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What you need to know about **celiac disease** and **gluten sensitivity**

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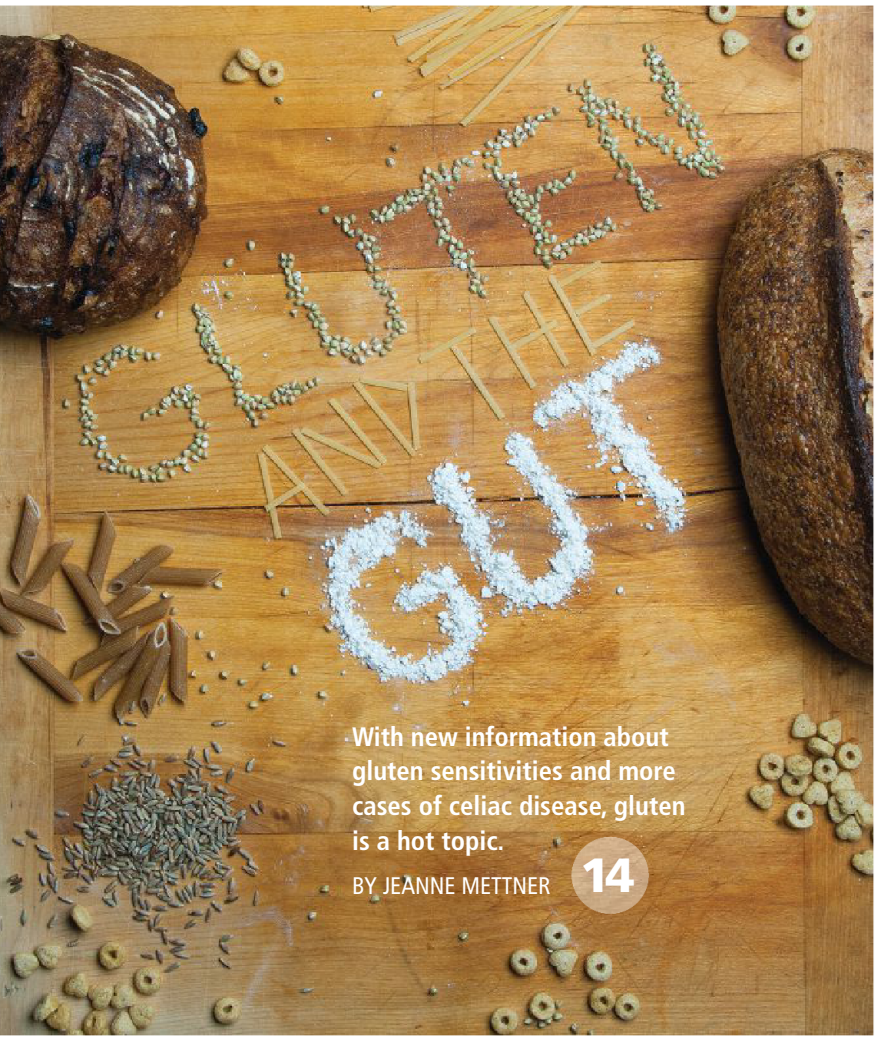

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Charles R. Meyer, M.D., editor in chief

An imprecise science

Establishing a cause-and-effect relationship between diet and disease is devilishly difficult.

On a sunny day several years ago, I lifted my then-3-year-old granddaughter onto the limb of a tree in front of my brother's California home. Fingering the green moss that covered the branch, she exclaimed, "Kale chips!" My other granddaughter, now 2, requests artichokes and mahi-mahi for dinner. My 2-year-old grandson chows down on sushi, although he never turns down cake. With a gourmet cook grandmother and parents who participate in community-supported agriculture cooperatives and seek out the latest restaurants, my grandchildren are well on their way to being third-generation foodies.

A phenomenon of the past 15 years, the foodie revolution has taken us far from my upbringing, when vegetables came from a can and fine dining meant the local steak house. Today, the emphasis is on a bewildering panoply of locally grown ingredients combined with artistic innovation and flare. Foodies believe good food and good-for-you food are not mutually exclusive.

This sounds like a gold mine for medical science, which has been struggling to find the connection between health and food for centuries. From the ancient Greeks' humor-balancing menu through Sylvester Graham's crackers to Framingham's anti-cholesterol message, medicine has always sensed that what we put in our mouths does make a difference. Although their rationales vary, many vegans and vegetarians choose their dining habits because of the perceived health benefits. The current-day sciences of dietetics and its kissing cousin, nutrition, attempt to package what we know about physiology and biochemistry into rational recipes for people with specific health issues. And medical schools are working to remedy the deficiency in the nutrition education of future doctors.

Medical schools do have more nutrition science to teach to today's future doctors. Enzymes such as ghrelin and leptin, strange inhabitants of the digestive system, were unknown when I went to medical school in the 1970s. Conditions such as gluten sensitivity have expanded the celiac disease diagnosis that was in its infancy then. And genomics is filling in the genealogy of the biochemistry of metabolism that we all learned.

Yet despite the glitz and glitter of new pathways and the promise of genomics, nutrition is still an imprecise science. Establishing a cause-and-effect relationship between diet and disease is devilishly difficult, relying on the "soft" data derived from answers to questions such as "What did you have for dinner in the last two weeks?" The dietary recommendation about butter has gone full circle at least once in my professional career. Even the calculus of obesity, which some say should be a simple "calories in, calories out" equation gets cloudier as our biochemistry gets more sophisticated. Food can get very complicated if you think too hard about it.

So three times a day, it boils down to what we should put in our mouths. In recent years, medical science has offered some clarity but has tossed in more than a little obfuscation. Until the healthy-eating advice from medical science gets a little clearer, perhaps I'll just listen to my grandchildren. **MM**

Charles Meyer can be reached at meyer073@umn.edu.

■ Food charter

Rewriting our food future

| BY CARMEN PEOTA

Some Minnesotans are aiming to do for obesity what the anti-tobacco movement did for smoking five years ago: create a new normal.

An effort is underway in the land of Jell-O salad and hot dish to ensure that people across the state have access to healthy foods so that individuals make better eating choices. One part of this massive undertaking, funded by a Centers for Disease Control and Prevention grant, is to write a food charter. The document will lay out what a new, healthier food system might look like in an attempt to get the organizations, individuals and funders who want to work on the problem of obesity pulling in the same direction. The work is being led by the Minnesota Department of Health but will involve those who grow, deliver, sell and prepare food as well as those involved in preventing, treating and paying for the health problems related to obesity.

The idea for the food charter emerged during a discussion about what could be done about the growing obesity problem, according to Lisa Gemlo, who heads the effort for the Department of Health. "We really wanted to put some work forward that brings people together, and this notion of collective impact came up," she says. "Collective impact" is a term that originated at Stanford University. It refers to the need to galvanize many people and organizations in order to address society's most "wicked" problems. "Obesity is one of those wicked problems," Gemlo says, explaining that it's multifactorial and involves individuals making choices multiple times a day. For that reason, she says, "it's probably more challenging than something like smoking."

The charter will address three questions: What is the state of the state with regard to food? Where does it want to go? And what is it going to take to get there? A draft is due by October of 2013 and a final version by September of 2014.

According to Donna McDuffie, Minnesota's nutrition coordinator, three states have food charters. Oregon's focuses solely on hunger, Michigan's on agriculture and Iowa's on policy. Minnesota's aims to encompass all three of those realms and more. But she says there is no precedent for what Minnesota is doing. "Historically, we've gone after behavior change on an individual level," she says. "We're [now] going to be looking at the whole system—from the time the food gets planted to the time it gets to the fork."

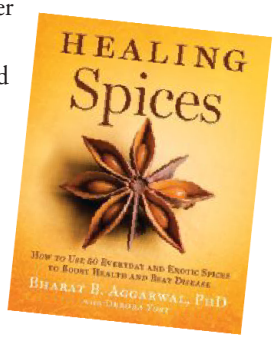
Dig in

Organizers are seeking physician input on the state's food charter. To learn more, go to healthyeatingminnesota.org.

■ Spices and health

A reason to season

A study published in *The Journal of Nutrition* in August made a surprising suggestion: that certain spices may lower triglyceride and insulin levels. Researchers at Pennsylvania State University compared the health effects of eating a spicy meal with a bland one by feeding a group of healthy-but-overweight men a meal seasoned with black pepper, cinnamon, clove, garlic powder, ginger, oregano, paprika, rosemary and turmeric. The men also ate a bland meal, and their blood was drawn prior to and after the meals. After eating the spiced meal, the men's triglyceride and insulin levels dropped 20 percent.



The Penn State researchers aren't the only ones intrigued by the relationship between spices and health. In his book *Healing Spices: How to Use 50 Everyday and Exotic Spices to Boost Health and Beat Disease,* Bharat B. Aggarwal, Ph.D., a professor in the department of experimental therapeutics at the M.D. Anderson Cancer Center in Houston, also looks at the connection. He cites research that shows that in places where people consume more spices, they tend to have a lower incidence of chronic diseases such as cancer, heart, disease, diabetes and Alzheimer's disease.

■ Childhood obesity

Promoting the healthy life

| BY KIM KISER

Ten years ago, when pediatrician Julie Boman, M.D., was working in a county hospital in Oxnard, California, she was struck by the number of overweight and obese Latino children in her practice. "We were seeing illnesses in them that you would see in adults—type 2 diabetes, high blood pressure, fatty liver, dyslipidemia—and we were running across those commonly," she recalls.

She noticed the same problem in the same population when she began practicing at Children's Hospitals and Clinics of Minnesota's Minneapolis clinic nearly seven years ago. Over the years, she realized the way to improve children's health was to target their families. "Without the family's involvement, kids won't change on their own," she says.

With a small grant from the National Initiative for Children's Healthcare Quality and help from the Minnesota Chapter of the Academy of Pediatrics, Boman created *Vida Sana* (Healthy Living) Minneapolis, which kicked off in July with a health fair at Children's that featured health screenings for adults, information on nutrition and stress reduction, and Zumba classes for kids. "We thought we would get 100 people. But we had more than 200. Entire families showed up," she says. "We realized how hungry people are for information, and we started growing the program from that event."

Boman says between 20 and 30 families have consistently participated in Wednesday evening Zumba classes at Waite House and the Phillips Community Center. In addition, *Vida Sana* Minneapolis has sponsored nutrition classes tailored to Latinos, which discuss ways to make fruits and vegetables more interesting to kids, sources of healthy protein, the importance of drinking enough water and portion size.

Boman says *Vida Sana* Minneapolis will continue thanks to funding from a Children's/HealthPartners collaborative. She plans to evaluate its effectiveness by comparing pre- and post-program BMI measures for all participants age 2 and older, monitoring their weight, tracking participation, and having them complete a questionnaire about fruit and vegetable consumption, the amount of water they drink, and the amount of time they spend doing physical activities and watching television.

"When it comes to the issue of childhood obesity, we can't do it all in clinic," she says. "We need to teach families how to stay healthy."

Best hospital food

Medical students and recent graduates rate the food at Twin Cities hospitals.

| BY KIM KISER

Hospital food gets a bad rap—and sometimes rightfully so. Hospitals have a reputation for serving overcooked veggies, soggy salads and saltless sauces. In fact, "hospital food" is a euphemism for all that is textureless, tasteless and anything but fresh. In order to combat the image, some facilities have attempted to make their offerings better tasting and better for you.

We asked medical students and recent graduates, all of whom have seen their share of hospital cafeterias during their rotations, to play food critic and tell us about what they've encountered. Here are some of their responses.

Best breakfast

HENNEPIN COUNTY MEDICAL CENTER (HCMC). "Their prices are the same as or less than other places, and they serve generous portions. AMAZING biscuits and gravy and, most important, really good coffee."

UNIVERSITY OF MINNESOTA FAIRVIEW. "Fairview has the best sausage-and-egg breakfast sandwiches. They're along the lines of a sausage McMuffin, but fresher and way tastier!"

Best fast-food restaurant in a hospital

SUBWAY AT FAIRVIEW RIVERSIDE. "It just makes sense to have a healthy option in a hospital. Also it makes the entryway smell so delicious that I can't walk to work without getting hungry."

Best places for vegetarians and vegans

ABBOTT NORTHWESTERN HOSPITAL. "They always have a vegan option in their hot bar. Although it is limited to tofu, at least it's something warm and not just a salad. In general, they also have really fresh vegetables, and you can add them to stir fries."

HCMC. "The noon conferences always had at east one vegetarian option, and that was fantastic! I am not sure whether the main cafeteria catered those conferences, but the food was always hot and often vegan."

What to try

Students recommend the following:

- **BISCUITS AND GRAVY** at Hennepin County Medical Center
- **CHICKEN QUESADILLA** at Fairview Riverside (Amplatz Children's Hospital)
- The **MONTE CRISTO SANDWICH** at Methodist Hospital
- The **POBLANO SOUP** with a **GRILLED HAM AND GOUDA SANDWICH** at Ridgeview Medical Center in Waconia
- **FRENCH SILK PIE** at Methodist Hospital
- **PAD THAI** at Fairview University Medical Center

Menu planning

When asked what they would like to see in hospital cafeterias, our students and recent graduates were clear that they would like to see more ethnic offerings. While specifics such as Chinese dumplings, sushi, and falafel were mentioned, others said they would like to see a make-your-own burrito bar as well as Indian and Thai foods.

They'd also like to see hospitals do better at labeling their foods so that vegans and vegetarians or those with other dietary desires or needs can know what ingredients are in the offerings.

Finally, they said they want more healthful options than chips, candy bars, burgers and fries.

Best salad bar

CHILDREN'S HOSPITALS AND CLINICS OF MINNESOTA, MINNEAPOLIS. "They recently renovated their cafeteria and they offer a fabulous fresh salad bar along with a gourmet sandwich bar."
HEALTHEAST ST. JOHN'S. "They have a big salad bar with a good variety of fresh vegetables."

Best made-to-order items

REGIONS HOSPITAL. "The make-as-you-wait food, especially the pasta bar, is delicious."
CHILDREN'S, MINNEAPOLIS. "They offer a make-your-own stir fry and pasta bar, where the ingredients are fresh."

Best ethnic cuisine

UNITED HOSPITAL. "They have an ethnic cuisine line, and I always look forward to the item of the day, ranging from some Japanese noodle soup to a mango salsa chicken burrito. It made me feel like I was dining out."

Best places for dessert

REGIONS HOSPITAL. "They have the most delicious and attractive bakery items. Every day, they have a fancy cake. In fact, when a friend of mine moved to town and asked where he could buy a good red velvet cake for his wife's birthday, I said, 'Regions Hospital's Overlook Café.'"
METHODIST HOSPITAL. "They have an amazing French silk pie that is to die for!"
THE DOCTORS' LOUNGE AT CHILDREN'S IN ST. PAUL. "They have a lovely assortment of Keurig coffees and delicious chocolate chip cookies to go with it."

Best place to fend off the late-night munchies

UNITED HOSPITAL/CHILDREN'S HOSPITALS AND CLINICS OF MINNESOTA, ST. PAUL. "The cafeteria has a late-night omelet bar once a week, which is awesome if you're on the night shift."

Best places to eat on a trainee's budget

CHILDREN'S IN MINNEAPOLIS. "As students and residents rotating at that site, we were given a per diem, which allowed us to get free food."
METHODIST HOSPITAL. "Methodist is good because it is unlimited food. Other rotations give you only so much money or so many meals."

Best places to eat (overall)

REGIONS HOSPITAL, **CHILDREN'S IN MINNEAPOLIS** and **HCMC** were consistently mentioned.

Thanks to the following students and residents who responded to our questions
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Dietitian or nutritionist?

What's the difference between these professionals? | BY HOWARD BELL

When physicians need to refer patients for a nutrition consultation, should they refer to a licensed registered dietitian (RD, LD) or a licensed nutritionist? The reality is that they are far more likely to refer to a dietitian simply because there are considerably more of them (1,464) than there are licensed nutritionists (80) in Minnesota.

Both are trained in human physiology, biochemistry and metabolism, and both understand how sugars, carbohydrates, proteins, fats, vitamins, minerals, trace elements and other micronutrients affect our health. "But only an RD is trained to directly work with patients and provide medical nutritional therapies to treat or manage a medical condition," says Greta Farley, RD, LD, spokesperson for Minnesota's Academy of Nutrition and Dietetics.

Registered dietitians

Registered dietitians tend to be employed by hospitals and clinics, where they work with physicians and other health care professionals to create nutrition plans. They also work directly with patients and their families or caregivers. Along with helping patients lose or gain weight, they might work with them to get their blood pressure or cholesterol under control through dietary measures. They might teach people with diabetes how to count carbs, read a nutrition label and match their carb intake with their insulin intake. And they might work with individuals with cancer or gastrointestinal diseases or those who've had bariatric surgery to improve outcomes and reduce the chance of complications. "Physicians facilitate this by referring patients to an outpatient dietitian in their area," Farley says.

Registered dietitians must complete a degree program that encompasses didactic training for dietetics accredited by the Accreditation Council for Education in Nutrition and Dietetics. Those programs, usually bachelor's programs in dietetics or nutrition, include courses on general and organic chemistry, biochemistry, physiology, medical nutrition therapy, nutrition education and counseling, and sociocultural nutrition. Farley says a bachelor's program in food science doesn't include the necessary didactic classes, and, therefore, is not adequate for the RD path.

After they earn their B.S. degree, students are eligible to do a dietetic internship, which requires 1,200 hours of supervised training in clinical, community and food service settings, according to Carrie Earthman, Ph.D., RD, LD, director of the University of Minnesota's Didactic Program in Dietetics. She says the process of getting an internship is highly competitive—about half of the applicants get a slot the first time they apply. Those who do not match the first time will usually apply a second time, often after gaining more work experience as a dietetic technician or dietary aide in a hospital or long-term care facility or in another nutrition-related position. "This improves their chances of being accepted," she says. Those who complete an internship are eligible to take the national certification exam to earn their RD credential from the Academy of Nutrition and Dietetics. If graduates don't complete an internship, they can't be dietitians. Those who don't get their RD credential sometimes work for industry developing recipes in test kitchens, developing food labels and/or doing research.

Although RDs need only complete a bachelor's degree, many who are practicing in Minnesota also have graduate degrees or specialty certifications, Earthman says. The academy offers certification in gerontology, sports dietetics, pediatrics, renal medicine, oncology, diabetes and nutrition support.

In addition to being registered nationally, Minnesota RDs are licensed by the Minnesota Board of Dietetics and Nutrition, hence the "RD, LD" on their nametags. To maintain their LD status, dietitians must complete 45 continuing education credits every three years.

"Licensing is how states protect the public by ensuring that practitioners are qualified and maintain appropriate continuing education," Farley says. However, not all states license RDs.

Licensed nutritionists

Minnesota's Board of Dietetics and Nutrition also licenses and credentials nutritionists. "'Licensed nutritionists' are held to the same standards as dietitians," says Randy Snyder, executive director of the board. But licensed nutritionists travel down a different training path. They must complete at least a master's degree in nutrition plus have 900 hours of supervised experience before they can become licensed in Minnesota, according to Snyder. "Licensed nutritionist is a protected credential for people who've met the requirements," he says.

The University of Minnesota-Twin Cities offers master's and doctorate degrees in nutrition, according to Earthman. These programs place greater emphasis on understanding research methods and conducting studies than undergraduate programs in nutrition or dietetics.

In Minnesota, almost all licensed nutritionists have their RD credential. Earthman says many of them work as dietitians in hospitals and clinics. "Others go straight to research positions at universities and industry." Individuals who earn their Ph.D. degree and the RD credential, usually teach or serve as program directors for didactic programs in dietetics at universities.

Nutritionist versus licensed nutritionist

The title "nutritionist" is not protected, which means it's perfectly legal for anyone to call him or herself a "nutritionist" as long as he or she doesn't bill for services or use the term "licensed," Farley says. A person calling him or herself a "registered nutritionist" is suspect, she says, explaining that in Minnesota there is no such thing.

Snyder says the board gets about four to six complaints each year about unlicensed people presenting themselves as nutritionists who don't have the educational background or credentials prescribed by law and who are offering medical nutrition advice for a fee. "We investigate every complaint we receive, but we haven't seen the problems other states see," he says, "partly because some other states don't license nutritionists like we do."

Snyder says the board only goes after people posing as science-based nutritionists. That leaves many people offering nutrition advice who may have some basic information but aren't qualified to do medical nutrition interventions.

"Massage therapists, fitness coaches, chiropractors and nutritional enthusiasts selling vitamins and supplements are sometimes the primary source of nutritional advice for people who have complex medical nutrition conditions such as cardiovascular disease and diabetes," she says. "It's a fairly pervasive problem in Minnesota that concerns us," she says.

Farley says physicians can help make sure that patients who need a nutrition assessment or counseling get qualified help. "Ask your patients where they're getting their nutrition advice," she says. "Encourage them to speak with an RD at their clinic."

If a clinic doesn't have an registered dietitian on staff, some grocery store chains do. Farley, for example, works for Hy-Vee Foods in Worthington. "I get many referrals from physicians who send their patients to see me in the grocery store," she says. "I help them manage or overcome medical conditions by helping them prepare meal plans and select appropriate foods." **MM**

Food for thought

Medical students are learning more about nutrition than in the past, but is it enough?

| BY SUZY FRISCH

With the obesity rate in the United States expected to climb from 35 percent of the population to 44 percent by 2030, diet and nutrition are more top of mind than ever. Yet future doctors might not be learning as much as they need to about nutrition to know how to guide patients.

The issue isn't new. The journal *Academic Medicine* caused a stir in 1985 when it published the results of the first comprehensive assessment of nutrition education in U.S. medical schools. The article reported that fewer than 28 percent of medical school graduates received the minimal amount of nutrition education recommend by the National Academy of Sciences, which was 21 hours at the time. After that, many medical schools—including those in Minnesota—added more on the topic to their curricula and changed the way they approached the subject. But there's still concern that it might not be enough. More than half of medical school graduates rated their nutrition knowledge as inadequate, according to a 2005 survey by the American Association of Medical Colleges. Other studies have also shown that physicians believe they don't learn enough about nutrition to counsel patients.

"I would say that in medical schools across the country, nutrition isn't taught adequately," says Alan Johns, M.D., an internal medicine physician and assistant dean for medical education and curriculum at the University of Minnesota Medical School–Duluth. "As practicing physicians and medical educators, many of us don't feel comfortable with it. It's one of the topics we could do better on, and it's not for lack of trying. We do need to look at better ways to teach it."

Nutrition in the classroom

In 1985, medical students received approximately 19 hours of instruction about nutrition during their four years of school. Although that increased to 22.3 hours in 2004, it has since declined. A 2009 survey found the average number of hours of nutrition instruction was back down to 19.6 hours.

One of the challenges has been figuring out how to teach medical students about the subject. Students need to understand the basic science of digestion, the science of weight regulation, the role of vitamins and minerals, metabolism and metabolic deficiencies, physiology and how the gastrointestinal system works. But they also need to know how to apply that knowledge in a clinical setting. For that reason, Minnesota's three medical schools report that professors are integrating the subject matter into other topics.

At Mayo

First-year students at Mayo Medical School learn about such nutrition basics as vitamins and metabolic deficiencies. In their second year, they learn about hormones, metabolism, body weight regulation, energy expenditure and more during a segment on endocrinology, says Kurt Kennel, M.D., an endocrinologist and assistant professor of medicine. They also study vitamin and mineral absorption, nutritional deficiencies and the overall functioning of the gut in a section on gastroenterology. In their third year, students study preventive medicine, which covers obesity, cardiovascular disease, behavioral change and public health among other topics, says Joseph Grand, M.D., a professor of pathology and associate dean for curriculum at Mayo.

To make the nutrition information more clinically relevant, lectures involve endocrinologists, psychologists, surgeons and dietitians along with patients who have contended with issues such as diabetes or obesity. "They give a strong sense of the broad nature of the problem," Kennel says. "It's not just a simple, 'Eat less and exercise more.'"

At the U

In recent years, the University of Minnesota Medical School has revised its curriculum, including its approach to teaching nutrition. After getting feedback from graduates who said they weren't learning enough about the topic, the medical school added a series of lectures on nutri-

tion, says Majka Woods, Ph.D., assistant dean for assessment, curriculum and evaluation on the Twin Cities campus. As at Mayo Medical School, nutrition is now covered more explicitly during students' first two years—the basic science years—when they learn about the digestive and endocrine systems, the mechanics of metabolism, obesity and weight loss, nutritional deficiencies, and the role of diet and nutrition in public health. In the third year, they learn how nutrition can help prevent disease.

Woods says the medical school essentially doubled what it was covering related to nutrition. It now dedicates 20 hours to nutrition education during the first two years and incorporates it into other topics throughout the four years. She says faculty aim to present information and tie it to case studies or problems for students to solve.

"Nutrition had been taught in our curriculum, but the clinical relevance wasn't as strong as it could have been," Woods says. "Now what we hope is that students don't just see nutrition for three lectures in year one. We'd like to see nutrition taught several times throughout their medical education, and that it builds on itself so that students become more savvy as they get more immersed in the clinical world."

At the Duluth campus, medical students spend about 41 credit hours out of 2,000 on nutrition—not an insignificant number—with 25 hours being taught in the first year and 16 in the second, Johns says. Students learn about everything from vitamins and cholesterol to metabolism, energy, and the role of fiber and antioxidants. Instructors also integrate discussions of nutrition with other topics such as gastroenterology.

Because many Duluth students are training to practice in small or rural communities, where they'll need to work with patients on issues such as diabetes, undernourishment, weight loss and preventive care, the goal is for them to learn in a way that will help them more easily retain information, Johns notes.

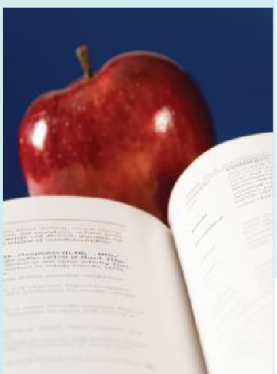
"Nutrition is very complex, and at a basic science level it's very interesting how it all interacts," he says. "Students need to know the basic science of nutrition, and we certainly teach that. But they also need the patient-centered approach to nutrition."

There's no question that medical schools will continue to finesse what and how they teach future doctors about nutrition. Physicians in all specialties can influence their patients' decisions about what they eat. "It's been shown that when physicians engage patients regarding wellness, it does change their behavior," Kennel says. "If they [students] aren't competent in the basics, it's pretty clear it will affect patient outcomes."MM

Comparing notes

In contrast to medical students, students at Northwestern Health Sciences University's College of Chiropractic in Bloomington do about 90 hours of coursework in clinical nutrition, covering nutrient metabolism and nutritional management to tackle common health problems seen in a chiropractic practice, says Renee DeVries, D.C., dean of the college.

"Chiropractic education has always taken a wellness approach to patient care, considering the patient as a whole," she says, adding that the school altered its approach as society began to focus more on disease prevention, obesity and diabetes. "There has been a greater focus in our curriculum on public health and the role chiropractors can play in a team-based approach to health care."—S.F.



A leg up on nutrition

Biology, chemistry, microbiology—these are typical majors for students who plan on applying to medical school. The University of Minnesota offers another option that gives students a strong basic science background with an additional focus on nutrition. The nutrition science major, found in the College of Food, Agricultural and Natural Resource Sciences, also serves as a gateway for undergraduates who plan to head to medical, dental, or pharmacy school or other graduate programs.

In the nutrition science program, one of three nutrition tracks (along with nutrition studies, which requires fewer science course, and a didactic program for those who want to become dietitians) offered by the Department of Food Science and Nutrition, students take two semesters of organic chemistry, two of physics, as well as courses in biology, biochemistry, microbiology and physiology. They also take at least 25 credits in nutrition, covering topics such as life-cycle nutrition, advanced human nutrition and metabolism, says David E. Smith, Ph.D., a professor in the food science and nutrition program and chair of the undergraduate program. About 20 students a year graduate from the nutrition science program. Between 1 and 2 percent go on to medical school.

"I think it's a great foundation for medical school," Smith says. "It's got a heavy-duty track from a math and science perspective, and it's fairly flexible in its required courses. It's a degree that sets students up well for post-baccalaureate programs."—S.F.

With new information about gluten sensitivities and more cases of celiac disease, gluten is a hot topic.

BY JEANNE METTNER

About five years ago, packages with labels containing the words "gluten-free" began showing up on grocery store shelves, gluten-free bakeries popped up on street corners, and gluten-free options were highlighted on restaurant menus. Suddenly, it seemed, gluten-free foods were everywhere.

Why their popularity? It isn't possible to pinpoint exactly what sparked the trend. However, University of Maryland researcher Alessio Fasano fanned the flame when he published a study in *Annals of Internal Medicine* in 2003 that estimated that one in 133 people in the United States had celiac disease, far more than anyone had expected. In another study published that same year, Mayo Clinic's Joseph Murray, M.D., found a dramatic increase in the rate of diagnosis of celiac disease between 1950 and 2001.

Following the publication of those studies, patients began asking their doctors whether the bread and pasta they were eating were having an effect on how they were feeling, and doctors began ordering more tests for celiac disease, which resulted in an increase in the number of patients diagnosed with it (something Fasano predicted). Then celebrities such as singer Miley Cyrus, who has a wheat allergy, and actress Gwyneth Paltrow, who has celiac disease, called attention to the benefits of a gluten-free diet. Capitalizing on the growing interest, companies such as Kellogg's, General Mills and even Anheuser-Busch started turning out more gluten-free products. According to market research firm Packaged Facts, the market for gluten-free products is now $4.2 billion.

Researchers also have been studying whether some people have a sensitivity to gluten that is neither an allergy nor celiac disease. And in the last few years, medical journals have been publishing a spate of articles describing "nonceliac gluten sensitivity" or gluten intolerance.

With so much new information about gluten, physicians may be among those with questions. Although they may be aware of wheat allergy and celiac disease, they may not know about the latest research on gluten intolerance. "There is rather robust peer-reviewed literature regarding the positive effects of a gluten-free diet in gluten-sensitive people," says Greg Plotnikoff, M.D., an integrative medicine physician at Allina's Penny George Institute for Health and Healing. "I am not sure if they are aware of it—or if they are, if they are counseling on the basis of that information."

Here we lay out what is straightforward, what is nuanced, and what is new about gluten and its effect on health.

Wheat allergy

Wheat is considered one of the "big eight" foods that can cause anaphylaxis in people who consume it. The other seven foods are dairy, soy, peanuts, tree nuts, eggs, fish and shellfish. Altogether, these eight foods are responsible for up to 90 percent of all food allergy reactions in the United States.

Because those who are allergic to wheat (or something in wheat) typically exhibit an immediate reaction including rashes, swelling of the lips and tongue, and anaphylaxis that can be life-threatening, wheat allergies are usually easier to pinpoint than celiac disease and nonceliac gluten sensitivities.

Wheat allergies, which are IgE-mediated, are diagnosed through skin and other testing. Once it is determined that a person has an allergy, he or she must avoid eating wheat. Most children with wheat allergies outgrow them by age 12; but some people must avoid wheat throughout their life. True wheat allergies are fairly uncommon. The prevalence rate among children is estimated to be only about 0.4 percent in the United States; it's even less in adults, according to a

Gluten is made up of the proteins gliadin and glutenin and is found in the endosperm of wheat.

2011 *Journal of the American Academy of Dermatology* article.

Celiac disease

Celiac disease, also called celiac sprue, is an inflammatory condition in the intestine triggered by gluten consumption. When someone with celiac disease eats gluten, the immune system sets up a strong response within the intestine—breaking down the tiny microscopic hairs, called villi, in the intestinal wall. "The purpose of having these villi is that they greatly expand the working surface of our intestine," says Joseph Murray, M.D., a gastroenterologist at Mayo Clinic. "As the intestinal damage occurs, it shrinks down those villi, so instead of having this deep-pile carpet in the intestine, you have a tile floor, and when that happens, it dramatically reduces the ability to digest and absorb what we are eating."

Celiac disease and gluten sensitivity are associated with a variety of symptoms including abdominal pain, diarrhea, migraines, joint pain, fatigue, gastric reflux, "brain fog," mental health issues and behavioral problems, Plotnikoff says. Physicians should suspect celiac disease if a patient has symptoms that persist, if they have a relative who has celiac disease and if they have ruled out other conditions that may be causing those same symptoms such as colon cancer or a gastrointestinal infection.

Celiac disease cannot be confirmed without a biopsy of the small intestine, but laboratory tests now enable doctors to screen for it more readily in the blood. These tests detect 1) antibodies that are directed to tissue transglutaminase (TTG) and 2) antibodies directed against deamidated gliadin, the most immunotoxic peptide in wheat. The TTG test is the most useful one for celiac disease. In some cases, however, patients may lack the immunoglobulins (IgA) that would make antibody markers. In those cases, IgG immunoglobulin-based testing is necessary. "If one or more of these tests are positive, the gold standard is still to do a biopsy, which can confirm celiac disease by identifying lymphocytes in the mucosa and flat or damaged villi in the small intestine," says Roger Gebhard, M.D., a gastroenterologist with HealthPartners and a professor of gastroenterology at the University of Minnesota.

1.8 million Americans have celiac disease and 1.4 million of them are unaware that they have it.

Murray believes celiac disease is indeed becoming more common. In his 2003 study, he and his team compared blood samples from Olmsted County residents with celiac disease taken between 1950 and 2001 and found a nine-fold increase in incidence rates, from 0.9 percent in 1950 to 9.1 in 2001. The researchers not only found a dramatic increase in the rate of diagnosis among adults (previously, the disease had been considered one of children), but they also challenged thinking that the disease is rare in North America. Several years later, they began investigating prevalence estimates in the United States. In one study, they took serum samples from 7,800 patients who had participated in the National Health and Nutrition Examination Survey between 2009 to 2010, then asked them to report on whether they were following a gluten-free diet. On the basis of this information, Murray and his team estimated that 1.8 million Americans have celiac disease, and that 1.4 million of them are unaware that they have it.

The reasons for lack of awareness are multi-fold: Many people who have the condition may have no symptoms, or they have had symptoms their entire lives and thus consider them to be "normal." The manifestation of celiac disease also can be vague and/or mimic conditions that may seem unrelated to the gastrointestinal system such as infertility, dermatitis, neuropathy and cerebellar ataxia. Plotnikoff says celiac disease was once thought to be a childhood illness marked exclusively by failure to thrive, weight loss or diarrhea. However, experts now know that it can be diagnosed at any time in life.

Individuals with celiac disease have HLA class II genes known as HLA-DQ2 and/or HLA-DQ8 located on chromosome 6p21. Because 40 percent of the population has one of those genetic markers and only 1 percent gets celiac disease, something must trigger the disease.

"One of the most interesting things about celiac disease is when it decides to declare itself," Gebhard says. "The trigger could be an event that's hard on the intestines—such as a bout of Norwalk virus—or consumption of an overload of wheat. Whatever it is, that trigger breaks down the lining of the small intestine and allows the gluten to cross it. When that happens, gluten suddenly becomes an antigen, which causes the damage to occur."

But that damage is not necessarily irreversible. A gluten-free diet allows the intestine to repair itself, and when that happens, many of the symptoms improve. In children, healing can take place within weeks, Murray notes. In adults, it can take years. Left undiagnosed, however, celiac disease is associated with myriad conditions including lymphoma, GI cancers, osteoporosis, osteopenia and iron-deficiency anemia. Murray says other

conditions such as type 1 diabetes, hyperthyroidism and hypothyroidism may be associated with the disease as well. "But excluding gluten from the diet will not make those conditions go away," he says.

Gluten intolerance

Some patients who do not have a wheat allergy or celiac disease still complain of symptoms after consuming gluten. The term "nonceliac gluten sensitivity" has been suggested for this condition. Those individuals are said to be gluten-intolerant or gluten-reactive.

Prevalence data for gluten intolerance is murky because it cannot be conclusively diagnosed through blood tests, biopsy or other means. Still, the absence of screening capability should not be a reason to disregard patients' concerns. "Many people just don't absorb and digest wheat proteins and wheat carbohydrates well, and that can certainly cause symptoms, even if they have not been diagnosed with celiac disease," Gebhard says.

The causes of nonspecified gluten intolerance are being explored. As part of Mayo's Microbiome Project (see "Studying Our Bugs"), Murray and his team are shedding light on what he calls "the no-man's land between irritable bowel syndrome and celiac disease." Specifically, they are comparing gut bacteria in patients with IBS who eat a normal diet with that from patients who eat a gluten-free diet. "Gluten intolerance is not something that is always necessarily made up," he says. "There is real evidence that it can occur. What's lacking are the tests to identify it." If a physician suspects gluten intolerance is a problem (for example, if a patient has persistent symptoms and high values in one of the four blood tests for celiac disease), he or she should screen for celiac disease. After ruling it out—and perhaps ruling out other conditions such as Crohn's disease and ulcerative colitis, they should consider nonceliac gluten intolerance or IBS. If switching to a gluten-free diet doesn't help the patient, they may test for sensitivities to other "big eight" foods through elimination diets.

Murray notes that eventually research could show that nonceliac gluten intolerance does not involve gluten at all. "Wheat has more genes than humans have," he says. "We've assumed it's gluten because gluten causes celiac disease, but that's not necessarily the case with nonceliac gluten intolerance. It could be a totally different part of wheat. Hopefully research will help us reveal if that's the case."

Managing patients

Experts acknowledge that managing patients with nonspecific GI symptoms can be frustrating. "When you have 20 percent of patients come in with GI symptoms that they would classify as ir-

Studying our "bugs"

At this very moment, they are stirring within us: tiny bacterial microbes that live next to the cells in our body, communicating with them, watching out for them, and, when necessary, protecting them from invaders while keeping our immune responses in check. These microbes, collectively known as our microbiome, outnumber our human cells exponentially (the human body is made up of about 1 trillion human cells; we have as many as 100 trillion bacterial cells). These microbes line the skin, mouth and respiratory system; but the largest concentration resides in the gastrointestinal tract. Not surprisingly, researchers are learning they can affect our health.

"Throughout our lives and with help from the genes of our mothers and fathers, we have cultivated a set of bacteria—'bugs' if you will—with which we have a symbiotic relationship," explains Joseph Murray, M.D., a gastroenterologist at Mayo Clinic. "Most of the time, we are good for our bugs and our bugs are good for us; but sometimes we start to react against them because of our own makeup."

Through the Microbiome Project at Mayo Clinic's Center for Individualized Medicine, Murray and his and team are investigating the role of the intestinal microbiome in certain cancers, autoimmune diseases and conditions linked with gluten sensitivity. For the past two years, Murray has been exploring the differences in flora composition between patients with celiac disease, patients without celiac disease, and patients who have gluten sensitivity but don't have celiac disease. They are also comparing the microbiome of patients with irritable bowel syndrome who consume a normal diet with that of those who eat a gluten-free diet.

Murray is impressed with the observations yielded thus far. "We know that the microbiome in a person with celiac disease is a little different from [the microbiome of] those who do not have it; but what we are trying to understand is what the trigger is that leads to that change," he explains. "Even with gluten sensitivity in general, we are asking, Is the gluten causing the direct change in the gut, or is the gluten altering the microbiome and the microbes themselves are causing the damage? That's the focus of our ongoing work."—J.M.

ritable bowel, your mind can kind of go numb," Gebhard notes. "The problem occurs when you don't come out of that, when you think, 'You have IBS symptoms … well, so does everyone else.' And they can't help, so they just stop listening."

His advice is if the patient has not been off gluten, do some blood work. (Those who are on a gluten-free diet but have celiac will have a false-negative response.) If the person is on a gluten-free diet or the anti-TTG test turns out negative and their symptoms continue, consider a gut biopsy to rule out esophagitis, *H. pylori,* ulcerative colitis or Crohn's disease. If a person is experiencing symptoms outside the gut such as rash, migraines, joint pain and neuropathy and diagnostic tests rule out other causes, consider celiac disease. "Think about celiac, and include it in your differential diagnosis," Gebhard says. "Just put it in the equation, and if you do the tests and nothing comes up, perhaps you can even talk about pursuing an exclusion diet to determine what they may be reacting to."

In regard to managing a patient with celiac disease, Murray and others advise acknowledging celiac disease for what it is: a chronic condition that requires ongoing management. "Detect it through blood tests, confirm it through a biopsy, refer them to a dietitian, and then most important, follow up," he says. "We would never give a prescription to a patient with hypertension and say, 'Good bye and good luck,' and yet that's what doctors often do with patients who have celiac disease. Following up illustrates the doctor's interest in the patient's condition, helps them monitor patient compliance, and confirms the level of response to the gluten-free diet." **MM**

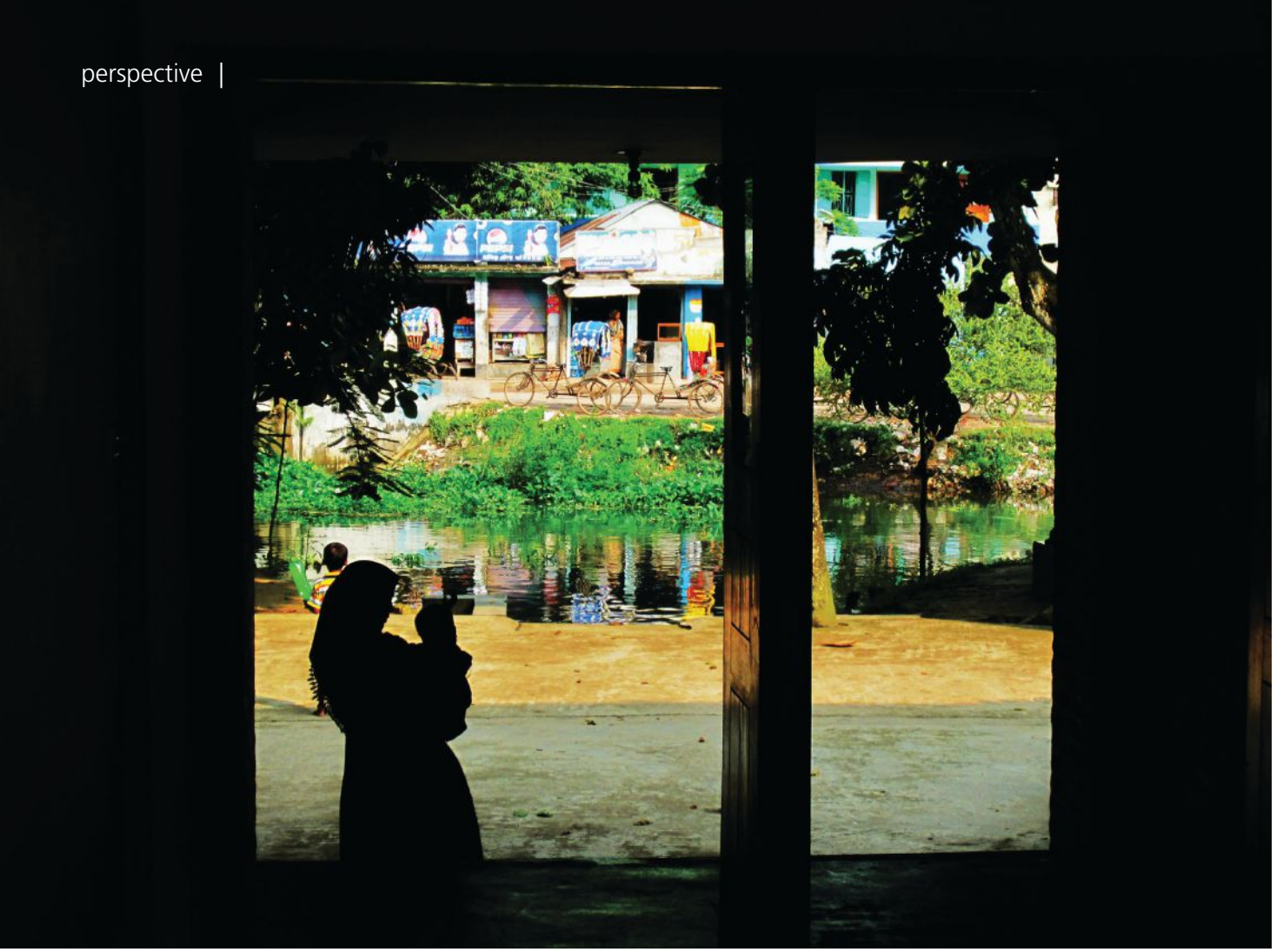
Jeanne Mettner is a Minneapolis writer and frequent contributor to *Minnesota Medicine.*

The **gluten-free catch 22**

While conducting research on the prevalence of celiac disease, Joseph Murray, M.D., a gastroenterologist at Mayo Clinic, happened upon an equally fascinating finding: An estimated 1.6 million people in the United States are on a gluten-free diet even though they have never been diagnosed with celiac disease.

Although Murray did not examine why these individuals went gluten-free, he has theories based on his own clinical experience. "About a third are on it because it makes them feel better," he says. "Some are on it because they think they'll lose weight. Some are on it because they think gluten's bad for them. So the lack of gluten in their diet becomes a 'nocebo' effect—the opposite of a placebo effect: they don't take something and they feel better because of it. And then there are some who eliminate gluten purely of fashion."

The gluten-free trend could be a double-edged sword, though, for those who have celiac disease or a sensitivity to gluten. On one hand, Murray says, more gluten-free foods are available—and that commercial interest improves options for those who must plan their lives around a medically mandated gluten-free lifestyle. But he notes there is a danger of not understanding how important it is that foods truly be gluten-free. "We see these offerings of gluten-free foods that are actually being cross-contaminated because they are being prepared in an environment filled with flour and gluten," he says. Oats, for example, are gluten-free but often are contaminated. A gluten-free pizza crust shipped to a restaurant may be contaminated by the flour it is exposed to when it is handled by cooking staff. "These foods are not suitable for celiac patients, and that's not always understood by the people who are serving them."–J.M.



A mother and child outside Matlab Hospital in Chandpur District, Bangladesh.

Death by poverty

How a cough can become a catastrophe.

Essay and photos by Russell A. Johnson

Rounds were business as usual in the Special Care Ward the morning it happened. All eight beds were occupied by Dhaka Hospital's most critically ill patients, many of whom were children. Our first patient was a child with pneumonia who also had blisters characteristic of pemphigus covering his body. Next to him was a patient gravely ill with *Salmonella pneumonitis* and pericarditis. Remarkably, another child was recovering from her second bout in a month of sclerema neonatorum, a condition that is almost always fatal even in the best of settings. Fresh out of my third year of medical school in the United States, I was at first fascinated by the unique pathologies in Bangladesh. But any intrigue I felt quickly dissipated as I began to witness the pain and suffering these diseases caused our patients and their families.

Midway through rounds, we came to a boy of 7 months who had presented to the hospital three days earlier with diarrhea and a cough. He was horribly malnourished. That morning, he was tachypneic, using accessory respiratory muscles to gasp for air. Rapidly progressive pneumonia, the attending said. The previous night, the boy's blood pressure had dropped suddenly and precipitously. Several boluses of fluid restored his blood pressure, but the extra fluid was too much for his young heart, which was failing. The attending decided to change antibiotics, and if the child's arterial pCO2 exceeded 80mmHg he would intubate him.

We moved on to the next patient but were quickly interrupted by a mother's shrill cry. I turned in the direction of the boy to watch his heart rate drop from 150 to 50 to not registering on the monitor. One of the junior Bangladeshi doctors started chest compressions, while a nurse began ventilating the child. Feeling helpless, I looked both at the chaotic scene around the boy and at his mother, who lay on one of the unused cholera cots, wailing through a Bangladeshi song. The first round

> The boy's death was caused by rapidly progressive pneumonia. The origin of that pneumonia was poverty.

TOP: A traffic jam in Dhaka. MIDDLE: A cholera cot. BOTTOM: An ambulance outside Matlab Hospital.

of CPR and epinephrine had no effect on the child's pulse. Another was given in hope of restoring his circulation; but both the second and third rounds failed to produce a pulse. According to hospital guidelines, we were supposed to give up. In desperation, the attending ordered one more round. When that failed, he ordered yet another. The child quickly went from being alive and breathing into cardiopulmonary arrest and dying. The team pulled away. The nurses disconnected the lines and tubing. The boy's mother lay sobbing in the cot. When she finally did see her son, she let out cries I am certain were heard far beyond the ward.

I always imagined I would cry the first time I saw a patient die; but I did not even react. I felt numb. At the end of rounds, the Bangladeshi attending pulled me aside to explain the pathology behind this boy's death. These patients, he said, collectively referring to the children who die of rapidly progressive pneumonia, present malnourished with what seems to be minor respiratory distress. Because of their frail state, their condition deteriorates quickly, and they become gravely ill. In three days, this child went from having a cough, to severe pneumonia, to dying. What saddened me more than his death was hearing that a large group of children throughout Bangladesh regularly meet a similar fate. The boy's death was caused by rapidly progressive pneumonia. The origin of that pneumonia was poverty.

Walking home from work that evening, I crossed a pedestrian bridge over the heavy Dhaka traffic. Tens of thousands of people seemed to be walking the overcrowded streets. Cars and buses brimming with passengers were practically stacked on top of each other. A child had been lost earlier that day, and yet life carried on as usual. However, it had changed for me.

As a medical student working in Dhaka for the year, I sometimes felt minuscule in the face of the enormous problems afflicting Bangladesh, as if my work would not make a drop of difference in the sea of human suffering. But then I remembered that for every child who died at Dhaka Hospital, many more children were saved. The ability to save lives, to prevent a child from dying from a second bout of sclerema, motivates the clinicians to continue helping their impoverished patients. Watching them work and seeing how human suffering can be alleviated with an astute mind and a gentle touch has renewed my dedication to medicine. My time in Bangladesh helped me realize that as members of the medical profession, we are uniquely positioned to intervene, to overcome death by poverty. **MM**

Russell Johnson is a fourth-year medical student at the University of Minnesota. He wrote this essay last year when, as a Fogarty International Clinical Research Scholar, he conducted clinical research on cholera at the International Centre for Diarrhoeal Disease Research in Bangladesh. For more about the center, go to www.icddrb.org/donate/overview.

Minnesota Medical Association

THE PHYSICIAN ADVOCATE

The MMA's monthly report on policy, people and politics

UP TO THE CHALLENGE

A look at the 2013 legislative session

Several challenges await lawmakers when they return to St. Paul this January.

First off, the state faces another budget deficit, which is projected to be around $1 billion for the biennium. Second, there will be many new faces trying to figure out how to balance the budget. Nearly 50 legislators will be walking up the Capitol steps for the first time. (And 12 former legislators will be returning after an absence.)

"We had a large group of legislators retire and many more ran for other offices," says Dave Renner, MMA director of state and federal legislation. "So, we have our work cut out for us—getting the new people up to speed on physician priorities and then ensuring that health care items such as physician reimbursement rates aren't cut as they work to balance the budget."

There will be nearly 50 new lawmakers at the Capitol in 2013.

Health care programming in general and physicians in particular have absorbed much of the Legislature's efforts to close budget gaps in the past. "Physician payments have not seen an across-the-board increase since 2000, and reimbursement rates for physicians were cut by 3 percent as recently as 2011," Renner says.

With the DFL taking control of both the House and Senate, Gov. Mark Dayton should have much more support for his call to increase income taxes on the state's top earners. This new revenue may relieve some pressure on lawmakers to make significant cuts in the Health and Human Services budget.

In addition to fighting to maintain health care dollars, the MMA will be working on a number of initiatives during the upcoming session.

Support a state-run health insurance exchange

As a national leader in health care delivery, Minnesota is working toward having a state-based exchange rather than allowing the federal government to operate the exchange, Renner says.

Legislation to support a Minnesota exchange stalled during the last session.

Gov. Dayton has said that he wants legislative support for a state exchange and expects the body to weigh in on a number of issues regarding it. With the DFL re-taking the majority, this may be a bit easier than first thought.

"We'll be paying particular attention to questions related to the financing and governance of the exchange, as well as questions about how the exchange will use quality measures and the future of MinnesotaCare," Renner says.

Expand Medicaid coverage

In order to take advantage of one of the provisions of the Affordable Care Act (ACA), states must now decide whether they want to cover individuals with incomes up to 133 percent of the federal poverty level under Medicaid. Gov. Dayton supports the expansion, but the measure likely will meet resistance from state Republicans.

"This will allow up to 57,000 more low-income Minnesotans to gain coverage under Medical Assistance," says Eric Dick, MMA manager of state legislative affairs. "This turns out to be a great deal for Minnesota."

The federal government will provide 100 percent of the additional funding for the first three years, then contributions will slowly drop to 90 percent beyond 2020.

Support the phase-out of the provider tax

In 2011, legislators voted for the eventual phase-out of the provider tax. The 2 percent tax has driven up the cost of health care and falls heavily on sick and low-income Minnesotans as well as those insured through individual policies or by small employers.

Set to be reduced as the surplus in the Health Care Access Fund grows, the "sick tax" is slated for full repeal in January 2020. The MMA will be lobbying to accelerate the repeal and will vigorously oppose any efforts to use money from the Health Care Access Fund for purposes other than which it was intended—to support the MinnesotaCare program, Renner says.

Support an integrated team approach to health care

The MMA expects legislators to weigh in on a proposal that could broaden the scope of practice for Advanced Practice Registered Nurses (APRNs). In particular, it is anticipated that APRNs will push for legislation that could give them more independence (for example, allow them prescribing authority). Sixteen states currently allow APRNs to practice independently.

APRNs contend that if they are allowed to prescribe, it will help address the shortage of primary health care providers across the state.

The MMA will work with legislators to address workforce shortages, while supporting a collaborative practice framework with physicians. ↳

Physicians in white coats will descend upon the Capitol again in February.

Day at the Capitol

FEBRUARY 7, 2013

The MMA's 2013 Day at the Capitol event is set for Thursday, February 7.

It's a great opportunity for physicians to meet lawmakers face to face and discuss health-related concerns they and their patients face. The day will include briefings and updates from MMA staff, remarks from key legislative and administrative officials, meetings with individual legislators as well as a late-afternoon reception for physicians.

Watch MMA News Now for details.

Invest in medical education and the physician workforce

The MMA will work with legislators to renew the state's investment in the physician workforce, particularly in loan-forgiveness programming and the MERC (Medical Education Research Costs) fund. Funding for MERC was cut by nearly 50 percent in the last budget.

With Minnesota's population graying and more individuals receiving care under the ACA and related reforms, the demands on the physician workforce—particularly in rural and underserved urban areas—are growing dramatically.

"For years, state leaders have seen the value in investing in the next generation of physicians through MERC and other programs, and we'll be lobbying them to renew that commitment," Renner says.

Other issues

Along with these priorities, the MMA will monitor legislation related to opioid abuse, prohibiting the use of tanning booths by minors, cosmetic laser regulation and other health care-related issues that could adversely affect Minnesota physicians.

"The MMA is positioned well with the new leaders, but it is crucial for physicians to build relationships with them as well," Renner says. "The new leadership in the Legislature offers a number of opportunities for medicine to move forward on key reform initiatives; but it will take all of us to be successful."

The 2013 legislative session begins on January 8.

EDITOR'S NOTE: Keep track of legislative events through MMA News Now – delivered to your email box free each Thursday. To subscribe, go to the MMA website and look for "MMA News Now" under the "Publications" tab.

Increase the tobacco tax

The MMA has been a long-time advocate for increasing the tax on tobacco products. Studies show that if there's one thing that keeps youths from beginning to smoke and encourages adults to quit—it's the high price of tobacco products.

With the cost of tobacco-related diseases and the associated lost wages totaling nearly $3 billion a year in Minnesota, reducing the number of youths who begin smoking should be an easy choice for policymakers. Minnesota ranks 28th among states in terms of how much it taxes tobacco.

Minnesota currently ranks 28th among states in terms of how much it taxes tobacco.

MMA IN ACTION

Happenings around the state

Robert Meiches, M.D., MMA CEO, gave a presentation on professionalism at the Transitions in Geriatrics Conference in late October in Minnetonka.

In early November, **Janet Silversmith**, MMA director of health policy, presented "A Look Inside: Minnesota's Health Insurance Exchange" at Essentia Health in Duluth.

Dave Renner, MMA director of state and federal legislation, discussed health policy and the November election at a lunch-and-learn event at the University of Minnesota, Duluth.

Brian Strub, MMA manager of physician outreach, hosted a meeting of the Medical Student Section at MMA headquarters in Minneapolis in mid-October. He also attended a lunch-and-learn on working effectively with trained medical interpreters at the University of Minnesota, Duluth. The Minnesota Academy of Family Physicians Foundation co-sponsored the event.

Eric Dick, MMA manager of state legislative affairs, discussed important health care issues and the November election at the University of Minnesota, Twin Cities campus, in late October.

Robert Meiches, M.D.

Janet Silversmith

Dave Renner

Brian Strub

VITAL SIGNS

MMA NEWS IN REVIEW

MMA speaks out on payment reform recommendations

In mid-October, the MMA sent a letter to the state in response to the most recent recommendations from the Care Integration and Payment Reform Work Group of the Governor's Health Care Reform Task Force.

"The MMA fully supports the work group's goal of advancing the Triple Aim—to improve population health, improve patient care and the care experience, and reduce costs," says the letter to work group members signed by MMA President Dan Maddox, M.D. However, the MMA is concerned that the work group's current recommendations are too narrowly focused.

The letter goes on to say: "The adoption and advancement of state-level policy aimed primarily at expansion of total cost of care (TCOC) contracting assumes a near-singular solution for accomplishing the Triple Aim." The MMA expressed concern that a state-sanctioned policy to expand TCOC contracting as the preferred solution might hinder further innovation and experimentation with payment and delivery models.

The MMA says it strongly believes that a variety of practice structures, sizes and types should be taken into account and are essential to meeting the varied needs of patients, communities and physicians.

MMA reaches out to students

This past October, MMA members and staff went back to school—medical school, that is.

In late October, MMA members and staff talked with nearly 150 medical students on the University of Minnesota, Twin Cities campus during two lunch-and-learn sessions. On October 29, MMA members **Timothy Crimmins**, M.D., and **Peter Dehnel**, M.D., joined Rebecca Thoman, M.D., in a discussion about nontraditional medical careers that was co-sponsored by the Twin Cities Medical Society (TCMS). The following day, MMA staff discussed the upcoming election.

Earlier in the month, MMA staff hosted:

- students at Mayo Medical School and discussed influencing health policy and improving medical practice through the MMA;
- the Medical Student Section for a general meeting at the MMA headquarters;
- a lunch-and-learn on working effectively with trained medical interpreters at the University of Minnesota, Duluth. (This event was joint-sponsored by the Minnesota Academy of Family Physicians Foundation);
- a lunch-and-learn at the University of Minnesota, Duluth, on health policy and the upcoming election.

The MMA and the TCMS also sponsored the 2012 Region II Student National Medical Association Conference at the University of Minnesota. The association, which is the nation's oldest and largest organization for medical students of color and from minority communities, is dedicated to serving and improving the health of members of underserved communities.

MMA members making a difference

Sherine Gabriel, M.D., assumed the position of dean of Mayo Medical School on November 1. Gabriel has been on the faculty of the department of internal medicine, division of rheumatology, and the department of health sciences research, division of epidemiology since 1993. In 2000, she became a professor of medicine (rheumatology) and professor of epidemiology in the College of Medicine. In 2005, she was named the William J. and Charles H. Mayo Professor.

The MMA organized a number of activities for medical students this past October.


Bruce Blazar, M.D.

Bruce Blazar, M.D., has been elected to the Institute of Medicine (IOM) for his work in both clinical and translational science. He is the 14th University of Minnesota faculty member elected to the IOM, which is considered one of the highest honors in health and medicine. Blazar is a Regent's Professor in the University of Minnesota's department of pediatrics in the division of Blood and Marrow Transplantation, an associate vice president of the Academic Health Center, and director of the Clinical and Translational Science Institute.

Two physicians recommended by the MMA were appointed to the state's Board of Medical Practice on October 8: **Irshad Jafri**, M.D., will represent Congressional District 2, and **Maria Statton**, M.D., will represent Congressional District 8.

John Abenstein, M.D., an anesthesiologist at Mayo Clinic, was named first vice president of the American Society of Anesthesiologists (ASA) on October 17. Previously, he had served as the group's speaker of the House of Delegates. Given his new position, Abenstein is in line to become the ASA's president in two years.

Several MMA members took part in panel discussions and breakout sessions at the Minnesota Alliance for Patient Safety's sixth statewide conference in late October. The conference was designed to provide practical strategies for accelerating and sustaining advances in patient safety. Member participants included: **David Rothenberger**, M.D.; **Robert Meiches**, M.D., and MMA CEO; **Keith Berge**, M.D.; **Larry Morrissey, Jr.**, M.D.; **Tim Hernandez**, M.D.; **Phil Kibort**, M.D.; and **Robert Moravec**, M.D., MMA Speaker of the House.

Eight distortions in modern medicine

In late October, Institute of Medicine President Harvey Fineberg, M.D., Ph.D., came to Minnesota to shed light on what he thinks ails the health care industry. He presented a list of eight "distortions" or concerns that need to be addressed in order to improve health care in this country.

Fineberg reminded the more than 100 physicians (many of them MMA members) and health care advocates in the audience at the Minneapolis Institute of Arts that politicians used to tout America's health care system as second to none. They are no longer bragging. In order to restore the luster, he said, the medical world needs to address the following concerns:

- An under-investment in prevention and wellness relative to what is spent on restorative treatment and care.
- Inappropriate use, be it over-, under- or misuse of care.
- Misaligned incentives for all stakeholders. Fineberg specifically mentioned the focus on fee-for-service payment rather than on compensation for results.
- Failure to optimize the flow and transition of patients. He noted that we have many systems in health care but are not making the most of them.

- A mismatch between the complexity and volume of information and our capacity to manage and use it. In other words, getting the right information to the right people (decision makers) at the right time.
- The increasing number of patients seeking services and the misdistribution of health care workers (both by type and geography). He talked about the burden the increased number of people obtaining insurance through the Affordable Care Act will place on the workforce.
- Substandard systems and processes that don't ensure quality and safety for patients.
- The value placed on autonomy and independence in medicine. Physicians need to accept that they work on teams, he said.

Fineberg went on to outline three items that hamper the progress on these issues:

- Difficulty finding common ground. "As a nation, we need to find a way to deal with (political gridlock)," he said.
- Vast illiteracy about health. The average patient does not understand what they are being told. "Every clinician should say, 'Tell me back what I just told you'" to ensure comprehension.
- The fundamental attitude toward health care. Fineberg noted that while the World Health Organization considers receiving the highest standard of health care a "basic right," our Constitution does not. He suggested that America needs to determine where it stands on health care as an inalienable right.

Finally, he advised those in attendance not to "wait for Uncle Sam" to fix things but to work together and always keep the focus on the patient.

Following his talk, Fineberg joined a panel discussion that included **Penny Wheeler**, M.D., chief clinical officer, Allina Health; Marc Manley, M.D., vice president and chief prevention officer, Blue Cross and Blue Shield of Minnesota; and Susan Crockett, Ph.D., vice president and senior technology officer with the General Mills Institute of Health and Nutrition. **Sanne Magnan**, M.D., Ph.D., president and CEO of Institute for Clinical Systems Improvement (ICSI), moderated

the discussion. Audience members asked questions about topics ranging from health disparities to coding for patient visits to what could be done to make the state of Minnesota healthier.

Fineberg's appearance was made possible through the George Family Foundation, the Penny George Institute for Health and Healing at Allina Health, ICSI and the Twin Cities Medical Society.

New value-based modifier for Medicare begins rollout

Beginning this month, the first phase of a new Medicare value-based modifier will begin with full rollout scheduled for 2015.

The government will use the value modifier—in addition to geographic factors—to adjust the Medicare physician fee schedule to better reflect differences in the quality and cost of care delivered.

The modifier is one of the lesser-known provisions in the Affordable Care Act (ACA), but one that holds real promise for many Minnesota physicians, says Janet Silversmith, MMA director of health policy. The MMA and other health care and patient advocacy groups have been working for years—making only marginal progress—on ways to address the geographic inequities in Medicare's payment methodologies.

The modifier will be determined by cost and quality performance data as reported in Medicare's Quality and Resource Use Reports (QRUR), which were authorized by Congress in 2008. These reports (also known as Physician Feedback reports) were first tested in 2009 and have continued to be refined and expanded. In early 2012, reports were made available to approximately 20,000 physicians who treated fee-for-service Medicare beneficiaries in Iowa, Kansas, Missouri and Nebraska.

The Centers for Medicare and Medicaid Services (CMS) announced in the 2013 Medicare physician fee schedule rule that physicians practicing in groups of 25 or more eligible professionals in five additional states, including Minnesota, will receive QRURs in 2012 based on 2011 dates of service.

The QRURs will have no bearing on 2013 Medicare payment rates. Rather, the confidential reports are intended to be used to benchmark Medicare cost and quality performance among a group's physicians and to offer suggested refinements to CMS on the methodology and reporting format. More importantly, the reports will offer a preview of physicians' cost and quality performance on many of the measures that will be used to calculate the value modifier.

The MMA will continue to provide details about the Minnesota QRURs and the value modifier as they become available.

LEFT: Peter Dehnel, M.D., (right) received one of the AMA's highest awards from AMA President Jeremy Lazarus, M.D. BELOW: The MMA Foundation's Dennis Kelly with *Star Tribune* reporter Maura Lerner.

Awards season at the MMA

The MMA and its Foundation have been busy handing out awards the past few weeks.

MMA President **Dan Maddox**, M.D., awarded **Blake Fechtel**, a medical student at Mayo Medical School, the MMA's Medical Student Leadership Award, which honors students who show a commitment to the profession's ideals, demonstrate leadership skills, and initiate or participate in service activities for the profession or the broader community.

MMA Foundation CEO Dennis Kelly presented Maura Lerner, a medical writer and investigative reporter for the Minneapolis *Star Tribune*, with the MMAF's Excellence in Medical Journalism Award in mid-November. The award is given annually to honor reporting in print and broadcast media that contributes to a better public understanding of medicine and health in Minnesota. Lerner's winning entry featured University of Minnesota researcher Karen Ashe, M.D., whose work focuses on Alzheimer's disease.

One of our members, **Peter Dehnel**, M.D., received a major award from the AMA. In November, AMA President Jeremy Lazarus, M.D., presented Dehnel with the AMA Benjamin Rush Award for Citizenship and Community Service. This award, which is named after the physician who signed the Declaration of Independence, is the AMA's highest award for public policy work. As part of the presentation, the AMA cited Dehnel's work at the state and county level to pass the Freedom to Breathe Act, his work on healthy eating initiatives and his involvement with Honoring Choices Minnesota.

EDITOR'S NOTE: Keep track of news through MMA News Now, which is delivered to your email box free each Thursday. To subscribe, go to www.mnmed.org and look for "MMA News Now" under the "Publications" tab.

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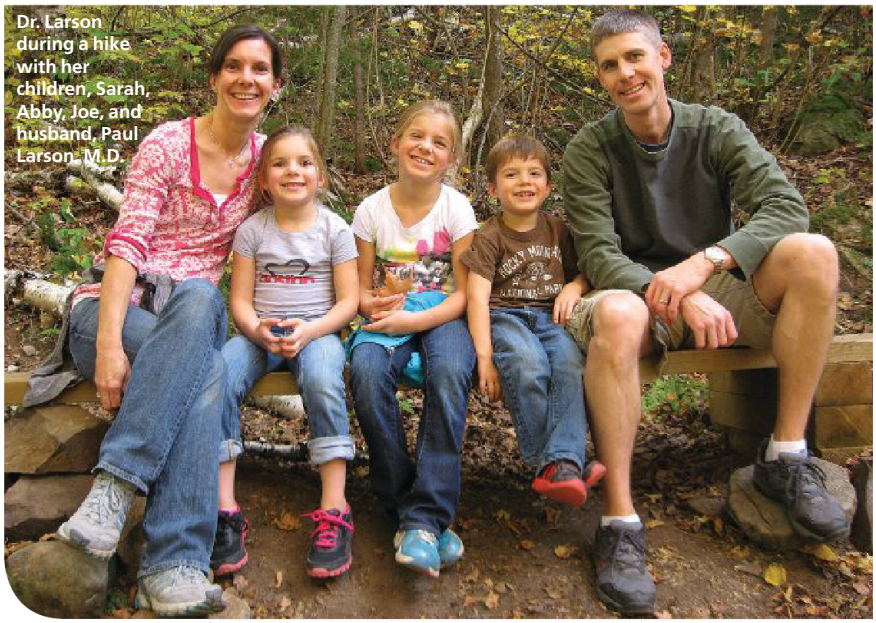
MEET A MEMBER

Jessica Larson, M.D.

| By Suzy Frisch



Dr. Larson during a hike with her children, Sarah, Abby, Joe, and husband, Paul Larson, M.D.

For pediatrician Jessica Larson, M.D., caring for children is all about helping families make good choices and setting kids up to lead healthy lives. A major part of that is getting them to establish habits that will keep kids at normal weights.

A pediatrician at the Fairview Elk River Clinic since 2005, Larson also serves on the board of the Minnesota chapter of the American Academy of Pediatrics (AAP) and is co-chair of its Pediatric Obesity Task Force. In addition to treating kids of all ages, Larson works to spread the word about childhood obesity to other physicians.

She champions the 5-2-1-0 program, which offers physicians an easy-to-remember framework for talking with families about diet and exercise: Encourage kids to eat five or more servings of fruits and vegetables a day; spend two hours or less engaged in recreational screen time (be it television or computer); engage in one hour of exercise or active play daily; and consume zero sugar-sweetened beverages such as pop or sports drinks.

In fact, this year, she introduced a resolution that was passed by the MMA House of Delegates encouraging physicians to use 5-2-1-0 at every well-child visit.

Tackling childhood obesity is a passion for Larson, who aims to help individual children and to address obesity as a public health issue.

"I think it's important," says the Plymouth native. "I have kids of my own, and I look around our community at the things kids face today. Obesity is really high on the list of health risk factors. It will impact their lives going forward, and as a society we can't sustain what we're doing right now."

As part of her work with the obesity task force, Larson is developing a maintenance of certification module on obesity for pediatricians as well as webinars on obesity prevention for pediatricians and other physicians. She also helped plan a conference on pediatric obesity held during the Minnesota AAP's annual meeting this past June and worked on a guide to help pediatricians implement First Lady Michelle Obama's Let's Move obesity prevention challenge for kids.

In addition, Larson along with other providers at her clinic, secured a $9,000 grant from Fairview Physician Associates and launched a pilot program called Fairview Fit Kids for children and families struggling with obesity. Six providers began testing it in July. The first step is to introduce 5-2-1-0 to the parents. If that is not effective, they'll recommend sessions with a dietitian and a physical therapist, who will work with the kids on overcoming their challenges with diet and exercise.

AT A GLANCE

MEDICAL SCHOOL: Mayo Medical School

RESIDENCY: University of Minnesota Medical Center-Fairview

CURRENT POSITION: Pediatrician at Fairview Clinics-Elk River

HOBBIES: Hiking, biking and gardening

Another issue on Larson's list of concerns is the lack of mental health care for pediatric patients. She says it's an issue that comes up regularly in her practice. She often finds herself having to treat patients with significant mental health problems while they wait for appointments with a specialist. "That has surprised me about my practice," she says. "It's coming to a crisis point."

When Larson isn't working, she spends as much time as possible outdoors hiking, biking and gardening. Her three children—Abby, 9, Sarah, 6, and Joe, 4—all play sports, so she and her husband, internal medicine physician Paul Larson, M.D., coach their soccer and basketball teams and attend games. Larson also plays the piano and is attempting to teach herself guitar.

Whether at work or home, it's all about the kids for Larson—hers and everyone else's. And she wouldn't have it any other way. "I like that they're a clean slate," she says. "Instead of dealing with people beating up their bodies for 50 years, I can help families make better choices. It's really fun to see kids coming into their own and learning how to take care of themselves, and I like being part of that process."

VIEWPOINT

By Dave Thorson, M.D.

Harbinger or squeaky wheels?

As long as we are not physicians but "healthcare providers" and there are no patients but "healthcare consumers," the situation will not get any better. As long as people with no medical training are dictating how we should practice medicine, none of us will get proper care. As long as people do not understand that you cannot put a price on a person's life and you cannot expect to make money out of sick people, the system will continue to deteriorate.
—Respondent from
Physicians Foundation survey

Strong words. Do they sound like something you have said or thought over the past few years? If so, you are not alone—at least according to the recent Physicians Foundation study, which recently took the temperature of nearly 14,000 U.S. physicians. Considering the results, I'd say we have a fever.

Earlier this summer, the foundation—a Boston-based nonprofit that seeks to advance the work of practicing physicians and help facilitate the delivery of health care—asked physicians about the future of health care. Here's what they found:

- Eighty-four percent said they feel the profession is in decline because of regulation and paperwork, loss of clinical autonomy, not being compensated for quality and the erosion of the patient/physician relationship.
- More than 90 percent are unsure where the health care system will be in five years and how they will fit into it because they are so focused on their daily activities.
- More than 52 percent said they have limited their Medicare practice or are planning to do so.
- Twenty-seven percent have closed their practices to Medicaid.
- Sixty percent of respondents said the passage of the Affordable Care Act has caused them to feel less positive about the future of health care.

(It should be noted that the Minnesota responses were slightly more positive than the national responses.)

So what are we to make of the results? Is the situation really this bad? Are physicians disgruntled, or is this just a case of a squeaky wheel wanting some grease? You could chalk it up to human nature. When life is good, we tend to keep it to ourselves. When it's not, we tend to broadcast our displeasure to co-workers, family and neighbors.

I'd be curious to hear what you think. Does the Physicians Foundation survey accurately portray the industry in Minnesota? I acknowledge that we have challenges ahead of us. Fortunately, the MMA is already working on many of them. But despite these challenges, I still love the profession and enjoy what I do—interacting with patients, working with my colleagues and having the prestige that goes with being a physician. One of the main reasons I remain actively engaged in the MMA is to further the profession.

How about you? What do you think of the results? What do you think of our profession? Send your comments to: Viewpoint@mnmed.org and we will publish some of them in a future issue.

Dave Thorson, M.D.

"A recent Physicians Foundation study took the temperature of nearly 14,000 U.S. physicians. **Considering the results, I'd say we have a fever.**"

The Obesity Challenge

To help bring down obesity rates, physicians need to give their patients two clear messages about nutrition.

By Donna Enoch-McDuffie, M.P.H., C.P.H., R.D., L.N.

The bad news: Minnesota is facing a crisis as the rates of chronic diseases such as heart disease/stroke, type 2 diabetes and cancer continue to increase. The good news: The severity and onset of these devastating diseases can be lessened and prevented by controlling a single risk factor—obesity. Obesity, which is most often the result of insufficient physical activity and poor nutrition, is now epidemic in both adults and children, causing weight-related chronic diseases that are responsible for the majority of deaths, years of potential life lost, disability, and soaring health care costs in the state.[1]

According to the Centers for Disease Control and Prevention (CDC), the obesity rate among adults in Minnesota is 25.7%. Although Minnesota does not have a statewide data-monitoring system to track obesity trends in children, Minnesota-specific data from the Pediatric Nutrition Surveillance System show that the prevalence of obesity in children enrolled in the Supplemental Nutrition Program for Women, Infants and Children increased 41% between 1995 and 2004, from 9.8% to 13.8%.[2]

The cost of chronic diseases is substantial. In 2003, U.S. spending on health care rose to $1.67 trillion or $5,670 per person.[3] Nationally, medical costs associated with obesity were estimated at $147 billion in 2008. The medical costs for people who are obese were $1,429 higher than those of normal weight.[4] Based on national estimates, the overall financial burden of obesity in Minnesota in 2006 was estimated at $2.8 billion. A report by the Minnesota Department of Health suggests that reducing the percentage of people who are obese from 25% to 15% by 2020, reducing the percentage who are overweight from 38% to 35%, and increasing the percentage who are at a healthy weight from 37% to 50% could potentially save $14.6 billion in health care spending.[5]

The Department of Health's challenge is to address this issue on a population basis. The clinician's challenge is to address it one patient at a time. We must work in concert if we are to stem the tide.

At the population level, we are working to address this issue in several ways, most notably through the Statewide Health Improvement Program (SHIP). SHIP initiatives approach obesity as a communitywide problem and strive to improve access to healthier food choices in schools, workplaces, health care institutions, child care centers and community gathering sites. In addition, representatives from SHIP and the Minnesota Department of Health are working with clinics to promote team-based care and health coaching for obese patients. They also are working to ensure that patients have access to evidenced-based programs and dietitians in their communities.

The Minnesota Department of Health has created a simple tool to help practitioners talk about increasing fruit and vegetable consumption, reducing consumption of sugar-sweetened drinks and eating healthier. An electronic version is available at www.health.state.mn.us/divs/hpcd/chp/cdrr/nutrition/foodtips/.

What Physicians Can Do

The CDC reports that 94% of physicians believe they should be doing some kind of nutritional assessment at each clinical visit but often don't feel confident in their ability to address nutrition with their patients. A survey of internal medicine residents at New York University School of Medicine found 86% report "low confidence" in their ability to provide nutrition-related lifestyle counseling. One reason for this is lack of training: Only 31% of the residents said their medical schools offered a nutrition elective and only 3% of them actually elected to take a nutrition course. Their average score on a basic nutrition test was 66%.[6] So what can a clinician do?

(continued on page 38)

Fitness not Dieting is the Prescription for Obesity

We need to re-examine our approach to managing this health risk.

By James T. Langland, M.D., FACP

Obesity is both a significant health problem for the nation and a significant management problem for physicians. Spending on diet programs, products and foods in the United States has increased from $30 billion in 1990 to more than $61 billion today.[1] During that same period, the prevalence of obesity increased from about 20% of the U.S. adult population to almost a third.[2,3] Focusing on dieting and weight loss as the primary strategy for combating obesity does not appear to have been effective in managing either the problem or its health consequences.

The Problem with Diets

Diets don't work well for maintaining weight loss. Typically, a person who is dieting will lose weight for about six months regardless of the macronutrient composition of the diet.[4] This is followed by a period of weight stability and then regain. Reviews of diet and weight loss maintenance show that one year after initiating a diet, a person's weight loss will be on the order of 4 to 6 kg.[5-10] Two to three years later, it will have fallen to 0 to 4 kg.[5-8,11,12] After four to five years, little or no weight loss is maintained. [5,6,12] The recent U.S. Preventive Services Task Force statement on screening and management of obesity reports that intensive multi-component behavioral interventions (12 to 26 sessions per year) produce a 4 to 7 kg weight loss in the first year. It also notes that there is inadequate evidence regarding the long-term health outcomes associated with these interventions.[13]

If obesity is viewed from an evolutionary standpoint, it is easy to understand why it is so difficult to lose weight and keep it off through dieting. The human energy regulatory system favors a moderate positive energy balance and the storage of excess energy as body fat. A number of redundant mechanisms stimulate food intake.[14] In one study, one year after obese individuals were put on a 10-week low-calorie diet sufficient to induce an average weight loss of 13.5 kg, they reported increased hunger and a greater desire and urge to eat than before they started the diet. Their ghrelin levels, which stimulate appetite, remained elevated relative to baseline and the satiety hormones leptin, cholecystokinin, peptide YY and pancreatic polypeptide remained suppressed one year after the diet intervention.[15] Human physiology resists efforts to lose weight, thus limiting the effectiveness of dieting.

Dangerous Downsides

Encouraged by the diet industry and buoyed by the occasional success story, dieting has become a pervasive phenomenon in the United States. The lifetime prevalence of dieting is estimated to be 47% in men and 75% in women,[16] with the point prevalence varying from a low of 8% of Hispanic men[17] to a high of 83% of female college students.[18] The weight loss expectations from dieting are often unrealistic. A loss of 20% to 25% of body weight is considered "acceptable" and a 10% loss is viewed as "disappointing."[19,20] Such high expectations have been associated with an increased drop-out rate from obesity treatment,[21] greater dissatisfaction with one's weight,[22] and greater concern about body image.[23]

When diets fail to achieve the desired weight-loss goal, individuals may turn to unusual or unhealthy practices to lose weight. One example is the ephedra-containing "natural" weight-loss supplements that proved fatal to some.[24] Internet sites promote a variety of weight-loss practices ranging from the amusing (body belts and wraps, lotions, creams,

earrings) to the dangerous (purging, fasting, skipping meals, crash dieting).

Dieting also can result in weight cycling, defined as the repetitive loss and regain of 10 or more pounds. This appears to magnify the adverse effects of obesity. Weight cycling has been associated with a greater incidence of lipid abnormalities,[25,26] hypertension,[26] atherosclerotic vascular disease,[27] cholecystectomy,[28] endothelial dysfunction,[29] ghrelin elevation[30] and renal cell cancer.[31] Reports on the effects of weight cycling on mortality are conflicting. Older studies report increased mortality in weight cyclers compared with individuals whose weight is stable,[32-35] whereas other studies with perhaps better control for involuntary weight loss have not found this relationship.[36,37]

The evidence on the effect of dieting and weight loss on mortality is also conflicting. Long-term prospective epidemiologic studies consistently show increased mortality with increasing body mass index.[38,39] The substantial weight loss observed with surgical treatment of obesity has been shown to reduce mortality and improve survival.[40,41] However, weight loss related to dieting has not produced the same results. Several studies show increased mortality in individuals dieting to lose weight compared with obese persons whose weight is stable.[42-46] A meta-analysis of the effect of weight loss on all-cause mortality found intentional weight loss had a small benefit for individuals classified as "unhealthy obese" but was associated with increased mortality in those who are healthy.[47] Given current knowledge, we cannot confidently tell our patients that weight loss through dieting will extend their life.

If Not Dieting, What?

If dieting is not the best strategy for managing obesity, then what is? Rather than focusing on weight loss, our goal should be to improve the health of obese individuals. Therefore, we should focus on improving functional capacity, improving body composition (reducing abdominal adiposity and increasing lean body mass), improving cardiovascular risk factors and reducing mortality. All of these goals can be achieved through exercise and improved cardiorespiratory fitness, even in the absence of weight loss.

The improvement in work capacity, VO2 max and strength associated with exercise is independent of any effect of exercise on weight. For example, older individuals with stable weight who were randomized to an exercise program demonstrated a significant reduction in measures of frailty. [48] Participants in exercise and walking programs were able to achieve substantial reductions in total fat, abdominal fat and visceral fat even though their weight remained stable.[49-51] Exercise without weight loss also has been associated with reduced total and visceral fat and increased skeletal muscle in obese and diabetic individuals.[52]

Weight loss is also not necessary for an exercise program to have a positive effect on cardiovascular risk factors. Improvements in blood pressure and lipids,[53-55] insulin sensitivity[51,56] and glucose metabolism[57] have all been reported in studies of exercise programs even in the absence of weight loss.

Multiple prospective epidemiologic studies have found that mortality is more closely related to fitness than to weight. Obese individuals who are fit consistently have had lower mortality rates than lean individuals who are not fit. This relationship has been shown in men,[58] women,[59] diabetics,[60] individuals with hypertension,[61] older individuals,[62] veterans[63] and a Russian population.[64] Fitness is not just a marker for better health or genetics, as unfit individuals who become fit correspondingly reduce their mortality.[65]

Focus on Fitness

Changing the goal of obesity treatment from weight loss to fitness offers strategic advantages: It shifts the focus from the scale to measures such as waist circumference, blood pressure, lipids, blood sugar and functional capacity. It also discourages people from adopting unhealthy diets and engaging in unusual weight-loss practices.

Perhaps the most significant benefit of emphasizing fitness and exercise when working with obese individuals is the immediate benefit resulting from the steep dose-response curve. Exercise has acute effects on blood lipids, blood pressure, glucose homeostasis, immunological function, vascular reactivity and hemostasis.[53] Each 15 minutes of exercise up to 100 minutes per day reduces all-cause mortality.[66] Cardiovascular mortality and diabetes control have also been shown to improve with exercise well below the recommended amounts.[67,68] In regard to physical activity, some is better than none, with additional benefits occurring with more activity.

Conclusion

The current approach to medical management of obesity, with its focus on dieting and weight loss, has not been effective in either reducing adult obesity or managing its health consequences. For that reason, shifting the focus to exercise and improved cardiorespiratory fitness may prove to be a more effective strategy for improving health. **MM**

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Our Unhealthy Food System

Why physicians' voices are critically needed.

By David Wallinga, M.D., M.P.A.

The current U.S. food system works at odds with the health of children.[1]
—Mary Story, Ph.D.

Mary Story is right. Our food system is unhealthy. But not just for children—for all of us. The signs are everywhere: high rates of obesity and chronic diseases such as diabetes and cardiovascular disease, near-constant outbreaks of foodborne illnesses and the problem of antibiotic resistance, exacerbated by the huge quantities of human antibiotics put into livestock and poultry feed.

What has gone wrong? There is no single, simple answer. But I and other public health researchers point to the decades-long industrialization of the food system as a critical factor.[2] When talking about our food system, we are referring to everything from the farm to the plate—food production, harvesting, processing, marketing and distribution. Industrialization describes the increasing tendency of economists, policymakers and agribusiness companies to treat farms as rural factories, with off-farm inputs (energy, antibiotics, synthetic fertilizers, genetically modified seed) marshaled in the service of producing caloric energy (feed corn and starches, soybeans and refined flour). Industrialization also describes a system in which economic return is paramount—more important than concern for the public's health, the potential health effects of pesticide exposure, the long-term resilience of the land where crops are grown, and the methods by which food is processed and delivered.

The hallmark of any system is that—for better or for worse—it functions as a complex whole, making it impossible to easily divorce one part from another. The plethora of problems in and related to our food system do not exist in isolation. They are intimately connected. Put another way, the healthfulness of our food, the health of the natural world (the soil, water, bacteria and genetic resources that gives rise to it), and the health of our patients cannot be considered apart from one another.[3]

Industrial models of farm production have been efficient at extracting profit from the system; but they have shifted the future costs of agricultural pollution, or soil and water degradation, onto consumers, local governments and other entities including the health care system. And our public agricultural policies have tended to support the industrial model. More specifically, they have supported goals such as increasing corn yield or acreage planted, and not promoted nutritional quality or better stewardship of antibiotics.

Effect on Health

Our industrialized food system has been a major contributor to the obesity crisis in this country, which now costs $190 billion annually in treatment costs alone. According to United States Department of Agriculture data, the average American now consumes 600 more calories per day than in 1970.[4] Most come from the added fats, sugars and refined grains commonly found in highly processed foods and junk foods—soda, frozen pizza, donuts and scones, burgers and fries, and the like. These additional calories have overwhelmingly come from corn (corn starches, corn syrup, high fructose corn syrup, feed corn fed to livestock), soybeans (soy proteins, vegetable oils, salad oils, partially hydrogenated oils, and fryer oils in fast-food restaurants) and wheat (refined flour). These three crops account for the vast majority of crop acreage planted in the United States.

A food system focused so narrowly on production is also a reason for ongoing problems with foodborne illnesses. In recent years, we have seen outbreaks of foodborne illnesses from contaminated ground beef, ground turkey, eggs, peanut butter and other foods. In 2009, the *New York Times* ran a story that illustrated the problem. A young Minnesota dancer was felled by *E. coli* O157:H7 from a contaminated hamburger. That hamburger contained meat from cows that came from slaughterhouses in Nebraska, Texas and Uruguay. Another 10 percent came from trimmed beef fat from who-knows-how-many cows collected by Beef Products, Inc., a South Dakota company. Meat companies often rely on suppliers to test for *E. coli* and other contaminants after the meat is ground. However, according to the story, unwritten agreements between suppliers and distributors can stand in

the way of this testing, with some slaughterhouses agreeing to sell their product only to grinders who agree not to test for fear that discovery of *E. coli* could lead to a recall of product sold to others.[5]

Industrialization also contributes to antibiotic resistance through the use of penicillins, tetracyclines, erythromycins, sulfa drugs and others in the production of animals for food. According to the Food and Drug Administration, 80% of all antimicrobials sold in this country—nearly 30 million pounds per year—are used in food animals.[6] Ninety percent of those are added to animal feed or their drinking water at nontherapeutic dosages for what are nontherapeutic purposes, such as promoting growth.[7] The overuse of antibiotics is a primary driver in the formation and spread of antibiotic resistance. The extensive use of antibiotics in animal feed, therefore, promotes resistance, resulting in the spread of more drug-resistant bacteria on meat, in waterways and among farmers and veterinarians.

There is both a human and financial toll to antibiotic overuse. In the United States alone, an estimated 900,000 cases of antibiotic-resistant infection occur annually; methicillin-resistant *Staphylococcus aureus* alone is responsible for 18,650 deaths and 94,000 cases of infection.[8,9] Antibiotic-resistant infection also results in longer hospitalizations, which cost the U.S. health care system $20 billion a year.[9] Lost productivity and other societal costs add another $35 billion to the annual cost.[9]

What You Can Do

Clearly, we have a food system in this country that contributes to our burden of disease. I mention only a few of the systemic issues and not others such as the widespread use of synthetic, petroleum-derived food dyes, the presence of multiple pesticide residues on fruits and vegetables or the inclusion of estrogen-like bisphenol A in food packaging. All of these problems are representative of a food system in which decisions are made and policies are set in concert with pharmaceutical companies and makers of industrial and agricultural chemicals—stakeholders that have a vested interest in leaving industrialized food production as it is. There is little regard for the potential impact on public health and little or no input from health professionals.

Putting the responsibility on individuals to eat healthfully and achieve health amid such an unhealthy food system is wrong-headed and will not prove to be effective. To truly improve health, change has to happen at the system level. Physicians have an opportunity to play a crucial role in much the same way we did in the fight against tobacco use. We learned from antismoking campaigns that physicians' voices are respected and their involvement is important to changing conditions in their communities. Had it not been for the health care community's critical and necessary counterweight to the financial and political might of the tobacco industry, more people would continue to smoke today. Therefore, it makes sense for physicians to work to change the food system.

This is starting to happen on a larger scale. Medical societies such as the American Medical Association (AMA) and the Academy of Pediatrics are becoming increasingly involved in food policy issues. The AMA, the American Dietetic Association and the American Public Health Association have all developed positions on the importance of healthy, sustainable food systems. But more is needed, particularly at the local and state level. We need individual physicians to join with other health professionals to make Minnesota's food system one that promotes health rather than profit. Our patients' needs will not be met until we do so.

The medical community can no longer afford to stand on the sidelines. Now is the time for physicians to lead in building a healthier food system. **MM**

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Advocating for Healthier Food Systems

IN SCHOOLS

www.Farm2Schoolmn.org

www.OneTray.org

IN HOSPITALS

www.HealthyFoodinHealthcare.org

IN COMMUNITIES

www.HealthyFoodAction.org

www.healthyeatingmn.org

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Nutritional Assessment in Vegetarians and Vegans

Questions Clinicians Should Ask

By Gregory A. Plotnikoff, M.D., M.T.S., FACP

Not all who adhere to vegetarian, vegan or other special diets have nutritionally sound eating habits. The clinical consequences of an insufficiently mindful vegetarian or vegan diet include many common symptoms such as anxiety, brain fog, depression, fatigue, insomnia, neuropathies and other neurologic dysfunction. Patients with such symptoms who report having a vegetarian or vegan diet, or a diet that severely restricts meat consumption, require a slightly expanded differential diagnosis. The challenge is to identify which patients require closer attention. This article lists questions to use to quickly assess for potential dietary drivers of clinical symptoms. In many cases, simple nutritional interventions, through diet and/or supplementation, can resolve or minimize problematic symptoms.

A vegetarian diet or even a vegan diet (one that excludes all meat, poultry, fish, eggs and dairy products) can be a very healthy choice. However, eating a nutritionally sound vegetarian or vegan diet requires knowledge, motivation and discipline. It also requires advance planning, as healthy and well-balanced options for vegetarians and vegans are rarely available in cafeterias and restaurants. Not everyone who professes to have a meat-free diet follows healthy eating patterns. Additionally, too many people confuse eating a meat-free diet with eating a healthful vegetarian diet. They might see a diet rich in cheese as adequate, for example. It is not. Simply eliminating meat from one's meals is not enough. And doing so can place one at high risk for clinically significant nutritional insufficiencies.

The clinical consequences of an insufficiently mindful vegetarian or vegan diet include common symptoms such as anxiety, brain fog, depression, fatigue, insomnia, neuropathies and other neurologic dysfunction. Patients with such symptoms who report having a vegetarian or vegan diet, or a diet that severely restricts meat consumption, require a slightly expanded differential diagnosis. In many cases, simple interventions can resolve or minimize their symptoms. Even for vegetarians and vegans who pay close attention to diet, three supplements are commonly required: vitamin B12, amino acids and DHA. The clinician's challenge is to identify which patients require closer attention. This article seeks to provide a quick guide for assessment in the clinical setting.

The First Step

Clinicians are often prompted by their electronic medical record to note whether a patient has any history of special diets including vegan, vegetarian, kosher, hallal or other traditional diets. This is actually helpful. For example, a question about a special diet may lead to discussion about a previous or current eating disorder.

Perhaps more importantly, however, inquiries about a patient's dietary preferences can lead to dialogue about his or her religious, spiritual and ethical beliefs. "Tell me about it" and "Tell me about why this is important to you—what would you most want me to know?" are questions that will elicit the meanings, beliefs and interpretations that inform the patient's values and evoke details that can be important to clinical decision making. A patient's answers may reveal factors behind apparent resistance to or noncompliance with clinical advice. For example, some patients may resist taking pills, capsules and gel capsules if they perceive animal products are used in their manufacture.

Questions to Ask Vegetarians and Vegans

Optimal clinical practice involves asking patients how they define "vegetarian" and "vegan" and what they actually eat. Assessment of key nutritional knowledge is also medically appropriate. The following questions can help you uncover information that will be helpful for clinical reasoning. A patient's inability to answer any of these is a red flag for potential dietary insufficiencies. (The questions get progressively more difficult to answer.)

■ Q: What is a complete protein?

A: Complete protein intake includes all of the essential and conditionally essential amino acids. Only two commonly eaten foods constitute complete proteins: eggs and quinoa. Complete protein intake can come from eating a combination of beans, grains, nuts and seeds or tahini as well as supplements such as Bragg's Amino Acids. As a rule of thumb, one should aim to consume at least 0.35 g of protein per pound of body weight per day.

Clinical relevance: Amino acids are crucial building blocks for key neurotransmitters that affect mood, memory, energy and sleep as well as the production of all proteins utilized in the body. Low levels of amino acids from an insufficient diet and/or hypochlorhydria are associated with a range of common conditions related to impaired production of neurotransmitters including mood disorders, hypoglycemia and insomnia.

■ Q: What is your preferred source of vitamin B12?

A: Vitamin B12 is produced by bacteria, not plants or animals. There are no natural sources of B12 found in a completely plant-based diet. This means that occult B12 deficiency is far more common in people with vegetarian or near vegetarian diets. Vitamin B12 can be obtained by consuming fortified nutritional yeast and fortified cereals. Supplements also may be required.

Clinical relevance: Vitamin B12 is crucial for nerve and brain cell function and is involved in DNA synthesis and regulation, fatty acid synthesis and energy production. Low levels of B12 are associated with fatigue, depression, cognitive dysfunction, peripheral neuropathy and anemia. Concomitant use of many common medications including antacids, anticonvulsants, antibiotics and metformin may increase the risk of B12 deficiency.

■ Q: What is your preferred source of iron?

A: Iron (for menstruating women or anyone with low iron levels) can be obtained by eating blackstrap molasses, cooked soybeans, lentils, lima beans, quinoa, spinach, Swiss chard, tempeh, tofu and fortified cereals. Iron from these sources, however, is less bioavailable than iron from meat sources. For that reason, vegans and vegetarians require higher iron intake than meat eaters.

Clinical relevance: Iron is crucial for blood production and oxygen transportation as well as for numerous enzymatic reactions including the production of dopamine. Low iron is a common cause of fatigue, dizziness, hair loss, irritability, restless legs syndrome, weakness, pica, and brittle or grooved nails. Antacids are one type of medication associated with low iron absorption.

■ Q: What is your preferred source of the long-chain omega-3 fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid)?

A: EPA and DHA are both found in cold water fish such as salmon and sardines. Getting enough of these essential fatty acids can be a challenge for vegetarians.

EPA is the long-chain omega-3 fatty acid from which the noninflammatory prostaglandins leukotrienes and thromboxanes come. There is no direct vegetarian source for this 20-carbon chain. Under some circumstances, such as during pregnancy or if consuming a very low-fat diet, the body can make EPA from the shorter-chain (18 carbons long) omega-3 (alpha-linolenic acid) found in walnuts and flax seed.

The 22-carbon DHA is the longest and most polyunsaturated fatty acid in the body. It is critical for proper membrane fluidity (for receptor binding) as well as to the functioning of all cells especially those in the nerves and brain. A vegetarian/vegan form of DHA from algae is commercially available. Patients with significant inflammation may need to supplement with EPA from fish oil or krill oil.

Clinical relevance: Low EPA levels are associated with inflammatory conditions including autoimmune disease, ulcerative colitis, Crohn's disease and atherosclerosis. Low levels are also associated with increased smooth muscle contraction, asthma, dysmenorrhea, hypertension and irritable bowel syndrome. Low levels are also strongly linked to depression. They also are linked to attention deficit hyperactivity disorder.

Low DHA is associated with cognitive dysfunction ("brain fog") as well as an increased risk for violence, depression and suicide. DHA is crucial for pregnant and breastfeeding women, as women with lower DHA levels have a much higher incidence of gestational diabetes, hypertension and pre-eclampsia during pregnancy. They also have a much higher incidence of post-partum depression and post-partum obsessive-compulsive disorder.

■ Q: What are your sources of the amino acids tryptophan, methionine and lysine?

A: This is an important question because vegetarian diets are often rich in soybeans and legumes, which are low in tryptophan and methionine. Likewise, diets rich in grains, nuts and seeds will be low in lysine. But eggs, grains and seeds contain tryptophan and methionine. And lysine is found in legumes (beans, peas and peanuts). For these reasons, a combination of foods is needed and supplementation is often required.

Clinical relevance: Tryptophan is the foundation of both serotonin and melatonin. Low serotonin production is associated with antidepressant failure and a number of symptoms including insomnia. Methionine is a crucial sulfur donor for the metabolism of carbohydrates, lipids and amino acids as well as for detoxification and the production of multiple neurotransmitters, insulin, coenzyme A and glutathione. Lysine is crucial for production of proteins and enzymes including pyridoxal phosphate (activated vitamin B6). Lysine is an important adjunct for production of serotonin from 5-hydroxytryptophan (5-HTP). Low lysine is associated with weight loss, anorexia, muscle weakness, poor muscle tone, growth failure in children and anemia. ↳

A Question for Persons on a Dairy-Free Diet

Many patients report dairy intolerance (as in lactose intolerance or constipation). Others may avoid dairy for different reasons. For example, vegans go beyond a traditional vegetarian diet and do not eat any animal products including eggs and dairy. If a patient says he or she is a vegan, ask all of the questions you would ask a vegetarian plus one more.

■ Q: What are your preferred sources of calcium?

A: Nondairy sources of calcium include almonds, beans, blackstrap molasses, broccoli, dark leafy greens (bok choy, collard greens, kale, mustard greens, turnip greens), dried figs, okra, tahini and tempeh. Note that foods rich in oxalic acid such as chard, collard greens, rhubarb and spinach can bind calcium and reduce its bioavailability. Phytic acid, which is found in many grains, nuts, seeds and vegetables, also can bind calcium. Phytase found in probiotics can block this process. In addition, sprouting grains and seeds as well as cooking foods can increase the bioavailability of calcium in them.

Clinical relevance: Diets low in calcium may result in decreased bone mineral density as calcium must be released from the bones to maintain a normal serum level. Calcium is also crucial in neurotransmitter release and muscle contraction, including cardiac myocyte contraction. Of note, vegetarian and vegan diets are believed to be more alkaline than diets that include meat. This means that, compared with a more acidic animal protein-based diet, a vegan diet may result in less calcium released from the bones to buffer dietary acid loads.

Conclusion

Vegetarian and vegan diets are often manifestations of religious, spiritual and ethical beliefs. Adherence to such diets can be associated with greater longevity and reduced health risks. However, clinicians must be aware of the potential nutritional risks in persons who have not learned, or have not fully applied, the discipline required for healthy menu planning. The questions highlighted in this article enable physicians to better assess how a patient's vegetarian or vegan diet may be contributing to their health concerns. Their answers can guide further decision-making about both laboratory testing and referrals to a nutritionist or dietitian. **MM**

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The Obesity Challenge

(continued from page 30)

Getting people to eat better can seem daunting; but practitioners can start by emphasizing two key messages that can go a long way toward that goal and toward preventing chronic diseases:

1) Increase your consumption of fruits and vegetables. It's hard to argue with the health benefits of a diet rich in fruits and vegetables, yet according to the 2007 Behavioral Risk Factor Surveillance data, 81% of Minnesota adults consume fewer than the recommended number of servings each day.[7]

2) Reduce your consumption of sugar-sweetened beverages. The majority of added sugar consumed comes from sugary drinks including carbonated sodas, energy drinks, artificially flavored fruitades, sweat teas, flavored waters and sports drinks. The U.S. Department of Agriculture's Dietary Guidelines recommend no more than 10 teaspoons of added sugar per day. A 20-ounce bottle of soda has 16 teaspoons of sugar, which is about the same as the amount in a full-size Snickers bar. According to the Minnesota Student Survey, 55.3% of all 12th graders drink at least one soda every day.[8]

It is going to take a multipronged effort to address our high rates of obesity and chronic disease. By counseling patients about improving their dietary habits in these two areas—increasing fruit and vegetable consumption and decreasing intake of sugar-sweetened beverages—physicians and other health care providers will be supporting public health efforts to address the upstream causes of obesity through policy, systems and environmental changes. Together we can and must stem the tide of obesity-related chronic disease. **MM**

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Elevated Homocysteine?

Consider Testing for Folate Metabolism Gene Variants

By Catherine Bogolub, M.D., M.S.

■ Folate metabolism is fundamental to health, as it closely regulates homocysteine level. Recent research suggests there is a genomic basis for individual variation in folate metabolism related to single nucleotide polymorphisms (SNPs). This article describes how two SNPs, both of which are methylenetetrahydrofolate reductase (MTHFR) variants, can affect the way an individual metabolizes folate, resulting in elevated homocysteine level, and why testing for these SNPs may be important.

Folate is a critical nutrient involved in methylation, DNA synthesis and amino acid metabolism. Impaired folate metabolism or a low folate level results in elevated homocysteine, which has been associated with four fundamental mechanisms of disease: thrombosis, oxidant stress, apoptosis and cellular proliferation.[1] An elevated homocysteine level is thought to contribute to the pathogenesis of a number of chronic disorders including atherosclerosis, thromboembolism, stroke, osteoporosis, recurrent miscarriages and other complications of pregnancy, and cognitive decline (including dementia and Alzheimer's disease).[2]

Homocysteine is a modified form of the amino acid methionine, which is tightly regulated by enzymes requiring folate. Dietary folate stimulates homocysteine removal. Thus, folate is closely tied to homocysteine level.

Folate (B9) from the diet and most supplements enters the folate cycle after it is converted to tetrahydrofolate (THF). Methylenetetrahydrofolate reductase (MTHFR), a riboflavin (B2)-dependent enzyme, catalyzes the formation of methyltetrahydrofolate (MTHF) or active folate from methylenetetrahydrofolate. MTHF is involved in neurotransmitter production pathways, estrogen metabolism, and the activation and inactivation of DNA transcription and translation. MTHF also is involved in the recycling of methionine from homocysteine. MTHF donates a methyl group to homocysteine via cobalamin (B12) to recycle methionine. Methionine is important in protein synthesis, production of the important methyl-donor S-adenosylmethionine (SAMe), detoxification pathways and carnitine production. Homocysteine also can be converted to cysteine, using the cofactor pyridoxine (B6).

A number of studies have suggested there is a genomic basis for individual variation in folate metabolism related to single nucleotide polymorphisms (SNPs). SNPs account for 90% of all variation in the human genome. In many cases, SNPs provide a genetic advantage, explaining their stability over generations.

Two SNPs known to affect MTHFR function are C677T and A1298C, with the C677T allele being the much more common variant. Homozygosity of these two genetic variations of MTHFR decrease the activity of the gene by 70%, which affects the ability of the cofactor riboflavin (B2) to bind with MTHFR. Heterozygosity decreases the gene's activity by 30%. These SNPs are very common, with 50% of the population being heterozygous.[3]

Studies are showing an association between these genetic variants and specific conditions. One meta-analysis showed a significant association between the C677T genetic variant and migraine with aura in the Caucasian population and total migraine in the non-Caucasian population.[4] The presence of the C667T allele confers an increased risk of breast cancer in BRAC1 carriers, and the presence of the A1298C allele confers an increased risk of breast cancer in sporadic cases.[5] The Hordaland study of older men and women in Norway found that elevated homocysteine coupled with the T/T allele of the MTHFR gene was associated with depression, but that folate and B12 without the T/T allele were not.[6] An in-depth study of depression

history, treatment and mood scores in the British Women's Heart and Health Study, in which nearly 3,500 women were tested for MTHFR variants, found evidence of an association between the MTHFR C677T TT genotype and risk of depression. This was also found in a meta-analysis of all such studies published to date.[7] Yet another meta-analysis demonstrated an association between the MTHFR C677T variant and depression, schizophrenia and bipolar disorder, raising the possibility of using folate for treatment and prevention.[8]

These varients also can play a role in the way medications affect individuals. For example, rheumatoid arthritis patients on methotrexate therapy may experience different and significant side effects based on their MTHFR allele profile, with increased toxicity in Caucasians with wild type A1298A, increased risk of alopecia in African Americans with C677T, and elevated liver enzymes in those with C677T.[9,10]

Checking Homocysteine Levels

According to an American Heart Association advisory statement, normal homocysteine concentrations range from 5 to 15 µmol/L (12 µmol/L is regarded as elevated by others). Intermediately elevated levels are between 31 and 100 µmol/L. Severely elevated levels are >100 µmol/L and are essentially pathognomonic for the presence of an inborn error of homocysteine metabolism causing homocystinuria.[1] End-stage renal disease, hypothyroidism, psoriasis and estrogen deficiency can elevate homocysteine levels. Use of tobacco and medications such as phenytoin, sulfasalazine and methotrexate also can raise homocysteine levels. Other causes of hyperhomocysteinemia include gastric atrophy, inflammatory bowel disease and laxative use, all of which interfere with absorption of nutrients.[8]

There are no official guidelines for who should be tested for either homocysteine or MTHFR variants. Checking blood homocysteine levels appears appropriate for individuals with unexplained blood clots (arterial or venous) and unexplained ath-

Case Study

Karin, a 53-year-old woman, presented to my office complaining of weight gain, low libido, hair loss, hot flashes, heartburn and extreme fatigue. Her medical history was significant only for calcium oxalate kidney stones. Her family history was significant for her father, a smoker, developing type 2 diabetes mellitus, heart disease, hypertension, stroke and severe depression in his late 40s and early 50s. He died of lung cancer at age 55.

Karin had been prescribed omeprazole for gastric reflux, but she stopped taking it because it worsened her heartburn. She was taking potassium citrate and following a low oxalate diet to manage her kidney stones. Her fasting blood glucose, lipid panels and blood pressure had always been unremarkable. She had tried multiple diet and exercise programs to lose weight without significant success. I decided to order Hgb A1c, hs-CRP, vitamin D, homocysteine, DHEA–s, salivary cortisol levels, complete blood count, metabolic panel, lipid panel, zinc and ferritin tests. I also ordered thyroid function testing, including TSH, fT3, fT4, reverse T3, and antibodies.

Karin's screening metabolic labs were significant for an elevated homocysteine level of 18.9 umol/mL, elevated Hgb A1C at 5.9%, elevated reverse T3 at 36.1 ng/dL (TSH, free T4, free T3, and thyroid antibodies within normal limits), and slightly low vitamin D3 at 29 ng/dL. An Adrenocortex Stress Profile by Genova Diagnostics showed depressed salivary cortisol levels throughout the day and markedly decreased salivary DHEA at 15 pg/mL. The remainder of her lab results (including complete blood count, metabolic panel, lipid panel, hs-CRP, zinc and ferritin levels) were all within normal limits. Tests for folic acid, vitamin B12, methymalonic acid and vitamin B6 were subsequently ordered and all of the results were within normal limits.

Because of her elevated homocysteine level (despite her normal folic acid, vitamin B12 and vitamin B6 results) and her father's history for chronic disorders associated with hyperhomocysteinemia, I recommended testing for MTHFR variants. Genetic testing showed that she is positive for one copy of the C677T mutation and negative (normal) for the A1298C mutation. Heterozygosity in either mutation does not lead to clinically significant elevations in homocysteine related to CAD or thrombosis.

Karin started taking a homocysteine support supplement that contains the previously mentioned vitamins and cofactors, including active folate. In addition, she was started on vitamin D3, fish oil, alpha-lipoic acid and an adrenal complex. To help with her fatigue in the face of elevated reverse T3, she was prescribed Cytomel 5 mg twice daily. Recommended lifestyle interventions included a Paleo Diet, which emphasized consumption of vegetables and healthy protein sources such as fish and grass-fed meats, to address her insulin resistance; adding more natural folates and antioxidants to her diet; and Heart Math biofeedback to help support her adrenal function.

Three months later, Karin's homocysteine had normalized to 7.6 umol/L, her Hgb A1c dropped to 5.6%, and her vitamin D3 rose to 49 ng/dL. She had lost about 20 pounds and reported feeling much more energetic; her hot flashes and heartburn also resolved. At that point, she was told to finish the homocysteine support supplement and switch to a high-potency multi-vitamin with active folate. Her homocysteine level has hovered at about 8.5 umol/L for the past two years.

erosclerosis. One can also argue that everybody with atherosclerosis (ie, patients with coronary artery disease or who have had a heart attack or stroke) should have their homocysteine value checked. At this time, it is not clear whether women with a history of recurrent pregnancy loss, preeclampsia, placental abruption, and/or babies that are small for their age should have their homocysteine levels checked.

In the absence of elevated homocysteine levels in patients with thrombosis or coronary artery disease, MTHFR mutations appear to have no clinical relevance to thrombosis and atherosclerosis. Therefore, one could argue that there is no indication to perform MTHFR genetic testing. The authors of a 2005 article in *Circulation* take this approach in their clinical practice.[11] It may be reasonable to check mothers who gave birth to a baby with spina bifida for MTHFR mutations. In patients with rheumatoid arthritis or other conditions in which methotrexate therapy may be considered, MTHFR genotyping may help predict methotrexate sensitivity, which may be most useful for patients starting therapy or those who have experienced toxicity but need to continue methotrexate use. Testing is unlikely to be useful for people already taking methotrexate without incident.[12]

Homocysteine levels are checked by most physicians treating patients who are at high risk of heart attack or stroke or those who have a significant history of heart attack or stroke, patients who have a history of cleft palate and neural tube defect or whose children do, and women who have had repeat miscarriages. At this point, MTHFR SNP testing is being ordered primarily by physicians trained in integrative medicine.

Use in Clinical Practice

Because my medical practice is focused on the nutritional and metabolic core imbalances that drive disease endpoints, I frequently check my patients' homocysteine levels (see Case Study). Since I know that the vitamins folate (B9), cobalamin (B12), riboflavin (B2) and pyroxidine (B6) are involved in homocysteine metabolism, I obtain a homocysteine level to screen for the aforementioned B vitamins. If a patient's homocysteine level is elevated, I order tests for levels of the individual B vitamins along with methylmalonic acid. If the patient's homocysteine level is significantly elevated, I consider testing for MTHFR genetic variants. My decision to test for MTHFR genetic variants is also influenced by a patient's family history. If the family history is positive for multiple chronic disorders associated with hyperhomocysteinemia and the patient's homocysteine is elevated, I strongly urge the patient to have MTHFR testing done. MTHFR gene variant testing is offered by most hospital labs, Quest Diagnostics, Lab Corp, and specialized metabolic testing laboratories, such as Genova Diagnostics and Metametrix.

There are many advantages to knowing the MTHFR status of these patients. If the patient is homozygous for one of the variants or heterozygous in two of the variants, I know that he or she is at increased risk for disorders caused by poor methylation. Besides addressing the factors that affect the MTHFR variant, I can focus my treatment on limiting the other risk factors for chronic disorders associated with hyperhomocysteinemia. I also know that the patient will benefit from nutritional counseling focused on increasing their intake of antioxidant- and folate-rich foods—oranges, strawberries, melons, leafy green vegetables, beans, eggs, seeds and whole grains.

For patients with hyperhomocysteinemia, I initially prescribe a high-quality nutriceutical that contains a daily dose of methylcobalamin 1 mg, 5-methytetrahydrofolate (active folate) 800 mcg, pyroxidine 25 mg, riboflavin 25 mg, trimethyglycine (betaine) 500 mg and choline 100 mg to address multiple points within the folate/methylation cycle. I recheck their homocysteine level in three months to make sure they have responded. At the same time, I recheck the B vitamin levels to help guide future nutriceutical therapy. Most of the time, a patient's homocysteine level has normalized, and I am able to switch him or her to a less potent B-complex that contains active folate.

I believe the use of active folate (5-methyltetrahydrofolate) supplementation in patients with elevated homocysteine levels is optimal. In the literature, regular daily doses of folic acid as high as 800 mcg to 5 mg are used to reduce homocysteine levels. These elevated folic acid doses push the sluggish MTHFR variants to work at their maximal speed; but substrate does build up at the bottleneck of the slow MTHFR enzyme pathway. In theory, the increased substrate can then be pushed into other metabolic pathways such as those for pyrimidine production and DNA synthesis. Since MTHFR variants are so common in the population, the use of active folate at the recommended maximal dose of 400 mcg daily for an otherwise healthy person and 800 mcg daily for fertile women and patients with chronic health disorders may be warranted. In multiple recent studies, however, there is mixed evidence that consumption of high levels of folic acid, the form used for fortification and in supplements, has different effects on biochemical pathways than natural folates and might promote carcinogenesis.[13] No studies have yet been conducted with active folate supplementation.

Conclusion

The role of genetic variants in health and disease is under intense investigation. With understanding of genetic variants there is potential for the development of individualized treatment regimens, both nutritional and pharmaceutical, that will be more effective and less toxic than current regimens. For now, homocysteine levels should be ordered in patients who are at risk for heart disease and thrombosis and for individuals who have had a child with a neural tube defect or who have a history of neural tube defects in the family. MTHFR variant testing should be considered before starting methotrexate therapy or if a patient is experiencing significant toxicity from methotrexate. Other indications for MTHFR variant testing are significant elevations

in homocysteine and significant family histories of chronic disorders related to elevated homocysteine. As the investigation of MTHFR SNPs continues, more specific, targeted recommendations for testing will be developed. **MM**

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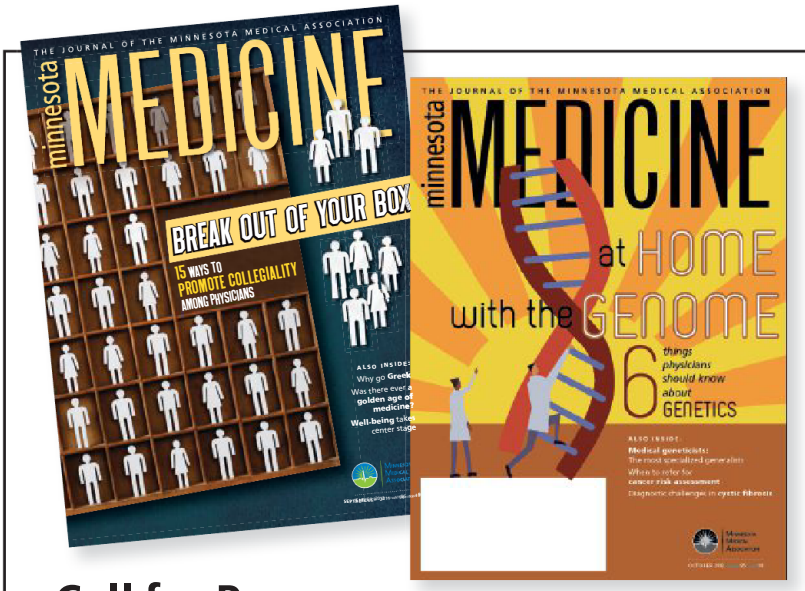

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The Elimination/Challenge Diet

By Carolyn Denton, M.A., L.N.

Elimination diets can be both a diagnostic tool and a therapeutic intervention for people with a suspected food sensitivity or allergy. They are clinically relevant not only for patients with functional gastrointestinal disorders but also for those with conditions where symptoms are refractory and a diagnosis is elusive. Elimination diets can help a physician make a diagnosis or identify an underlying cause of symptoms. The physician and team treating the patient can then use that information to recommend appropriate dietary and lifestyle changes as well as judicious drug therapy. This article describes the elimination/challenge diet approach and explains the rationale for undertaking it.

Case Study: A 65-year-old woman was referred to me for severe fatigue and uncontrolled, agonizing pain despite escalating dosages of appropriate medications including tramadol. Her history included 15 years of rheumatoid arthritis and gastritis. Methotrexate produced numerous side effects including a recent blood clot. Additionally, she noted recurring eczema, rhinitis, dry eyes and anxiety. Her sleep was poor, and she needed trazodone nightly. She was about to retire and was afraid her condition would not allow her to travel abroad as she had hoped.

Given her history and symptoms, we employed a modified elimination diet followed by food challenges to determine whether she might be reacting to one or more of the most common triggers of inflammation: wheat, corn, cow's milk dairy products or nightshade vegetables (white potatoes, tomatoes, peppers and eggplant).

She reported improvement after only a few days of not eating the suspected foods. She had more energy. Her bowels had normalized, and her pain was dramatically reduced. She also reported that when corn was reintroduced into her diet, her eyes burned and felt dry and itchy, her hands became stiff and swollen, and her colitis "kicked up." When the nightshade vegetables were reintroduced, she had the strongest reaction: burning pain in her back, arms and hands. She noted that all over her body her joints were "very achy." She also experienced gas, bloating and nausea. She had no reaction to products made from cow's milk or wheat.

For the next five months, the patient successfully avoided corn and nightshade vegetables, adding them back into her diet as instructed to find a threshold for intake. During the second follow-up appointment, she reported that she was completely off methotrexate, trazodone and tramodol. She noted that she had been able to do treadmill training for the first time in years. And she announced that the following week she was leaving for a hiking trip in Asia with her sister, a trip she never dreamed would have been possible because of her severe fatigue and pain.

Adverse Food Reactions

What the patient in the case study and about 25% of all patients who come to our clinic complaining of inflammatory symptoms, poor sleep, depression, anxiety or autoimmunity discover is that these conditions are often triggered by foods they have been eating their entire lives. The incidence of adverse food reactions is increasing not only in the United States but also in other countries, and they are considered to be a growing concern for children, adolescents and adults.

In 2010, the National Institute of Allergy and Infectious Diseases published guidelines classifying adverse food reactions according to the presence or absence of immune system involvement.[1] Nonimmune-mediated adverse food reactions are called "food intolerances." These can be metabolic in nature, such as lactose intolerance, which is caused by a deficiency in lactase, the enzyme used to digest lactose. In addition, some non-immune-mediated adverse reactions are considered idiopathic, for example, the intolerances some people have to food additives and preservatives including MSG, mono- and diglycerides, and sulfites. Finally, some non-immune-mediated reactions are considered to be pharmacologic, for example the effect of

the vasoactive amines found in bananas, mushrooms, red wine and Parmesan cheese.[1,2]

Immune-mediated adverse food reactions include IgE-mediated and non-IgE mediated responses. IgE-mediated reactions are considered food allergies. With a food allergy, the immune system decides that a particular food is harmful to the body and responds by creating specific antibodies (IgE) against it. Every time the food is eaten, the immune system releases chemicals such as histamine, triggering allergic symptoms that can be life-threatening. A classic example is a peanut allergy. When someone with a peanut allergy consumes peanuts, he or she may experience swelling of the tongue and throat or hives. Only 1% to 4% of adults have IgE-mediated food allergies.

Non-IgE-mediated reactions are those such as gluten sensitivity in celiac disease or nonceliac gluten sensitivity.[1,2] Non-IgE reactions can be subtle and delayed. The immune response is inflammatory rather than chemical. In addition to gluten, foods such as corn, wheat, dairy and nightshade vegetables can produce symptoms in some people. For those with a food sensitivity, eating these common foods can trigger multiple symptoms and is associated with a wide range of inflammatory conditions including migraine headaches, dermatitis, eosinophilic esophagitis and irritable bowel syndrome.[3-7] Growing evidence suggests adverse food reactivity also may be associated with attention deficit hyperactivity disorder.[8]

Identifying a Sensitivity

If a patient has a food sensitivity, traditional allergy tests, including blood and skin-prick tests, are not applicable or may yield negative results. IgG antibody testing for delayed food sensitivity remains controversial because of inconsistent test results. Likewise, there is little evidence that expensive testing such as ALCAT is effective for identifying food sensitivities.[9] In my experience, the only reliable approach to determining whether a patient has a food sensitivity is to use an elimination diet followed by a food challenge to see whether a suspected food causes a reaction.

Some elimination diets use a lengthy list of forbidden foods that may include dairy products, wheat and other gluten-containing grains (spelt, rye and barley), eggs, corn, soy and soy products, peanuts, citrus fruits, yeast, coffee, refined sugars and artificial additives, preservatives and colorings. A modified elimination diet uses a targeted number of foods.

The first step in an elimination diet is to discontinue intake of all foods that are potential triggers for 10 to 14 days. Dairy products made from cow's milk, wheat (not gluten), corn and nightshade vegetables—foods that often are the most problematic for patients—are the first to be eliminated. If the patient's symptoms persist, foods including gluten, soy, eggs and citrus are eliminated.

The next step is the food challenge: The patient systematically adds back the eliminated foods one at a time to see if symptoms occur. Altogether, the food challenge takes about a month to conduct.

Throughout the entire elimination/challenge period, patients should keep a journal to record information about what they ate and their energy, mood and sleep in order to track reactions. In my experience, the key to helping a patient successfully complete an elimination/challenge diet is identifying substitutes for the foods that are being eliminated so that the patient does not feel restricted. With the help of an informed and experienced nutritionist or dietitian, patients can identify foods that can be eaten during and after the elimination period.

Discussion

Critics of elimination diets cite the absence of randomized controlled trials showing their value except for functional gastrointestinal disorders and migraine headaches. It is true that most of the literature on elimination diets cites anecdotes and experience. Such anecdotes do not equal evidence; they only lead to hypotheses. Clearly, large-scale trials are needed. However, there are practical challenges to such studies: 1) parallel treatments, 2) double-blinding, and 3) disease heterogeneity. In the absence of such clinical trials, we must rely on anecdotal evidence. And the abundance of case studies in the literature supports consideration of this very low-cost, nontoxic patient-centered approach for identifying potential triggering foods. **MM**

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Introduction to Traditional Asian Therapeutic Diets

Two Enduring Perspectives

By Jennifer Blair, L.Ac., Ma.O.M., and Marcia Meredith, C.N.P. Introduction by Gregory A. Plotnikoff, M.D., M.T.S., FACP

In some ancient systems of medicine, health was understood as a state of balance, and diet was considered essential to achieving and maintaining that balance. Traditional Chinese medicine and Ayurveda are based on this premise. Here we present an overview of these two traditional systems' views on diet and eating. This article aims to explain the reasoning behind some of the recommendations that practitioners of these forms of medicine may be making.

Diet is frequently understood as restriction of food for weight loss. In antiquity, however, Hippocrates noted that the meaning of the term "diet" (the Greek word was *diaita)* encompassed all areas not determined automatically by nature. In the *Corpus Hippocraticum,* the treatise *De diaeta* emphasized food as a preventive and therapeutic measure: "Let food be your medicine." In fact, the Hippocratic oath included the pledge to oversee the "regimen of patients," which included their diet and other variables.

Because Western medicine has de-emphasized the role of diet in health and rejected the ancient understanding of food as medicine, patients following the guidance of a traditional medical system can find themselves a source of clinical conflict. Consider the case of a 24-year-old woman in a post-partum unit who consistently refuses the food brought to her because it is "cold." Her nurse is frustrated because she has repeatedly reheated the food to the point that it is dangerously hot to touch, only to have the woman refuse it. Or consider the example of a 78-year-old man with advanced cancer and cachexia. His physicians have urged him to maximize his caloric intake by consuming milkshakes, meats and orange juice. His wife reports he can only take a sip of Ensure, a bite of a sandwich or a sip of orange juice before he must lie down and rest. His doctors express disapproval when his acupuncturist recommends much simpler, less calorie-dense foods.

To the Western mind, these patients' responses of these patients can seem illogical. However, from an Eastern perspective, their behaviors make sense. Hot and cold status has nothing to do with measureable temperature. One would never have cold foods after childbirth. And not all calories are created equal. One would never recommend foods that exceed the body's capacity to digest and absorb.

Western medicine has in the past learned from the world's oldest healing traditions. Consider the origin of oral rehydration therapy, which has saved millions of lives. It came out of a Western physician's experience treating cholera patients in Bangladesh in the 1960s, when carbohydrate ingestion was thought to worsen prognosis. Imagine the physician's shock in discovering that the traditional Ayurvedic approach to cholera, the combination of coconut water, carrot juice, rice water, carob flour and dehydrated bananas, was highly effective in saving lives. Since then, the world has benefited from understanding that the combination of carbohydrate and sugar in a solution with salt results in quicker water uptake and faster rehydration. Might there be additional insights from traditional Eastern medicines? Here we present an overview of the dietary approach of two systems.

Chinese Dietary Therapy

Traditional Chinese medicine is foreign to our culture both in language and conceptual framework. Terms such as *yin* and *yang* and *qi* can seem antiquated and be easily misunderstood when approached without context. These terms describe essential components of a complete and distinct medical paradigm. The medical philosophy is based on the premise that maintaining health requires both appropriate balance and flow between complex energy systems.

Although the overall paradigm of traditional Chinese medicine is intricate and complex, one of the beauties of the system is that the dietary approach appeals to the common sense of many patients. An individualized diet is essential to cultivating harmony with both our internal and external environments and, as a result, optimal health. The foundations of this approach can be outlined simply as follows:

- Eat in harmony with the seasons.
- Eat in harmony with your geography and climate.
- Eat in harmony with your phase of life.
- Eat in harmony with your constitution.
- Eat to promote harmony and treat imbalance—to treat what ails you.
- Eat a balance of the five flavors (Table 1).

The superior practitioner uses diet primarily to support optimal health. But it is also true that diet can be used as a therapeutic intervention to treat chronic and acute illnesses or simply enhance outcomes.

■ Flavor

According to the principles of Chinese medicine, food is defined by its energetic function—how it causes *qi* to move. This is further broken down into taste and temperature (Table 2). These categories describe how a food, or any medicinal substance, interacts with our body to contribute to or detract from our relative state of balance, or homeostasis.

TABLE 1 **The Five Flavors**

FLAVOR	ORGAN ASSOCIATION	FUNCTION	EXAMPLES
Sweet	Spleen	Norishes *qi* and warms, boosts *qi,* engenders fluids, relieves pain	Rice, meat, squash
Salty	Kidney	Softens and descends	Sea vegetables, ocean fish, pork
Bitter	Heart	Dries and astringes, clears heat, descends *qi*	Espresso, salad greens, celery
Pungent	Lung	Disperses *qi* upward and outward, dries	Cinnamon, ginger, mint
Sour	Liver	Gathers *qi* and binds	Lemon, vinegar
Bland		Leaches dampness, promotes urination	Rice

TABLE 2 **The Five Temperatures**

TEMPERATURE	FOOD EXAMPLE
Hot	Dried ginger, pepper, chicken
Warm	Beef, peaches, fresh ginger
Neutral/level	Rice, grapes, soybean
Cool	Pears, spinach, tofu
Cold	Watermelon, clams, crab, some fish

Each of the five flavors has a function in the body. In modern terms, we might say that each governs a specific aspect of metabolism. When the flavors are in balance, the body is able to maintain homeostasis, promoting longevity. By extension, the principle of flavor is also used to treat imbalance in the body.

To begin to understand how this works, we must consider how flavor functions. The sweet flavor is said to nourish the *qi*. Put simply, foods that are considered sweet provide energy to an organism. The sweet flavor occurs naturally in meat, fish, vegetables, grains and other foods. It is stated that an overabundance of the sweet flavor in the diet leads to conditions of "dampness." Dampness can be defined on a spectrum, ranging from such mundane symptoms as nasal congestion to systemic problems such as obesity. Dampness, when congealed, becomes "phlegm." An obvious sign of phlegm is congestion in the lungs; but it can also be expressed in more life-threatening problems such as atherosclerotic plaque in the coronary arteries.

In patterns of dampness, consumption of the sweet flavor should be limited and the patient's diet should be enhanced with foods or medicinal herbs that have qualities that will help resolve the pattern. In the presence of an acute congested cough, a clinician likely would suggest limiting sweet, cold and dense foods and would instead suggest consuming more pungent, drying and bland flavors as an antidote or, at the very least to support a medicinal therapy. In this case, a patient would be encouraged to avoid foods like pizza and cold beer, which engender dampness. Instead, foods such as mild broth-based soups, rice and ginger tea would best support the application of any herbal or other remedies prescribed. A good clinician trained in traditional Chinese medicine would never encourage a patient to take a medicinal without supporting it with dietary recommendations.

It would simply not be considered good sense.

Often, the logic of good cooking correlates that of good medicine. When balancing flavors in a meal, a good cook might consider pairing a naturally sweet food with a more pungent flavor. Think about horseradish paired with roast beef or wasabi mustard with sushi. When one considers the effect of a spicy wasabi mustard on the sinuses, it is easy to see how this flavor might break up phlegm accumulation in the sinuses or lungs. In traditional Chinese medicine terms, the pungent flavor disperses the *qi* and balances the properties of the sweet food so that it is more easily digestible. It is also thought to have a drying quality that is an antidote to the more damp-engendering qualities of the sweet food.

■ Temperature

Temperature is another way in which foods are categorized in traditional Chinese medicine. It is important to note that in this context "temperature" is defined more broadly than as a measure of Fahrenheit or Celsius. Fresh ginger is an example of a warm food, while dried ginger is considered hot. Rice is considered neutral in temperature. Tomatoes are considered cold. A balance of "temperature" in the foods we consume allows us to harmonize both the internal landscape of the body and it's relationship with the external environment.

The physical temperature of a food also is thought to have an effect on digestion and metabolism. Eating too many cold or raw foods or drinking iced beverages is thought to inhibit the body's natural distillation process and result in an accumulation of dampness. Instead of washing a meal down with a sugary iced beverage, a clinician would encourage sipping a small cup of warm water or a mild tea with meals. Iced beverages inhibit distillation of nutrition from food, slow down gut motility and impede optimal bowel function.

Foods of a cooler nature are used in the summer months and in warm climates to help regulate the body's internal temperature. Tomatoes, cucumber and watermelon are examples of cool or cold foods that would keep someone both hydrated and cool in hot weather. Watermelon can be used to help reduce a fever and rehydrate someone with a mild case of heat stroke. Ideally, however, it would be used to prevent the onset of such a state.

When applying food for therapeutic purpose, a clinician would always account for the natural warm state of the human body, especially that of the digestive process. It is believed that consuming too many foods that are cold in either nature or physical temperature inhibits distillation of the essence of a food for nutritional gain.

■ The importance of digestion

In traditional Chinese medicine, the nutritional value of a food must be measured by both its nutritional content and the ability of the body to extract that nutrition. In this way, the net gain for the individual is considered more important than caloric intake. Often, patients who are hospitalized with a serious illness or who are recovering from surgery are encouraged to eat and drink in a way that inhibits the healing process. For a weak patient, a broth-based soup, rather than a high-calorie food such as a grilled cheese sandwich, may deliver the best outcomes. The soup offers nutrition in a form that the body can more readily assimilate. Although calorically dense, the grilled cheese sandwich would inhibit healing by requiring the patient to expend too much energy to extract nutritional value. With so much of the body's energy focused on digestion, there would be little left over for regeneration and repair.

In Chinese medicine, diet is viewed as both a therapeutic and preventive therapy. This complex and logical system provides effective approaches to clearly defined patterns of illness or disharmony in the body. At it's core, it defines the kind of individualized approach to care we are seeking in medicine today. Using these principles may offer a physician the opportunity to enhance outcomes in treating chronic illnesses and potentially even reduce the cost of treating some acute ones.

Dietary Approach in Ayurveda

Ayurveda is a holistic system of medicine that dates back more than 5,000 years to the ancient Vedic culture of India. It is considered by many scholars to be the oldest healing science. The word "Ayurveda" means "the science of life." Ayurveda emphasizes balance in mind, body and spirit using dietary and lifestyle adjustments, exercise, meditation and herbal remedies. It is for this reason that Ayurveda is primarily a prevention system and its practitioners consider staying well to be the best medicine.

Ayurveda teaches us that good health depends in part on our ability to digest the food we eat. It holds that there is a digestive fire or energy in the stomach and digestive tract called *agni* (ah'-nie). If the *agni* is healthy and strong, the food we eat will be fully metabolized and the nutrients easily absorbed, leading to healthy tissues, a well-functioning immune system and efficient elimination of waste products. Thus a healthy *agni* leads

TABLE 3 **The Constitutions used in Ayurveda**

CONSTITUTION	QUALITIES	WHAT IT GOVERNS
Vata	Light (in weight), dry, cold, rough, subtle, mobile	Breathing, blinking, muscle and tissue movement, heartbeat, all bodily movements
Pitta	Hot, sharp, light (bright), liquid, oily	Digestion, absorption, assimilation, nutrition, metabolism, body temperature
Kapha	Heavy, dense, slow, stable, soft, smooth, cool, oily, liquid	Bones, muscles and tendons

to physical strength, clarity of perception and a strong immune system. A weak *agni* leads to incomplete digestion resulting in a build up of toxic waste called *ama* (ah'-mah).

According to Ayurveda, the accumulation of *ama* is a primary cause of disease. It leads to blockages in the flow of energy and in the processing of information on all levels, from emotional to nutritional. The intake of old, spoiled or processed food and improper food combinations that are difficult to digest create *ama*. Ayurvedic treatments focus on eliminating *ama* from the body. Making appropriate changes in diet and lifestyle can prevent it from building up, thus preventing a host of physical and emotional illnesses.

Ayurveda uses the *dosha* system to determine the correct diet for an individual. In this system, each individual is considered to have a constitutional type or *dosha* pattern, reflecting his or her physical, mental, emotional and spiritual characteristics. When a person's constitution is in balance, digestion is quiet, tissues and organs are healthy, elimination is regular, and he or she has a contented and cheerful approach to life. Many factors can affect a person's constitution. These include one's emotional state, diet, the weather and seasons, physical trauma, and work and family relationships. Because Ayurveda views each person as unique and as having his or her own energy pattern, recommendations for health and healing are different for everyone.

According to Ayurvedic philosophy, the universe is said to be composed of five elements: ether (or space), air, fire, water and earth. These elements come together in specific patterns to create the three doshas called *vata, pitta* and *kapha* (Table 3). The qualities of ether and air come together to create *vata,* which is associated with movement. *Vata* means "wind" in Sanskrit. Its qualities are light (in weight), dry, cold, rough, subtle and mobile. The vata individual has a tendency to be light in weight and cold. He or she loves the heat, is active and has many interests. When in balance, *vata* energy promotes creativity and flexibility. When out of bal-

TABLE 4 **Dietary Suggestions from the Ayurvedic Perspective**

Avoid iced food and beverages. Iced food and beverages put out the digestive fire (*agni*) and create toxins (*ama*), a cause of disease, in the digestive system.
Pay attention to food combinations. Eat fruit separately from other food. Fresh fruit is best enjoyed in between meals as a snack or one hour before or after a meal. This is because fruit is digested differently than grains, proteins and fats. When those foods are eaten with fruit, the combination becomes indigestible and toxins are created. Most important, do not eat fruit and dairy together. This includes fruit and yogurt. The exception to this rule is when fruit is cooked with the food. Also avoid combining too many proteins at one meal, taking leftovers with fresh food, eating raw and cooked foods together, and eating melons with any other food.
In general, cook your food. Although raw food is very popular, most people have difficulty digesting it. Excess raw food creates an overly light feeling in the body along with gas and bloating. The exception is fruit. Fruit is usually eaten raw and is easy to digest.
Cook food with herbs and spices (except chili peppers). Ayurveda recommends food be cooked together such as in a stir-fry, a soup or a stew. Using herbs and spices from the garden or cupboard enhances the ability to digest food.
Chili peppers should be avoided by anyone with a warm (*pitta*) constitution or a condition caused by excess heat (inflammation).
Stick to a daily routine to maintain a calm mind and promote regular elimination. Ayurveda defines a regular routine as going to bed about 10 p.m., rising about 6 a.m. and eating meals at traditional mealtimes.
Eat the biggest meal between 10 a.m. and 2 p.m., ideally between 11:30 a.m. and noon.
When eating a meal, fill one-third of the stomach with food, one-third with liquid such as warm water or warm herbal tea/ginger tea, and leave one third empty to have room for digestion.
If a person has gas and bloating it is a good idea to kindle the digestive fire (*agni*) prior to eating a meal. This can be done by taking a tablespoon of lemon or lime juice with a small amount of room temperature or warmer water or by taking a quarter- to half-inch of fresh ginger (peeled and chopped) with juice from a wedge of lime before a meal.
Eat your meal in a quiet comfortable atmosphere. Focus on taste and texture and chew the food properly. Do not watch TV, read, work at the computer, attend meetings or have an intense conversation while eating. Eating in a stressful environment disrupts digestion and creates *ama*.

ance, it produces weight loss and feelings of cold, fear and anxiety.

The qualities of fire and water come together to create the constitution called *pitta*. *Pitta* means "fire" in Sanskrit. The qualities of *pitta* are hot, sharp, light (bright light), liquid and oily. *Pitta* individuals are generally warm but prefer to be cool. They enjoy intellectual pursuits and are often in teaching or leadership roles. In balance, *pitta* promotes understanding and intelligence. Out of balance, *pitta* arouses anger, impatience, hatred, and jealousy, and is associated with skin rashes and inflammatory conditions.

The qualities of water and earth come together to create *kapha. Kapha* means "water" (or phlegm). The qualities of *kapha* are heavy, dense, slow, stable, soft, smooth, cool, oily and liquid. *Kapha* individuals are kind and soft-hearted. They rarely overreact and are fair-minded. They have a tendency to gain weight. In balance, *kapha* is expressed as love, calmness, forgiveness and steadiness. Out of balance, it leads to attachment, greed, envy, obesity and diseases of excess such as type 2 diabetes.

Ayurveda teaches that we all have the energies of all the *doshas—vata, pitta* and *kapha*—within but that two of them usually are more predominant. For example, someone might have a *vata-pitta* constitution or a *pitta-kapha* constitution.

It is important to understand the qualities of *vata, pitta* and *kapha* in order to comprehend Ayurvedic recommendations with regard to nutrition and diet (Table 4). In addition, understanding that like qualities increase and opposite qualities balance is important as well. The Ayurvedic practitioner seeks to balance the energies in the individual. These case studies offer brief examples of how this works:

■ Balancing the *vata* client

A client came to see me in the fall of the year complaining of constipation, coldness, weight loss and insomnia. She had recently decided to try eating a raw diet. During our visit, we reviewed the qualities of a raw foods—light, cold, rough and dry. These qualities are the same as *vata* and were aggravating her symptoms. I suggested she stop the raw food diet and eat warm cooked foods, especially during the cold months of the year. One month later, she reported her symptoms were greatly improved.

■ Balancing the *pitta* client

A client came to see me in the summer complaining of having had hives for more than 20 years. As we reviewed his dietary habits, I noted that he ate hot chili peppers daily. I suggested a *pitta*-soothing diet, which requires avoiding heating foods such as chili peppers. The client reluctantly agreed to give the dietary suggestions a try. When he returned one month later, the hives had resolved.

■ Balancing the *kapha* client

A client came to me in the spring of the year complaining of chronic seasonal allergies. She regularly ate wheat and dairy, both of which, like *kapha,* have moist, dense, heavy and cool qualities. We reviewed a *kapha*-reducing diet, and she agreed to eliminate those foods that aggravate *kapha*. When she returned one month later after eliminating wheat and dairy from her diet, her allergy symptoms had greatly improved.

Ayurveda holds that the five elements in nature create the qualities of the three *doshas*. These *doshas* or constitutional types determine the correct dietary recommendations for each individual—an approach that is quite different from the contemporary view that we should eat from certain food groups. Understanding one's *doshic* composition and following simple rules of eating can help improve digestive function and overall health.

Conclusion

Like Hippocrates, the ancients who developed traditional Chinese medicine and Ayurveda understood that food is medicine, and that diet can be therapeutic. Physicians working with patients who also see certified traditional practitioners can be reassured that any dietary recommendations made from these perspectives are consistent with thousands of years of practice-based observations. In such situations, some clinical humility may be helpful. As with the treatment of cholera, there may be much to learn from the world's oldest and most complete healing traditions. **MM**

Further Reading

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Our cadaver

By Sherry-Ann Brown, M.D., Ph.D.

Our cadaver
had a big heart.

He had a big hernia,
he had a big lung,
he had a big heart.
And we can see where
the big heart came from—
his family,
his relatives,
his friends.

It took a big heart
for them to do what they did.
To invite us to share in the circle
of those who knew him.

They knew his spirit,
they knew his soul.
We got to know his body.
Every detail of it.
And every detail of his body
helped us to learn,
to understand every detail
of our patients.

If you could only see
the awe in our eyes
every time
we looked at something new
in our cadaver.

His femoral artery,
his rectus abdominis,
his cortex,
his cerebellum.

All we could say each time was
"wow."

Our cadaver
was beautiful.
He
is beautiful.

Although his body
we see no more,
we still see his heart,
we still feel his spirit
in the soft caress of the gentle wind,
in the sweet songs of the birds in the morning,
in the noise the engine makes when we first
turn our cars on.

The sound of life.

Sherry-Ann Brown is an internal medicine resident at Mayo Clinic.