The American Journal of Clinical Nutrition
February 2015 Media Alert

Need another reason to reach for milk? How about lowering oxidative stress in the brain?

Background Milk clearly does more than just build strong teeth and bones. Indeed, scientists now believe that dairy foods, when consumed as part of a healthy diet, may also help prevent hypertension, obesity, colon cancer, and type 2 diabetes. However, what is it in dairy products that causes these seemingly disparate health benefits? Might these effects also be present in other tissues and organs? Recently, a collaboration of scientists led by In-Young Choi (Hoglund Brain Imaging Center and the University of Kansas) asked whether dairy intake might be related to oxidative stress in the brain via increasing concentration of glutathione, one of the body's most potent antioxidants. This is important because not only have oxidative stress and its concurrent inflammatory processes been associated with many of today's common diseases (e.g., hypertension, obesity, and cancer), they may also lead to neurodegenerative decline and aging. Details about this study and its findings are published in the February 2015 issue of *The American Journal of Nutrition*. A related editorial written by Peter Jones (University of Manitoba, Canada) accompanies this article.

Study Design To evaluate the relation between dairy intake and brain glutathione, the researchers recruited 60 healthy older adults (mean age: 69 years). Dietary intakes were assessed by using 7-day detailed self-recorded records, and the glutathione content of 3 regions of the brain was estimated by using a recently developed method involving magnetic resonance (MR) technology.

Results The researchers discovered that participants consuming the most dairy products had the highest concentrations of glutathione throughout their brains. This association appeared to be driven by fluid milk intake because there was no such relation between glutathione content and cheese or yogurt consumption. Higher calcium intake (presumably from dairy foods) was also correlated with higher glutathione in 2 of the 3 brain regions examined.

Conclusions The research team proposed that the positive association between dairy intake and brain glutathione might be due to the fact that milk is an excellent source of building blocks, such as protein, needed by the body to synthesize the glutathione molecule. However, Jones urges that additional randomized controlled trials be conducted before clinicians start recommending greater milk consumption to lower cerebral inflammation. This is mainly because only a randomized dietary intervention trial can ultimately prove that milk—and not some related lifestyle confounder such as not smoking or increased exercise levels—is actually responsible for the greater glutathione concentrations in the brain.

References

Choi I-Y, Lee P, Denney DR, Spaeth K, Nast O, Ptomey L, Roth AK, Leirman JA, Sullivan DK. Dairy intake is associated with brain glutathione concentration in older

adults. *American Journal of Clinical Nutrition* 2015;101:287–93.
Jones PJH. New health benefits of dairy products. *American Journal of Clinical Nutrition* 2015;101:249–50.

For more information
To contact the corresponding author, In-Young Choi, please send an e-mail to ichoi@kumc.edu.
To contact the corresponding author, Peter Jones, please send an e-mail to peter.jones@umanitoba.ca.

Whipped milk-based drinks reduce appetite by increasing stomach stretching

Background The term "aerated drinks" has historically been used to refer to carbonated beverages. Whereas some aerated beverages such as soft drinks are generally considered to have no nutritional value and contribute to poor overall health, others such as mineral water are neutral in this regard. Might some aerated drinks, however, actually have health benefits beyond the water they provide? Some scientists think they might, because the presence of air in a beverage not only reduces its caloric density but also may lead to reduced hunger and increased satiation. To test whether these effects are due to greater levels of stomach stretching and slower stomach emptying, a team of researchers led by Luca Marciani (University of Nottingham, School of Medicine, United Kingdom) conducted a carefully controlled, randomized dietary intervention study with the help of 18 healthy men. Their detailed results are published in the February 2015 issue of *The American Journal of Clinical Nutrition*.

Study Design To test their hypothesis that consumption of aerated beverages decreases appetite by increasing stomach stretching, the researchers created 3 skimmed-milk-based, sweetened drinks all having similar calories (110 kcal) and nutrient compositions. One of the beverages (the control) was served without further processing, whereas the other 2 were aerated by whipping—similar to how milk is frothed to make a latte. The aerated beverages were stabilized by protein and fiber (one more than the other) to affect the amount of time the drinks would remain foamy in the stomach after being consumed. Each of the 18 participants reported to a research facility on 3 occasions, each time consuming one of the beverages and then undergoing magnetic resonance imagining (MRI) so that the investigators could visualize what happened to the beverage over a 4-hour period. They also filled out questionnaires related to their perceived appetite.

Results Compared with the control beverage, both of the stable foamy drinks caused the stomach to stretch more and reduced feelings of hunger, with the more stabilized drink being even more effective than its less stable counterpart.

Conclusions The researchers concluded that appetite suppression induced by drinking stabilized foamy beverages can largely be explained by their effects on stomach volume and rate of emptying and that increasing stability of the foam can enhance this effect. Whether this new knowledge can be translated to new products to aid in weight management will require further study.

Reference
Murray K, Placidi E, Schuring EAH, Hoad CL, Koppenol W, Arnaudov LN, Blom WAM, Pritchard SE, Stoyanov SD, Gowland PA, et al. Aerated drinks increase gastric volume and reduce appetite as assessed by MRI: a randomized, balanced, crossover trial. *American Journal of Clinical Nutrition* 2015;101:270–8.

For more information
To contact the corresponding author, Luca Marciani, please send an e-mail to luca.marciani@nottingham.ac.uk.

Whey protein with leucine and vitamin D may prevent muscle loss in older individuals who are dieting

Background Aside from increasing risk of cardiovascular disease and type 2 diabetes, obesity in older adults can lead to physical disabilities and mobility impairments. Consequently, obese individuals are generally encouraged to lose weight by dieting and/or participating in exercise programs. However, although weight loss can be beneficial to the elderly in terms of normalizing metabolic parameters, it can also lead to muscle loss and increased risk of falling and injury. Some studies suggest that a diet rich in high-quality protein (such as dairy products) combined with calorie restriction and resistance exercise may help prevent muscle loss during weight loss. Others suggest that leucine (an essential building block of protein) and vitamin D supplements may be especially beneficial. To test the effect of dieting and consuming supplements of dairy whey, leucine, and vitamin D combined with resistance exercise on body weight and composition in the elderly, researchers at Amsterdam University of Applied Sciences (The Netherlands) and Nutricia Research (The Netherlands) conducted the gold standard of nutrition experiments: a double-blind, randomized, controlled intervention trial. You can read more about this study along with an accompanying editorial by Gordon Smith and Bettina Mittendorfer (Washington University, St. Louis) in the February 2015 issue of *The American Journal of Clinical Nutrition.*

Study Design Amely Verreijen and colleagues recruited 60 obese older men and women and randomly assigned them to an intervention or control group. All participants followed a low-calorie diet and participated in a resistance exercise program 3 times weekly for a total of 13 weeks. Participants in the intervention group consumed one 150-kcal supplement containing whey protein, leucine, and vitamin D just before breakfast and 3 supplements immediately after exercise. Subjects in the control group were instead provided with 150-kcal placebo supplements that looked and tasted similar to the experimental products.

Results Although both groups lost similar amounts of weight and total fat, participants in the intervention group preserved their skeletal muscle whereas those in the control group lost some. There was no difference in muscle strength between groups.

Conclusions The researchers concluded that their findings "support the current advice to increase protein intake of high quality and sufficient quantity during a weight loss program in obese older adults." Smith and Mittendorfer conservatively agree but urge additional carefully

designed, long-term investigations to better understand possible adverse effects of high-protein diets (such as on bones and kidney function) on the health and wellbeing of older individuals.

References

Verreijen AM, Verlaan S, Engberink MF, Swinkels S, de Vogel-van den Bosch J, Weijs PJM. A high whey protein–, leucine-, and vitamin D–enriched supplement preserves muscle mass during intentional weight loss in obese older adults: a double-blind randomized controlled trial. *American Journal of Clinical Nutrition* 2015;101:279–86.
Smith GI, Mittendorfer B. Slimming down in old age. *American Journal of Clinical Nutrition* 2015;101:247–8.

For more information

To contact the corresponding author, Amely Verreijen, please send an e-mail to a.verreijen@hva.nl.
To contact the corresponding author, Bettina Mittendorfer, please send an e-mail to mittendb@wustl.edu.

Endogenous cannabinoid release is altered in patients with anorexia nervosa

Background There are many factors that affect what we eat, when we eat, and how much we eat. At a very basic level, we eat to obtain nutrients. Of course, other aspects such as our overall health, mood, social setting, and food preferences can greatly affect food decisions. Scientists are also beginning to uncover physiologic and neurochemical differences in people with various food intake patterns. This research is especially important because it may lend insight into why some people develop eating disorders such as anorexia nervosa whereas others eat too much. Results of one such study, published in the February 2015 issue of *The American Journal of Clinical Nutrition* and carried out by Palmiero Monteleone and Vincenzo Di Marzo (University of Salerno and Consiglio Nazionale delle Ricerche, respectively), suggest that dysregulation of the brain's "endocannabinoid" system might play an important role in patients with anorexia nervosa. Endocannabinoids are fat-like compounds the body produces in response to eating appealing, delicious foods and are thought to impart the sense of pleasure we get from eating them. It's noteworthy that chemically related compounds that act on endocannabinoid receptors are found in the *Cannabis* plant, which is used to make marijuana.

Study Design The research team studied 3 groups of individuals, all of whom were at least 18 years of age. Two of the groups were comprised of 7 underweight or 7 weight-recovered anorexia nervosa patients admitted to an inpatient eating disorder facility. The researchers also included a group comprised of control subjects with healthy weights and no history of an eating disorder. Study participants were exposed to their "favorite" and "nonfavorite" foods, and their blood was monitored for several endocannabinoids. The researchers then determined whether there were different endocannabinoid-related responses between the groups.

Results The research team identified several differences in endocannabinoid responses depending on which group the participants were in. For instance, in the control group circulating concentrations of 2-arachidonoylglycerol (an endocannabinoid) were higher after eating their favorite foods than after eating less desirable foods. Conversely, the opposite trend was seen in

the anorexic patients who had gained back weight, and concentrations were not affected by type of food in the underweight anorexic subjects.

Conclusions The scientists concluded that their findings support a dysregulation of the endocannabinoid system associated with pleasurable eating in individuals with anorexia nervosa regardless of whether they are or are not currently underweight. They further postulate that the altered response in anorexia patients may underlie the lack of motivation toward eating or even an increased sense of wellbeing from this unhealthy behavior.

Reference

Monteleone AM, Di Marzo V, Aveta T, Piscitelli F, Delle Grave R, Scognamiglio P, El Ghoch M, Calugi S, Monteleone P, Maj M. Deranged endocannabinoid responses to hedonic eating in underweight and recently weight-restored patients with anorexia nervosa. *American Journal of Clinical Nutrition* 2015;101:262–9.

For more information

To contact one of the corresponding authors, Palmiero Monteleone or Vincenzo Di Marzo, please send an e-mail to monteri@tin.it or vdimarzo@icmib.na.cnr.it, respectively.