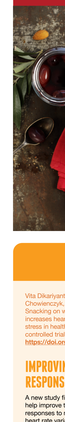
AUTUMN 2020



NUTRITION BULLETIN

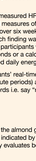
IN THE LATEST EDITION OF THE ALMOND BOARD NUTRITION BULLETIN:

Welcome to the Autumn edition of the Almond Board Nutrition Bulletin. We hope that you are keeping well. This issue features almond research updates about heart rate variability and satiety, a review paper about tree nuts and their impact on the gut microbiome, as well as some virtual resources to help us stay connected.

Want access to more professional resources and research? We have a brand new, beautiful website at almonds.co.uk. We are very excited to share with you everything almond and would love to hear your feedback!

RESEARCH SPOTLIGHT

Vita Dikariyanto, Leanne Smith, Phillip J Chowienczyk, Sarah E Berry, Wendy L Hall. Snacking on whole almonds for six weeks increases heart rate variability during mental stress in healthy adults: a randomized controlled trial. *Nutrients* 2020, 12(6), 1826; https://doi.org/10.3390/nu12061826.



IMPROVING THE BODY'S RESPONSE TO STRESS:

A new study finds that eating almonds may help improve the heart and nervous system's responses to mental stress through improved heart rate variability in response to mental stress for participants eating almonds in place of typical snacks. This cardiovascular disease (CVD) measure had never before been evaluated in clinical research trials involving almonds.

Heart rate variability (HRV), a measure of the fluctuation in time intervals between consecutive heartbeats, is an important indicator of the cardiovascular system's response to stress and it is thought that lifestyle factors including physical activity and diet might impact HRV. Higher HRV represents greater adaptability of the heart in response to environmental and psychological challenges, while low HRV is linked to cardiovascular disease and sudden cardiac death. Mental stress is among the psychosocial factors thought to contribute to CVD risk.

Researchers at King's College London (UK) measured HRV in participants undergoing a mental stress challenge and saw improved measures of HRV in participants who had been replacing typical snacks with almonds over six weeks. The study was funded by the Almond Board of California. This new research finding was part of the ATTIS study, a 6-week randomized control, parallel-arm trial, where participants with above average cardiovascular disease risk consumed a daily snack of almonds or a calorie-matched control snack providing 20% of each participants' estimated daily energy needs.

In this study, researchers measured participants' real-time heart rate (HR) and heart rate variability (HRV) at rest (lying down for 5-minute periods) and during a Stroop Test (in which participants were asked to read coloured words i.e. say "red" in a green font) to stimulate short period of mental stress.

RESULTS:

- During acute mental stress, participants in the almond group showed better heart rate regulation compared to the control group, indicated by statistically significant differences in high frequency power, which specifically evaluates beat-to-beat intervals (a measure of HRV).
- The research suggests that eating almonds in place of typical snacks may diminish the drop in HRV that occurs during mental stress, thereby improving cardiac function. This dietary strategy has the potential to increase cardiovascular resilience to mental stress, along with other heart health benefits of consuming almonds such as lowering LDL-cholesterol and improving the function of blood vessels.

LIMITATIONS:

There were some differences between groups in cardiometabolic disease risk factors at baseline. Also, the participants were free-living, and although almond compliance was confirmed, it is possible there is potential for some inaccuracies in their reported food intake. Finally, more research is required because the mechanisms for the increase in HRV are unknown.

RESEARCHER PERSPECTIVE:

"This study shows that the simple dietary strategy of swapping almonds for typical snacks may bolster resilience to the adverse cardiovascular effects of mental stress by improving regulation of heart rate. We found that the stress-induced reduction in heart rate variability was lessened in the almond group compared to control following the dietary intervention, which indicates a cardiovascular health benefit. It is useful to think of having a higher HRV as the heart being able to switch gears faster in response to demands on the body, which means more cardiac resilience and flexibility during periods of stress," said Dr. Wendy Hall, PhD, co-principal investigator.

RESEARCH UPDATE

Creedon, A.C.; Hung, E.S.; Berry, S.E.; Whelan, K. Nuts and their Effect on Gut Microbiota, Gut Function and Symptoms in Adults: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. *Nutrients* 2020, 12, 2347.

UNDERSTANDING HOW NUTS AFFECT THE GUT:

Tree nuts, including almonds, and peanuts, are of interest to investigate their effect on the gut microbiota and gut health in general. Almonds contain fibre, polyphenols and unsaturated fatty acids that affect the composition of gut microbiota. Using

a systematic review and meta-analysis of randomised controlled trials (RCTs) in healthy adults, the study aimed to assess the impact of nuts on gut microbiota, gut function and gut symptoms. Besides having a potential prebiotic effect, the researchers note, "The food matrix of nuts might therefore represent a unique method of delivering a rich supply of fermentable nutrients such as fibre, polyphenols and lipids to the gut microbiota."

Eight studies reporting nine RCTs were included, investigating almonds (n = 5), walnuts (n = 3) and pistachios (n = 1). Nut consumption significantly increased *Clostridium* (SMD: 0.40; 95% CI, 0.10, 0.71; p = 0.01), *Dialister* (SMD: 0.44; 95% CI, 0.13, 0.75; p = 0.005), *Lachnospira* (SMD: 0.33; 95% CI, 0.02, 0.64; p = 0.03) and *Roseburia* (SMD: 0.36; 95% CI, 0.10, 0.62; p = 0.006), and significantly decreased *Parabacteroides* (SMD: −0.31; 95% CI, −0.62, −0.00; p = 0.05). There was no effect of nuts on bacterial phyla, diversity or stool output. The researchers concluded that nut consumption affects gut microbiota composition at the genus level, but not phyla or diversity, or on stool output, but note "nut type and, to some extent, duration of consumption influence the effects." Further investigation is needed.

A recent study reported that almonds may improve the gut microbiome by increasing microbiome diversity, while decreasing relative levels of potentially harmful bacteria. The study authors reported that after college freshmen consumed 57g of almonds daily for eight (8) weeks, their gut microbiome quantitative diversity increased by 3%, and qualitative diversity increased by 8%, compared to eating a calorie-matched snack of crackers. Also, the abundance of *Bacteroides fragilis*, a potentially pathogenic species of bacteria, was reduced by 48% with almond consumption over time. Strains of *Bacteroides fragilis* that produce enterotoxins may cause gastrointestinal inflammation.

UNDERSTANDING AND MANAGING SATIETY - SYMPOSIUM

This brief report in the *Journal of Nutritional Sciences* summarises a framework for understanding satiety with reference to almonds presented at the 13th European Nutrition Conference, FENS 2019 – Malnutrition in an Obese World: European Perspectives. Aspects of satiety are considered in the context of appetite control and obesity. The session further evaluates almonds for their unique composition and structure which affect their behaviour in the gastrointestinal tract. Read more about the four FENS sessions here.

HP CORNER: ALMONDS AND SKIN HEALTH WEBINAR

We're excited to share a brand new webinar, specifically for the health professional audience, presented by integrative dermatologist and researcher Dr. Raja Sivamani. Dr. Sivamani, University of California, Davis, takes a deep dive into the connection between diet and skin health, explores the latest understanding of the gut-skin axis, and shares recent research examining the role of almond consumption on wrinkles. The webinar and accompanying slide presentation pdf can be found here.

Within the new Almonds.com site, you can explore our Almond Living Magazine with articles about innovative research and food trends; download the latest Almond Academy resources within the Dietitian Tools section; and be inspired by new cooking ideas at the Recipe Centre.

ALMONDS' PERFECT PORTION SIZE

Recently, the Almond Board changed our portion size guidance to be consistent with European Snack Association's portion recommendation for nuts to 30 grams instead of 28 grams. This portion size aligns with dietary guidance in many countries in Europe. So how does that affect portion nutritional information? A handful, an easy way to measure the serving size is about 23 almonds due to the varying size, of each kernel. The 30-gram portion delivers 175 kcal (up from 160 kcal). Unsaturated fat per serving changes from 13g to 14g and saturated fat remains at 1g, with 6g of plant protein and 4g of fibre. The updated almond portion recommendation is consistent with other nuts and snacks, which allows clients and patients to compare nutrition values more easily.

RECIPE INSPIRATION

ALMONDS WITH DARK CHOCOLATE AND ORANGE

Try this delicious classic combination of a zesty orange and dark chocolate with almonds for a treat that is smart swap.

Follow the link to learn how to make and share the recipe.

While visiting our new Recipe Centre, please stick around to see a full range of snack-meal ideas with easy to difficult skill ratings.

GROWING GOOD: ZERO WASTE

The California almond community is dedicated to growing a nutritious and sustainable food and established the Almond Orchard 2025 Goals. Within each bulletin, we'll share an update to help you understand our sustainability journey.

Within the next five years, the California almond community aims to achieve zero waste by putting everything we grow to optimal use and reducing the environmental footprint. Almonds grow in a shell, protected by a hull, on a tree: products traditionally used for livestock bedding, dairy feed and electricity generation. All of these products are used so nothing goes to waste.

Almond trees capture and store a significant amount of carbon over their 25-year life cycle, and using the trees' hulls, shells and woody biomass is key to reducing carbon emissions and environmental impact. Considering the inherent properties of trees and traditional uses of almond coproducts, current almond farming practices are offsetting about 50% of their carbon emissions.* With further production improvements and policy changes, the California almond community could eventually be carbon neutral, or even carbon negative. Within the larger context of food, researcher Dr. Alissa Kendall states, "California almonds have a lower carbon footprint than many other nutrient-dense foods."

To learn more, please see an overview of the zero waste process and progress here.

* Alissa Kendall, et al. "Life Cycle-Based Assessment of Energy Use and Greenhouse Gas Emissions in Almond Production. Part 1: Analytical Framework and Baseline Results." *Journal of Industrial Ecology*. 2015.

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