Advanced Glycation Endproducts (AGEs) and Their Role in the Aging Process

Jacob Mey, BA, PhD Candidate

LEARNING OBJECTIVES:
At the completion of this self-study article, the learner will be able to:
• List and describe the structural components of advanced glycation endproducts (AGEs).
• Identify exogenous sources of AGEs and describe factors that could increase endogenous production.
• Discuss possible physiologic complications associated with increased AGE levels.

A NEW DIRECTION OF AGE RESEARCH
American population demographics have been undergoing a unique transition. Life-extending medical advances coupled with the aging of the Baby Boomer generation have increased the average age of older Americans. In fact, the United States Census Bureau estimates that about 70 million Americans (20% of the population) will be over the age of 65 by 2030. Thus the health concerns of this growing population are becoming increasingly important and are exemplified in Dr. Ezekiel Emanuel’s controversial article, “Why I Hope to Die at 75,” published in The Atlantic. Chronic diseases, such as cardiovascular disease (CVD) and type II diabetes mellitus (T2DM), impaired nutrient metabolism, skeletal muscle dysfunction, and reduced mobility continue to be major areas of concern for older Americans. In addition to advancing age, genetic predisposition and lifestyle contribute greatly to these health deficits. For example, poor diet and lack of exercise lead to elevated blood glucose that in turn contributes to the development of T2DM. Despite this knowledge, many of the precise molecular mechanisms responsible for the aging process have yet to be elucidated. A developing area of research examines the role of advanced glycation endproducts (AGEs), which have emerged as molecules of interest in a variety of tissues and disease states. The ramifications of these potentially damaging molecules are exacerbated with chronic disease, but may be present even throughout healthy aging. This brief review provides a concise history and overview of AGEs in order to bring attention to their role in the aging process, and highlight areas of current and future research.

WHAT ARE AGEs?
AGEs are essentially glycotoxins produced as spontaneous byproducts during normal metabolism from the result of protein, lipid, or nucleic-acid modification by glucose or glucose metabolites. These glucose modifications, or glycation events, affect the structural and functional integrity of the macromolecules and can cause them to become dysfunctional and potentially damaging. Furthermore, these structural changes to proteins cause them to become resistant to normal proteolytic breakdown by the continued on page 2
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body, allowing them to circumvent the cellular processes that would normally dispose of these agents. Although AGEs form during normal metabolism, certain disease states produce an environment that increases the rate of AGE formation—for example, chronic low-grade inflammation or hyperglycemia. The combination of increased AGE formation and decreased proteolytic disposal causes a buildup of circulating and tissue levels of AGEs, which confers susceptibility to AGE-mediated damage.

AGE FORMATION AND THE MAILLARD REACTION

AGEs are formed through a process known as the Maillard reaction. Named after its discoverer, Louis Camille Maillard, the reaction was first described in 1912 whereby glucose and amino acids underwent spontaneous interaction under heat, resulting in a physical change in the appearance of the molecules. Maillard immediately hypothesized about the importance of this reaction, making what at the time seemed like brash claims that this reaction would play a major role in food, agriculture, medicine, and even diabetes. As it turns out, Maillard’s knowledge was far beyond his time, since today we know that many of his predictions have come to fruition. A deeper understanding of the Maillard reaction reveals several additional reactions that occur before a fully formed AGE is produced. Figure 1 describes the progression from a healthy protein into a fully formed AGE.

The initial spontaneous reaction between a glucose moiety and amino acid residues on proteins forms an intermediate product (a Schiff base), a process that takes place over the timespan of hours to days. Over extended time (weeks to months) the Schiff base undergoes an Amadori rearrangement, changing the structure of the molecule and forming yet another intermediate, called an Amadori product. Finally, after crosslinks are formed between amino acid residues on the protein, a complete AGE is formed. This last step can take anywhere from months to years to occur. The final AGE acquires characteristics unique to its original, nonglycated form. Depending on the cause of AGE formation and the environment in which it belongs, these changes can be inert or produce a damaging byproduct.

Although the Maillard reaction as a long-term somatic process seems rather obscure, its everyday presence in our environment is far more commonplace than one may realize. The intense heat of cooking dramatically speeds up the rate of the Maillard reaction. As with many basic chemical reactions, increasing the concentration of reactants (in this case, glucose) can also increase the rate of this reaction.

It wasn’t until the 1980s that the importance of this reaction was transitioned from chemistry into human physiology. Vincent Monnier of Case...
Western Reserve University first hypothesized that the Maillard reaction occurs to the proteins in our bodies as well. Since body temperature is well below that of cooking temperatures, Monnier had to find a way to study proteins that survived long enough (months to years) within our body cells to undergo the Maillard reaction and form AGEs. He studied lens crystallins, which are extremely long-lived proteins in the eye that undergo effectively zero proteolytic turnover. Essentially, these proteins are present for almost the entirety of an individual’s life. Monnier’s investigation of the Maillard reaction in vivo redefined the perception of the Maillard reaction and AGEs. In his 1989 publication, “Toward a Maillard Reaction Theory of Aging,” he highlighted the potential for these molecules to impact aging.

Why is This Important for Aging? The simplest way to recognize the importance of this pathway is through the heavily used diabetes diagnostic tool, hemoglobin A1c (HbA1c). HbA1c is hemoglobin (a protein in our red blood cells) that has been glycated by glucose; a blood test determines the total percentage of hemoglobin that is glycated and gives clinicians an estimate of average blood glucose levels over several weeks to months. HbA1c is an Amadori product, one of the intermediate molecules of the Maillard reaction between the formation of a Schiff base and a full-formed AGE. Due to the approximately 120-day half-life of red blood cells, HbA1c does not remain in the body long enough to develop consistently into a complete AGE. However, other proteins in the body that have slower turnover rates have a tendency to generate AGEs; these include proteins that support cell structure (like collagen and other proteins in the extracellular matrix) and proteins in the basement membrane of veins and arteries.

Accumulation of AGEs has been shown to disrupt important metabolic pathways and contribute to inflammation and the potentiation of oxidative stress, both of which play major roles in the progression of chronic disease. In addition, AGEs are molecules of interest in sarcopenia, Alzheimer’s, and T2DM, along with other age-related disorders. AGEs also exert harmful effects by binding with the receptor for advanced glycation endproducts (RAGE). RAGE is a membrane receptor present in most tissues and is particularly copious in the heart, lungs, and skeletal muscle. Dr. Richard Semba’s group at Johns Hopkins has studied circulating AGEs in several populations and has shown older women with elevated plasma carboxymethyl lysine (CML), a primary AGE species, were at higher risk of cardiovascular mortality. Additionally, the InCHIANTI study investigating older adults living in Italy showed that plasma CML was an independent predictor for CVD and all-cause mortality as well. In addition, seminal research by Jacob Haus found AGE accumulation in the skeletal muscle of older individuals was associated with reduced measures of muscle function. In agreement, larger studies correlated circulating AGEs with reduced grip strength in older community-dwelling women and slower walking speed in adults, while AGEs measured in the skin correlated with reduced muscle strength in older men.

Dietary Sources and Implications for Practice

Although AGEs are formed endogenously, exogenous sources are a major contributor to an individual’s total AGE pool. Dr. Jaime Uribarri’s Mount Sinai group has produced several studies investigating the effect of AGE consumption in the diet and the potential benefits of decreasing dietary intake. Generally, high fat and/or protein foods (such as mayonnaise, butter, and beef) naturally contain higher amounts of AGEs than carbohydrates (such as bread, apples, and bananas). Additionally, high-heat cooking methods such as grilling and deep-frying can dramatically increase AGE content. With this in mind, it is easy to see that the Western diet is high in dietary AGEs and that health benefits may exist if dietary AGE consumption is reduced. Does this provide more credence to the well-documented benefits of adopting a plant-based diet? Is this scientific ground for the raw-food movement? Potentially. However, whether or not reducing the AGE content of the diet provides a physiologic benefit has yet to be elucidated. Limitations in this line of research include a low dietary AGE absorption rate (~10% of dietary AGEs appear in plasma), an inability to determine the contribution of dietary AGE versus endogenously produced AGEs on AGE-mediated damage, and lack of true dietary AGE quantification. Dietary recalls are typically used for this purpose and have recently come under much scrutiny as to their accuracy. Future research aimed at large-scale, long-term evaluation of dietary AGE content may be warranted to understand the role of exogenous AGEs. At this point, it would be prudent to reserve any applications to your clinical practice until more data are available.
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Having said this, recommending more fruits and veggies and less deep-frying is probably good advice for most clientele, regardless.

In addition to reducing dietary intake, methods of reducing endogenous accumulation of AGEs are also being investigated. Paul Thornalley and colleagues out of Warwick, UK have been investigating potential mechanisms related to detoxifying AGE precursors. They are largely interested in the glyoxalase system, a cellular enzyme network whose primary function is preventing AGE formation. Interestingly, the glyoxalase system loses function throughout the aging process and may be a primary source of endogenous AGE production in older individuals. Some research groups are even investigating exercise as an avenue to increase the turnover rate of proteins to help increase the breakdown and removal of AGEs. Although these investigations look promising, additional research aimed at understanding the biological role of dietary and endogenous AGEs is still needed.

Summary
AGEs are glycotoxins that accumulate during the lifespan, especially in tissues with reduced proteolytic turnover. AGEs are known to contribute to inflammation and oxidative stress, implicating them in a plethora of age-related disorders. Recently circulating AGEs have been associated with the risk of developing chronic disease, immobility, and even all-cause mortality in older adults. Continued research of the biological role of AGEs is needed to determine whether AGEs are merely a consequence of getting older or play a causative role in the aging process. Potentially therapeutic strategies to minimize AGE accumulation in the body may come in the form of reducing exogenous intake, limiting endogenous production, or increasing breakdown and excretion.

About the Author
Jacob Mey, BA, PhD candidate, is a native of Cleveland, Ohio and currently resides in Chicago, Illinois. He received his bachelor’s degree from Case Western Reserve University, completing ACEND® accredited coursework in nutrition while focusing on biochemistry and metabolism. Jacob worked as a research assistant in the lab of John Kirwin, PhD, at the Lerner Research Institute of the Cleveland Clinic before transitioning into a doctoral program at the University of Illinois at Chicago. He is currently in his fourth year of graduate work under the mentorship of Jacob Haus, PhD, where he receives academic and research training in kinesiology and nutrition, with a focus on skeletal muscle metabolism in obesity, diabetes, and aging. The Haus Lab uses a translational approach to study metabolism and the beneficial effects of exercise.

Disclosure statement: The author is completing his doctoral work in a lab that investigates diabetes, obesity, aging, and the role of AGEs. He is receiving no financial compensation for this work.

References
Click here to see the references for this article.

Additional Resources
For more information about AGEs, see the following websites:
- The Internal Maillard Reaction Society website
- NutriDesk website

CPE Credit
This article has been approved for 1.5 hours of CPE credit upon successful completion of a quiz. At the conclusion of each month, the quizzes are reviewed and those successfully scoring 80% will receive their CPE certificate via email. This free CPE credit is available for all Healthy Aging DPG members until March 15, 2019.

Click here to take the quiz.

Mark Your Calendar: Upcoming Conferences & Events
Click here for a list of upcoming conferences, workshops, webinars, and other events related to healthy aging.
DEMENTIA AND COGNITIVE DECLINE are significant public health concerns. Alzheimer’s dementia is the sixth leading cause of death in the United States and impacts an estimated 11% of the population aged 65 and older; prevalence increases to 33% of people aged 85 years or older.1 The US population is getting older; the number of individuals aged 65 and older is expected to increase from 14.1% of the total population in 2013 to 21.7% by 2040.2 There is an increasing need to find cost-efficient and effective interventions to prevent cognitive decline. Increased attention is being given to the role that physical activity and dietary patterns may have in slowing cognitive decline in older adults.3

THE DIET

Researchers at Rush University Medical Center have identified a new dietary pattern to determine the risk of cognitive decline in older adults. Nutrient-rich foods were identified from the Mediterranean and the Dietary Approaches to Stop Hypertension (DASH) diet patterns, which have been shown to impact cognition, to develop the Mediterranean-DASH Diet Intervention for Neurodegenerative Delay (MIND) diet score.4,5 This hybrid dietary pattern awards points to reduced consumption of components known to be harmful. For example, green leafy vegetables6,6 and berries7 are specific foods known to be beneficial, whereas saturated fat is known to be harmful.8 The MIND diet has 15 components comprised of 10 beneficial brain foods (green leafy vegetables, other vegetables, nuts, berries, beans, whole grains, seafood, poultry, olive oil, and wine) and five harmful brain foods (red meat, butter/stick margarine, cheese, pastries/sweets, and fried/fast food). Target intake frequencies of each component translate into one point for a best possible score of 15. See Table 1 for such thresholds/frequencies for each component.

RESEARCH

The MIND diet was found to be effective in slowing cognitive decline in older adults. Rush University researchers found that participants in the highest MIND diet score tertile (median score 9.5; range 8.5 to 12.5) had significantly slower rates of decline in global cognition score ($\beta=0.0366$, SE=0.0101, $p=0.003$) compared with those in tertile 1 (median score 6; range 2.5 to 6.5). The rate reduction equated to being 7.5 years younger. Interestingly, participants with intakes that were classified in tertile 2 (median score 7.4; range 7 to 8) also had slower cognitive decline ($\beta=0.0243$, SE=0.0099, $p=0.01$).9 Participants in the highest tertile of the MIND diet score also had a lower incidence of Alzheimer’s dementia (HR=0.65; 95% CI 0.44-0.98).10 The benefits of the MIND diet are thought to be related to the promotion of foods high in antioxidants and anti-inflammatory properties.9

MIND DIET IN ACTION

For many patients, the MIND diet is relatively easy to implement. The following are some simple changes to help follow the MIND diet:

- Add garbanzo, black, or kidney beans to salads.
- Snack on walnuts, almonds, or pistachios.
- Include berries at lunch or as a snack daily.
- Use olive oil and vinegar for salad dressing instead of commercial dressings.
- Sprinkle nuts over pasta dishes, cereal, yogurt, or oatmeal.
- Make your own salad dressing by puréeing berries with olive oil and other spices.
- Swap steak and hamburger for white meat chicken or turkey, salmon, or tuna.
- Use beans as a primary source of protein in at least two meals per week.

Table 1: MIND diet components and ideal intake.

<table>
<thead>
<tr>
<th>Beneficial Foods</th>
<th>Harmful Foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green leafy vegetables $\geq$ 6 servings/week</td>
<td>Butter, margarine $&lt;$ 1 Tbsp/day</td>
</tr>
<tr>
<td>Other vegetables $\geq$ 1 serving/day</td>
<td>Cheese $&lt;$ 1 serving/day</td>
</tr>
<tr>
<td>Berries $\geq$ 2 servings/week</td>
<td>Red meat $&lt;4$ meals/week</td>
</tr>
<tr>
<td>Nuts $\geq$ 5 servings/week</td>
<td>Fast or fried foods $&lt;1$ time/week</td>
</tr>
<tr>
<td>Olive oil Primary oil used</td>
<td>Pastries &amp; sweets $&lt;5$ servings/week</td>
</tr>
<tr>
<td>Whole grains $\geq$ 3 servings/day</td>
<td></td>
</tr>
<tr>
<td>Fish (not fried) $\geq$ 1 meal/week</td>
<td></td>
</tr>
<tr>
<td>Beans $\geq$ 3 meals/week</td>
<td></td>
</tr>
<tr>
<td>Poultry (not fried) $\geq$ 2 meals/week</td>
<td></td>
</tr>
<tr>
<td>Wine $\geq$ 1 glass/day</td>
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</tbody>
</table>

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- Sauté vegetables in olive oil instead of butter.
- Choose fruit or berries for dessert instead of cake or cookies.
- Experiment with different greens such as kale, spinach, collard/mustard greens, or Swiss chard.

In addition, see Table 2 for a sample three-day MIND diet meal plan.

As with any lifestyle change, modifying dietary patterns can be difficult for patients. However, focusing on making a few changes at a time can help promote successful and lasting change. The MIND diet lends itself to working on one category at a time and focuses primarily on encouraging foods rather than limiting them, which may help with compliance.

In addition to preventing cognitive decline, the MIND diet promotes healthful eating in many other ways. The diet promotes foods known to be helpful for other common health conditions including hypertension, diabetes, and cardiovascular disease. The promotion of lower calorie options such as vegetables, berries, and lean protein could also help promote weight loss. Constipation is a common experience for geriatric patients. However, the MIND diet encourages high-fiber foods such as vegetables, berries, nuts, and beans, which may aid with this common problem.

As with any nutrition advice, it is important to provide patients with detailed information regarding type, amount, and frequency of recommended intake. Involving a dietitian will help ensure foods are incorporated appropriately. For example, increasing nuts and olive oil could contribute to excess calories if not eaten in appropriate portions, fish should not be fried, and wine consumption should be no more than one glass per day. Medical history must be reviewed before recommending the MIND diet as it is not appropriate for some common medical conditions. For example, the high potassium and phosphorus content of the MIND diet would not be appropriate for patients with kidney disease, and a general recommendation to eat more whole grains, berries, and beans may not be appropriate for patients with diabetes. Care should be taken to ensure foods are incorporated properly.

### Table 2: MIND diet sample meal plan.

<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakfast</strong></td>
<td>1 oz whole wheat bagel</td>
<td>Breakfast Sandwich:</td>
<td>Egg Scramble:</td>
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<tr>
<td></td>
<td>1 c blueberries</td>
<td>1 oz whole wheat English muffin</td>
<td>1 egg</td>
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<td></td>
<td>1 egg</td>
<td>1 oz low-fat cheddar cheese</td>
<td>1 egg white</td>
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<tr>
<td></td>
<td></td>
<td>1 egg white</td>
<td>½ c veggies</td>
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<tr>
<td></td>
<td></td>
<td>1 slice avocado</td>
<td>1 tsp olive oil</td>
</tr>
<tr>
<td><strong>Lunch</strong></td>
<td>Tuna Salad Sandwich:</td>
<td>Spinach Salad:</td>
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<tr>
<td></td>
<td>2 slices whole grain bread</td>
<td>2 c spinach</td>
<td></td>
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<tr>
<td></td>
<td>3 oz canned tuna</td>
<td>1 c strawberries</td>
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<tr>
<td></td>
<td>1 Tbsp low-fat mayonnaise</td>
<td>½ c chickpeas</td>
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<tr>
<td></td>
<td>1 slice onion</td>
<td>2 Tbsp sliced almonds</td>
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<tr>
<td></td>
<td>1 slice tomato</td>
<td>1 Tbsp olive oil &amp; vinegar dressing</td>
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<tr>
<td></td>
<td>½ c three-bean salad with olive oil</td>
<td>1 oz whole grain dinner roll</td>
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<tr>
<td></td>
<td>1 c cucumber slices</td>
<td></td>
<td></td>
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<tr>
<td><strong>Dinner</strong></td>
<td>Pasta Toss:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1 c whole wheat pasta</td>
<td>4-6 oz grilled salmon</td>
<td>1 c bean chili</td>
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<tr>
<td></td>
<td>3-4 oz baked chicken breast</td>
<td>½ c brown rice</td>
<td>1 c kale salad with 1 Tbsp almonds</td>
</tr>
<tr>
<td></td>
<td>½ c sautéed mustard greens</td>
<td>½ c steamed broccoli</td>
<td>1 oz whole grain dinner roll</td>
</tr>
<tr>
<td></td>
<td>1 tsp olive oil</td>
<td>6 oz wine</td>
<td>6 oz wine</td>
</tr>
<tr>
<td></td>
<td>6 oz wine</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Snack</strong></td>
<td>¼ c walnuts</td>
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<td></td>
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<tr>
<td></td>
<td>½ c low-fat yogurt</td>
<td>2 Tbsp hummus</td>
<td>1 c raspberries</td>
</tr>
</tbody>
</table>

**FINAL THOUGHTS**

The MIND diet offers an exciting new link between dietary patterns and cognitive health. It is a simple and cost-effective way to help maintain cognition in the aging population and should be considered as a potential intervention for older adults. Further research needs to be conducted to determine other foods that may impact cognition and the impact of diet at a young age on cognitive decline later in life.

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The author of this article has no conflicts of interest to declare.

About the Author
Melanie V. Betz, MS, RD, CSG, LDN, is a dietitian at US Foods in Chicago. Her research has focused on medical nutrition therapy for geriatric patients and those in inpatient rehabilitation.

References

Need Awards Money to Fund Your Research?

The Healthy Aging DPG Community Based Applied Research/Best Practice Award encourages applied research projects that improve the nutritional status, well-being, and independence of community-residing older adults. Ideally, the $4,000 award will be used to solve and identify problems pertaining to dietetic practice, program administration, service/care coordination, and/or behavioral practices of older adults.

The award is administered by the Academy of Nutrition and Dietetics Foundation.
The Healthy Aging DPG achieves success by supporting the success of its members. Renewing your HA DPG membership when you renew your Academy membership will ensure your uninterrupted access to:

- Continuing-education credits through webinars as well as articles in The Spectrum.
- Professional development grants to further your education and credentialing.
- Networking and leadership opportunities.

JAND Articles About Older Adult Nutrition

The Journal of Nutrition and Dietetics has recently published two articles that focus on the nutritional needs of older adults. Click the graphics below for free access to these articles. To view the full text, log into the Journal’s website and then click the graphics below to go straight to the articles.

**Are the Recommended Dietary Allowances for Vitamins Appropriate for Elderly People?**

Francesco Bolletta, MD; Nicola Veronesi, MD; Marina De Rui, MD; Linda Borcon, MD; Elena Deborba Toffanello, MD; Sara Carraro, MD; Fabrizio Miotto, RD; Emanuela Inelmen, MD; Lorenzo Maria Donini, MD; Enzo Manzato, MD; Alessandro Corn, MD; Egle Perlasinotto, ScD; Giuseppe Sergi, PhD, MD

**Environmental Considerations for Improving Nutritional Status in Older Adults with Dementia: A Narrative Review**

Joy W. Douglas, MS, RD, CSR, LD; Jeanine C. Lawrence, PhD, RD, LD

Author Opportunities

The Spectrum is searching for articles from RDNs and dietetics students. Topics include (but are not limited to):

- Alcohol and aging
- Integrative medicine and older adults
- Iron and zinc, dietary and supplemental
- How physical activity prevents age-related diseases
- Risky food-consumption practices and older adults
- Cost-cutting strategies for nutritious meals
- Supplementation safety and older adults
- A topic that you suggest

If you are interested in becoming an author, or would like to suggest a possible author or topic, please contact Robin Dahm (dahmRD@gmail.com). Author guidelines and a topics pick list are located on the HA DPG website.
Congratulations to the following HA DPG members who have been Academy members since 1966:

- Linda J. Brinkley, RD, BS; Allen, TX
- Linda Lagman Hoops, EdD; Evansville, IN
- Carolyn Sue Johansen, RD, CD; Waterbury, VT
- Mary W. Kranyak, CDN; Stratford, CT
- Diantha B. LaVoie, MS; Dagsboro, DE
- Beverly J. McCabe-Sellers, PhD; Little Rock, AR
- Ruth M. O’Brien, MA, RD; Manasquan, NJ
- Angela Ostermann, OSB, MS, RDN, LD; Atchison, KS
- Karen P. Ross, MA, RD; Palo Alto, CA

Call for Information: Conferences and Events

The Healthy Aging DPG calendar contains events of interest to RDNs and NDTRs who work with older adults.

If you would like to suggest a conference or event for our calendar, please e-mail Robin Dahm (dahmRD@gmail.com) with your information. The event must focus on the nutritional and physical health of older adults.

March Is National Nutrition Month®

SAVOR THE FLAVOR OF EATING RIGHT

The Academy created the annual National Nutrition Month® (NNM) campaign, which has been running since 1973, to focus on the importance of:

- Making informed food choices,
- Developing sound eating patterns, and
- Being physically active.

The theme for this year’s NNM: “Savor the Flavor of Eating Right.”

Need ideas?
Visit the Academy’s website and toolkit for promotional information, products, and activities related to this campaign.

Want to see past HA DPG events for NNM?
Visit our website’s archive of NNM activities conducted by HA DPG members.

Need NNM-branded products?
The Academy’s store offers a variety of NNM-branded items, including educational materials, food and drink containers, and t-shirts.

What are you doing for NNM?
We would love to learn about your successful NNM program, activity, or event! Submit your info here by April 8 and you will be entered into a drawing for a $25 gift card.
Chair’s Message

Maureen Janowski, RDN, CSG, LDN, FAND

Happy New Year! The Healthy Aging Dietetic Practice Group (HA DPG) wishes you a happy New Year and a great start to 2016! We had a very productive and exciting 2015 and are looking forward to continuing the forward momentum in 2016.

Thank you for taking the time to complete our annual membership survey. The information we received is very valuable for our strategic planning. Another big thank you to all our members who volunteered to review the seven different position and practice papers scheduled to expire in December of 2017. We were thrilled to submit to the Academy so many DPG-member names as potential reviewers.

The application process for our new Student Executive Board Member position has begun! We would like to encourage current student members of the HA DPG to apply for this exciting new position (see the boxed item in this column for more information). We are really excited about this new position and are hoping to get many applicants!

Our work on the CSG Toolbox’s flash cards for the CSG exam is progressing rapidly and with exciting results. A group has tested the initial set of flash cards and provided a lot of valuable feedback. We’re continuing to develop them and are adding more flash cards to the deck. We are still on target to have the flash cards ready for sale by the beginning of the Academy’s 2016–2017 fiscal year.

We received great feedback from the post-FNCE® follow-up survey, so thank you to everyone who completed it. Our FNCE® 3K walk Saturday morning was a smashing success despite the less than ideal weather! In fact, it was so well received that we’ll probably make it an annual event. The HA member dinner was lots of fun, with delicious food! The Weight Management DPG was kind enough to invite the HA DPG members to attend their sponsored member breakfast, featuring Dr. Paddon-Jones as he presented “Protecting and Improving Muscle Health: The Sarcopenic Obesity Puzzle.” His talk was very educational and enlightening. In fact, Dr. Paddon-Jones has been gracious enough to agree to be our presenter for our March 2016 webinar.

As always, please feel free to contact me with any comments, questions, and/or suggestions. I’d love to hear them!

Call for Applications: Student Executive Board Member

The Executive Committee of the HA DPG has created a new Board position: Student Executive Board Member. Eligible applicants must be:

- A student member or active member of the Academy of Nutrition and Dietetics.
- A member of the HA DPG.
- A full- or part-time student during the Academy’s 2016 fiscal year (June 1, 2016–May 31, 2017)

The application period starts February 15, 2016 and ends April 15, 2016.

You can learn more about the position by clicking here. You can apply for the position by clicking here.

Healthy Aging Dietetic Practice Group

Our Mission
Empowering and supporting members to be food and nutrition leaders promoting life-long wellness.

Our Vision
Optimizing longevity and wellness in aging through food and nutrition.
THE FALL MONTHS were a busy time for all of us. In addition to our work lives, we prepared for the holidays and attended social gatherings. Your Academy volunteers had additional responsibilities beyond these: They continued to manage the business of dietetics and to plot the future course of our profession. Are things calming for you now that the holiday season is over? I hope you will take a few minutes to catch up with what is happening at the Academy since the fall HOD meeting.

RESOURCES FROM THE NUTRITION SERVICES COVERAGE TEAM

Health care delivery and payment models are changing. The evolving business models impact all health care settings and all areas of practice. Academy members need to understand these changes and proactively position themselves and their services within this changing environment to achieve the recognition, respect, and remuneration they seek and deserve. The world of health care reimbursement can be confusing and overwhelming. Obtaining the provider numbers necessary to receive reimbursement from insurance companies and government payers can be difficult. The Nutrition Services Payment Committee has worked to develop tools and resources to assist you, the dietetics practitioner, though this process. The fall 2015 Nutrition Services Delivery and Payment Action Plan gives the history and progress of the committee and new resources for members. In addition, the Academy website has detailed actions for the practitioner to develop payment systems and navigate specific health care delivery models.

FUTURE PRACTICE

The Council on Future Practice (CFP) released “Change Drivers and Trends Driving the Profession: A Prelude to the Visioning Report 2017,” along with a survey to solicit input from Academy members and credentialed dietetics practitioners. The survey is now complete, and we hope the majority of our members were able to provide their input for this critical process. If you identify a change driver or trend that needs to be considered by the CFP, you can still submit your thoughts. Please submit the change driver, rationale, and supporting documentation to hod@eatright.org, who will then forward it to the CFP for consideration.

Members of the Healthy Aging Dietetic Practice Group (HA DPG) won’t be surprised that the number-one change driver in the visioning report is called “the approaching gray tsunami” and described as “[e]xponential growth of the aging population that has dramatic and wide-ranging ramifications and economic impacts on government, businesses, families, and health care and support services.” You can read about the trends that support this change driver in the full report, “Change Drivers and Trends Driving the Profession: A Prelude to the Visioning Report 2017.” Not enough
Hispanic Family Nutrition is an online counseling kit designed to help RDs treat Hispanic patients more effectively through a better understanding of Hispanic culture, family dynamics, and foods.

The online toolkit:

- Offers information to help RDNs gain a better understanding of Hispanic families and foods to be able to connect with and treat patients more effectively.
- Includes a comprehensive guide to Hispanic foods, featuring Hispanic “Hero” Foods
- Provides references illustrating English and Spanish names for foods and a guide to Hispanic produce – including photos, shopping and preparation tips.
- Suggests strategies for changing habits in the kitchen and at the table; including recommendations for healthy alternatives to common cooking techniques or dining habits of Hispanics.

Learn more at www.eatrightSTORE.org.
Thank You, Behind-the-Scenes Volunteers of The Spectrum!

As with any peer-reviewed publication, The Spectrum depends on a dedicated group of volunteer contributors, many of whom perform tasks that are invisible to our readership. Some of our volunteers peer-review the newsletter’s columns, standard articles, and continuing-education articles. Others write the objectives and test questions for the continuing-education articles. All generously find time in their busy schedules to ensure the quality of the newsletters we present to you. Once a year the editor in chief, on behalf of the entire newsletter team, has the pleasure of recognizing these “behind the scenes” people for their hard work. Thank you!

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The First Fifty: A Pictorial History of the Academy of Nutrition and Dietetics, 1917–1967 represents the first time that the Academy’s flame has been documented in photographs. This book documents six eras in the Academy’s history—from the early years to the 1960s—in black-and-white and color photographs that wordlessly deliver a profound narrative of the origins of the Academy of Nutrition and Dietetics and the profession it represents.

Visit www.eatrightSTORE.org to purchase today!
Legislative Update

Become a Champion: Tips for Becoming a Nutrition Advocate

Dianne Polly, JD, RDN, LDN, FAND; Policy and Advocacy Leader

Our Profession’s Ongoing Need for Advocates

I SPENT A SIGNIFICANT AMOUNT OF TIME surfing the Academy’s advocacy website as I researched this column. This website has a wealth of excellent information to help you become a better advocate for our profession, no matter your advocacy experience level. I recommend that each of you take the time today to visit this website.

Lawmakers always need and want to hear from experts in food, nutrition, and health. Become a champion for your profession by using the following tips and suggestions for gaining political influence, meeting with policymakers, speaking in public forums, and crafting effective messages. This column contains information from the Academy’s advocacy website, plus a few of my own suggestions. Could you add this goal to your list for 2016: “I will make at least one contact with an elected official this year on behalf of my profession”?

TIPS FOR GAINING POLITICAL INFLUENCE

Use these tips to create your game plan:

- **Identify key political players.** Identify groups, legislators, and agency regulatory officials with whom you may need to negotiate for changes in legislation. Do not dismiss anyone because of previous disagreements or because you lack a history of working together. We need to be working on both sides of the aisle.

- **Get to know these political players well.** Learn about their voting records and their interests and priorities. Give them your business card so they can contact you in the future.

- **Learn the legislative process and understand it well.** Keep on top of the issues and be aware of controversial and contentious areas. Understand the budget process as much as you can. Know what departments and agencies hold authority over the programs that you care about.

- **Build your reputation.** Always be honest, straightforward, and realistic when working with political players and their staff. Make promises only if you can keep them. Avoid misleading a legislator about the importance of an issue, the opposition, or the importance of our profession.

- **Get to know their staff members, too.** Remember that the staff members for federal, state, and local legislators are essential sources of information and have significant influence in the development of policy.

- **Build your reputation.** Always be honest, straightforward, and realistic when working with political players and their staff. Make promises only if you can keep them. Avoid misleading a legislator about the importance of an issue, the opposition, or the importance of our profession.

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Renewed Your Membership Yet?

We hope you have enjoyed the Healthy Aging DPG’s continuing-education opportunities, newsletter, and other member services this past year. When you renew your Academy membership, please remember to renew your membership with the Healthy Aging DPG at the same time.

To learn more about Academy and DPG membership, go to:
http://www.eatrightpro.org/resources/membership/membership-types-and-criteria

To renew and expand your membership online, click the Join/Renew button at the top of the screen.

To renew by phone:
Call (800) 877–1600 ext. 5000, Monday through Friday, 8 AM–5 PM Central time to reach the Member Services Center.
May 25 Is National Senior Health & Fitness Day®

Keep with this year’s slogan of “If You Keep Moving...You’ll Keep Improving!” and join more than 1,000 organizations in all 50 states as they get 100,000 older Americans moving! The goal of National Senior Health & Fitness Day, the nation’s largest annual health promotion event for older adults, is to get and keep this population healthy and fit.

We encourage you to sponsor an event in your area. Visit the event website to learn how to host a local event, view videos of past events, read testimonials, and more.

If you plan to sponsor an event, please let us know how it went (dahmRD@gmail.com), so we can share your experience with our members!

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tion’s position or strength, or other matters. If you do not know the answer to a question a legislator asks, say so, then offer to find the answer and get back to him or her. Be polite and remember names.

■ Say thank you. Thank those who help you, both in the legislature and in the public health advocacy community.

MEETING WITH YOUR ELECTED OFFICIALS AND POLICYMAKERS
Arranging an appointment with an official or policymaker is a fairly straightforward process:

1. Visit the official’s website or call this person’s office to determine the preferred process for scheduling meetings.
2. Identify yourself by stating your name and that you are a registered dietitian nutritionist. If you are a constituent, be sure to mention this as part of your request, since priority is usually given to constituents.
3. Once the appointment has been scheduled, send an e-mail or make a phone call to confirm the meeting and identify who will be in attendance.

In my personal experience, my state representative has told Academy members to stop by whenever we are in the state capital. He wants to get to know us before we have a need for something!

SPÉAKING AT A TOWN HAll OR OTHER PUBLIC MEETING
Here are some tips about how to arrange and prepare for a presentation at a public political gathering:

■ Determine the purpose of the event. Research the background and position statements of the official and/or organization sponsoring the public meeting and review the agenda and speaker information in advance.

■ Consider the views of your agency official and your legislator. Consider what you would want to know in...
Legislative Update
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- Prepare a few brief points that you would like to communicate.
- Use messages that demonstrate how registered dietitian nutritionists are essential in health care reform initiatives.
- Rehearse your presentation with colleagues in advance to ensure you are comfortable and convincing.
- Introduce yourself as a registered dietitian nutritionist or a dietetic technician, registered, as appropriate. If you are representing your affiliate or another Academy group, state the membership numbers.
- Leave a copy of your key message with the official and his or her staff, along with your contact information/business card. Be prepared to answer their questions or promise to get the answers.
- Offer to be a resource for the policymaker and his or her staff. You have much to offer in areas of mutual interest, and your expertise can make their jobs easier!
- Be a respectful and good listener by allowing the official to speak. Have a conversation and productive dialog.
- Be prepared to hear objections to your request. Find respectful ways to say “Yes, and……” or to refocus the topic.
- Include a personal story. Present your request, bolstered by facts and an example from your experience that includes the impact on real-life situations.
- Ask for a commitment. Closing the discussion with an anticipated response is effective. Remind them that you are there for a specific reason.

SAMPLE EFFECTIVE MESSAGES
Use the following samples as you consider your presentation:
- “I am a registered dietitian nutritionist. I work in _____ and primarily focus on ______.”
- “I am passionate/supportive about this program because ______.”
- “My background and expertise tell me that this is important because ______.”
- “We have done thorough research, and those in our profession are united on these issues.”
- “Some of the opposition you can expect on this issue include these groups and main points: (List the points and the potential groups that would be opposed to your issue).”
- “Utilizing the registered dietitian nutritionist in this health care reform program will ensure optimum success with preventive care.” (Explain how.)

FOLLOW UP
After your presentation, perform these follow-up tasks:
- Within a week of your meeting, provide any additional written material requested by your legislator. Always include your contact information along with information about your role as a registered dietitian nutritionist.
- Send a thank-you note. If you met with staff or if staff were included in the meeting, add a positive comment about their valued contribution.
- If you have questions, our professional staff in Washington, D.C. is always willing to help you (800-877-0877, 202-775-8277).

Free Access to the Institute of Medicine’s Workshop on
THE ROLE OF NUTRITION IN HEALTHY AGING

The Institute of Medicine held a two-day workshop (October 29 and 30, 2015) where it examined research, policies, and best practices about the role of nutrition in healthy aging. The Academy participated as part of the workshop planning committee. You can access the workshop’s six-session agenda (PDF), a short overview video, and recordings of the complete workshop. Learn more about the new Root Cause Coalition announced at the workshop and its multisectorial approach to address food insecurity.
AMY CAMERON ELLIS, PhD, MPH, RD, LD, is the recipient of the 2015 Healthy Aging Dietetic Practice Group (DPG) Community Based Applied Research/Best Practice Award. This grant through the Academy Foundation encourages RDNs to expand our collective knowledge base through research. An experienced clinical dietitian, researcher, and educator, Dr. Ellis has insights that highlight how each of us can make a meaningful contribution to the ever-growing body of evidence-based nutrition literature, no matter what role we play in the dietetics field.

EK: Your career path has led you through the arenas of health care, research, and education. What from those experiences have you taken into your role as an educator?

ACE: I love the overlap between health care, research, and education. We emphasize the importance of research to our students who are training to be future dietitians. Even if they have no intention of a career in research, it is crucial that they become experts in interpreting research findings for their patients and clients. We try to help our students understand that the evidence base for our practice parameters and standards of care comes directly from research.

EK: You have a BS in biology, an MPH in nutrition, and a PhD in nutrition sciences. Did you earn these degrees with the explicit intent of becoming a researcher?

ACE: As an undergraduate in biology, I had a skewed perception that research only entailed work at the laboratory bench, with test tubes and cell cultures. I never considered human-subject research. For several years after earning my MPH, I enjoyed working as a clinical dietitian in a large hospital. During that time, our medical center hosted a large outpatient clinic for individuals with various neuromuscular diseases, and I had the opportunity to participate in some ongoing research involving patients with amyotrophic lateral sclerosis (ALS). Immediately I was hooked on clinical research. Asking questions about gaps in our current knowledge, formulating hypotheses and protocols to hopefully answer those questions, and working directly with research participants are all exhilarating aspects of this field!

EK: What caused you to transition from neurodegenerative disease to aging?

ACE: My first exposure to geriatric nutrition came when I took a job as a rehab tech in a skilled nursing facility in order to pay for my undergraduate studies in biology. I was mesmerized by the roles and responsibilities of the registered dietitian in the nursing home. As I watched how her interventions impacted quality of life and health outcomes such as wound healing, I was inspired to change my career plans and pursue a master’s degree in nutrition. During my graduate program at UNC-Chapel Hill, I worked as an in-home caregiver for older adults through an organization called Helping Hands. After obtaining my RD licensure, I worked for several years as a clinical dietitian at a large medical center. Working with adults of all age ranges confirmed older adults as my favorite patient population. My early work with ALS patients taught me first-hand that quality of life and autonomy are as important as any physiological outcome, and I believe this is important to keep in mind as we work with older adults, too.

Call for Interviewees: Help Us Shine the Spotlight

We are searching for HA DPG members to interview for The Spectrum’s “Spotlight on Your Colleagues” column. Have you or a colleague walked an interesting career path? Is your practice innovating solutions for older adult clients? Do you or a colleague perform ground-breaking research? We need your help to discover individuals whose work is quietly having a positive impact on our field.

Please e-mail Robin Dahm the name and contact information of one or more individuals you would like to see spotlighted. Thank you!
EK: Could you tell us a little about your other research topics? They are pertinent to the health of older adults.

ACE: It was the work with ALS that sparked my interest in research, and a primary research interest still is to investigate nutritional influences on body composition changes associated with aging and neuromuscular disease. I became interested in hormonal influences on body composition during my doctoral work. In a 2014 study, we looked at the relationship between serum levels of 25-hydroxyvitamin D and cardiorespiratory fitness in older adult women. I also became interested in ethnic disparities, which led to research on ethnic differences in metabolic processes. In the future, I hope to investigate the interplay between all of these factors and their effects on the cardiometabolic health of older adults. The grant from the HA DPG will support research that could inform that line of investigation. The study will examine the effects of watermelon on vascular endothelial function. It is well known that vascular dysfunction increases with age, due largely to decreases in bioavailable nitric oxide and increases in oxidative stress. Watermelon is a rich food source of arginine, citrulline, lycopene, and ascorbic acid. We hypothesize that these bioactive food components may work in synergy to decrease arterial stiffness by increasing nitric oxide production and reducing oxidative stress.

EK: What led you to such a specific research topic?

ACE: In 2010, we were working on a randomized placebo-controlled trial to examine the effects of an amino acid mixture on body composition and vascular function of healthy older adults. We saw improvements in endothelial-dependent vasodilation among the treatment group, which we attributed to the arginine in the dietary supplement. We did publish those findings, and it spurred our question as to whether a natural food source of arginine and its precursor citrulline (watermelon) may show similar effects. This dietary supplement study inspired the “food-first” study we plan to pursue with the HA DPG funding. We are hopeful that the pilot data generated from the HA DPG study also may pave the way for studies examining food-first approaches to reduce cardiovascular disease risk in older adults.

EK: What other areas do you believe dietetics research will focus on in the coming years?

ACE: The rising obesity rate among middle-aged adults is concerning because more and more people will be entering older age with longstanding obesity and related comorbidities. We are still working to establish our evidence base for the best treatment of obesity in older age. I’ve always been grateful to the Academy Foundation for their support of research, and I am optimistic that the studies they encourage will grow that evidence base.

EK: On a more personal note, what would you transplant to Alabama from your home state of Illinois?

ACE: I haven’t found a substitute for Chicago deep-dish pizza. Even amidst all of the delicious food in the Southeastern United States, nothing compares!

EK: “Deep-dish” is such an efficient descriptor—short but very evocative. I now am craving pizza.

Thank you for taking the time to speak with us, Dr. Ellis! Your dedication to research and to educating tomorrow’s dietetics professionals is inspiring. It’s interesting to see how your varied experiences and research interests complement one another, and how they have led to focused studies on topics valuable to dietetics. Your wonderful encouragement can help all of us dietetics practitioners consider how we can expand our personal and collective knowledge base.

For more information about the Healthy Aging DPG Community Based Applied Research/Best Practice Award, or to apply, visit the Academy Foundation website.
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HA website: www.hadpg.org

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