the art of endocrinology
How Art Informs the Practice of Endocrinology pg.4

ALSO IN THIS ISSUE:
Celebrating 25 Years of Endocrinology Advancements

As we reflect back on our journey, we invite you to follow along with the timeline throughout this magazine and reminisce on where AACE has been and what it has accomplished!
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AACE recently adopted the universal endocrine logo design (left), which is intended to serve and be recognized by the scientific community and the public at large as an international symbol of recognition of all areas of the specialty of endocrinology (academic/research/clinical).

In its simplest form, the logo represents a continuous loop that conveys the concept of endocrine science, education, communication, safety, and overall good endocrine health; lay focus groups identified “balance” and endocrinologists identified “feedback loop” – both are desired interpretative attributes.

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As the history of medicine goes, 25 years might seem like a brief period of time. Still, the art and science of endocrinology has exploded since 1991, with remarkable, potentially life-saving breakthroughs unfolding in a number of clinical practice areas. Through a combination of inspiration, exploration and innovation, physicians, scientists and researchers in the field have woven a rich tapestry of accomplishments that have advanced patient care substantially.

Likewise, the American Association of Clinical Endocrinologists (AACE) has realized many worthwhile accomplishments over this time span, authoring ground-breaking comprehensive clinical care guidelines and algorithms for diabetes, obesity, osteoporosis, menopause, thyroid disease and more, creating and implementing courses to train young endocrinologists in the highest level of patient care, and promoting disease-specific public education programs to advance patients’ knowledge.

As AACE marks the silver anniversary of its founding with more than 7,500 members in 32 chapters located throughout the world, it seems a fitting occasion to take note of the many achievements in the field of endocrinology – and at AACE – over the last two-and-a-half decades and highlight some of the newest milestones that promise to advance the practice of endocrinology even further in the future.

Thus, throughout the pages of this EmPower Magazine issue (our 28th!), we’ve constructed a timeline that spotlights some of the most notable milestones in the endocrinology field and within our organization. We hope you find it informative, entertaining...and inspiring.
As endocrinologists, we tend to focus on science in medicine, but there is also “art”...not just in the application of scientific knowledge, but also in being observers of what is around us all.

Since the beginning of time, artists have been portraying the people and environments they are surrounded by in order to identify ideas, people and stories they can relate to. Even depictions of gods and goddesses normally start with a basic human form, to which things are added or changed to reflect unique or even supernatural attributes. Artists often have also depicted people with severe, late-stage medical problems that, up until the modern scientific era, were left untreated and/or undiagnosed. In fact, many medical schools now teach students to hone their skills of observation and better detect physical exam findings in their patients by diagnosing people depicted in artwork.

A review of art created over time reveals that groups of people from completely different cultures and time periods who had no contact with each other often portrayed similar medical diseases. For example, up until the 20th century, iodine

1991

Recognizing the need to have a voice for their sub-specialty in organized medicine, a group of visionary endocrinologists – dubbed “The Florida Four” – joins forces with a steering committee of 26 fellow physicians to create the American Association of Clinical Endocrinologists (AACE).

1992

AACE obtains official observer status in the American Medical Association’s (AMA) House of Delegates and the AMA Specialty Society Section.

First AACE Annual Meeting & Clinical Congress held in Orlando.
Deficiency was very common in mountainous areas that were far away from the sea because people did not have access to seafood, which is naturally rich in iodine. Iodine is an element that is very important to thyroid function, so much so that in the 1920s, some governments around the world began adding minute amounts of iodine into table salt to prevent the devastating consequences of iodine deficiency. In babies, this condition can cause low IQ, mental retardation, stunted growth, and a distinctive posture with bent knees. In adults who were born with a normal thyroid, iodine deficiency can cause a goiter, a harmless enlargement of the thyroid gland.

Depictions of goiters (a swelling of the neck resulting from enlargement of the thyroid gland) abound in artwork. In excavations of the Ohio River Valley of the Native American Adena tribe from 800 BCE to 1 CE, many stone pipes in the shape of men have been found. These men usually have a head disproportionately larger than the body, bent knees and a swollen neck (Figure 1). These findings are consistent with someone who has a long-standing iodine deficiency. More realistic depictions of goiters are also found in the paintings of the Italian Renaissance painter Caravaggio, who chose to live among the poor and working-class citizens of inland Italy and often used his friends and neighbors as models for paintings that the Vatican and the nobility commissioned from him. As iodine deficiency was very common among the poor, many of Caravaggio’s figures also show goiters, such as in the Virgin Mary in Madonna of the Rosary (Figure 2), which was painted around 1607.

While goiters are probably the most common endocrine disease seen in artwork, they are not the only one. After Egyptian pharaoh Akhenaten ascended to power in the 14th century BCE, he completely changed Egyptian religion and shifted its focus away from the traditional depictions of numerous gods and goddesses to a single one — the sun-disk god Aten. Mirroring this development, Egyptian artwork also changed radically. Instead of the stiff, formal and stylized art of the past, Akhenaten (as the primary sponsor and tastemaker of art and architecture) preferred emphasis on a more relaxed, naturalistic style to honor the real world that was the gift of the Aten.

Figure 1. Human Effigy pipe, Adena, 800 BCE to 1 AD, The Ohio History Connection, Joseph Froelich Collection

Continued on page 6

1993

The Diabetes Control and Complications Trial (DCCT) clinical study confirms that keeping blood glucose levels close to normal delays the onset and progression of eye, kidney and nerve disease caused by diabetes.

The American College of Endocrinology (ACE), the scientific, educational and charitable arm of AACE, is founded.
What is striking is the way Akhenaten himself is portrayed in artwork he commissioned and approved. In all his portraits, he is shown with a long neck, full lips, prominent breasts and curved hips. His feminine appearance in all the artwork has generated much comment and speculation. Some physicians have thought that he had a condition called aromatase excess syndrome. Aromatase is an enzyme complex that converts androgens (precursors to male hormones, such as testosterone) into estrogens. Men and women have both androgens and estrogens in differing proportions. In aromatase excess syndrome, the balance tips in favor of estrogens, which means even men end up with too much estrogen. This leads to feminizing characteristics in boys (like the ones Akhenaten had) and early breast development and puberty in girls.

Since it is dominantly inherited, Akhenaten would have passed it on to all of his children, and in a relief of Akhenaten and his family that has been found (Figure 3), this does seem to be the case. Akhenaten and his wife, Queen Nefertiti, are shown seated with one daughter standing in between them. Another daughter is standing on Nefertiti’s lap and a third sitting behind her sister. All three girls are drawn smaller than their parents to indicate they are children who haven’t reached puberty, but the one standing between her parents already has prominent breasts and hips.

As this stone slab rendering reveals, artwork often shows the unusual along with the ideal. People have had a fascination with others who exhibit various physical deformities for a long time. During the Hellenistic period between the death of Alexander the Great and the rise of the Roman Empire, “grotesque” figures of all kinds were popular. These distorted figures and shapes stand in stark contrast to the idealized human figures usually portrayed during this time. One figurine, of which only the head remains, very clearly shows acromegaly (Figure 4), a condition in which the pituitary gland starts making excessive growth hormone, which can cause an increase in soft tissue bone all over the body leading to large

**Figure 3.** Stela of Akhenaten and Family, Amarna period, 14th century BCE. From Tell el-Amarna. Egyptian Museum, Cairo

**Figure 4.** Terracotta head, 2nd century BCE. The Metropolitan Museum of Art, New York City.

1994

Landmark drug captopril, used previously for the treatment of hypertension and congestive heart failure, is approved by the FDA to treat end-stage renal disease, an often-deadly complication of diabetes.

AACE publishes its first clinical care guidelines for the management of diabetes mellitus.
noses, prominent foreheads and jaws, and large tongues when it manifests in adults. All of these features can be found in this figurine.

Botanical prints also can provide historical perspective. In Figure 5, different views of a plant that was used as an old folk remedy for diabetes are shown. This plant, known under various names as goat’s rue, French lilac, Italian fitch, or professor-weed, can be toxic and has been linked to pulmonary (lung) edema, abnormally low blood pressure (hypotension), paralysis and death. But in the Middle Ages, it was used to treat diabetes. In the original form, it was too toxic for safe use, but over time, popular type 2 diabetes oral medication metformin was developed from this plant.

We tend to think of diseases, and especially endocrine diseases, in the frame of modern medicine, and there can be a tendency to forget that most of the diseases we live with now have been around for a very long time. What has changed is how we think they develop and how we treat them. In fact, since these diseases now get caught and treated early, we are fortunate that we don’t see them at the advanced and often fatal stages like we used to. As this article shows, endocrine diseases, along with many other diseases of the human body, have been described since the beginning of time, and ever since human beings have first started making art that represented the world around them.

**Dr. Iram Ahmad** graduated summa cum laude from The University of Arizona with a Bachelor of Science degree in Molecular and Cellular Biology and a Bachelor of Arts degree in Art History. She attended The University of Arizona College of Medicine and did her internal medicine residency at The University of Arizona Medical Center (now Banner-University Medical Center) in Tucson, AZ. Dr. Ahmad is currently a clinical fellow in the Division of Metabolism, Endocrinology, and Nutrition at the University of Washington in Seattle and does her medical research with the Division of Nephrology.

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**Figure 5:** Illustration of Galega officinalis from Flora von Deutschland, Österreich und der Schweiz by Otto Wilhelm Thomé, 1885- precursor of metformin

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1995

Metformin, which prevents glucose production in the liver, becomes only the second type of oral medication approved in the U.S. to treat diabetes.

A branded version of alendronate sodium tablets is approved by the FDA to treat osteoporosis, the first non-hormonal medicine used to treat the disease in post-menopausal women.
Cystic fibrosis-related diabetes (CFRD) is a form of diabetes that is distinct from type 1 or type 2 diabetes and is common in people with cystic fibrosis (CF), an inherited disorder of the secretory glands which affects the cells that produce mucus, sweat and digestive juices.

In the past, the expected life span for a person with CF was very limited due to serious lung complications caused by the chronic disease. However, with better treatment of respiratory and other infections commonly found with the condition, individuals with CF are now living longer: the life expectancy of patients with CF has increased from less than one year in the 1950s to more than 40 years in 2013. And thus, CFRD is becoming a more common disease complication, occurring in approximately 20 percent of adolescents and 40 to 50 percent of adults with CF.

**How does Cystic Fibrosis cause CFRD?**

In addition to lung problems, the thick, sticky mucus produced in people with CF causes scarring and damage to the pancreas. This damage prevents the pancreas from producing enough of the hormone insulin. This is a condition known as insulin deficiency, a feature of type 1 diabetes in which antibodies attack the insulin-producing cells of the pancreas. In addition, individuals with CFRD may not respond appropriately to the insulin they make. This is known as being insulin resistant and is a feature of type 2 diabetes.
Symptoms of CFRD vary from person to person. Initially, some people may not experience any symptoms until the disease worsens. Others will experience symptoms common with other forms of diabetes, such as increased thirst and urination along with unexplained weight loss.

Are the diabetes complications of CFRD different from those of typical types of diabetes?
The short answer is yes...and no! Research suggests that there might be a stronger link between fasting hyperglycemia (elevated blood sugars) and the risk of developing specific diabetes-related complications than if fasting blood sugars are normal. In a study of 37 patients with CFRD who had diabetes for more than 10 years and also had fasting hyperglycemia, 14 percent had increased urine protein (a sign of kidney damage) and 16 percent had evidence of diabetes-related eye changes (retinopathy). In another study, of 59 patients who underwent full nervous system testing, 42 percent had at least one abnormality. Gastrointestinal symptoms were found in about half of subjects both with and without fasting hyperglycemia. These symptoms were more common with longer diabetes duration or worse blood sugar control, suggesting that diabetes may aggravate the gastrointestinal abnormalities that typically underlie cystic fibrosis.

But the prevalence and severity of retinopathy and diabetes kidney disease may be lower in CFRD compared with other forms of diabetes because the hyperglycemia in those with CFRD tends to be less severe. Additionally, because those with CFRD can still be producing some insulin (the loss of production typically being slow), this factor also contributes to decreased risk of some diabetes complications. Moreover, cholesterol levels typically are low in CF, hypertension occurs but usually is mild, and insulin resistance tends to be lower unless an acute illness process occurs. Therefore, some of the metabolic factors that physicians worry about in more typical diabetes cases are less likely to be present in CFRD, lowering the risk of developing what is called large vessel disease (heart attacks, stroke and poor circulation in the legs).

How is CFRD diagnosed and treated?
CFRD is diagnosed with an oral glucose tolerance test (OGTT) performed over a two-hour period following an overnight fast. This test consists of drinking a very sweet sugar mixture, with blood tests obtained at various time intervals to check the level of sugar in the blood. The less insulin produced, the higher the blood sugar. A person without diabetes will show the same level of sugar over time, because the body makes and releases into the blood the precise insulin amount needed to keep the blood sugar normal. If there is not

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1997

The terms type 1 diabetes and type 2 diabetes replace “insulin-dependent diabetes” and “non-insulin-dependent diabetes,” defining diabetes by cause rather than by treatment.

AACE launches its “Patients First” campaign, a national initiative created to help patients aim for intensive diabetes self-management and to persuade insurers, managed care companies and public officials to provide coverage for intensive diabetes self-management efforts.
enough insulin, the blood sugar rises. The Cystic Fibrosis Foundation (CFF) care guidelines recommend that all individuals with CF who are 10 years of age and older be tested each year using an OGTT.

The goal of treatment is to keep the blood sugar levels as close to normal level as possible. This can be achieved through a combination of medication, dietary modification to limit sugar intake and regular exercise.

The best medication used to treat cystic fibrosis-related diabetes is insulin. There are different types of insulin that may be prescribed, including longer- and shorter-lasting formulas or a combination of the two. Other diabetes medications used to treat type 2 diabetes, such as pills and injection medications, are not recommended in treating CFRD, as the main treatment goal is to replace the insulin not being produced. Making the insulin work harder, as is typically the effect of pills, is ineffective.

Researchers worldwide are making significant progress in their understanding of cystic fibrosis and how best to treat this disease, with the goal of better treatment of the underlying cause of cystic fibrosis and CFRD, rather than just the symptoms. To learn more about CF and CFRD, visit: www.cff.org.

**Cystic Fibrosis-Related Diabetes (CFRD): A Distinct Form of Diabetes**

(Continued from page 9)

**Dr. Magdalena Szkudlinska** is an Acting Instructor and Senior Fellow in the Division of Metabolism, Endocrinology, and Nutrition at the University of Washington in Seattle. She is actively engaged in clinical research, investigating the mechanisms causing hypoglycemia in cystic fibrosis patients who have not yet developed diabetes. She is interested in all aspects of clinical endocrinology, including diabetes and thyroid diagnosis and management. She is an active member of the Endocrine Society, the American Association of Clinical Endocrinologists and the American Thyroid Association.

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**1998**

A U.K. study shows that people with type 2 diabetes who practice tight control of blood sugar and blood pressure levels reduce their risk of complications, transforming the nature of diabetes care around the world.

AACE reaches the 3,000-member mark.
To improve the health of people living with diabetes

Boehringer Ingelheim and Eli Lilly and Company are committed to researching and developing innovative treatments that make a difference for people affected by diabetes.
Of all the medical specialties currently being practiced in the U.S., among the most in-demand services are those of endocrinologists, sub-specialists who manage diseases and conditions ranging from diabetes and obesity to reproductive system issues, osteoporosis, thyroid disorders and more. The supply of these specialists, however, is far outweighed by the need. According to the American Board of Internal Medicine (ABIM), there were only 5,811 board-certified endocrinologists in the U.S. in 2010 and many of those were involved in research, administrative or academic activities rather than providing clinical care. When increasing numbers of prediabetes and diabetes cases, the growing epidemic of obesity and an aging population developing conditions within an endocrinologist’s area of expertise are factored in, the impact of the nationwide shortage of endocrinologists becomes profound. Fortunately for patients and the physicians who care for them, endocrine physician assistants (PAs) are helping to fill the void.

Roughly one-third of PAs practice in primary care, with the remainder practicing in specialty medicine such as endocrinology, according to the American Academy of Physician Assistants. “PAs provide a broad range of health care services under the supervision of a physician in private practice, clinic or hospital settings, including include physical exams, diagnosing and treating illnesses, ordering and interpreting tests, developing treatment plans, prescribing medications, and educating and counseling patients on preventative health care,” says Sondra O’Callaghan, PA-C, a practicing endocrine PA and president of the American Society of Endocrine Physician Assistants (ASEPA).

After acquiring a bachelor’s degree, PA candidates are instructed for two to three years in an accredited graduate program similar to a medical school using what is known as a “fast track medical model,” developed during World War II to accelerate doctors’ training. The intensive curriculum offers training in internal medicine, an important foundation and prerequisite to moving into a specialty or sub-specialty area such as endocrinology. This classroom training is complemented by a minimum of 2,000 hours of clinical rotations. The PA candidate must then pass a rigorous board certification exam administered by the National Commission on Certification of Physician Assistants (NCCPA). In most states, certified PAs are licensed to practice medicine by the state medical board and are held to the same standards of care that physicians provide. They must complete 100 hours of continuing medical education every two years and take the board exam every 10 years in order to maintain their certification and licensure. They also continue hone their skills through allied memberships in organizations such as the American Association of Clinical Endocrinologists (AACE), which offers various educational, clinical programs and practice-related resources.

While endocrine PAs are trained in all aspects of endocrine diseases and disorders, they can also specialize further. For example, PAs can learn to do neck ultrasounds and thyroid biopsies. Others choose to run lipids (blood fat) or obesity clinics. And some work for physician practices where they manage the majority of patients with diabetes – a role known as a diabetologist. “The collaborative nature of the endocrinologist-PA team is such that the patients reap the benefits,” O’Callaghan notes. “With a continued shortage of endocrinologists and the rise in diabetes, prediabetes and resulting chronic conditions that demand our expertise, PAs can step in to provide increased access to quality endocrine care.”

1999

The FDA approves the first-ever physician-use continuous glucose monitoring (CGM) system to monitor patients for potentially dangerous high or low blood glucose levels.

AACE conducts its first annual Congressional visitation trip, meeting with legislators to advocate for enhanced care on behalf of patients with endocrine diseases.
The Scoop on Poop
Potential Benefits of Gut Microbiota

By Emory Hsu, MD

We humans are often preoccupied with our outward appearance. But how often do we give any thought to our gastrointestinal tract? Certainly, we talk about gut instincts, gut reactions, but remain remarkably ignorant of what is really going on in this part of our bodies.

As it turns out, perhaps we should be paying more attention (as unsavory as the thought might be). Scientists are discovering that the trillions of non-human cells (bacteria, viruses and fungi) that inhabit our gut – so numerous that they weigh approximately the same as the human brain – play a huge role in our well-being, with our poop potentially holding the key to treatment for bowel disorders, mental health issues and even obesity.

It’s only been in the past few decades that researchers have begun to realize the vast positive health effects of this complex community of living organisms, now commonly called microbiota, and have been working on new methods of boosting beneficial gut bacteria. Among the developments are prebiotics, a non-living supplement (usually non-digestible dietary fibers or fermented nutrient mix), that specifically changes the gut microbiota composition by nourishing the good bacteria already in the large bowel or colon, thereby improving the good-to-bad bacteria ratio.

Alternatively, probiotics are live bacteria and yeasts that are good for your health (especially the digestive system) that can be introduced to the body via supplements as well as foods that are prepared by bacterial fermentation, such as yogurt, kefir, tempeh and kimchi. They can be effective in reducing inflammation and disease severity in conditions such as ulcerative colitis and Crohn’s disease, although not all probiotics work equally effectively. It’s important to note that the strains of bacteria used in probiotic supplements are not sourced from human waste; rather they are strains that were originally extracted from healthy human stool samples during early probiotic research and cultured under controlled laboratory conditions.

Perhaps the most interesting (and newest) method of introducing live microorganisms into the body is through human feces. Fecal microbiota transplant (FMT) – where feces is taken from a carefully screened donor, mixed with saline and placed into the intestinal tract of a patient – has been studied extensively as therapy for difficult-to-treat intestinal infections caused by a bacteria called Clostridium difficile (C. diff). The procedure is meant to restore the “good” bacteria from the donor into the patient. The irony is that these patients often become severely ill in the first place because antibiotics meant to destroy the bad bacteria end up destroying the good bacteria as well, which paves the way for the C. diff infection.

Scientists are also studying how changes in gut bacteria may affect obesity. About a decade ago, researchers started investigating how changes in microbiota may impact our weight and discovered increases or decreases in different

Continued on page 14

2000
Long-acting insulin Lantus is introduced in the U.S. It has a 24-hour action period, but no peaks and valleys, making more stable blood sugar control possible.

2001
AACE celebrates its 10th anniversary and conducts its first Consensus Conference on Diabetes.
types of bacteria are associated with obese or lean body size. However, whether the association of specific bacteria and a lean body means that that bacteria is causing weight control is hotly debated in scientific circles—it could just mean that the foods the person is eating are foods that are lower in calories and these foods are what make the specific bacteria flourish, or that the person’s own genetics direct food processing and what bacteria are in the gut. The jury is still out on this topic.

Additional insight about microbiota’s impact is coming from studies of antibiotic use which, in certain instances, seem to affect body weight. However, research in mice suggests the weight change is not a direct effect of antibiotics, but rather is from the changes in gut microbiota. Studies looking at people born via cesarean section (thus having been exposed to different flora than through vaginal birth), as well as those treated with antibiotics in their childhood, suggest some moderate associations with body mass.

And after gastric bypass, in circumstances where patients have not lost much weight following the surgery but whose blood sugar levels become much more controlled and are even able to come off medications like insulin, it is now thought that microbiota may be partially responsible for this rapid change in metabolism. Ongoing studies are looking at transferring stool from lean donors to obese individuals to examine their microbiota changes and the effects on the person’s metabolism. A note of caution is in order, however: this does not mean that exchanging feces might be a cure for obesity. A number of factors beyond microbiota are at play with the disease.

Yet other studies suggest a link between microbiota changes and conditions as diverse as depression, non-alcoholic fatty liver disease and rheumatoid arthritis. However, these links are not clear cut and do not yet provide the strong scientific evidence needed to establish an absolute causal link. Further research is needed before definitive recommendations can be made.

Studying microbiota has proven to be difficult, and not just because of their sheer number and diversity. Microbiota are sensitive to changes in diet, sleep, exercise, stress and other factors. Plus, within a species (E. coli, for example), some strains can be beneficial, while others are harmful. Even the same strain can have different effects when in different parts of the body. This obviously presents challenges to any researcher.

What is indisputable, though, is that there is a strong interdependency between humans and the trillions of other beings living in us. Now it’s up to scientists to determine how we might use these microorganisms to maximum benefit.

Dr. Emory Hsu is conducting research on osteoporosis and microbiota at Emory University in Atlanta, Georgia. He graduated with an undergraduate degree from Harvard University and from medical school at Vanderbilt University, during which he was a Howard Hughes Medical Institute “Cloisters” Research Scholar for a year at the National Institutes of Health near Washington, D.C. He completed his Internal Medicine residency at Emory University, where he is now an Endocrine Fellow.

The term “prediabetes” is first introduced by the U.S. Department of Health and Human Services, replacing its former clinical name, impaired glucose tolerance, to highlight the seriousness of the condition and motivate people to seek appropriate treatment.

AACE’s Founding President, and one of “The Florida Four” who established the organization, is inaugurated as president of the AMA.
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Would you consider yourself to be a person with “healthy eating patterns?” Better yet, do you know what “healthy eating patterns” are? If you answered “no” to either of these questions, then this article is especially for you. Even if you answered “yes,” this article could be for you, too!

In the United States, we actually have a tool intended to help us make healthy food and beverage choices for the purposes of promoting good health, preventing chronic disease, and helping people to achieve and maintain a healthy weight: the U.S. Department of Health and Human Services (HHS) and the U.S. Department of Agriculture’s (USDA) Dietary Guidelines for Americans (Dietary Guidelines).

Jointly published by the HHS and USDA every five years since 1980, each edition of the Dietary Guidelines reflects an extensive review of the body of nutrition science and addresses pressing public health concerns as well as the nutrition needs of specific populations. The eighth edition was recently released and is summarized here.

**Dietary Guidelines for Americans**

Whether you eat three or five times a day, the foods and beverages consumed or avoided form a pattern. Eating patterns are the sum total of foods and drinks that one tends to consistently consume, and they interact to impact our health. There are five main guidelines outlined, and healthy eating patterns are at the core. These guidelines offer the most benefit when they are followed in entirety.

1. Follow a healthy eating pattern across one’s lifespan
2. Focus on variety, nutrient density and amount
3. Limit calories from added sugars and saturated fats and reduce sodium intake
4. Shift to healthier food and beverage choices
5. Support healthy eating patterns for all

The Healthy U.S.-Style Eating Pattern (2000 calorie level) is one example of an eating pattern and will be used to demonstrate the specific amounts for food groups and how following such a pattern can help people comply with the

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**2003**

- ACE’s Power of Prevention patient education program (now called EmPower®) is launched.
- The federal government reverses a three-decade ban on people who use insulin from driving a commercial vehicle.

**2004**

- AACE conducts its first Diabetes Day for Primary Care Physicians, an educational program to help doctors improve disease management and outcomes for their type 2 diabetes patients.
- AACE reaches 5,000 members.
guidelines. Please note there is more than one way to achieve a healthy diet, and eating patterns can be adjusted to a degree to fit your cultural and economic lifestyle. For additional information, you can review the dietary guidelines for different eating patterns/calorie levels that may fit your personal needs.

Here are the guidelines’ core principles:

**Vegetables**
All the five vegetable subgroups – dark green, red and orange, legumes (beans and peas), starch and other foods such as avocados – should be included in a healthy diet. The recommended daily amount is 2½ cup-equivalents. Each of the different subgroups provides specific combinations of nutrients including vitamins A, C, E and K, iron and folate, so it is important to choose to eat vegetables from all the subgroups.

**Fruits**
This group includes whole fruits – fresh, canned, frozen and dried forms, and 100 percent fruit juice. Fruits are an invaluable source of dietary fiber, potassium and vitamin C. The recommended daily intake is 2 cup-equivalents. Because 100 percent fruit juice contains less fiber and can contribute to extra calories when consumed in excess, half of your daily intake of fruits should be obtained from whole fruits. Additionally, canned fruits, fruit juices and even dried foods may have added sugars which can contribute to extra calories. It is important to always read your food labels and select those prepackaged fruits with the least amount of added sugars.

**Grains**
A healthy diet emphasizes whole grains while limiting consumption of processed grains and their byproducts. Whole grains such as brown rice, oats and quinoa are rich in dietary fiber, iron and other nutrients such as vitamin A, B6 and zinc, whereas refined grains, including ready-to-eat cereals and breads, are processed and contain significantly less nutrients. However, many of them are enriched with iron and B vitamins such as folic acid, making them “enriched grains.” At least half of the recommended grain intake of six-ounce equivalents per day should come from whole grains.

It is especially important for pregnant women to have “enriched grains” in their diet because they are fortified with folic acid, which prevents against fetal neural tube defects, birth defects of the brain, spine, or spinal cord that happen in the first month of pregnancy, often before a woman even knows that she is pregnant.

Continued on page 18
Dairy
A healthy diet includes fat-free and low-fat (1 percent) dairy. These products include milk, yogurt and cheese and are fortified with calcium, vitamins A and D, potassium and other nutrients. If you cannot eat dairy products, you should look for foods that provide similar nutritional value such as soy milk, almond milk, or orange juice enriched with calcium and vitamin D. Fish is also a great source of vitamin D. Whole milk, 2 percent milk and regular cheese have more fat, sodium (salt) and more calories, therefore their intake should be minimized. The recommended daily dairy amount depends on your age and ranges from 2 to 3 cup-equivalents per day.

Protein
This group contains both animal and plant sources including seafood, meats, poultry, nuts and soy. Proteins are an important source of B vitamins, zinc, copper, vitamin D and E. The different protein sources provide various amounts of these nutrients. For example: meat, poultry and seafood are a greater source of heme iron than plant sources. In animal foods, iron attached to proteins is referred to as heme iron. In plant foods, iron is not attached to heme proteins and is then referred to as non-heme iron. Heme iron is typically absorbed at a rate of 7-35 percent. Non-heme iron is typically absorbed at a rate of 2-20 percent. Iron is especially important for young children and women of childbearing age. To maintain a balance of these nutrients, the guidelines make specific recommendations on the weekly intake of these proteins, but total daily intake should be 5½ ounce-equivalents. (roughly the size of 1 ½ playing card decks).

Oils
Oils such as canola, olive and sunflower are fats that are liquid at room temperature. They are not really considered a food group, but are an important part of a healthy diet because they are a primary source of essential fatty acids and vitamin E. The recommended daily intake is 27 grams or 5 teaspoons.

Alcohol
There is no dietary need for alcohol. Intake should be no more than one drink daily for women and up to two drinks per day for men of legal drinking age.

Many Americans have typical eating patterns that are not those outlined in the current Dietary Guidelines. But how different is the typical American diet from the recommended diet? Well, about 75 percent have an eating pattern that is low in fruits, vegetables, dairy and oil. Fifty percent are meeting or exceeding the total grains and protein recommendations, and most

2006

The Juvenile Diabetes Research Foundation International (JDRF) funds a consortium of centers’ research into artificial pancreas systems. Still under development, the systems will automate blood sugar management around the clock, thereby dramatically reducing type 1 diabetes-relates risks.

The FDA approves Januvia, the first in a new class of drugs known as DPP-4 inhibitors that enhance the body’s ability to lower elevated blood sugar.
exceed the recommendations for added sugars, saturated fats and sodium. Do you see yourself in any of these groups? If so, here are some ways to launch your way into a healthier eating pattern:

- **Vegetables**: consider selecting a green salad or vegetable side dish with most meals/snacks.
- **Fruits**: consider including fruits as side dishes, select fruits as snack options, and replace cakes and cookies for desert with whole fruits.
- **Grains**: consider increasing whole grains and decreasing refined grains by reading your food labels! Foods with whole grains as the first ingredient instead of enriched flour are better choices.
- **Dairy**: consider drinking fat-free or low-fat milk with meals and include yogurt as a snack choice. (But beware of high sugar content in some yogurts.) Using lower fat options will reduce saturated fats and sodium.
- **Protein**: consider increasing protein variety by including seafood options once or twice weekly and using legumes, nuts or seeds in place of typical protein options like poultry, eggs and meat.
- **Oils**: consider using vegetable oil instead of butter when preparing food and increasing the intake of foods that naturally have good oils, such as seafood and nuts.
- **Added sugars**: choose beverages without added sugars, and limit desserts and sweetened snacks.
- **Saturated fats**: read the food labels and opt for foods higher in polyunsaturated and monounsaturated fats.
- **Sodium**: reading the food label is your best bet. Also, a home-cooked meal is the best way to know and control the amount of sodium in each meal.

Making lifestyle changes is an effort that can have a lasting benefit for you personally, as well as on your family...and even future generations. For some, the necessary shifts will be minor, but for others greater efforts will be required. If you need help in making these changes, speak with your medical care team.

Should I worry about osteoporosis?
As you get older, your doctor may talk to you about osteoporosis, a disease that occurs when the creation of new bone doesn’t keep up with the body’s removal of old bone, resulting in bones becoming fragile and brittle. When most of us think of osteoporosis, we often think about a broken bone - maybe having an arm or leg in a cast for a few weeks, and then returning to life as normal. Yet while osteoporosis may not seem as serious as other medical problems, the reality is that the disease can have severe consequences.

Broken bones prevent you from engaging in normal daily activities and can be serious enough to require nursing home care or can lead to other major medical issues. One in five seniors who get a hip fracture (perhaps the most feared complication of osteoporosis) will die from complications within the 12 months following the injury.

And it’s a common disease. Over 50 million Americans are thought to have osteoporosis. Estimates suggest it leads to over 2 million broken bones each year, generating nearly $19 billion in medical costs in the United States alone. But while all these statistics are scary, the good news is that there are very effective treatments for the disease, as well as opportunities to decrease the risk of developing osteoporosis.

What are the symptoms and how is it detected?
Most people with osteoporosis don’t experience any symptoms. Bones can deteriorate without any pain or weakness. Some people may only find out they have osteoporosis after they break a bone.

Thus, screening is recommended for many adults, especially if you are over age 65, have other medical problems such as rheumatoid arthritis, or take certain medications such as steroids. The most common way a physician will screen for osteoporosis is by having a picture of your bone density taken, usually at the spine or hip. This is called a DXA (dual-energy X-ray absorptiometry) scan, which is a quick and painless X-ray-based scan that takes only a few minutes and can be done on an outpatient basis without any fasting or preparation beforehand. The results are reported as a “score”: T and/or Z score. The lower the score, the worse the bone strength is. A T score of -2.5 or lower is usually osteoporosis, while a T score of lower than -1 is considered osteopenia, meaning low bone density with a risk of osteoporosis. If your DXA scan is normal, usually it does not need to be repeated for another 10 years unless medical conditions change, whereas if it shows low bone density, your endocrinologist may want to repeat it in as few as two years.
What can I do to prevent osteoporosis?
As with so many other medical conditions, good nutrition and exercise are important to help prevent the disease. Getting enough calcium and vitamin D helps maintain strong bones. If you don’t like milk, no worries! Beyond dairy products, there are many other good dietary sources of calcium such as leafy vegetables, and vitamin D sources, such as mushrooms, as discussed in a previous EmPower Magazine article (http://www.empoweryourhealth.org/magazine/vol7_issue3/calcium-and-supplements-what-you-need-to-know).

If you don’t get enough of these minerals in your food, in general, adults can take 1,000 milligrams of calcium each day, and menopausal women can take 1,200 milligrams daily. There is controversy as to exactly how much supplemental calcium should be taken, so it’s best if the calcium comes from food and not supplements.

For people who do not get much exposure to sunlight or enough vitamin D (which slows bone loss) in their diet, taking a supplement with at least 800 IU (international units, a measure used for drugs and vitamins) may be beneficial. Some experts even suggest taking more -- in the range of 1,000 to even 2,000 IU daily. This is something you should discuss with your endocrinologist, as there is the possibility of taking too much and becoming vitamin D toxic. Vitamin D is often called ergocalciferol or cholecalciferol (different types of vitamin D). Whichever you take, ingesting the supplement with the daily meal that has the highest fat content will help your body absorb the vitamin D.

And if you smoke, quitting is the goal since recent studies have shown a direct relationship between tobacco use and decreased bone density.

What if I have osteoporosis?
There’s no need to worry. There are many good treatments now available to prevent the risk of fractures and even to help reverse osteoporosis. First, your endocrinologist will make sure that there isn’t some other disease causing the osteoporosis. Whether or not to test for these diseases will depend on your medical history and physical exam. If you have conditions such as hyperthyroidism (an overactive thyroid), hypogonadism (low sex hormone levels), hyperparathyroidism (an overactive parathyroid gland or glands), kidney stones, or cancers, be sure to tell your doctor.

Also, your doctor will go over any medications you are taking as some – such as steroids, stomach acid controllers, or hormone therapies – can affect your bone strength. Your doctor will discuss an appropriate dose of calcium and vitamin D to be taking, which may be different from the daily over-the-counter dosage that people take to prevent osteoporosis. Staying active, especially with weight-bearing exercises, is beneficial. Weight-bearing exercise means an exercise that puts stress on your skeleton, such as walking, but not swimming. Be sure to get rid of any tripping hazards (clutter on stairs, loose rugs) at home, but be sure to stay as active as you can be.

Your endocrinologist will use a special calculator to estimate your personalized risk of a major fracture, called FRAX. If the risk is high, additional treatment will be recommended. Sometimes even if you don’t have osteoporosis, if you are at high risk of developing the disease, such as when taking long-term high-dose steroids, your doctor will start treatment as well.

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2009
AACE chapters are established in Bangladesh and Romania.
What are the medication treatment options?
In addition to calcium and vitamin D, there are prescription medicines that can treat osteoporosis effectively. The most common class of medicines used to treat osteoporosis is called bisphosphonates. Bisphosphonates have been shown to reduce various types of fractures and improve bone density. These are drugs such as alendronate (Fosamax), risedronate (Actonel), ibandronate (Boniva), and zoledronate (Reclast/Zometa). While the bisphosphonates all work in the same manner by reducing the ability of cells to break down bone, there are differences between these medicines: some brands are taken daily, whereas others are taken weekly or monthly, and some require intravenous infusion. Accordingly, they have slightly different levels of effectiveness and side effects. Your endocrinologist will recommend the one that is best for you.

After starting this medication, you will need to have your blood tested to make sure your calcium and vitamin D levels are adequate and that your kidney is handling the medications well. There are rare but serious side effects. If your bisphosphonate is a pill, you should be sure to swallow it with just a little water and not lie down for an hour afterwards in order to maximize absorption as well as to prevent the medication from irritating your esophagus. If you have serious kidney problems, the risk of bisphosphonates may outweigh the benefits. If you had recent dental work, tell your doctor before starting bisphosphonates, as jaw bone changes have been reported in those with dental work that start on bisphosphonates. Potential side effects will be thoroughly reviewed with you by your endocrinologist.
When medical conditions prohibit the safe use of bisphosphonates, or when they just do not seem to be working, other treatment options are available. Denosumab (Prolia or Xgeva) also affect cells that break down bone, but do so by stopping their activation. Teriparatide (Forteo) works to increase cells that make bone. For postmenopausal women, hormonal therapies (such as estrogen or drugs that act like estrogen) can be considered. And there are promising new drugs in the development pipeline.

**So, what’s the bottom line?**

While osteoporosis can be a silent disease, physicians now have effective and safe ways to prevent it and to treat it. In addition to exercise, calcium and vitamin D, your doctor will review your risks for fracture and discuss with you what medications could prevent fractures from happening.

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**How You Can Support Osteoporosis Testing**

Although DXA is universally recognized by the medical community as the gold standard for osteoporosis testing, Medicare reimbursement for the procedure has dropped from $140 in 2006 to $42 in 2016, a payment reduction of 70 percent over a 10-year time frame.

Consequently, the capacity within the healthcare system to provide DXA testing is being reduced and fewer patients are being tested, despite data that illustrate its value: evidence indicates that people at risk for osteoporosis who received bone density tests live longer, experience fewer fractures and save money for all payors, including Medicare, Medicaid and private sector insurance providers.

In an attempt to remedy this situation, the American Association of Clinical Endocrinologists (AACE) has joined forces with other national organizations in the Fracture Prevention Coalition, which is dedicated to providing a sustainable Medicare payment rate for DXA bone density scans. The group actively supports Congressional legislation H.R. 2461, which would improve access to, and utilization of, Medicare bone mass measurement benefits.

To learn more about this legislation, visit: https://www.congress.gov/bill/114th-congress/house-bill/2461. If you are interested in supporting this bill, AACE encourages you to contact your representative to urge their support of H.R. 2461: http://www.house.gov/representatives/find/.

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**DR. EMMORY HSU** is conducting research on osteoporosis and microbiota at Emory University in Atlanta, Georgia. He graduated with an undergraduate degree from Harvard University and from medical school at Vanderbilt University, during which he was a Howard Hughes Medical Institute “Cloisters” Research Scholar for a year at the National Institutes of Health near Washington, D.C. He completed his Internal Medicine residency at Emory University, where he is now an Endocrine fellow.

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Ranibizumab, which helps prevent the excess blood vessel growth that leads to diabetes-related blindness, is approved for treatment of diabetic macular edema.
When children with type 1 diabetes experience the everyday fun and freedom of camp with others just like them, something incredible happens. Diabetes isn’t the focus of their day. Lilly Diabetes believes that every child should have the opportunity to go to camp, and that’s why we’ve provided insulin and a variety of carefully designed resources to diabetes summer camps for more than 10 years. We help camps care for your child’s unique, personal needs so your child can focus on what’s most important — having a summer to remember.

LillyDiabetes.com
To register for a camp near you, visit www.diabetescamps.org.
So your physician just advised that your blood sugar is higher than normal, or maybe you have already been diagnosed with diabetes. Although the focus is often on diet and medications when discussing with your physician how to control your diabetes, physical activity – yes, the dreaded word “exercise” – can play a big role in helping you control your blood sugar and overall health.

If you’ve been diagnosed with type 2 diabetes, you need to look at physical activity not as a nuisance or an unwelcome activity, but rather in a whole new light. An additional 20 to 30 minutes of any type of exercise to your schedule three to four days a week can go a long way in improving your health status. Participating in group exercises in a local gym or sports club (for example, joining a regular swimming or yoga class) can also help motivate you to maintain a regular exercise regimen. Plus, exercising with a group of regulars can be very motivating socially as well and can serve as a support system when you might feel like throwing in the proverbial towel.

But what if you don’t want to pump iron at the gym? Don’t downplay the benefits of activities such as vacuuming the house, choosing to take the stairs instead of the elevator at work, and walking around your local mall. These count as exercise, too.

Continued on page 26

2013

AACE authors and successfully advocates for the adoption of resolution 420 (“Resolution of Obesity as a Disease”) by the American Medical Association House of Delegates.

The FDA approves a first-generation automated artificial pancreas-type system for use by people with diabetes ages 16 and older. The insulin pump/CGM combination automatically reduces insulin delivery when sugar levels are low.
Since everyone is different in the amount of exercise they like to do (or can do) and can perform safely, it is a good idea to review with your physician which exercises might be best for you. Your physician will be able to consider what is medically safe for you to try and recommend specific approaches for exercise depending on your heart health status, whether you might have diabetes-related neuropathy (loss of sensation) in your feet, or whether your vision might have been affected by the disease.

Additionally, your healthcare team can be a wonderful resource for specific programs in your community that could help you get active and stay active. Some of the more structured exercise programs that can involve personal trainers might require a note from your physician to make sure that you are medically able to participate, so this is one more reason to let your diabetes team know what you are planning.

And if you are still needing a little more of a nudge, here are just a few of the many benefits exercise offers:

**Blood sugar (glucose) control**
Exercise helps glucose get into body cells where it is converted into energy for your body to function. Exercise also lowers the amount of body fat and increases the amount of muscle in your body. Muscles take up glucose and use it for energy in a mechanism separate from how insulin works to lower glucose levels.

It is important to note how your blood sugar responds to exercise to prevent blood sugars that are too low, a condition called hypoglycemia. You can see these possible sugar fluctuation patterns by checking your blood sugar before and after physical activity, as well as noting the type of physical activity that caused the blood sugar change. Your diabetes-controlling medications might need adjustment to account for physical activity, so keeping track of your blood sugar patterns with exercise becomes a very powerful tool to help make the appropriate changes, whether dosing changes, changing to another type of medication, or even decreasing your medication.

**Lower blood pressure**
As with any other muscle in your body, exercise makes your heart stronger. With regular exercise, your heart becomes strong enough to require less effort to pump more blood. In turn, this causes less force on your arteries, which will result in lower blood pressure. Regular exercise also helps with maintaining a normal weight, which contributes to lower blood pressure.

It typically takes about one to three months of regular exercise to see the effects of lower blood pressure. As mentioned earlier, everyone is different in the amount of exercise they can do, or want to try, so it is very important to talk to your physician about your exercise plans, especially if you have any heart or blood vessel disease which can limit the amount of exercise you can perform safely.

**Improved cholesterol levels**
Exercise helps your cholesterol by increasing the amount of high density lipoprotein (HDL) cholesterol, also known as "good" cholesterol. Increasing this HDL cholesterol to as high a level as possible is good for your heart health. And exercise also can decrease triglycerides – blood sugar fats. High triglyceride levels (hypertriglyceridemia) are believed to be associated with increased risk for heart disease in both men and women, perhaps more so for women. And it is well known that people who exercise regularly have lower triglyceride levels than those individuals that are sedentary.

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2014

The U.S. Preventative Services Task Force recommends all pregnant women be screened for gestational diabetes after 24 weeks of pregnancy.

AACE organizes an Obesity Consensus Conference where work begins to produce an advanced clinical care framework for a new diagnosis of obesity based on a complications-focused chronic disease model.
Weight control
Routine physical activity also boosts your metabolism to help you lose and maintain a healthy weight. Simply allotting an extra 20 to 30 minutes of exercise a few times a week can help you lose weight, which can contribute to multiple benefits, as mentioned above.

Overall sense of well-being
The relationships between anxiety, depression and exercise aren’t entirely clear, but working out and other forms of physical activity can lessen feelings of anxiety or depression and make you feel better. Exercise may also help keep anxiety and depression from coming back once you’re feeling better. It might be the last thing you want to do, but if you get moving, your endorphin levels (natural hormones that your body makes that are associated with feeling good) increase. Stress is more manageable. Some experts feel that exercise can decrease immune system chemicals that can worsen depression, and others note that when you exercise, your body temperature increases, another calming factor. Plus, the sense of self-confidence that often accompanies exercise and the social interaction of a friendly smile or greeting as you walk around your neighborhood can help your mood.

So what are you waiting for? The skies are sunny and warm weather is here, so take a deep breath and take that exercise plunge.

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DR. MIRIAM THOMAS is a board-certified physician in Internal Medicine and currently an Endocrinology Fellow at Emory University in Atlanta, Georgia. Her interests include obesity, diabetes and thyroid diseases.

ACE launches “Get to the Heart Of It” (www.get2theheartofit.com), a dedicated patient website to increase awareness of LDL cholesterol levels and their relationship to heart disease risk and tools and resources to help reduce that risk.
Managing diabetes involves making healthy food choices, being active and, for some people, taking medicine.

If you are taking medications to help manage your diabetes, it can be confusing to know when and how often to take them. You might also be afraid of side effects, have a hard time remembering to take your medicines, or stop taking them because you feel better or don’t know if they are working.

Talk to your doctor or other members of your health care team to better understand your medications. Here are some questions you can ask:

1. What is the name of the medicine and what is it supposed to do?
2. Why did you choose this particular medicine for me?
3. What are the possible side effects I should look out for? How can I prevent them?
4. How soon should I expect the medicine to begin to work? How will I know if it’s working?

Other tips to help you take medicines safely include using a pill box to keep your medicines organized. It can also be easier to remember to take your medicines when you take them with another daily activity, such as in the morning when you brush your teeth or eat breakfast. If you have a smartphone, set a daily alarm on your phone or download an app that will remind you to take your medicines and when to get them refilled. Ask a loved one for help if you need it.

Your health care team can also help. Ask if you can get all of your prescriptions filled at the same pharmacy and if refills can be planned for the same time of the month. If timing is a problem, ask if it is okay to take the medicine at a different time. For example, if you forget to take your medicine before you eat, ask if you can take it after the meal. The important thing to remember is that your healthcare team can’t help you if they don’t know you are having problems with how to take your medicine or know you have concerns about taking a medicine.

Visit the National Diabetes Education Program’s Promoting Medication Adherence in Diabetes web resource (http://www.niddk.nih.gov/health-information/health-communication-programs/ndep/health-care-professionals/medication-adherence/) to find online tools and handouts to help you learn how to better manage your medications.

The U.S. Department of Health and Human Services’ National Diabetes Education Program is jointly sponsored by the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) with the support of more than 200 partner organizations.

2016

Two National Institutes of Health-funded clinical trials begin testing how effective the artificial pancreas is in automatically monitoring and regulating type 1 diabetes patients’ blood-sugar levels.

AACE celebrates its 25th anniversary.
You can become an active participant in protecting your well-being by visiting www.thyroidawareness.com.

The site features in-depth content about thyroid disease risk factors, symptoms and treatment options, as well as downloadable flyers about the range of thyroid conditions.
Thank You

The American College of Endocrinology (ACE) and the American Association of Clinical Endocrinologists (AACE) would like to thank AbbVie, Boehringer Ingelheim, and Lilly Diabetes for their support of the EmPower initiative.

Supported by a sponsorship from AbbVie.