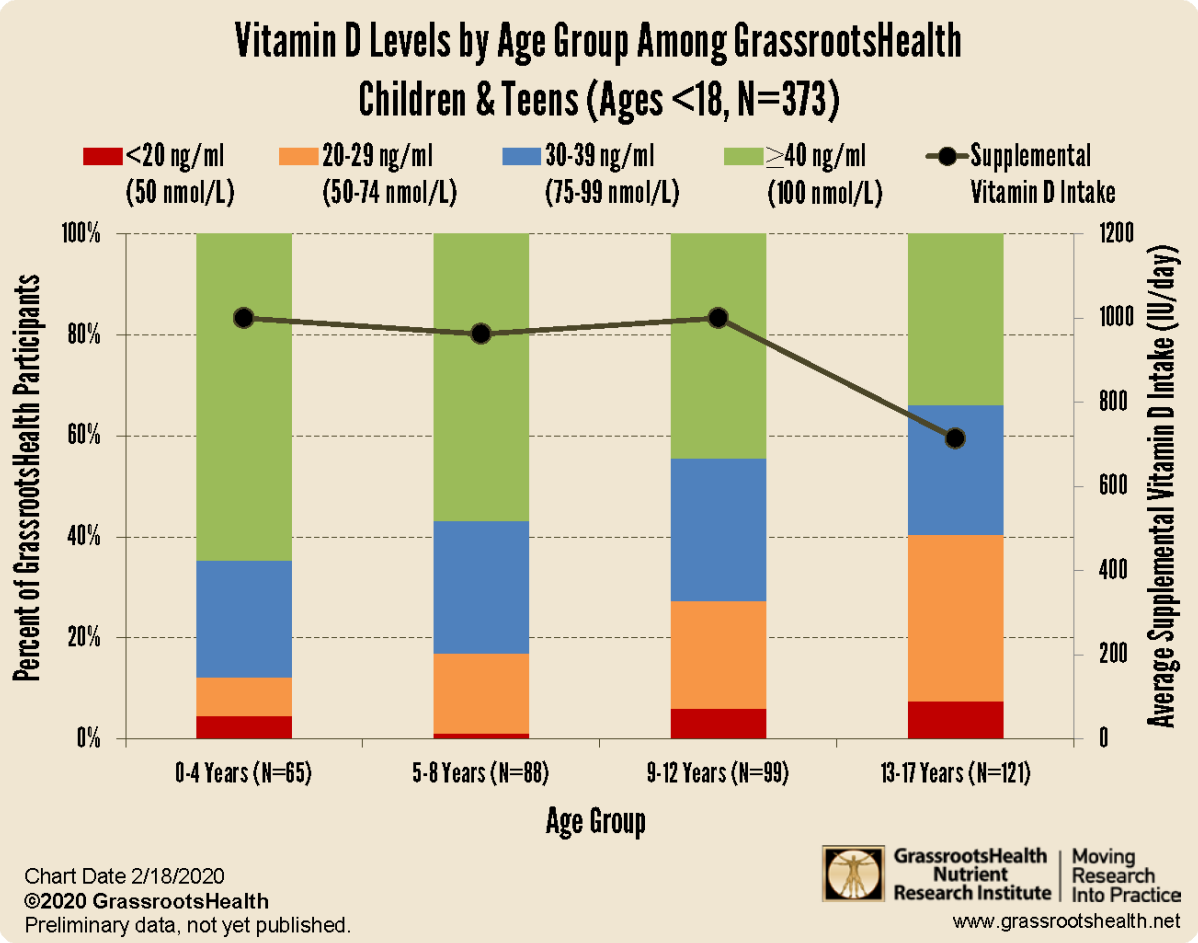
As Children Grow – So Does Their Requirement for Vitamin D!

In a past analysis of vitamin D intake and levels among children in the GrassrootsHealth cohort, we discovered that **as the age of the children increased, the percent of children with levels at or above 40 ng/ml decreased, from about two-thirds for those 0-4 years to about one-third for those 13-17 years**. We also found that, while vitamin D intake should increase as body weight increases, **intake remained the same or decreased as age increased**, which is likely the main cause of the decreasing vitamin D levels with age.

How Can Children Get the Amount of Vitamin D They Need?

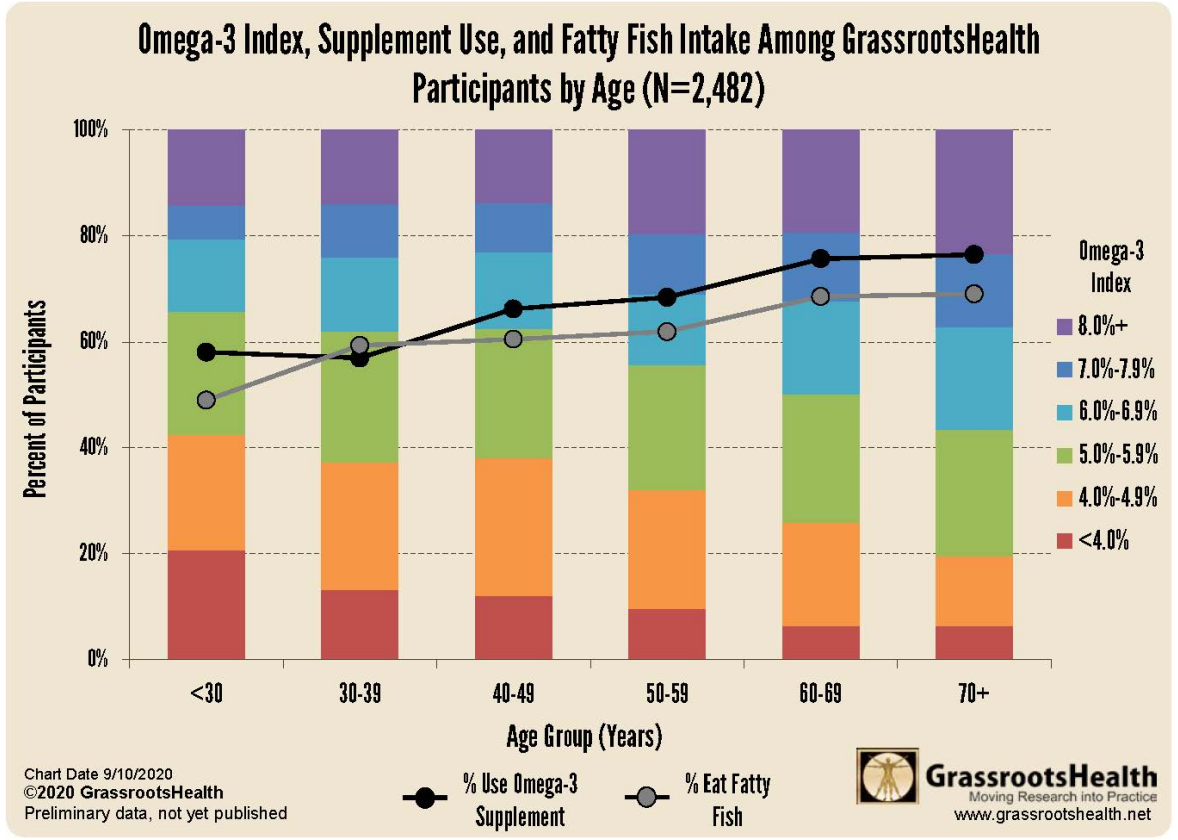
Testing is the first step – based on their current blood level an appropriate dose of vitamin D can then be determined. Re-testing is necessary to ensure the target blood level has been reached.

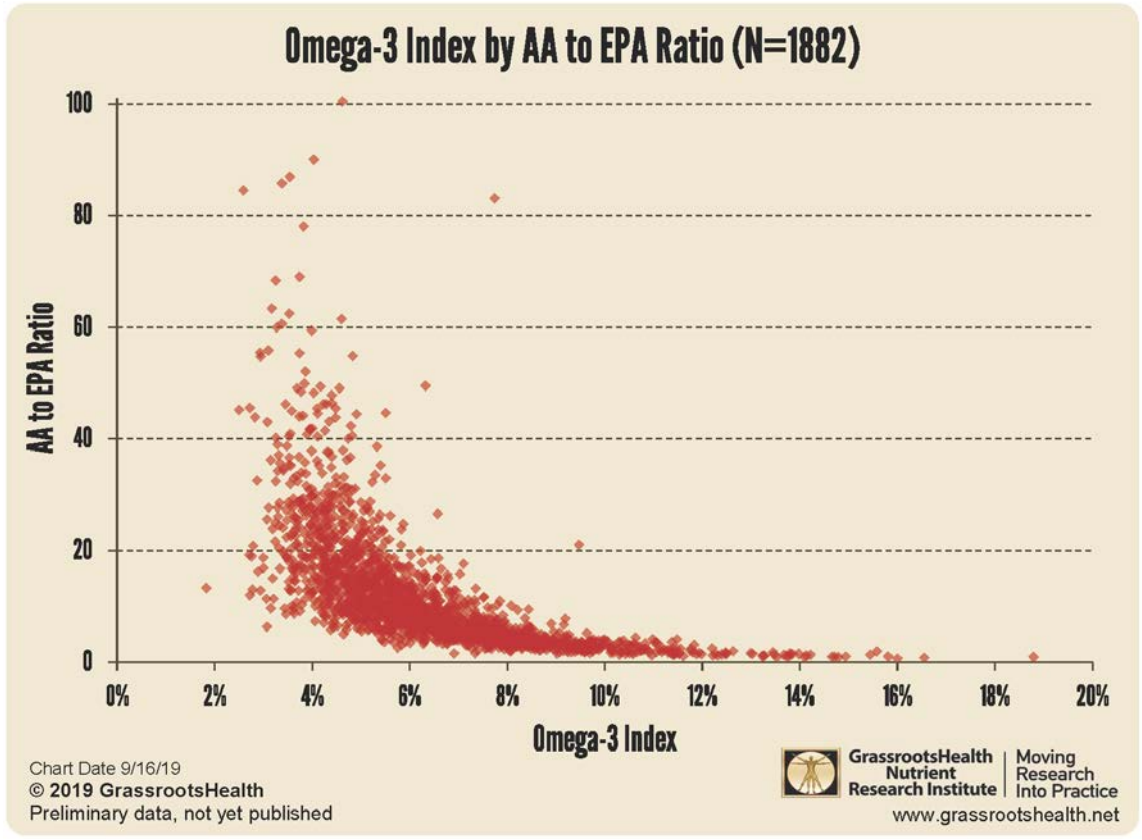
Risk of Vitamin D Deficiency Increases with Age as Requirements Change



- Among all GrassrootsHealth participants younger than 18 years old, 5% had vitamin D levels less than 20 ng/ml, 21% had levels between 20-29 ng/ml, 26% had levels between 30-39 ng/ml, and 47% had levels at or above 40 ng/ml
- The chart shows the breakdown of levels by age group; as age increased, the percent of participants with levels at or above 40 ng/ml decreased, from about two-thirds for those 0-4 years to about one-third for those 13-17 years
- While vitamin D intake should increase as body weight increases, the black line on the chart shows that intake remained the same or decreased as age increased which is likely the main cause of the decreasing vitamin D levels with age

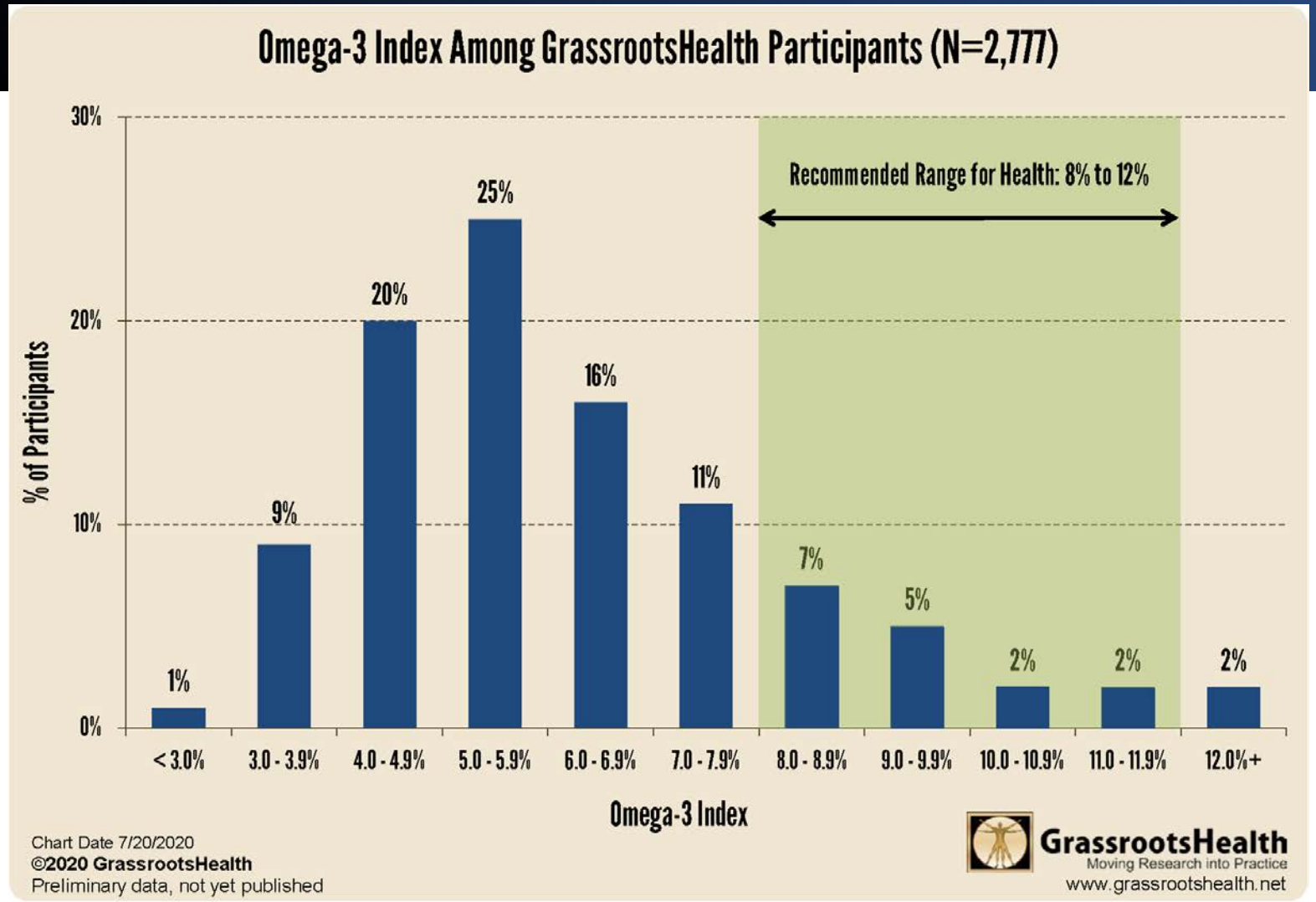
Measuring Omega-3s and 6s with the Omega-3 Index and AA:EPA Ratio

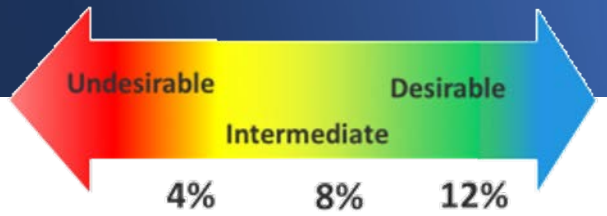




- The percent of participants with an Omega-3 Index of 8% or higher, which evidence shows is optimal for health, increased with age, from 14% for those less than 30 years old to 23% for those aged 70 years and older
- The percent of participants using an omega-3 supplement and eating at least one serving per week of fatty fish also increased by age
- **Among those with an Omega-3 Index of 8% or higher**, nearly all (99.7%) had an AA:EPA ratio lower than 11 and about half (49%) had a ratio of 3 or lower

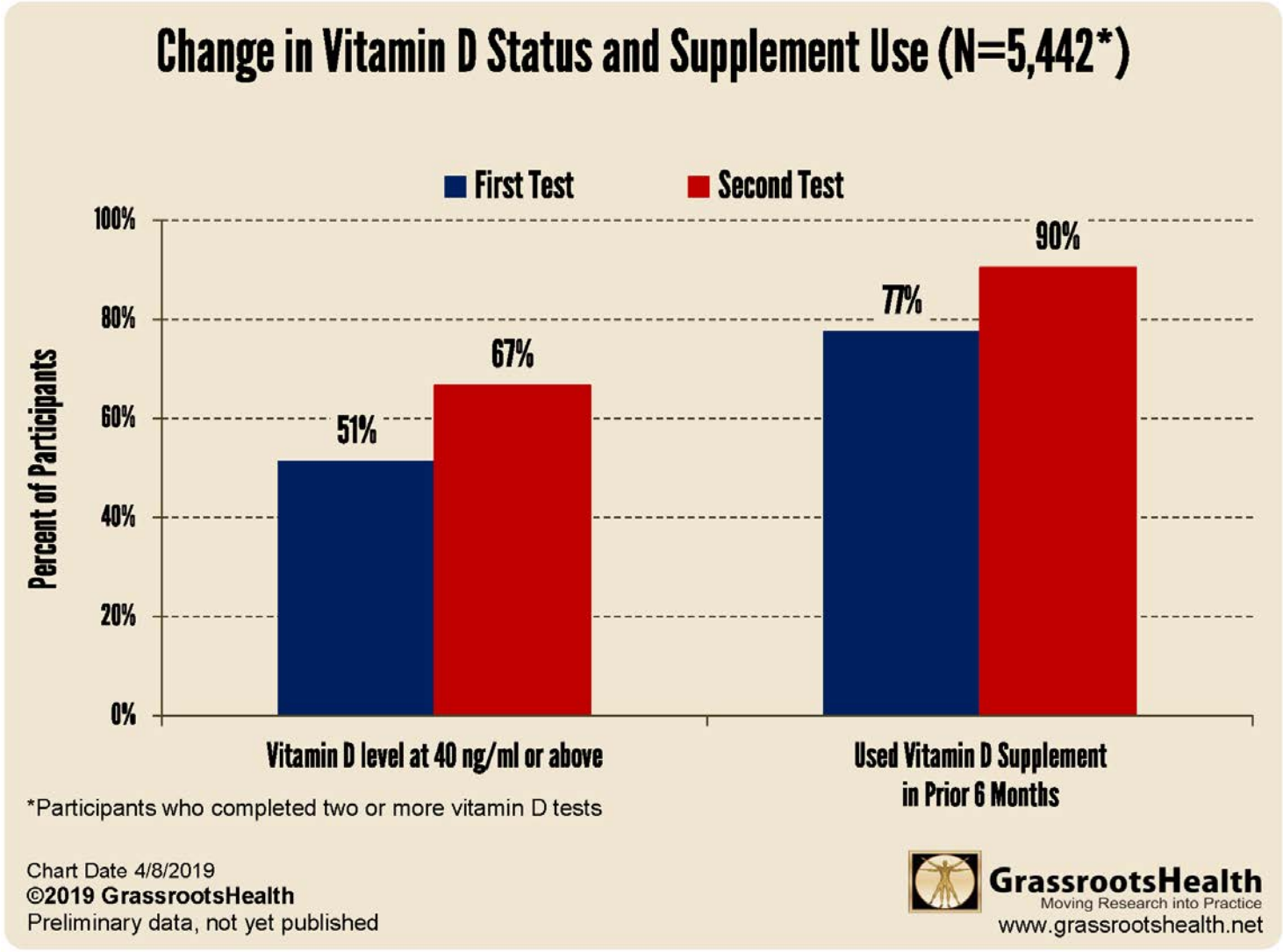
Testing Provides Motivation to Take ACTION





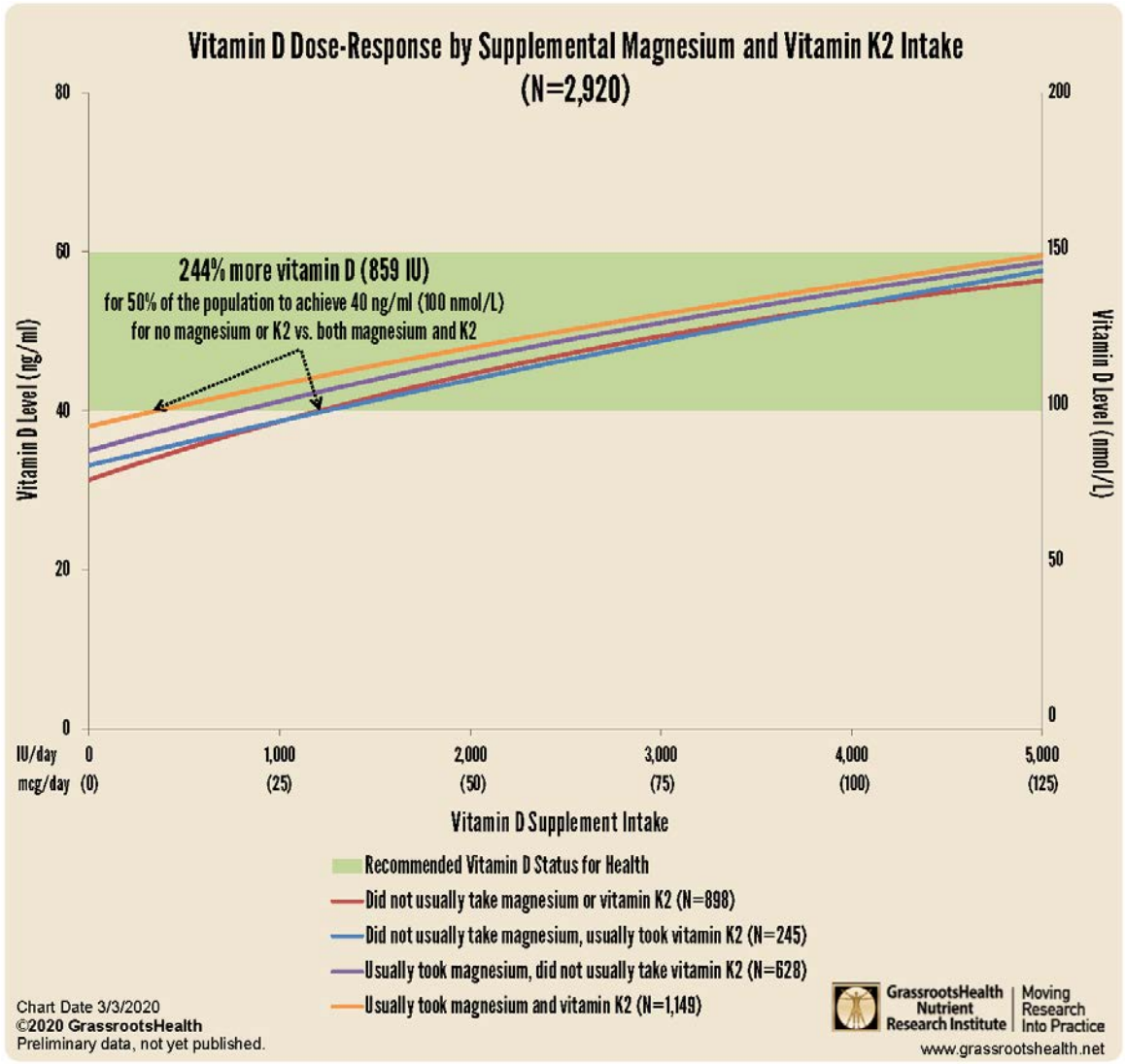
- Among 2,777 participants who had tested their Omega-3 Index between mid-2017 and mid-2020, the average index was 5.7%
- 71% of those with an Omega-3 Index less than 8% increased their index after their first test; this indicates that when individuals are provided with information about their health, they are empowered to make changes and to take charge of their own health

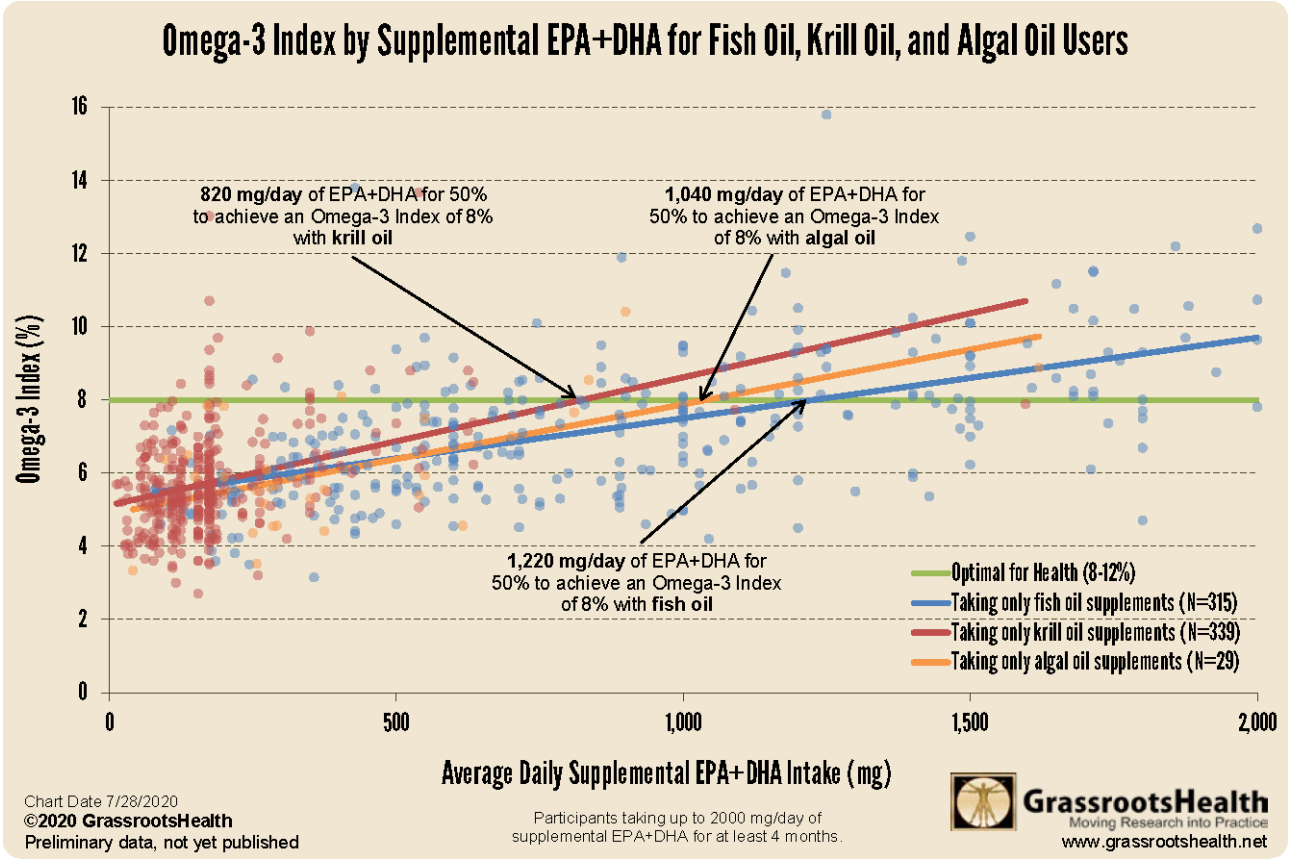
Testing and Retesting are Necessary to Determine Correct Supplement Dose



- Among 5,442 GrassrootsHealth participants who completed at least two vitamin D tests, approximately half (51%) achieved 40 ng/ml on their first test compared to two-thirds (67%) on their second test – leaving 1/3 of those who re-tested still below 40 ng/ml
- The median vitamin D supplement intake amount increased from 2000 IU/day on the first test to 4000 IU/day on the second test
- Among those who were less than 40 ng/ml on their first test, a majority increased their supplemental intake amount (76%) and their vitamin D level (81%) between their first and second tests

Dose Response Varies by Supplement Type & Co-Nutrients

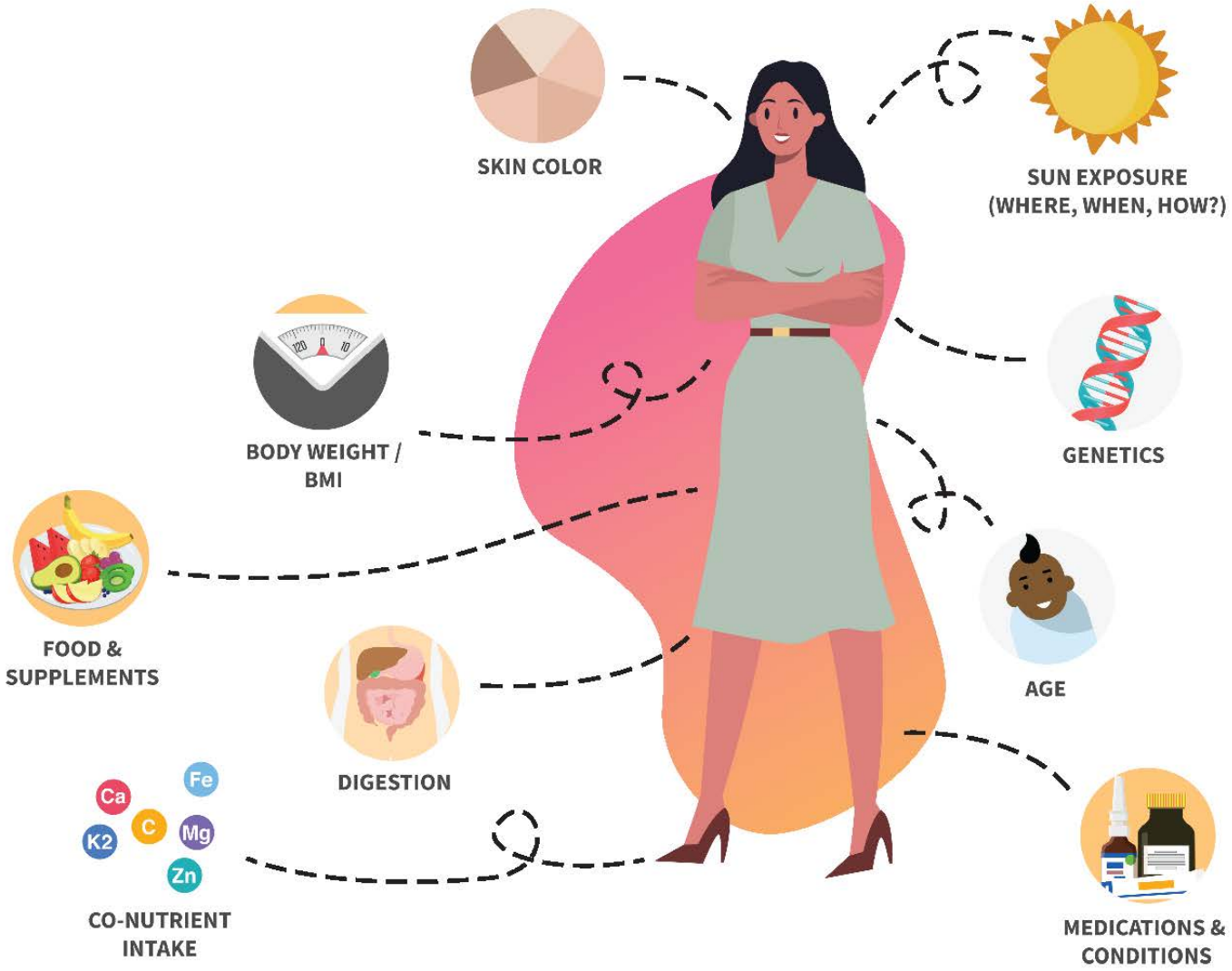




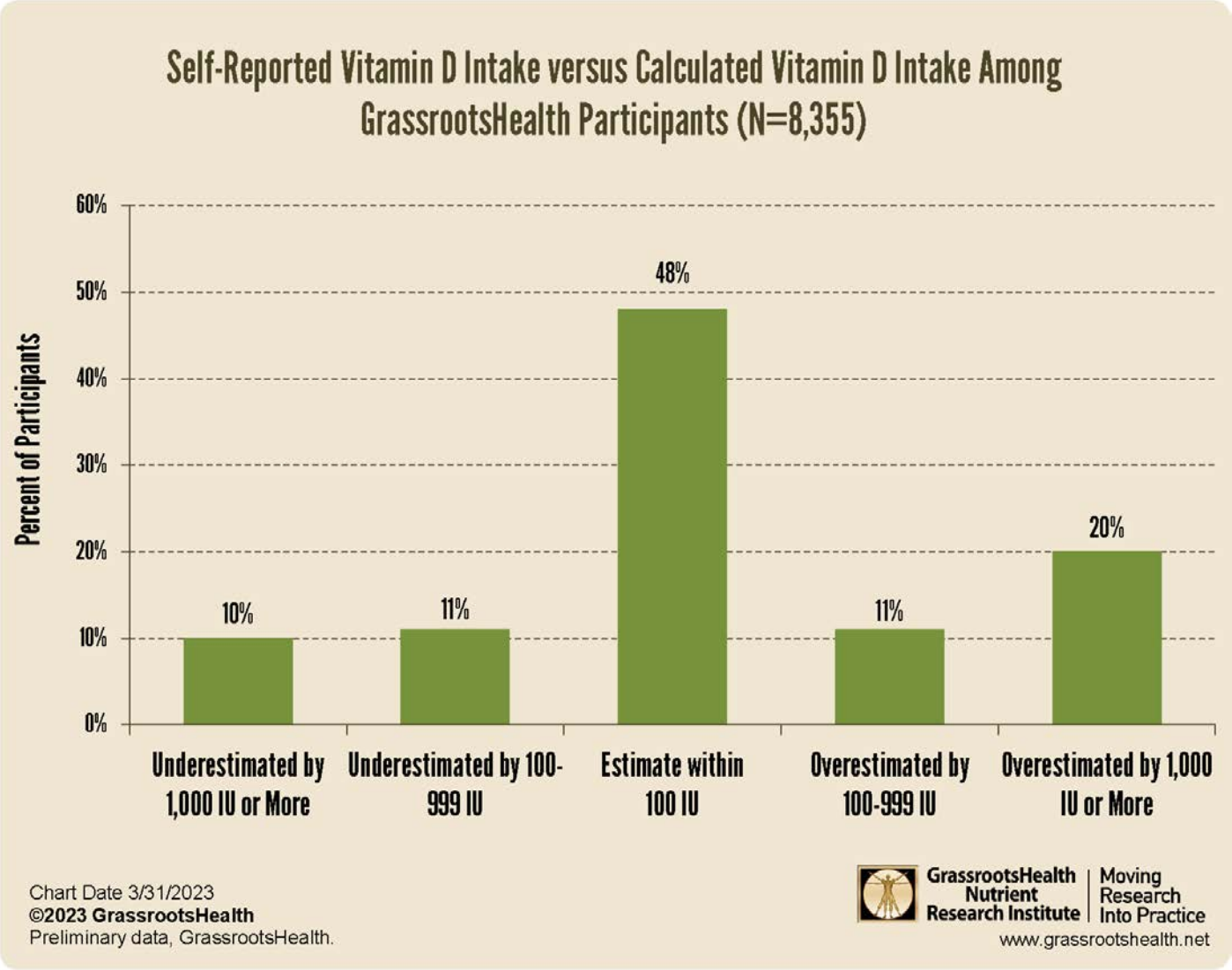
Dose-response analyses provide important information about how supplement type, co-nutrients, and individual factors can influence response to supplementation.

Everyone Responds Differently to Vitamin D Inputs

For the same dose taken, individual vitamin D level response can vary by a factor of six or more. In other words, what might be enough vitamin D for one person may not be enough for another. On top of all that, children are constantly growing, and as they grow, so does the amount of vitamin D their body needs.

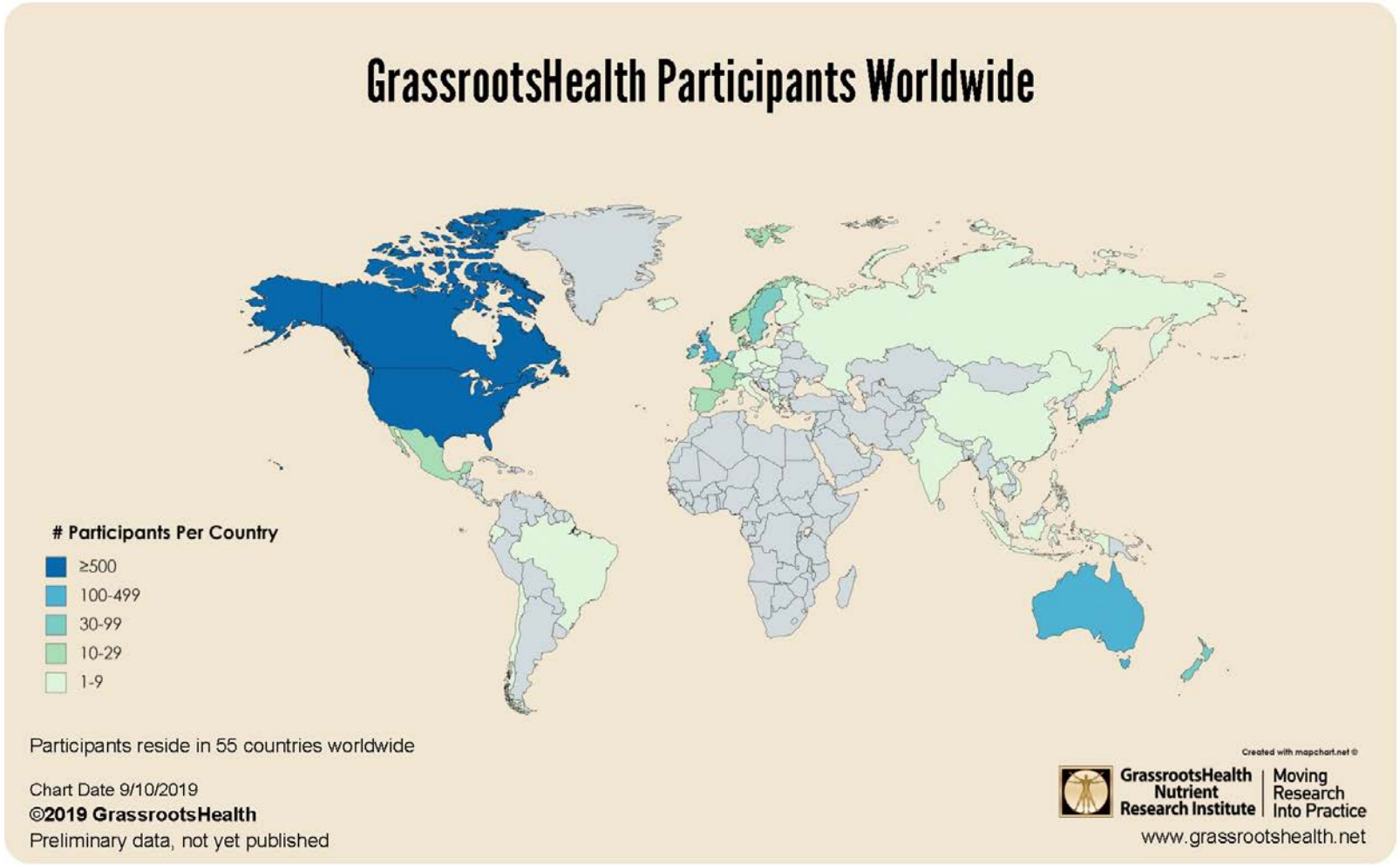


Another Reason Testing is Necessary



- A total of 8,355 records were included in a preliminary analysis to compare the self-reported vitamin D intake to the calculated supplemental intake amounts
- According to our data, participants who underestimated their daily intake typically forgot to include the vitamin D from their multivitamin or other non-vitamin D specific supplements that contained vitamin D
- Those who overestimated typically put the amount that is on their supplement bottle but did not adjust for the fact that they didn't take it every day or that they took fewer pills than a full "dose"

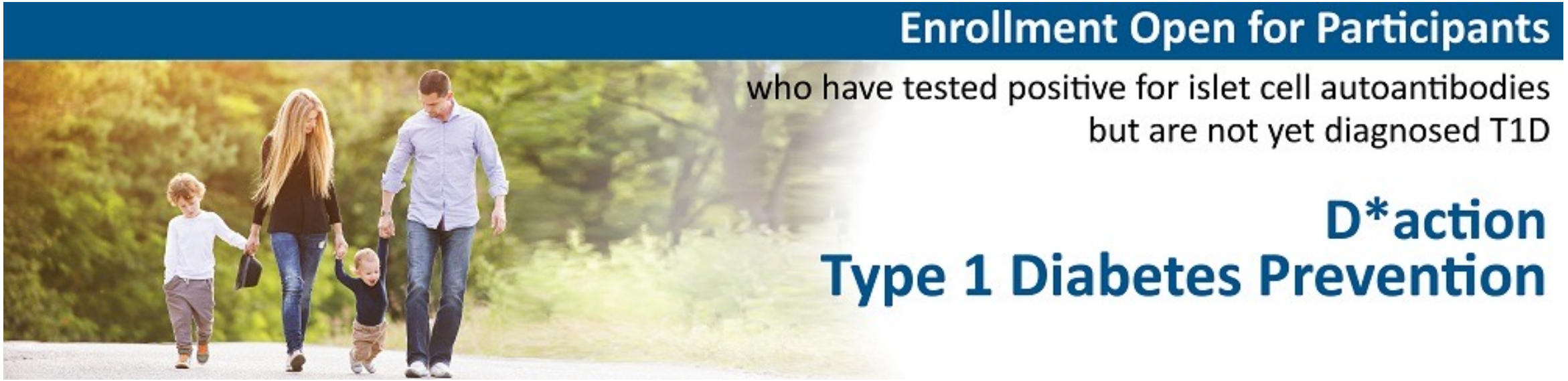
Participants of the International D*action Study



As of 2019

- Participants resided in 55 countries worldwide
- A vast majority of participants reside in the United States (84%), 8% in Canada, 4% in the United Kingdom, and 1% in Australia

D*action Sub-study: Type 1 Diabetes Prevention Project



What's needed to solve the vitamin D deficiency and type 1 diabetes (T1D) epidemics?

- Measure the 25-hydroxyvitamin D serum levels, Omega-3 Index, AA:EPA ratios, hs-CRP, HbA1c, and T1D autoantibodies levels every 3-6 months along with an online health survey
- Provide education about supplementation, diet, UVB exposure, and other lifestyle changes to get vitamin D levels to at least 40-60 ng/ml (100-150 nmol/L), improve omega-3 status with an AA:EPA ratio of <3, and maintain an HbA1c level of 5.5% or below

Type 1 Diabetes Prevention – A D*action Sub-Study

CellR4 2019; 7: e2737

Vitamin D and Omega 3 Field Study on Progression of Type 1 Diabetes

C. Ricordi[1], M. Clare-Salzler[2], M. Infante[1], C. Baggerly[3], J. Aliano[3], S. McDonnell[3], S. Chritton[4]

[1]Diabetes Research Institute, University of Miami Miller School of Medicine, Miami, FL, USA
[2]Department of Pathology, Immunology and Laboratory Medicine, University of Florida College of Medicine, Gainesville, FL, USA
[3]GrassrootsHealth, Encinitas, CA, USA
[4]Children With Diabetes Research Foundation, Superior, CO, USA

GrassrootsHealth Nutrient Research Institute | Moving Research Into Practice

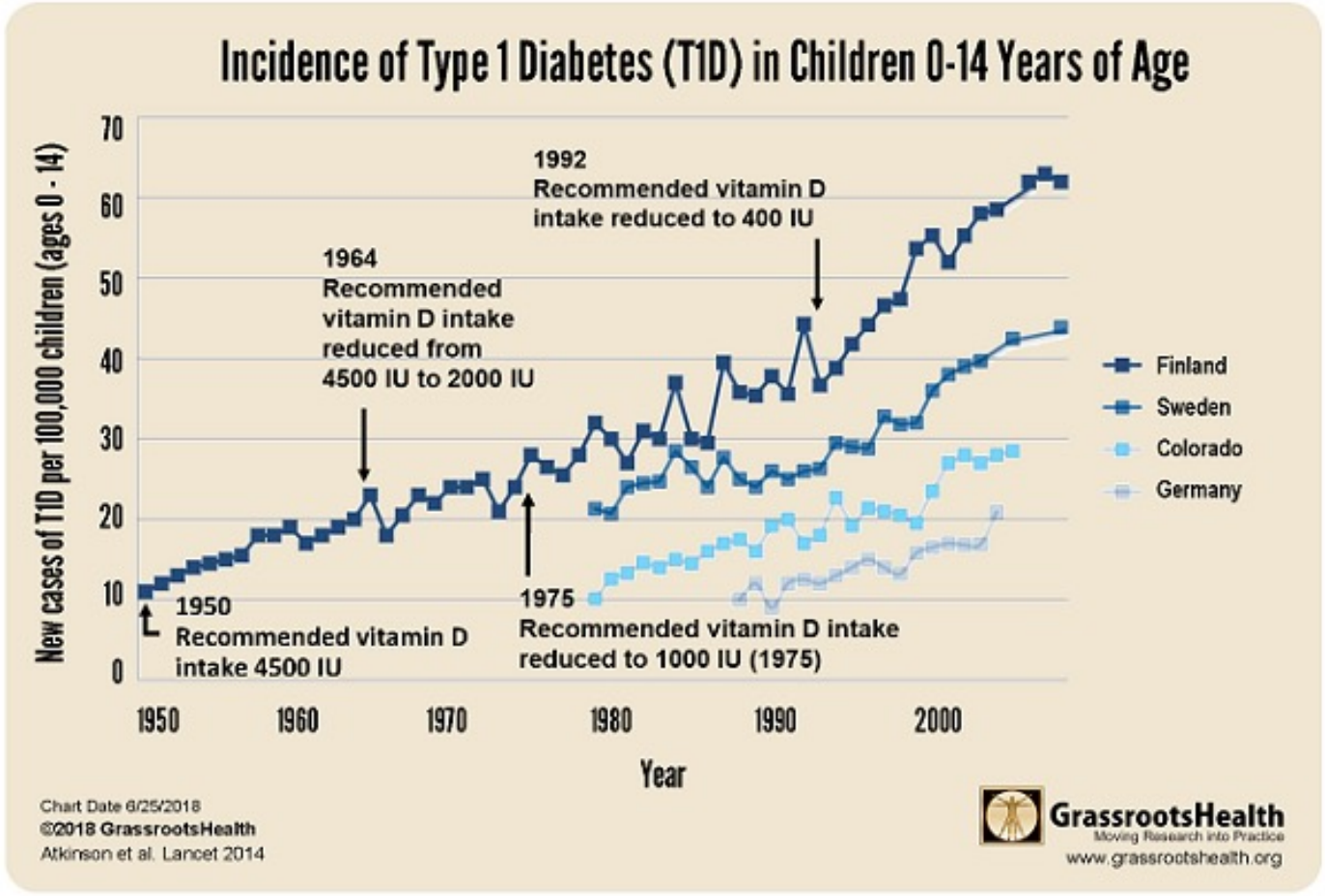
CWD Research Foundation

- The Type 1 Diabetes Prevention Project began enrolling participants in the summer of 2018, offering testing and education to individuals who tested positive for any of the T1D autoantibodies and who were not yet diagnosed as stage 4 T1D

- **Objective:** to learn if achieving optimal levels of omega-3 fatty acids and vitamin D3 can help delay or prevent the onset of type 1 diabetes. We hypothesize that reaching and maintaining an optimal AA:EPA Ratio and vitamin D level [measured as 25(OH)D] may assist in slowing or reversing the progression towards T1D, even for those who test positive for one or more T1D autoantibody (aab).

- This study is approved by the WCB IRB, IRB Protocol Number: 20111002, and is ready for transfer to Qatar Foundation for its parallel application in Doha

Incidence of Type 1 Diabetes Rises 3-5% Each Year



An illustration of the increase in incidence of T1D over the last several decades, as the recommended intake of vitamin D decreased

Mohr SB, Garland FC, Garland CF, Gorham ED, Ricordi C; Am J Prev Med. 2010; Atkinson MA, Eisenbarth GS, Michels AW; Lancet 2014.

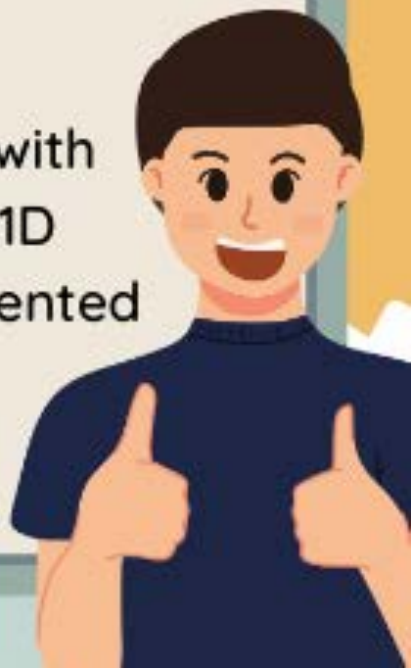
A protocol involving vitamin D and omega-3s is now being implemented to help decrease the progression of T1D among those at risk...

Success Story

Ben was told he was 'doomed' for T1D diagnosis at age 11;
he has remained T1D free for over 23 years!

His T1D prevention protocol, "Ben's Cocktail," has been shared with many others around the world who have tested positive for T1D autoantibodies, with similar stories from those who have implemented it with their children & for themselves.

We invite you to participate!



Research Shows

Vitamin D & Type 1 Diabetes

Lower vitamin D levels were associated with higher HbA1c and fasting blood glucose, higher risk of T1D diagnosis, higher insulin need & increased risk of diabetic ketoacidosis (DKA) among children with T1D (Alqudsi, 2020; Savastio, 2022)

A 44% lower risk of T1D was found among non-Hispanic whites with vitamin D levels of 40 ng/ml or higher vs below 30 ng/ml (Munger, 2013)

A lower risk of developing T1D has been associated with vitamin D supplementation in infancy and early childhood (Infante, 2019)

"Among nutritional deficiencies, that of vitamin D is one under the research magnifying glass as a trigger in TID development" (Savastio, 2022)

Research Shows

Omega-3s & Type 1 Diabetes

Lower AA:EPA ratios (Arachidonic Acid, an omega-6 fatty acid, to Eicosapentaenoic Acid, an omega-3 fatty acid) have been associated with **lower inflammation & lower insulin requirements** after diagnosis (Savastio, 2022)

Higher omega-3 intake and levels were associated with a significantly **reduced risk of islet autoimmunity** (Norris, 2007)

A study involving 11,247 cases of adult onset T1D concluded that higher fish intake and higher omega-3 status may **prevent or prolong T1D onset**, even among GAD65 antibody-positive individuals (Lofvenborg, 2022)

Case Report!

Case report of an 8 year old new onset T1D demonstrated effectiveness of vitamin D and omega-3 fatty acid testing and supplementation as a safe and cost-effective strategy to assist in halting the progression of T1D (Cadario, 2019)

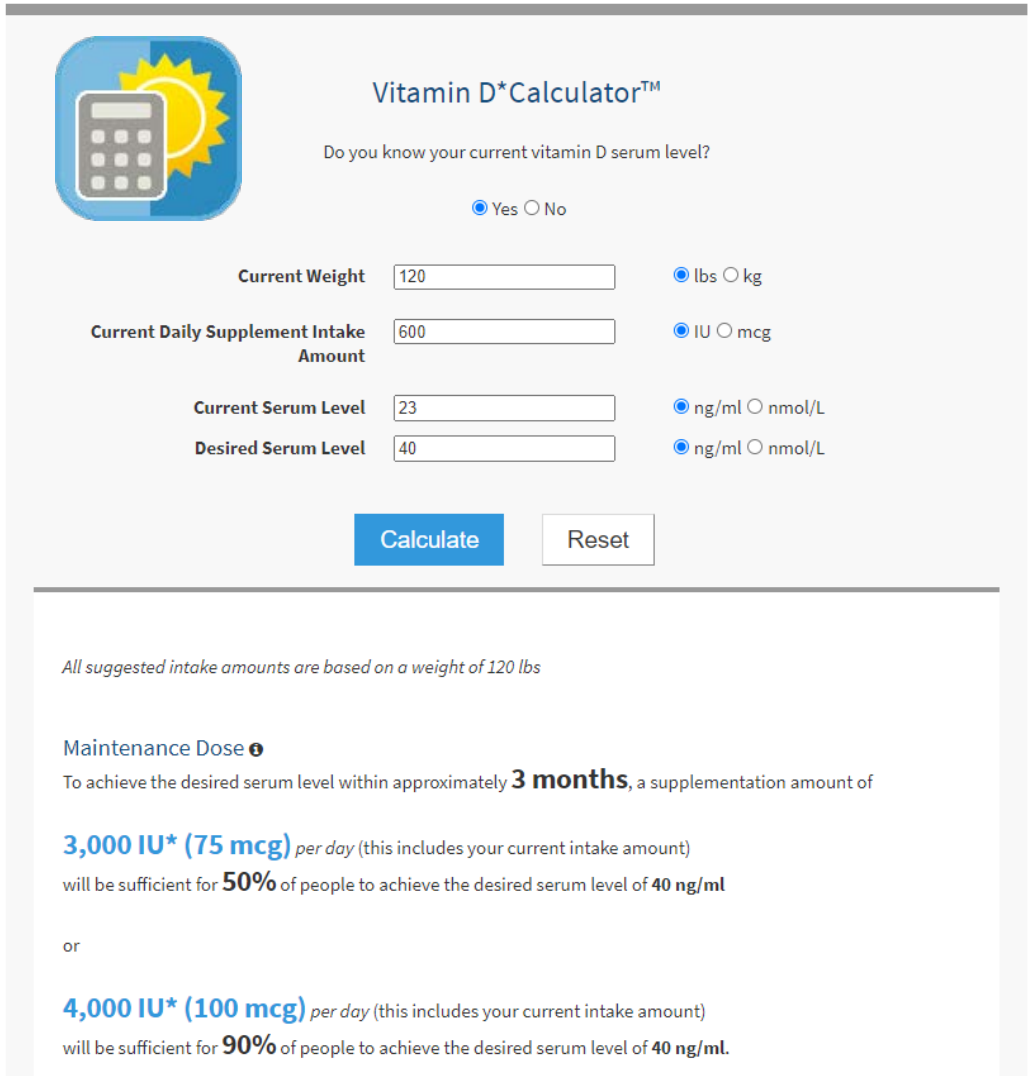
Become part of our T1D Prevention Study, *so that we can measure, track, and publish the findings to help make this an officially recognized protocol in the scientific journals – and more likely to be discovered, shared, and accepted.*

GrassrootsHealth
Nutrient
Research Institute

Moving
Research
Into Practice

TOOLS & RESOURCES

Educational Tools and Resources: Vitamin D & Omega-3 Dosing Calculators

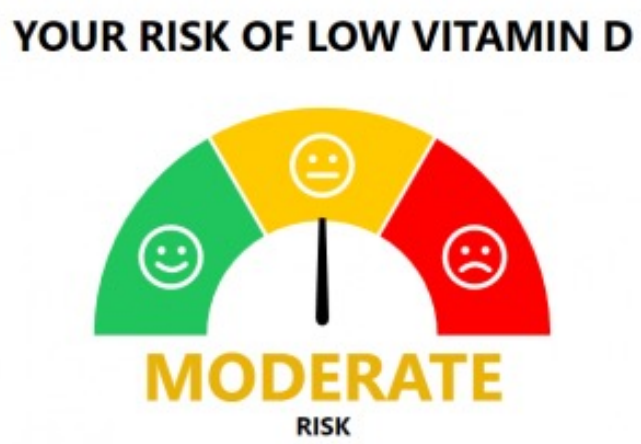


Vitamin D*Calculator

- Voted as an Absolute #1 Favorite Resource!
  - The original GrassrootsHealth Vitamin D*calculator was published in 2015 as a tool to help individuals calculate the estimated additional Vitamin D intake (beyond their current intake from food, sun and supplements) needed to reach a target vitamin D level
- The updated Vitamin D*calculator calculates a customized Loading Dose to help an individual reach their chosen target vitamin D level more rapidly (based on body weight and starting vitamin D level)

> "Definitely essential!"
> "So easy and helpful and I've shared it with many people!!!!"

Educational Tools and Resources: Vitamin D Deficiency Risk Assessment Quiz



- Built to help educate individuals about their unique risk factors for vitamin D deficiency
- Short set of questions about an individual's supplemental vitamin D intake, UVB exposure, and low exposure indicators to assess risk level
- Scoring is intended to determine if an individual has a low, moderate, or high risk of having a vitamin D level below 40 ng/ml (100 nmol/L)
- This tool can help motivate individuals to take their supplements or take other steps to reach and maintain healthy vitamin D levels!
- Western IRB Approved, in Beta

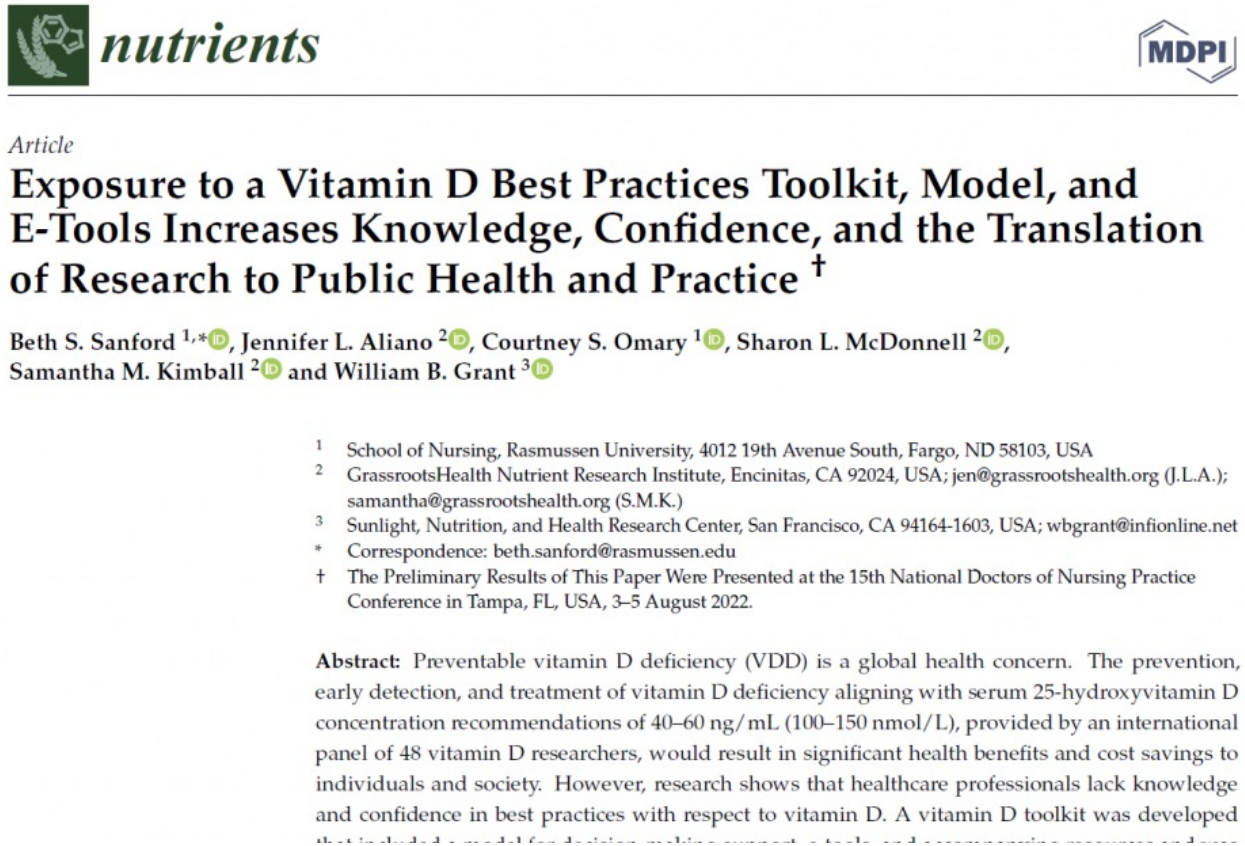
Educational Tools and Resources: Download, Share & Print

Voted as a #1 ABSOLUTE FAVORITE: The *Disease Incidence Prevention Chart* (General): Summarizes 15 peer-reviewed, published papers on vitamin D and certain conditions, with percentage reductions based on vitamin D levels

Other favorites include the

- *Scientists' Call to D*action*
- Interactive PDF: *How Vitamin D Deficiency Affects Every Part of the Body*
- *KNOW "D" NUMBER Patient and Provider Guide to Understanding Vitamin D, Testing & Results* Booklet
- *Everyone Responds Differently to Vitamin D* Infographic
- *How Much Vitamin D Do You Need?* Infographic
- *Cancer Prevention with Vitamin D* Brochure
- *Vitamin D & COVID-19, A Summary of Published Research* eBook

Educational Tools and Resources: Practitioner ToolKit & Best Practices Model



nutrients

MDPI

Article

Exposure to a Vitamin D Best Practices Toolkit, Model, and E-Tools Increases Knowledge, Confidence, and the Translation of Research to Public Health and Practice †

Beth S. Sanford [1,*], Jennifer L. Aliano [2], Courtney S. Omary [1], Sharon L. McDonnell [2], Samantha M. Kimball [2] and William B. Grant [3]

1 School of Nursing, Rasmussen University, 4012 19th Avenue South, Fargo, ND 58103, USA
2 GrassrootsHealth Nutrient Research Institute, Encinitas, CA 92024, USA; jen@grassrootshealth.org (J.L.A.); samantha@grassrootshealth.org (S.M.K.)
3 Sunlight, Nutrition, and Health Research Center, San Francisco, CA 94164-1603, USA; wbgrant@infionline.net
* Correspondence: beth.sanford@rasmussen.edu
† The Preliminary Results of This Paper Were Presented at the 15th National Doctors of Nursing Practice Conference in Tampa, FL, USA, 3–5 August 2022.

Abstract: Preventable vitamin D deficiency (VDD) is a global health concern. The prevention, early detection, and treatment of vitamin D deficiency aligning with serum 25-hydroxyvitamin D concentration recommendations of 40–60 ng/mL (100–150 nmol/L), provided by an international panel of 48 vitamin D researchers, would result in significant health benefits and cost savings to individuals and society. However, research shows that healthcare professionals lack knowledge and confidence in best practices with respect to vitamin D. A vitamin D toolkit was developed

- GrassrootsHealth, with Dr. Beth Sanford and Dr. William Grant, published a paper on utilizing our best practices model and toolkit for improving vitamin D knowledge and confidence among individuals and health care providers
- This publication demonstrates the success of our online vitamin D education course (CEUs available for nurses and dietitians) and supporting ToolKit of resources in filling existing gaps that currently prevent the translation of vitamin D research into practice

Participated in Over 20 Research Publications
(Several using data from the Vitamin D*action Study)

60% lower preterm birth risk associated with maternal 25(OH)D concentrations ≥40 ng/mL

Maternal 25(OH)D concentrations ≥40 ng/mL associated with 60% lower preterm birth risk among general obstetrical patients at an urban...

65% Lower Cancer Risk with 25(OH)D Concentrations ≥40 ng/ml

The objective of this analysis was to investigate whether the previously reported inverse association between 25(OH)D and cancer risk...

Type 2 Diabetes 50% Lower

Incidence Rate of Type 2 Diabetes is >50% Lower in GrassrootsHealth Cohort with Median Serum 25–hydroxyvitamin D of 41...

Lower Risk of Preterm Birth with Higher Vitamin D

Post-Hoc Comparison of Vitamin D Status at Three Time Points During Pregnancy Demonstrates Lower Risk of Preterm Birth with...

Vitamin D and Kidney Stones

25-Hydroxyvitamin D in the Range of 20 to 100 ng/mL and Incidence of Kidney Stones Stacie Nguyen, MPH, Leo...

Association of Vitamin D Status with Insulin Resistance

A Novel Approach Localizes the Association of Vitamin D Status With Insulin Resistance to One Region of the 25-Hydroxyvitamin...

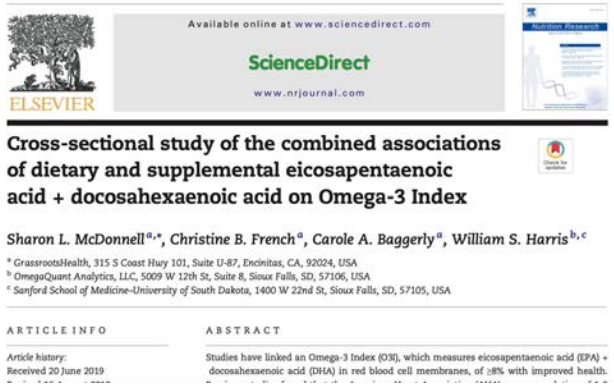
nutrients MDPI

Review

Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths

William B. Grant [1,*], Henry Lahore [2], Sharon L. McDonnell [3], Carole A. Baggerly [3], Christine B. French [3], Jennifer L. Aliano [3] and Harjit P. Bhattoa [4]

[1] Director, Sunlight, Nutrition, and Health Research Center, P.O. Box 641603, San Francisco, CA 94164-1603, USA
[2] 2289 Highland Loop, Port Townsend, WA 98368, USA; hlahore@vitamindwiki.com.
[3] GrassrootsHealth, Encinitas, CA 92024, USA; Sharon@grassrootshealth.org (S.L.M.); carole@grassrootshealth.org (C.A.B.); Christine@grassrootshealth.org (C.B.F.); jen@grassrootshealth.org (J.L.A.)
[4] Department of Laboratory Medicine, Faculty of Medicine, University of Debrecen, Nagyerdei Blvd 98, H-4032 Debrecen, Hungary; harjit@med.unideb.hu



Available online at www.sciencedirect.com

ScienceDirect

www.nrjournal.com

ELSEVIER

Cross-sectional study of the combined associations of dietary and supplemental eicosapentaenoic acid + docosahexaenoic acid on Omega-3 Index

Sharon L. McDonnell [a,], Christine B. French [a], Carole A. Baggerly [a], William S. Harris [b,c]*

[a] GrassrootsHealth, 315 S Coast Hwy 101, Suite U-87, Encinitas, CA, 92024, USA
[b] OmegaQuant Analytics, LLC, 5009 W 12th St, Suite 8, Sioux Falls, SD, 57106, USA
[c] Sanford School of Medicine–University of South Dakota, 1400 W 22nd St, Sioux Falls, SD, 57105, USA

ARTICLE INFO

Article history:
Received 20 June 2019

ABSTRACT

Studies have linked an Omega-3 Index (O3I), which measures eicosapentaenoic acid (EPA) + docosahexaenoic acid (DHA) in red blood cell membranes, of ≥8% with improved health.

French et al. Journal of Medical Case Reports (2019) 13:29
https://doi.org/10.1186/s13256-018-1948-9

Journal of Medical Case Reports

CASE REPORT Open Access

25-Hydroxyvitamin D variability within-person due to diurnal rhythm and illness: a case report

Christine B. French[1*], Sharon L. McDonnell[1] and Reinhold Vieth[2]

Abstract

Background: Vitamin D nutrition research requires accurate measures of circulating 25-hydroxyvitamin D. Our objectives were to test whether a diurnal fluctuation in blood-spot concentrations of 25-hydroxyvitamin D can be demonstrated statistically in a single individual, and whether such fluctuation is affected by the pre-dose versus post-dose timing of the blood draw.

Case presentation: The participant in this case study was a generally healthy Caucasian woman in her 40s who has taken 5000 IU vitamin D3 supplement at midday for over 1 year. Each blood sample was drawn individually

Check for updates

OPEN ACCESS

PLOS ONE

RESEARCH ARTICLE

Breast cancer risk markedly lower with serum 25-hydroxyvitamin D concentrations ≥60 vs <20 ng/ml (150 vs 50 nmol/L): Pooled analysis of two randomized trials and a prospective cohort

Sharon L. McDonnell[1]*, Carole A. Baggerly[1], Christine B. French[1], Leo L. Baggerly[1], Cedric F. Garland[2], Edward D. Gorham[2], Bruce W. Hollis[3], Donald L. Trump[4], Joan M. Lappe[5]

1 GrassrootsHealth, Encinitas, California, United States of America, 2 Department of Family Medicine and Public Health, University of California San Diego, La Jolla, California, United States of America, 3 Medical University of South Carolina, Charleston, South Carolina, United States of America, 4 Inova Schar Cancer Institute, Falls Church, Virginia, United States of America, 5 Department of Medicine, Creighton University, Omaha, Nebraska, United States of America

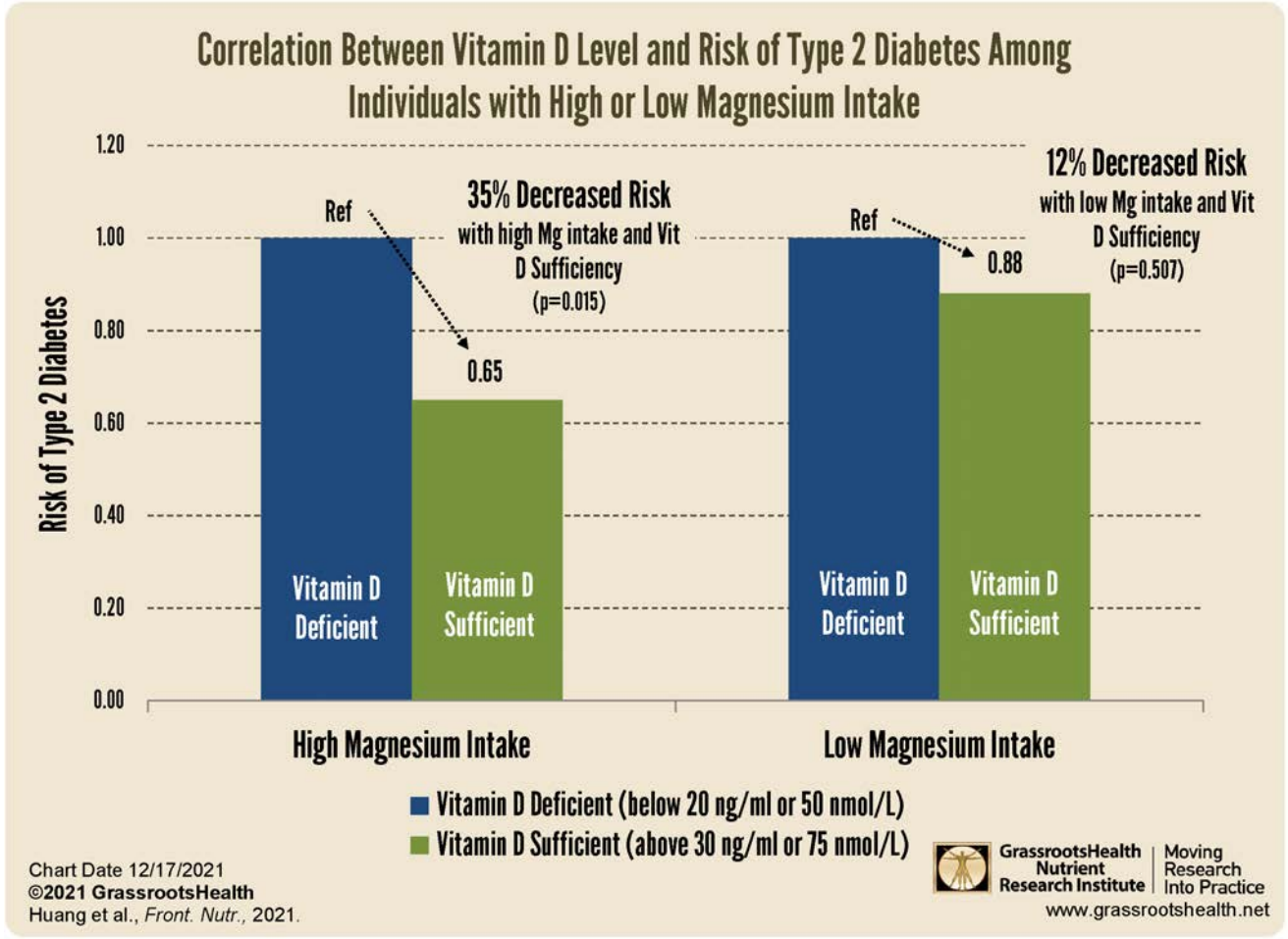
* sharon@grassrootshealth.org

GrassrootsHealth
Nutrient
Research Institute

Moving
Research
Into Practice

EVIDENCE-BASED EDUCATION

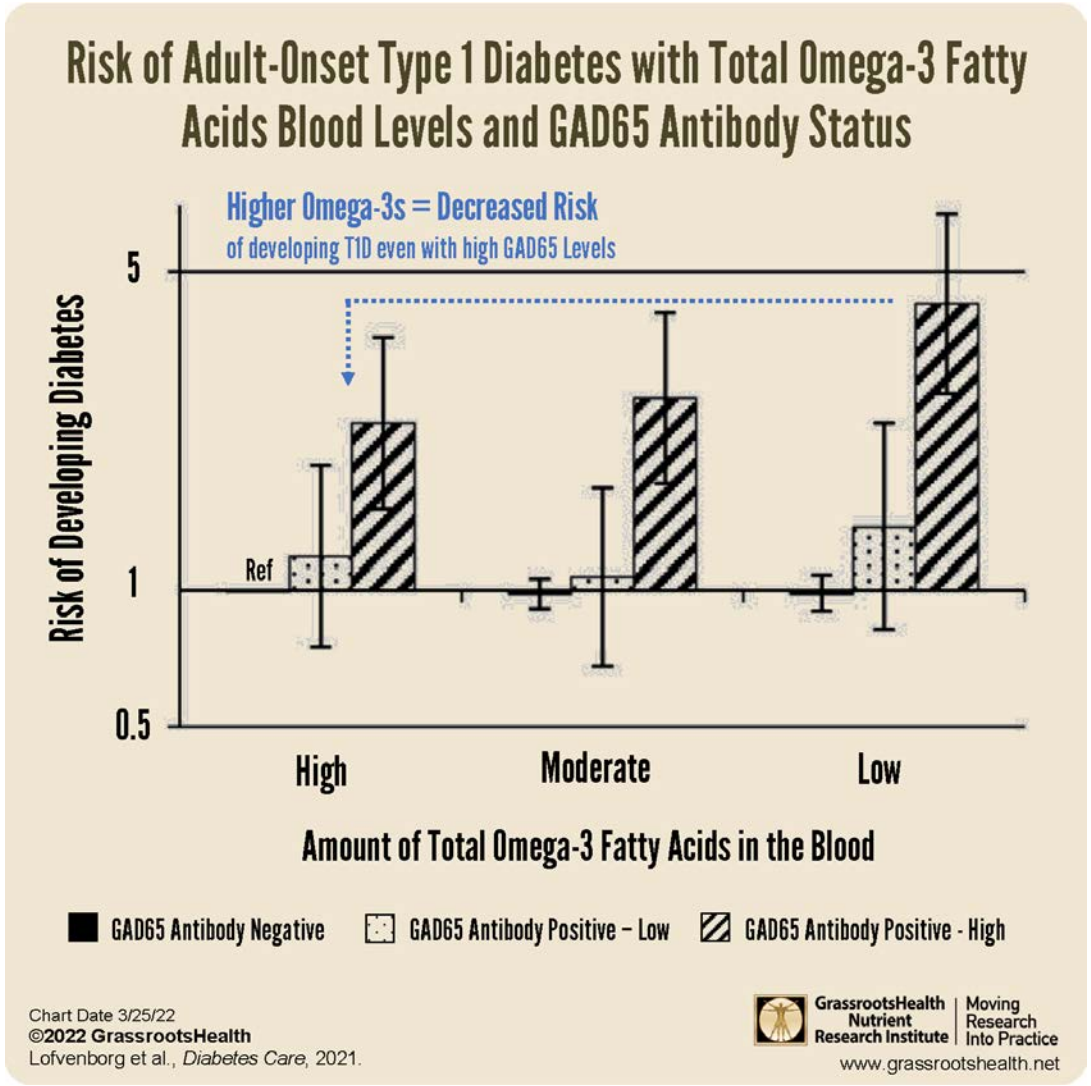
Evidence-Based Education: Nutrient Research Reviews & Visuals



Huang et al. (2021)

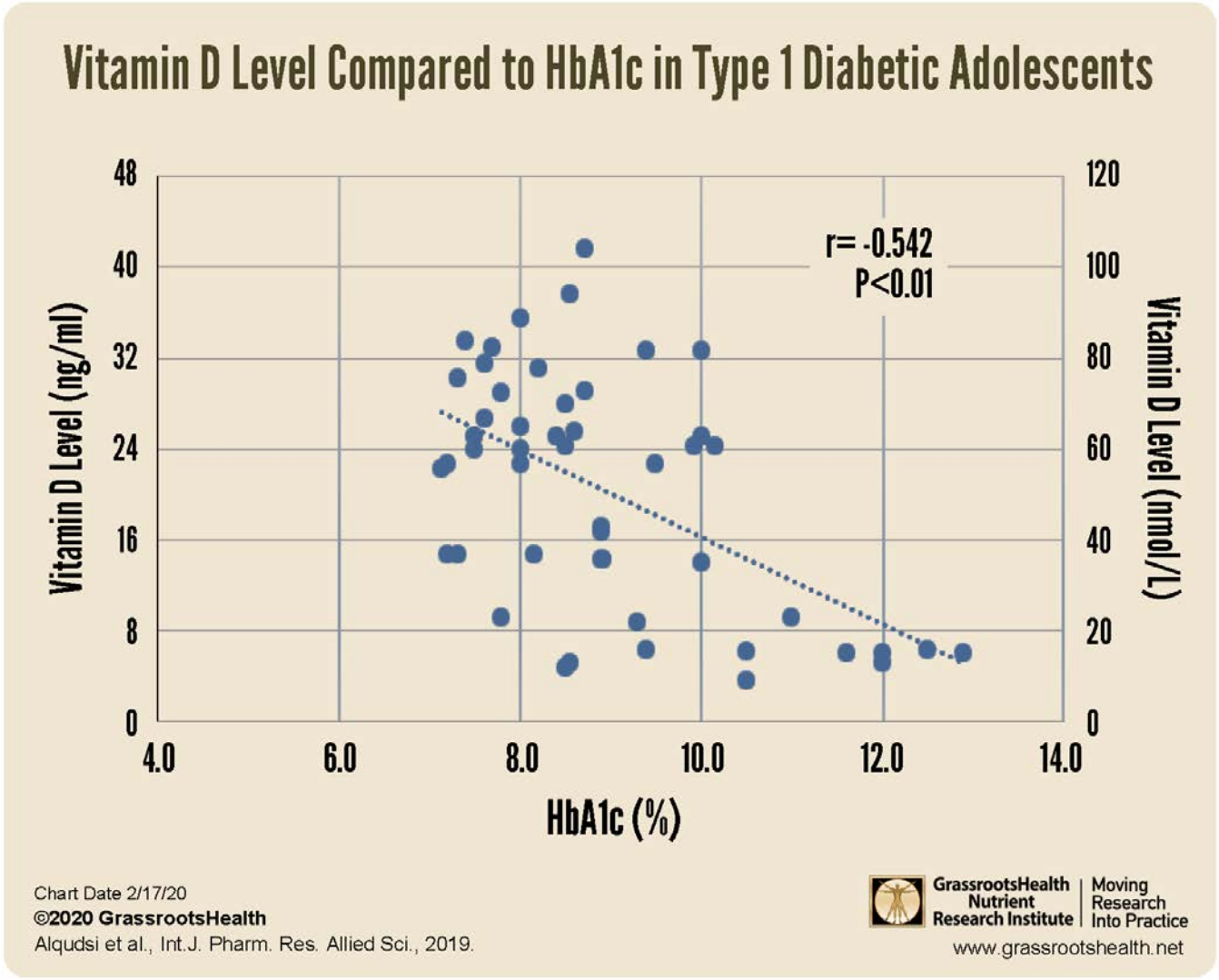
- Found that magnesium intake affected the association between vitamin D level and the incidence of type 2 diabetes
- Those getting more magnesium had a 35% significantly decreased risk of type 2 diabetes among those with vitamin D sufficiency vs those with vitamin D deficiency; those getting less magnesium only had a 12% decreased risk among those with vitamin D sufficiency, and the finding was not significant
- **Conclusion:** higher vitamin D levels were associated with a decreased incidence of type 2 diabetes, and the significance of the effect was greater among those who got more magnesium

Evidence-Based Education: Nutrient Research Reviews & Visuals



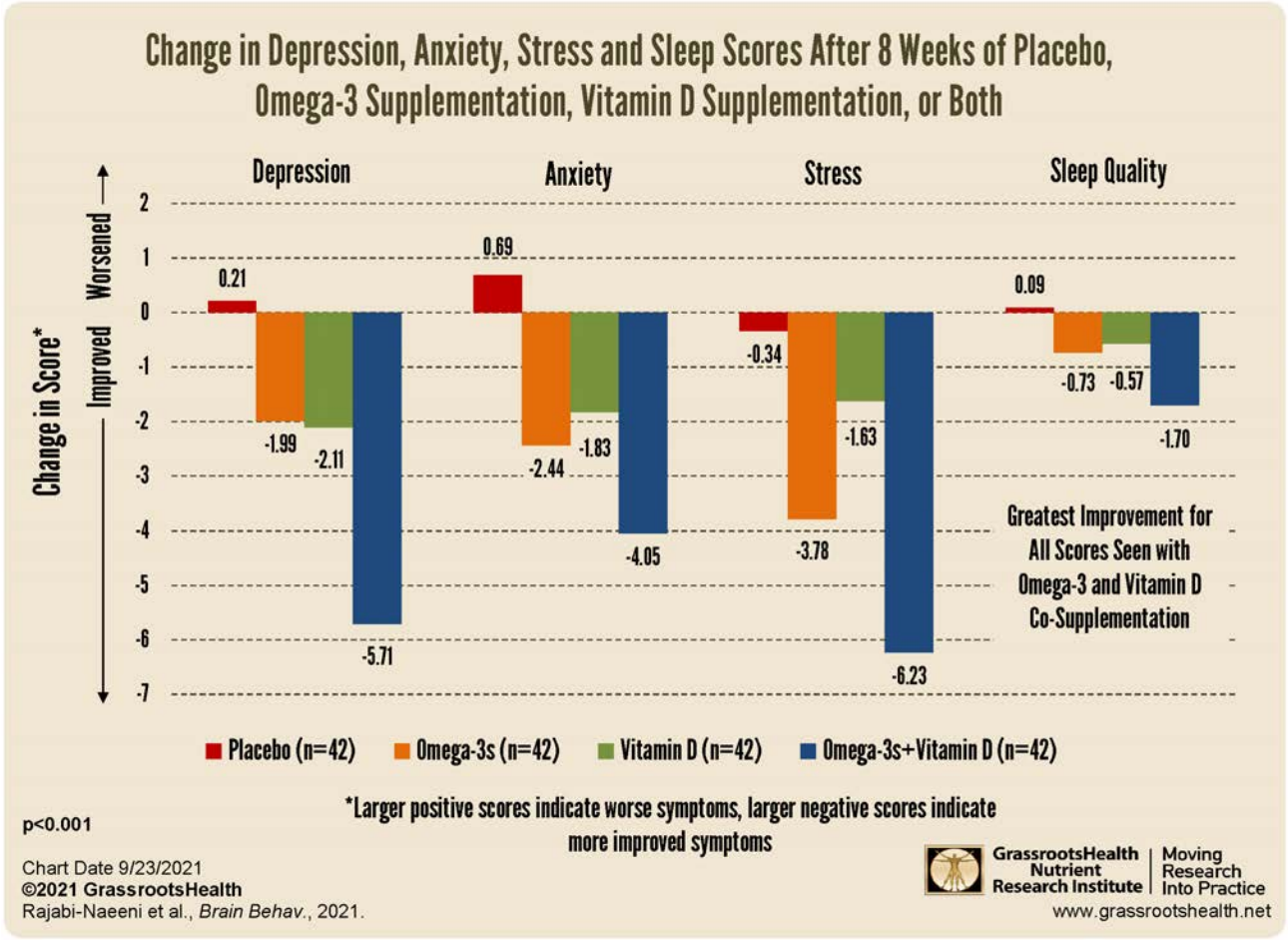
- A study by Lofvenborg et al. looked to see if there was a relationship between fish intake and/or omega-3 fatty acid levels in the blood, GAD65 antibody positivity, and adult-onset type 1 diabetes
- Those who were GAD65 positive and had low fish intake had a significantly higher risk of diabetes, with **more than a fourfold risk of diabetes among those with both high levels of GAD65 antibodies and low omega-3s** compared to those who were negative for GAD65 and had high omega-3 levels

Evidence-Based Education: Nutrient Research Reviews & Visuals



- Alqudsi et al. looked at a group of adolescents in Saudi Arabia to determine the relationship between vitamin D levels and the incidence of T1D
- Those with a T1D diagnosis had an average vitamin D level of 19.8 ng/ml (49.5 nmol/L) which was significantly lower than those without T1D who had an average level of 27.2 ng/ml (68 nmol/L)
- There was an inverse, linear correlation between the HbA1c values and vitamin D levels and between fasting blood glucose and vitamin D levels for those with T1D. Both were statistically significant within the T1D group; there was no correlation in the control group.

Evidence-Based Education: Nutrient Research Reviews & Visuals



Rajabi-Naeeni et al. (2021)

- Sought to determine the effectiveness of supplementing with either omega-3s or vitamin D, or co-supplementing with both, on improving psychological stress, depression, and sleep
- All except those in the placebo group experienced improvement in depression, anxiety, and sleep
- **The group supplementing with both vitamin D and omega-3s experienced the greatest improvements** in depression, anxiety, stress, and sleep scores at the end of the study compared to all other groups

GrassrootsHealth
Nutrient
Research Institute

Moving
Research
Into Practice

Contact: Jen Aliano, Director
jen@grassrootshealth.org
(760) 710-9305

THANK YOU!