AUGUST 2016

THE LEADING MAGAZINE FOR ENDOCRINOLOGISTS

Endocrine news

Chemical Imbalance

ENDOCRINE SCIENCE CONTINUES TO UNCOVER THE SECRETS OF ENDOCRINE-DISRUPTING SUBSTANCES AND THEIR ALARMING EFFECTS ON THE HUMAN BODY.

- **Just the Facts:** The ongoing EDC arguments between researchers and regulators.
- **Forbidden Fruits:** The hidden dangers of obesogens lurking in produce.
- **Free & Clear?** How safe are products labeled "BPA free?"

LAB NOTES Q&A:
Harmonies & hormones with Dan Gorelick, PhD.

COME TOGETHER:
The merging of two Endocrine Society journals.

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Endocrine-disrupting chemicals known as "obesogens," found in many fungicides, have been shown to alter the function of fat cells in animal studies. Are fruits and vegetables the next items added to the list of known endocrine disruptors?

BY GLENDA FAUNTLEROY

FROM THE **EDITOR**

Endocrine-Disrupting Chemicals: Unsafe at Any Level

AS WE CONTINUE OUR JOURNEY THROUGH THE YEAR OF ENDOCRINOLOGY, we find ourselves in August with an issue highlighting one of the many areas where the Endocrine Society has forged far ahead of many similar organizations — endocrine-disrupting chemicals (EDCs). I've been proud to watch and report on the progress that the Society has made in making sure that our governmental agencies, as well as governments around the world, are aware of the dangers that these compounds pose.

Any issue as large as this is sure to cause a commotion in the world of manufacturing and regulation, and that's exactly what Eric Seaborg writes about in "EDCs: Researchers and Regulators Argue the Facts" on page 18. Time and time again, research reveals what dangers these chemicals can be to our health — especially the health of the young or unborn — but regulators have not been quick to respond. There is definitely a difference of opinion between the chemical producers and the researchers, according to Heather Patisaul, PhD, professor of biological sciences at North Carolina State University, Raleigh. "If you talk to people outside the regulatory community — scientists at the Endocrine Society, academic scientists, scientists who study chemicals — we all think that the evidence is pretty strong that BPA contributes to human health effects," she says. "There is this disparity between what the regulatory agencies say and what the rest of science says."

Some studies have shown that chemicals such as BPA, phthalates, arsenic, and others interfere with appetite control and satiety by altering the programming of fat cell development ("Forbidden Fruits," p. 36). Designated "obesogens," these compounds are found in everything from personal care products and food storage containers to fungicides used on produce. One of the challenges regarding stressing EDCs' threats is the fact that the problems don't occur until months, if not years, after exposure. "EDCs produce a subtle effect on health a long time after exposure, which often occurs during fetal development," says Angel Nadal, PhD, professor of physiology at the Institute of Bioengineering and CIBERDEM at Miguel Hernandez University of Elche, Alicante, Spain. "Furthermore, EDCs do not directly initiate a pathology, yet they increase the probability of an individual suffering from chronic diseases…that have multifactorial causes. To me, the fact of not having a straightforward cause-effect relationship avoids the public alarm of EDC exposure."

Associate editor Derek Bagley has a plastic *Walking Dead* cup on his desk with a sticker on it that says "BPA Free." However, in his article "Warning Signs" on page 24, that doesn't necessarily mean that it's any safer. An item with this sticker on it may indeed be BPA free but the substitute compound — bisphenol S (BPS) — could be just as harmful. "'BPA free' does not necessarily mean safer," says Nancy L. Wayne, PhD, a professor of physiology at David Geffen School of Medicine at UCLA. "It's been marketed in that way. But when you look at the structure of BPA and BPS, there is very little difference. What were manufacturers thinking? It was merely an EDC swap." EN

— Mark A. Newman, Editor, *Endocrine News*

AUGUST 2016

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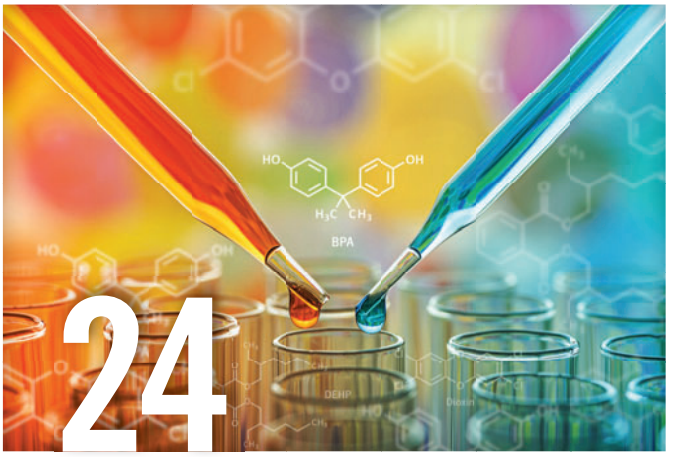

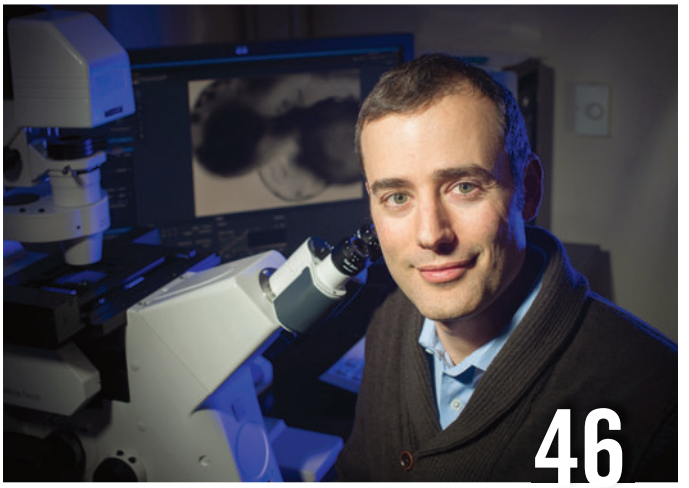

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ENDO 2017: Advancing Endocrine Science in Our Second Century

INNOVATION. COLLABORATION. SCIENTIFIC Breakthroughs. Improvements in patient care. World-class speakers.

As president of the Endocrine Society, I am proud to say that your Annual Meeting Steering Committee (AMSC) fully embraced these concepts to develop an outstanding scientific and clinical program that showcases the most cutting-edge research and clinical practice guidance, and features both domestic and international perspectives on the science and practice of endocrinology. Under the bold leadership of the chairs — Gary Hammer, MD, PhD, Carolyn Smith, PhD, Jack Leahy, MD, and Ann Danoff, MD — the AMSC has made **ENDO 2017** a meeting that you *need* to attend.

Scientists, clinicians, and educators will find much to choose from with more than 80 symposia, 60 Meet-The-Professor sessions, and numerous special clinical, basic, translational, and educational sessions.

A few highlights of **ENDO 2017** include:

- Presidential Plenary with international leaders who will focus on the role of the microbiome in nutrition and obesity;
- Novel plenaries that will examine the biology and science of gender; oxytocin and why voles love; steroid abuse in athletes and much more;
- Titans in diabetes going head-to-head in an exciting and illuminating debate;
- An innovative hands-on workshop about mastering databases;
- The nucleus of our meeting — abstracts reporting new endocrine science and medicine — will be available and readily searchable;
- World-class, career-shaping information for our clinical and basic science trainees;
- All new and highly interactive Meet-The-Professor sessions, clinical trial presentations, innovative symposia, new Society guidelines, and sessions developed with your learning in mind; and
- Pre-conference and satellite symposia that are of high value to basic scientists, clinician scientists, and practicing physicians.

> **"Be part of the best Endocrine Society Annual Meeting and Expo ever, so please mark your calendars to be in Orlando, Fla., from April 1 – 4, 2017."**

ENDO Expo will continue to offer activities complementary to those of the scientific program. Definitely stop by to visit the exhibits, educational theaters, posters, and special events while networking and enjoying the coffee breaks.

ENDO 2017 will provide an opportunity for our community to come together to review our accomplishments and set our priorities for the future. Be part of the best Endocrine Society Annual Meeting and Expo ever, so please mark your calendars to be in Orlando, Fla., from April 1 – 4, 2017.

This meeting will remain a unique way to advance the Society's tripartite mission. I look forward to a highly successful and productive year for the Endocrine Society, particularly as we embark on year one of our next century.

Please share your questions or comments with me at president@endocrine.org. EN

— **Henry M. Kronenberg, MD**, President,
Endocrine Society

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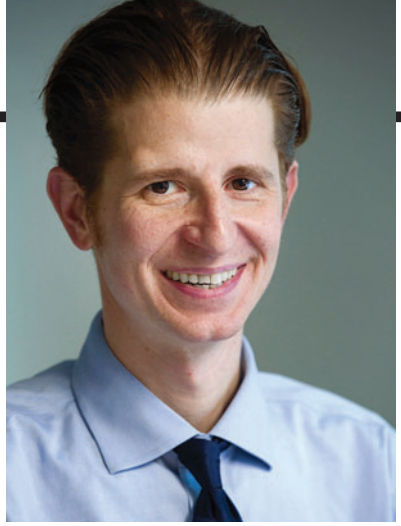


WHY **ENDOCRINOLOGY?**

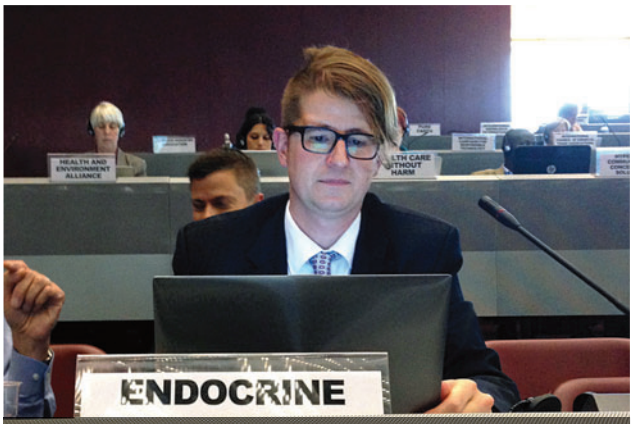
An International EDC Advocate

BY LEONARDO TRASANDE, MD, MPP, Associate Professor of Pediatrics, Environmental Medicine & Population Health, NYU School of Medicine; Associate Professor of Health Policy, NYU Wagner School of Public Service; Associate Professor of Public Health, NYU Steinhardt School of Culture, Education and Human Development; Associated Faculty Member, NYU Global Institute of Public Health, New York

As a pediatrician-epidemiologist, it's been an exciting privilege to contribute to the field of endocrinology, both by documenting associations of chemical exposures with effects on obesity and metabolic risks in humans, and by describing the social costs of inaction in preventing endocrine disruption. It's gratifying in particular to see the leadership of the Endocrine Society on international efforts to protect the public from endocrine-disrupting chemicals (EDCs). The presence of the Society at meetings with the European Health Commissioner in Brussels, at the International Conference on Chemicals Management, and on Capitol Hill has had palpable impact.

While I practice in a general pediatric clinic, the increase in endocrine-related conditions is palpable. During my residency from 1999 to 2002, I saw the uptick in diabetes hospitalizations first-hand, not to mention the rise in obesity. Developmental disabilities are all too common in children now, and while the increase in reproductive conditions is not part of the regular day-to-day experience, the increase in birth and neonatal complications among couples who conceive using advanced methods is all too evident.

My focus on environmental chemicals in my career evolved out of an interest in health policy. I had already received a Master's in Public Policy from the Harvard Kennedy School of Government and caught "Capitol Fever" from that experience. I decided to pursue a year's legislative fellowship in the office of then-Senator Hillary Rodham Clinton, and was asked to focus on children's and environmental health policy. It was through the focus



In September 2015, Trasande traveled to the International Conference on Chemicals Management in Geneva, Switzerland, on behalf of the Society, where he spoke of the importance for worldwide chemical safety.

> **"Developmental disabilities are all too common in children now, and while the increase in reproductive conditions is not part of the regular day-to-day experience, the increase in birth and neonatal complications among couples who conceive using advanced methods is all too evident."**

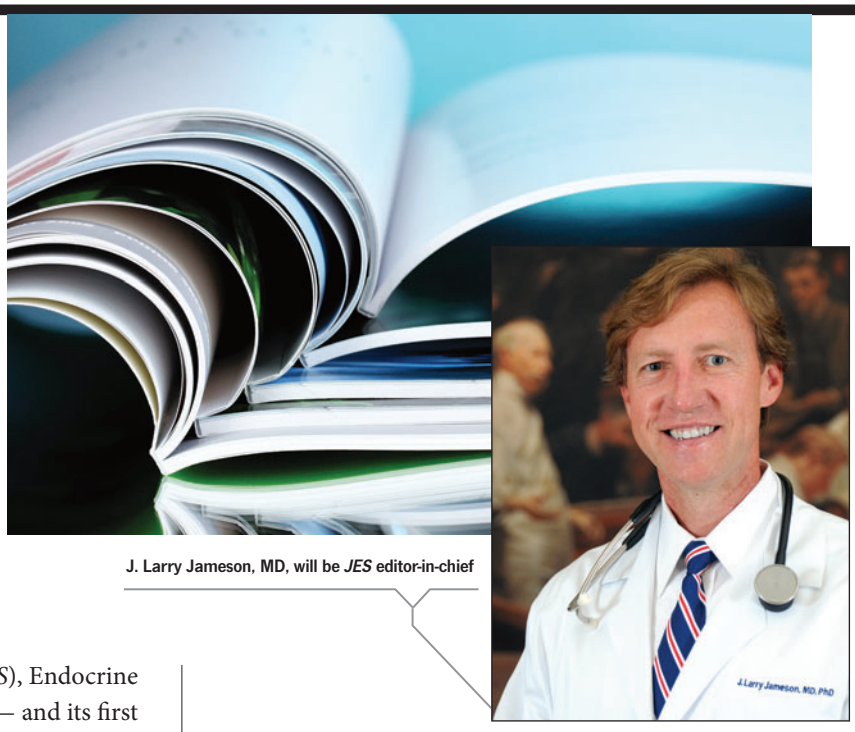
To celebrate 100 years of the Endocrine Society, throughout 2016 *Endocrine News* is running a "Why Endocrinology?" column in each issue. If you'd like to share your story with our readers, contact Mark A. Newman at **mnewman@endocrine.org**.

on environmental health that my interest in this field blossomed. I chose to get some environmental pediatrics training and pursue an academic career at the interface of environmental health and policy.

I first focused on effects of chemicals on the developing brain but could not leave aside an interest in understanding of origins of obesity and metabolic conditions. I began to focus in particular on phthalates and bisphenols, and we published some early studies that served as the foundation for active NIH grants examining these chemicals as obesogens and cardiometabolic risks. Through this work, I came to interact with Endocrine Society members and have become ever more involved since! EN

Trasande (second from right) has been a vocal advocate for the Society's efforts to educate governments around the world on the impact on patients' health due to EDC exposure. In February, he was part of a team of Endocrine Society members that went to Brussels, Belgium, to meet with European Commissioner for Health and Food Safety to discuss the impact of EDCs on human health. From left to right: Remy Slama, PhD; Commissioner Vytenis Andriukaitis, MD; Trasande; and Jean-Pierre Bourguignon, MD.

Journal of the Endocrine Society Announces Associate Editors



J. Larry Jameson, MD, will be *JES* editor-in-chief

The *Journal of the Endocrine Society* (*JES*), Endocrine Society's first new journal in 30 years — and its first Open Access (OA) journal — is preparing for its launch this fall. Leading this new endeavor will be J. Larry Jameson, MD, executive vice president of the University of Pennsylvania for the Health System and dean of the Perelman School of Medicine at the University of Pennsylvania, as the founding editor-in-chief.

Helping Jameson in his task of making *JES* successful is a team of associate editors from around the world:

- Andrew Arnold, MD, University of Connecticut, Mansfield
- Jim Fagin, MD, Memorial Sloan-Kettering Cancer Center, New York
- Ken Ho, MD, Princess Alexandra Hospital, Brisbane, Australia
- Takashi Kadowaki, MD, University of Tokyo, Japan
- Marta Korbonits, MD, Queen Mary University, London, UK
- Carol Lange, PhD, University of Minnesota, Minneapolis
- John Leahy, MD, University of Vermont, Burlington
- Ana Claudia Latronico, MD, Sao Paulo University, Brazil
- Eun-Jig Lee, MD, Yonsei University, S. Korea
- Luca Persani, MD, University of Milan, Italy
- Margaret Shupnik, PhD, University of Virginia, Charlottesville
- Paul Stewart, MD, University of Leeds, UK
- Nancy Weigel, PhD, Baylor College of Medicine, Houston, Texas
- Bulent Yildiz, MD, Hacettepe University, Turkey

Topic categories of articles that will be considered for *JES* are adrenal; diabetes, pancreatic and gastrointestinal hormones; growth, growth hormone, and growth factors; hormone action in cancer; lipids and cardiovascular; nuclear receptors and their ligands; obesity and adipocyte biology; parathyroid, bone, and mineral metabolism; pituitary and neuroendocrinology; reproductive biology and sex-based medicine; signaling pathways; and thyroid. The following cross-cutting terms will be used to further refine the topic categories: aging, autoimmunity and inflammation; bioinformatics; development; endocrine disruptors; genetics and genomics; health disparities; neoplasia; pediatrics; therapeutics; surgery; transcription and gene regulation; and protein regulation and proteomics.

JES will publish perspectives, images, data papers, and mini-reviews as well as research and methods articles.

To volunteer to review for the new OA journal or to sign up for updates, go to **www.endocrine.org/jesopenaccess**.

MEMBERS in the NEWS

Burnett-Bowie Promoted at Harvard Medical School

Sherri-Ann M. Burnett-Bowie, MD, MPH, has been named faculty assistant dean for student affairs in the Office of Recruitment and Multicultural Affairs at Harvard Medical School.

Burnett-Bowie is also the inaugural chair of the Society's Committee on Diversity and Inclusion (formerly Minority Affairs Committee) and will lead the Society's expanded diversity and inclusion efforts, which include implementation of the diversity and inclusion strategic action plan approved by the Council in June.

In addition to her new position, Burnett-Bowie holds two other leadership positions devoted to increasing diversity and inclusion: She is one of the associate directors of the Massachusetts General Hospital Center for Diversity and Inclusion, and she is the director of Multicultural Affairs for the Department of Medicine, where she co-chairs the Diversity and Inclusion Board.

As a clinical scientist, her research has focused on defining the physiology of the mineral metabolism hormone, FGF23; skeletal and non-skeletal effects of vitamin D; and clinical trials of treatments for osteoporosis.

She has received multiple local and national grants to support her clinical investigation and local awards for both excellence in teaching and the promotion of diversity and inclusion.

The Broadmoor, Colorado Springs, Colorado, the location of this year's conference

LINCOLN ROGERS / SHUTTERSTOCK.COM

National Conference on Women's Health Research Taking Place in September

In partnership with the Society for Women's Health Research, the Center for Women's Health Research (CWHR) at the University of Colorado Anschutz Medical Campus is hosting a National Conference on Women's Health Research entitled "Sex Differences Across the Lifespan: A Focus on Metabolism" from September 28 to 30.

This conference will convene some of the best minds in sex-difference research to share knowledge and ideas, while setting the stage for the next pivotal scientific research in cardiometabolic risk across the lifespan. A collaborative, productive environment will be fostered through interactive sessions, poster presentations, focus groups, and keynote speakers. Conference attendees will have strong opportunities for networking, exchanging new ideas, and creating plans for collaborative, interdisciplinary research to tackle unaddressed questions in sex-difference research.

In addition to updates from senior scientists, there will be a national call for abstracts for poster presentations. The conference will showcase the talents of the CWHR's junior scientists who are being invited to present their work in dynamic five-minute updates. This small meeting format will further the CWHR's mission of mentorship and collaboration across career generations.

CWHR is focused on research to prevent, treat, and cure cardiovascular and metabolic diseases in women, as well mentoring the next generation of scientists in women's health and educating the public. The hope is that via research that addresses sex differences, future breakthroughs to improve the health of both women and men will occur.

To learn more, register, or submit a poster abstract, visit **www.endocrine.org/WomensHealth**.

Society Launches Leadership Training Survey

> “The idea that leadership [skills and abilities] are only for program chairs or leaders of a hospital really needs to change. All physicians that enter the clinical or research worlds need to be viewing themselves as leaders in some capacity, and we need to be training them for that.”
>
> — COL. MARK W. TRUE, MD, USAF, MEDICAL CORPS OF THE SAN ANTONIO MILITARY MEDICAL CENTER, TEXAS

To find out if leadership is an important issue to budding endocrinologists, as well as fellowship program directors, the Endocrine Society is co-sponsoring the Leadership Training Survey.

The Society is working with Col. Mark W. True, MD, USAF, Medical Corps of the San Antonio Military Medical Center, who is the lead author of the Leadership Training Survey. He is a member of the Clinical Endocrine Education Committee (CEEC) that is exploring the need for leadership training as part of the endocrinology fellowship curricula. The survey, launched on March 30, is targeting fellowship program directors, fellows, and recent graduates and supports the work of the Leadership Development Task Force.

“A lot of people feel like this is an important subject and needs to be addressed,” True told ENDO TV at **ENDO 2016** in Boston. “In the military, our fellowship graduates stay in our system, and they often serve as solo endocrinologists, leading clinics in big medical centers. As I became a program director, I realized early on that we’re not really training our fellows adequately for those roles.”

In many hospitals or medical centers, endocrine care is delivered by primary care physicians for major conditions such as diabetes, obesity, or thyroid issues, but according to True, it is up to the endocrinologist to lead delivery of care in terms of training others who would be giving the care. “The idea that leadership [skills and abilities] are only for program chairs or leaders of a hospital really needs to change,” he added. “All physicians that enter the clinical or research worlds need to be viewing themselves as leaders in some capacity, and we need to be training them for that.”

The Society is responsible for data gathering, and True, together with his team in San Antonio, is responsible for data analysis. Once the data has been analyzed, it will be published in one of the Society journals.

Recommended Criteria Would Fail to Protect from EDC-Associated Harms

On June 15, the European Commission released long-awaited criteria to identify endocrine-disrupting chemicals (EDCs). The Commission decided to support an option that uses the World Health Organization's definition for EDCs but introduced modifications that create a very restrictive definition that will prevent effective regulation of EDCs. During the Commission's period of consideration, the Endocrine Society supported an option that would have ranked EDCs in multiple categories based on available scientific evidence and also allowed for new data to be incorporated as more studies are published.

More than 1,300 studies have tied EDC exposure to health problems such as infertility, diabetes, obesity, hormone-related cancers, and neurological disorders, according to the Endocrine Society's 2015 Scientific Statement. Because the health effects of exposure can take years or even generations to become apparent, scientists have used a variety of animal and epidemiological studies to document the effects of EDCs.

The European Commission's overly strict criteria would result in very few EDCs being identified and regulated, at a high cost to the public's health. Recent studies published in *The Journal of Clinical Endocrinology & Metabolism* have found that adverse health effects from EDC exposure cost the European Union more than €163 billion each year in healthcare expenses and lost productivity. Bisphenol A and other EDCs can be found in common products, including food containers, plastics, cosmetics, and pesticides.

The European Parliament and member countries still need to approve the regulatory criteria before they take effect. To influence this vote on the criteria, we are pursuing a targeted strategy to engage targeted European Union member states and connect Society EDC experts with health ministries in their countries. Additionally, the Endocrine Society provided detailed comments to a public consultation issued by the European Commission to gather feedback on the proposed criteria. We will continue to advocate for changes to ensure the criteria are grounded in scientific evidence.

For more information about the Society's position and advocacy related to EDCs, please visit http://escentennial.org/calendar/august/.


Seattle, Washington

Society Provides Input to CMS on How New Care Models Impact Endocrinology; Schedules Special Session at CEU

The Endocrine Society submitted extensive comments to the Centers for Medicare and Medicaid Services (CMS) on proposed healthcare delivery models called the Quality Payment Program (QPP).

The QPP resulted from legislation replacing the Sustainable Growth Rate last year and overhauling the way in which physicians are reimbursed for services they provide to their patients. The proposal delineates two paths for payment: A merit-based incentive payment system (MIPS) and advanced alternative payment models (APMs), which emphasize quality improvement as opposed to straight fee-for-service healthcare delivery.

Key comments from the Society to CMS included:

- The proposed programs are an opportunity for CMS to improve upon its existing quality improvement programs but that CMS should delay its reporting period to ensure that physicians have enough time to properly transition to the QPP.
- CMS should provide ample opportunity for physicians to receive feedback on their performance for continued process improvement.
- Risk adjustment will be a critical component of these programs and should be devised in a manner that is transparent and can be tested.

The new payment system is a big change and confusing to most healthcare providers. To help endocrinologists better understand how the new payment system will affect them, there is a special informational session about the new QPP at the Society's upcoming Clinical Endocrinology Update (CEU) meeting.

For more information about the Society's response to CMS' proposal, please visit **www.endocrine.org**. *For more information about the informational session at CEU, please visit* w**ww.endocrine.org/ceu/program/macra-symposium**.

MEMBERS in the NEWS

Adi Oversees New Pediatric Diabetes Division

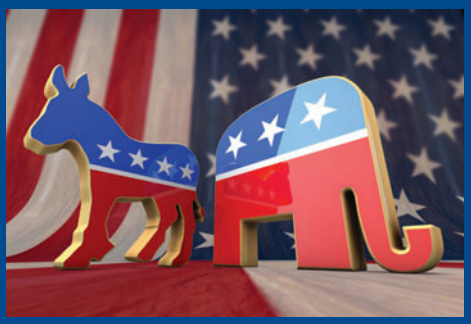
Endocrine Society member Saleh Adi, MD, a pediatric endocrinologist and diabetes specialist, is spearheading the new pediatric diabetes support services by Marin General Hospital at the Braden Diabetes Center in partnership with the Madison Clinic for Pediatric Diabetes at UCSF.

"Living with diabetes or caring for a child with type 1 diabetes is hard enough and full of daily challenges — distance to quality care shouldn't be one of them," says Adi, director of the Madison Clinic for Pediatric Diabetes at UCSF. "I am delighted to partner with the leadership and staff at the Braden Diabetes Center to be the cornerstone of a program in Marin that will facilitate access and improve the health of children and young adults with type 1 and type 2 diabetes from Marin County and other parts of Northern California."

Before Marin General Hospital's Braden Diabetes Center collaborated with UCSF Health to offer pediatric diabetes services in Marin, families had to travel outside of the county to receive medical care for their children with diabetes. The frequency at which these families require support; the consequences of not having care for the children in a timely fashion; and the family challenges of balancing careers, school, work, and extracurricular activity schedules, makes the proximity of care very important.

Adi and his team of specially trained pediatric nurses and dietitians, all of whom are certified diabetes educators, offer children and their families one-on-one care and group support for type 1 and type 2 diabetes, along with the critical information for managing their illness, such as intensive insulin management, pump training, continuous glucose monitoring, and medical nutrition therapy.

"I am grateful to the team at Marin General Hospital under the leadership of Dr. Linda M. Gaudiani," Adi adds, "who enthusiastically opened their arms to host our program and worked tirelessly to make it happen."



Society, Obesity Organizations Hold Briefings at Party Conventions

The Endocrine Society and members of the Obesity Care Action Network conducted educational briefings at both the Republican and Democratic Conventions to educate policy makers about obesity, change mindsets, and increase support for access to evidence-based obesity care.

Through these efforts, the goal is to make more members of Congress aware of and support the Treat and Reduce Obesity Act, which would enable specialists to provide intensive behavioral counseling for obesity and would provide Part D coverage for weight-loss drugs. At the briefing, the Society also will highlight policy priorities for the coming year, which include diabetes prevention and coverage issues, the need for increased National Institutes of Health funding, and opportunities to educate the public about endocrine-disrupting chemicals.

The Endocrine Society looks forward to continuing to stress the importance of a comprehensive approach to addressing chronic diseases with policy makers, and there are plans to host a congressional briefing in September on how obesity has impacted children in America. EN


Beijing, China

17th International Congress of Endocrinology/15th Annual Meeting of Chinese Society of Endocrinology

Beijing, China, August 31 – September 4

This event furthers the collaboration between ICE and CSE and promotes the long-term commitment to supporting endocrinology around the world, especially in developing nations. Local and international experts are working together to develop an unmissable program of the highest scientific standards appealing to the full spectrum of endocrinologists around the globe — basic scientists, clinician scientists, practicing endocrinologists, and of course, trainees.

Held jointly with the CSE annual meeting, ICE-CSE 2016 promises to be a rich and fulfilling educational event with the opportunity to learn from experts, colleagues, and peers based around the world in a diverse and colorful environment, unique only to ICE!

www.ise-cse2016.org

AADE16

San Diego, August 12 – 15

Each year, thousands of diabetes educators from around the country attend the American Association of Diabetes Educators (AADE) Annual Meeting and Exhibition to learn about the newest and greatest in the world of diabetes through presentations and hands-on experience with products in the exhibit hall.

www.aademeeting.org

Clinical Endocrinology Update 2016

Seattle, September 8 – 10

This three-day meeting provides the latest information available in clinical endocrinology. Taught by expert faculty in a dynamic meeting format, you will return from CEU confident that your endocrine practice benefits from the most current and advanced information possible.

www.endocrine.org/ceu

Endocrine Board Review 2016

Seattle, September 11 – 12

Identify areas for improvement at the most in-depth board preparation available. Fellows preparing to sit for the boards and certified practitioners needing to maintain certification will benefit from EBR, the premier preparatory mock exam.

www.endocrine.org/ebr

86th Annual Meeting of the American Thyroid Association

Denver, September 21 – 25

The ATA meeting is designed for the community of endocrinologists, internists, surgeons, basic scientists, nuclear medicine scientists, pathologists, trainees, nurses, physician assistants, and other healthcare professionals who wish to broaden and update their knowledge of the thyroid gland and its disorders.

www.thyroid.org

Sex Differences Across the Lifespan: A Focus on Metabolism

Colorado Springs, September 28 – 30

The Center for Women's Health Research at the University of Colorado Anschutz Medical Campus is hosting a national conference on women's health research in partnership with the Society for Women's Health Research. A collaborative, productive environment will be fostered through interactive sessions, poster presentations, focus groups, and keynote speakers.

www.endocrine.org/WomensHealth

EndoBridge 2016

Antalya, Turkey, October 20 – 23

EndoBridge provides a comprehensive update in the field of endocrinology and is specifically designed for the clinical endocrinologist. The official language of the meeting is English, but simultaneous translation will be available in Russian, Arabic, and Turkish.

www.endobridge.org

ObesityWeek 2016

New Orleans, October 31 – November 4

The preeminent annual scientific and educational conference covers the full scope of the obesity issue, from cutting-edge basic science and clinical research to intervention and public policy discussions that can impact the quality of life for millions affected by obesity.

www.obesity.org

PPTOX V

Fukuoka, Japan, November 13 – 16

The international summit of Prenatal Programming and Toxicity (PPTOX) is dedicated to cutting-edge discussion of environmental hazards during early life and long-term consequences. PPTOX is one of the premier international venues for scientists to evaluate current knowledge and guide forward momentum for this burgeoning field.

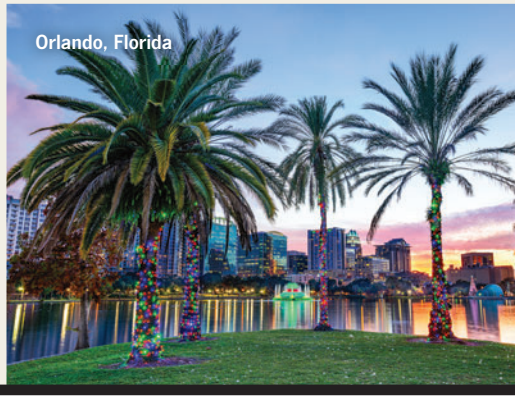
www.pptoxv.com

ENDO 2017

Orlando, April 1 – 4, 2017

The Endocrine Society holds its annual meeting within arm's reach of the "happiest place on Earth" in Orlando. With over 9,000 attendees, nearly 3,000 abstracts, and over 200 other sessions, it is the leading global meeting on endocrinology research and clinical care. The meeting also hosts other satellite and pre-conference events, such as our Early Career Forum and Hands-On Thyroid Workshops.

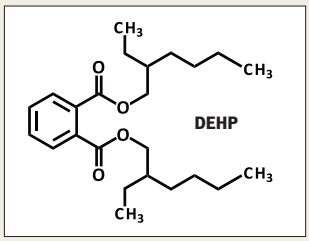
www.endocrine.org/endo-2017


Orlando, Florida

FROM THE CENTURY OF ENDOCRINOLOGY TIMELINE

1991

The Term "Endocrine Disruption" is First Used at the Wingspread Conference



Theo Colborn's 1988 research on the state of the environment of the Great Lakes revealed that top predator female birds, fish, mammals, and reptiles transferred persistent, man-made chemicals to their offspring, which undermined the development and programming of their youngsters' organs before they were born or hatched. In 1991, in light of this evidence, Colburn convened 21 international scientists from 15 different disciplines to share their research relevant to transgenerational health impacts. The Wingspread statement contains participant and specialty information. During that meeting, the term "endocrine disruption" was coined.

In 1992 a book followed, *Chemically Induced Alterations in Sexual and Functional Development: The Wildlife/Human Connection,* which is a collection of technical manuscripts by those who attended the session. The information from this volume and numerous subsequent scientific publications on the result of low-dose and/or ambient exposure effects of endocrine disruptors was popularized in her 1996 book, *Our Stolen Future*, co-authored with Dianne Dumanoski and John Peterson Myers published in 18 languages. Colborn's work has prompted the enactment of new laws around the world and redirected the research of independent scientists, governments, and the private sector.

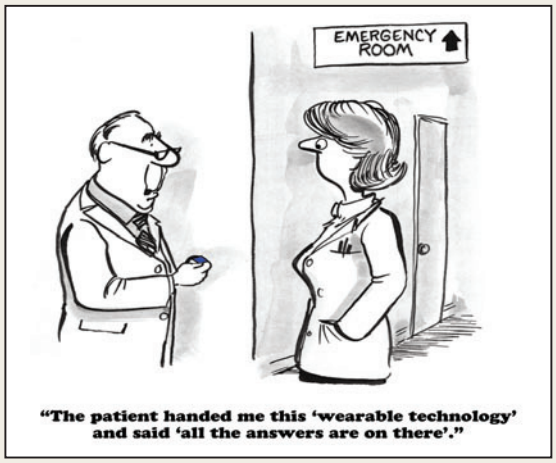
For more about the Century of Endocrinology, go to: www.ESCentennial.org/timeline.

> **All of the pediatricians I know are worried about [endocrine-disrupting chemicals] because they see increases in abnormalities and birth defects.** The people who have become the most vocal are the ones who have been on the ground seeing what's happening."
>
> **— R. THOMAS ZOELLER, PHD,** professor of biology, University of Massachusetts, Amherst, in "EDCs: Researchers and Regulators Argue the Facts," page 18.

30%

Higher amount of risk for colon cancer in women who underwent non-cancer related ovary removal.

— SOURCE: *BRITISH JOURNAL OF SURGERY*



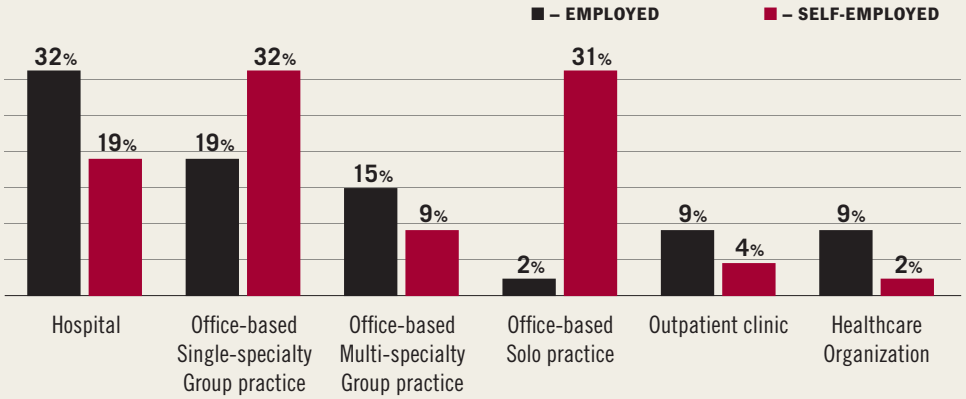
SHUTTERSTOCK.COM/CARTOONRESOURCE

7.7 million

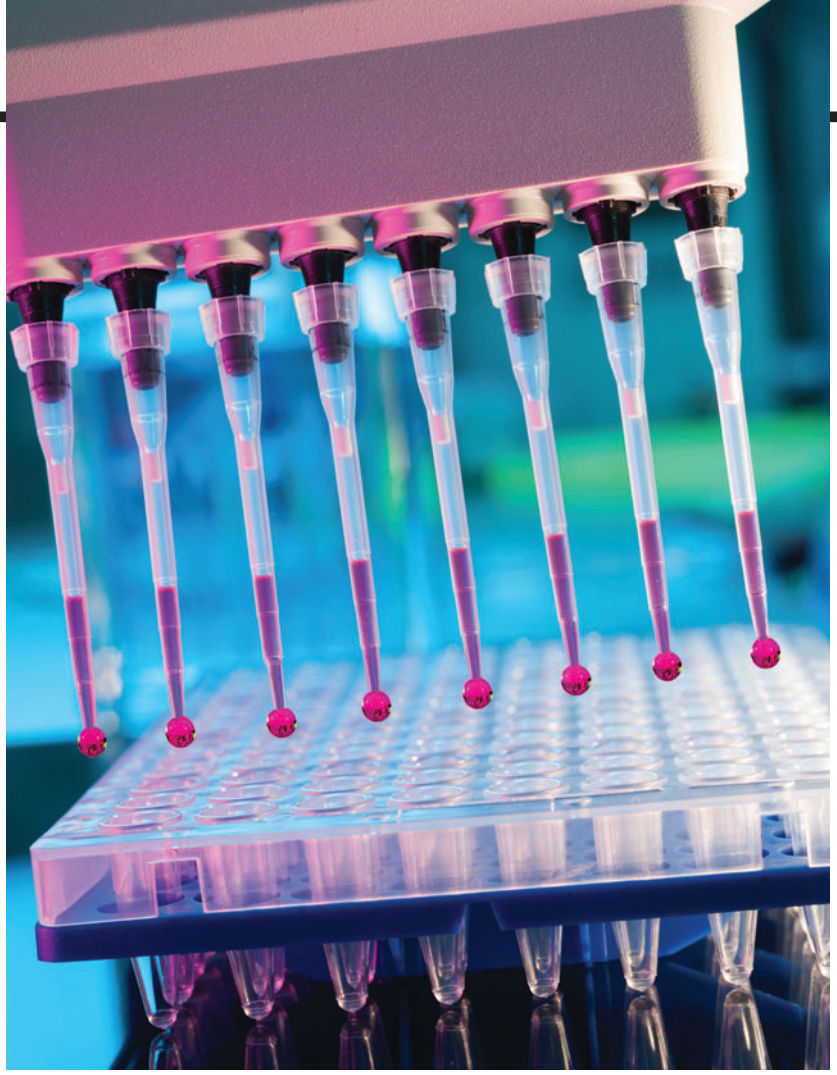
Number of Americans affected by diabetic retinopathy, the leading cause of vision loss among working-age adults.

— SOURCE: NATIONAL EYE INSTITUTE

Where Do Employed Physicians Work?



— SOURCE: MEDSCAPE EMPLOYED DOCTORS REPORT 2016



BY DEREK BAGLEY

Genetic Sequencing Used to Determine Cause of Mauriac Syndrome

Using the tools of genetic sequencing, a team of researchers at the University of Wisconsin School of Medicine and Public Health has identified the genetic cause for a rare syndrome in children with poorly controlled type 1 diabetes (T1D).

The research, led by Michael MacDonald, MD, emeritus professor of pediatrics, was published in the July issue of *Diabetes*. The rare disease, Mauriac syndrome, is characterized by massive liver enlargement, growth failure, and delayed puberty. It's seen only in a small subset of children with high blood sugar from poorly controlled T1D. Mauriac syndrome was first described 85 years ago.

The researchers sequenced the DNA of a patient and looked at all of the genes that encode enzymes involved in glycogen metabolism.

"We found a cause for a syndrome that has baffled doctors for 85 years," MacDonald says. "Although poorly controlled diabetes is common and is present in at least 20% to 30% of children with type 1 diabetes, extreme liver enlargement with growth failure is rare, occurring in way lower than 1% of children with type 1 diabetes."

Findings: Through DNA sequencing of one family, they were able to find the cause. After identifying the mutation in the gene that encodes a key enzyme of glycogen metabolism, the researchers expressed that mutant enzyme in human liver cells in cultures and found it suppressed the enzyme's activity and caused glycogen to accumulate to a very high level, thus explaining the liver enlargement. However, the patient's mother had the same genetic mutation but no enlarged liver or diabetes. The patient's father had neither the gene mutation nor an enlarged liver but did have poorly controlled T1D.

"This case is a perfect storm. Each parent had one component of the syndrome that alone was insufficient to cause the disease. This case demonstrates how the effect of the mutant enzyme acted together with the hyperglycemia and combined to cause the enormous liver loaded with glycogen and the growth failure," says MacDonald. "Like many other genetic discoveries, it just sheds more light on the cause and hopefully in the future, when gene therapy or a new medicine becomes a treatment option, the lives of these youngsters can be improved."

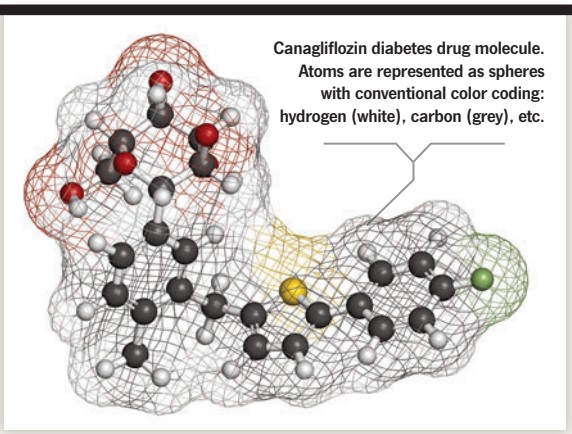
Testosterone Treatment Improves Sexual Desire in Older Men

A large placebo-controlled, double-blinded trial that spanned 12 academic medical centers found that older men with low libido and low testosterone levels showed improvements in sexual desire after undergoing testosterone treatment. The results of the study were recently published in *The Journal of Clinical Endocrinology & Metabolism*.

Researchers led by Glenn R. Cunningham, MD, of Baylor College of Medicine and Baylor St. Luke's Medical Center in Houston, Texas, analyzed testosterone's effectiveness on specific sexual activities. They enrolled 470 men, ages 65 and older, all with low libido and all with a partner willing to have sexual intercourse at least twice a month. The men were assigned a testosterone gel or placebo for one year, after which sexual function was assessed through questionnaires every three months.

Findings: The men treated with testosterone reported improvement in libido, frequency of intercourse, masturbation, and nocturnal erections. The authors conclude that testosterone treatment in older men with low testosterone levels consistently improves sexual desire and activity, and that these improvements are related to changes in testosterone, free testosterone, and estradiol levels. "We found no clinical characteristics that predicted responsiveness to T treatment and no T threshold for improving sexual function," they write.

"Our findings indicate low testosterone is one cause contributing to reduced libido and erectile dysfunction in older men," says Cunningham. "Men experiencing these symptoms should be evaluated for testosterone deficiency."



Canagliflozin diabetes drug molecule. Atoms are represented as spheres with conventional color coding: hydrogen (white), carbon (grey), etc.

Research Points to Effectiveness of Canagliflozin in Treating T2D

Scottish researchers have found that canagliflozin, may be particularly effective in treating type 2 diabetes (T2D), without the need to be used in combination with metformin, according to a study recently published in *Diabetes*.

The research was led by Professor Grahame Hardie, FRS, FRSE, FMedSci, of the University of Dundee, working in collaboration with colleagues at the University of Glasgow in Scotland and McMaster University in Canada.

"We have found that canagliflozin not only inhibits SGLT2 but also activates the AMP-activated protein kinase (AMPK), a signalling pathway that we discovered in Dundee back in the 1980s," says Hardie. "Dapagliflozin and empagliflozin do not do this nearly so effectively."

Findings: "The significance of this is that activation of AMPK is also one of the main mechanisms of action of metformin, which is already the front-line drug for treatment of T2D and is prescribed to more than 100 million people worldwide," Hardie continues. "Pharmaceutical companies are currently carrying out clinical trials to test the efficacy of combinations of SGLT2 inhibitors and metformin. Our results suggest that, in the case of canagliflozin, it may not be necessary to add metformin, because canagliflozin is already activating AMPK."

This research was supported by the Wellcome Trust and the British Heart Foundation.

New NHANES Analysis Shows No Improvement in Last Decade to Get More Diabetes Patients to HbA1c Goal

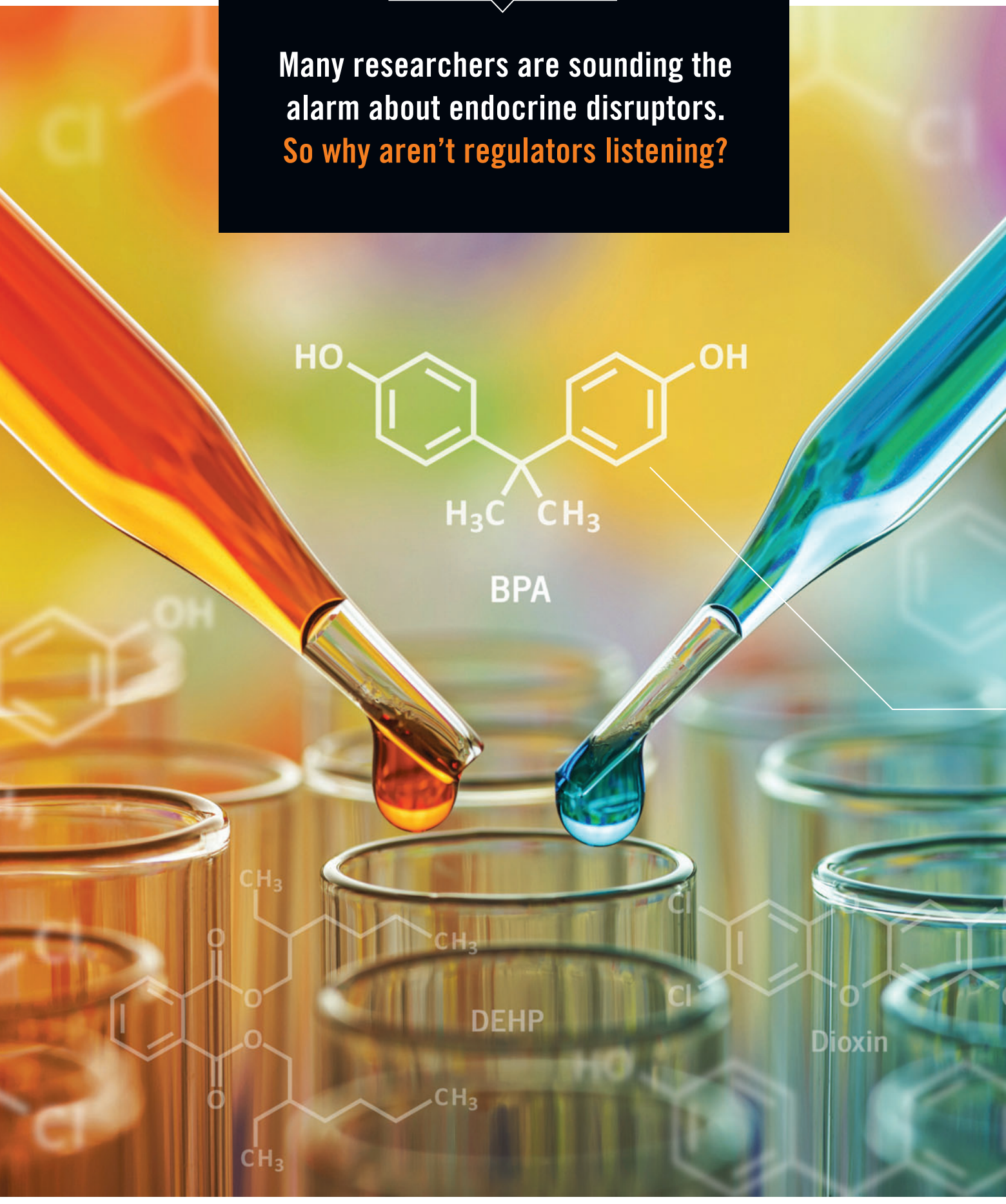
A recent analysis of NHANES published data underscores an urgent need for innovative strategies to improve patient adherence to achieve and maintain glycemic goals for a vast number of patients with type 2 diabetes (T2D). The findings of the study — funded by Intarcia Therapeutics, Inc. — were presented at the 76th Scientific Sessions of the American Diabetes Association in New Orleans, La.

The new NHANES analysis from 2011 to 2014 showed a slight erosion in the percent of patients at HbA1c goal of <7% since the earlier 2003–2006 report — approximately 50% of patients currently, which is down from 56.8% in the previous report. A second analysis, using a large U.S.-integrated EMR-administrative claims database, assessed the HbA1c lowering effect in the real-world setting of two currently available categories of agents: GLP-1s and DPP4s. Results indicate that treatment efficacy in the real-world falls far short of that demonstrated under controlled clinical trial conditions, most likely due to poor medication adherence with these pill and self-injected medicines.

"Our analysis reveals an alarming disparity between HbA1c reduction seen in short-term controlled clinical trials and what is being achieved over time in real-world settings. This disconnect is primarily driven by poor adherence to current pill and injection therapies," says Steven Edelman, MD, professor of medicine at the University of California, San Diego, and founder of the patient-focused organization, Taking Control of Your Diabetes. "In fact, only approximately 50% of all people with diabetes in this country are achieving HbA1c goal with their current therapies, and there has been little change in this statistic over the past decade. This is frankly shocking, eye-opening information that the healthcare community needs to confront with new and different therapeutic strategies."

Findings: **Suboptimal control of HbA1c puts patients at higher risk of complications associated with a progressive and serious disease like T2D. Published clinical study results of pills and injections may set unrealistic expectations of benefits that are not reproducible in the majority of patients from a long-term outcomes point of view. "Despite over 40 new pills and injections approved for T2D in the last decade, there are still more than 50% of patients who continue to have poorly controlled blood sugar levels over time," says Kurt Graves, chairman, president, and CEO of Intarcia. "NHANES data shows that despite dozens of pills and injections recently brought to market, we have yet to turn around two of the biggest unmet need trends in diabetes: suboptimal glucose control and patient non-adherence with therapy. As an industry, we must innovate and bring totally new therapeutic approaches and drug delivery systems capable of controlling blood sugar over time and taking the real-world non-adherence challenges off the table."** EN

Many researchers are sounding the alarm about endocrine disruptors. So why aren't regulators listening?



Bisphenol A (BPA) provides a good case study of this dichotomy because it has been studied so extensively. Environmental and consumer groups have lobbied to get it out of the food supply but have not succeeded except in the case of baby bottles.

EDCs: RESEARCHERS AND REGULATORS ARGUE THE FACTS

BY ERIC SEABORG

At **ENDO 2016** in April, the Endocrine Society signaled its concern about the public health risks of endocrine-disrupting chemicals (EDCs) by presenting an award for outstanding public service to four scientists for their work in bringing the danger of EDCs to the attention of the public. And yet, these and other scientists are frustrated at their inability to convince government regulators of the risks.

As a case in point, the U.S. Food and Drug Administration (FDA), the European Food Safety Authority, and health authorities in Canada and Australia all consider one of the most well-known EDCs — bisphenol A (BPA) — to be safe in food contact applications.

According to several researchers active in the field of EDCs, three issues in particular make it difficult to separate fact from fiction when it comes to EDCs:

1. Industry-sponsored research aimed more at bolstering the argument that chemicals are safe than advancing scientific knowledge;
2. Government regulators who have their own standards that seem to cherry-pick research studies and downplay a true understanding of the workings of the endocrine system; and
3. A lack of unanimity among non-industry researchers over the level of risk that EDCs pose to the public.

A MANUFACTURED CONTROVERSY?

"I think much of the debate is manufactured," says R. Thomas Zoeller, PhD, professor of biology at the University of Massachusetts, one of the recipients of the public service award, and a co-author of both the first and second Endocrine Society scientific statements on EDCs. "There are people who are paid by industry to manufacture a debate. When somebody is paid to make up things that sound right, that is not a legitimate, scientific debate."

When the FDA restricted the use of BPA in baby bottles and sippy cups, it was not a "ban" but rather an "abandonment" based on industry recommendations resulting from mounting consumer pressure.

> **"I think much of the debate is manufactured.** There are people who are paid by industry to manufacture a debate. When somebody is paid to make up things that sound right, that is not a legitimate, scientific debate."
>
> — R. THOMAS ZOELLER, PHD, PROFESSOR OF BIOLOGY, UNIVERSITY OF MASSACHUSETTS, AMHERST

Another researcher compares this effort to the fossil fuel industry's attempt to obfuscate the issue of climate change by making it appear that there is scientific debate when there is none. Heather Patisaul, PhD, professor of biological sciences at North Carolina State University, says, "If you talk to people outside the regulatory community — scientists at the Endocrine Society, academic scientists, scientists who study chemicals — we all think that the evidence is pretty strong that BPA contributes to human health effects. There is this disparity between what the regulatory agencies say and what the rest of science says."

THE REGULATORS' VIEW

BPA provides a good case study of this dichotomy because it has been studied so extensively. Environmental and consumer groups have lobbied to get it out of the food supply but have not succeeded except in the case of baby bottles.

Released in June 2014, the FDA's most recent "updated safety assessment of bisphenol A for use in food contact applications" was based on an extensive literature review of more than 300 studies, according to Jason Aungst, PhD, a supervisory biologist at the FDA who led the group that performed the review and assessment. The safety assessment concluded that "an adequate margin of safety exists for BPA at current levels of exposure from food contact uses."

But according to Patisaul, the FDA group cherry-picked studies to reach that conclusion.

In the literature review's section on neurotoxicology, FDA reviewers examined 36 studies and concluded that only one had any relevance to its hazard identification and risk assessment. That industry-funded study found little effect of low-dose, acute exposure to BPA on a number of behavioral parameters in adult, ovariectomized female rats. Patisaul points out that the endpoint — behavioral parameters — and the study population — adults without ovaries — are hardly the best places to look for the effects of BPA, which is believed to have the greatest effects during development.

Patisaul noted the same pattern in reproductive studies: "There are 25 reproductive studies in the review, and they said none of them are appropriate for risk assessment." Aungst defends the conclusions, saying they "are based on our comprehensive and systematic review. We used predefined, scientifically supported criteria for evaluating the level of inclusion for information from each study."

The literature reviewers also found that not a single one of the 48 epidemiological studies they examined was of any use for the agency's risk assessment. Zoeller says that regulators have told him that one reason they have dismissed epidemiological studies is that people are exposed to so many chemicals, it is hard to sort out individual impacts.

He thinks that there is a gulf between the way regulators — who may look at endpoints of acute toxicity rather than endpoints reflective of disease — and the

Regulators have said that they ignore epidemiological studies because people are exposed to so many chemicals in their daily lives, it's hard to sort between individual impacts.

way he and other researchers see some issues: "The measurements of endocrine disruption that the regulatory community uses are really not designed to capture effects on hormone systems as we know them today."

THE BABY BOTTLE CONUNDRUM

The FDA itself sowed confusion about its attitude toward BPA in 2012 when it disallowed the use of BPA in baby bottles. Aungst says that this action was "not a safety decision," but a response to a request from the American Chemistry Council, an industry trade association. Aungst says that it was not a "ban" but an "abandonment" — the FDA merely removed the regulation allowing the use of BPA at the request of manufacturers that had stopped using it in response to pressure from consumers.

NOT EVERYONE IS CONVINCED

Zoeller acknowledges that there are genuine disagreements among researchers in the field. For example, Geoffrey C. Kabat, PhD, MS, a cancer epidemiologist at the Albert Einstein College of Medicine of Yeshiva University, New York, is not convinced of the risks of BPA and other EDCs. He notes that the issue of falling sperm counts linked to EDCs has been discussed for at least 25 years, but "it turned out these studies showing falling sperm counts were off the mark, and there was no universal decline in sperm counts" and that trends in other health conditions linked to EDCs "aren't clear."

He says that looking at the effects of EDCs in a condition such as diabetes is a distraction from the more obvious drivers, such as the many factors leading to weight

AT A GLANCE

- **Many academic researchers complain that federal regulators are cherry-picking among studies of endocrine-disrupting chemicals in ways that favor industry-generated research.**
- **The FDA considers bisphenol A to be safe, but its most recent safety assessment discounted the contributions of many studies, noting that of the 48 epidemiological studies it examined, "no single study was able to make a definitive contribution to hazard identification or risk assessment."**
- **BPA has been found to have deleterious effects at levels below those considered safe by regulators, according to some researchers.**

It's not just plastic products that have the potential to expose consumers to EDCs. Many food and beverage cans have linings containing BPA as well that can leach into ingested materials.

> "If you talk to people outside the regulatory community — scientists at the Endocrine Society, academic scientists, scientists who study chemicals — **we all think that the evidence is pretty strong that BPA contributes to human health effects.** There is this disparity between what the regulatory agencies say and what the rest of science says."
>
> — HEATHER PATISAUL, PHD, PROFESSOR OF BIOLOGICAL SCIENCES, NORTH CAROLINA STATE UNIVERSITY, RALEIGH

gain and obesity in modern society. Kabat's position is based in part on evidence that the amount of BPA that leaches out of containers is very small and that whatever BPA is ingested is metabolized quickly and almost completely, so people "are absorbing trivial, minute amounts."

Kabat points to research such as a study by government researchers (but funded by the American Chemistry Council) recently published in *Food and Chemical Toxicology* that examined serum and urine BPA levels in pregnant women and concluded that "typical exposures of North American pregnant women produce internal exposures to BPA within the picomolar range."

These issues of rapid metabolism and low exposure levels are often cited by FDA researchers and regulators to bolster their belief in BPA's safety but are particular sticking points for those who believe in the risks of BPA.

Zoeller takes issue with an oft-quoted statistic that BPA goes to the liver first where 99% is metabolized because biological systems don't function at this very high level of efficiency and because there is no reason to assume that the resulting metabolites are inactive or benign.

Laura N. Vandenberg, PhD, assistant professor at the University of Massachusetts, Amherst, says the focus on knowing how much BPA is in the blood is somewhat of a red herring because there is a wealth of evidence from epidemiological, longitudinal, and animal studies showing that BPA has effects at doses below the FDA's "no-observed adverse effect level" used to calculate the "safe" dose for human exposure. "If the doses that are used to calculate 'safe' amounts are wrong, then the issue of how much humans are exposed to is secondary," Vandenberg says.

Perhaps a final point where perspectives divide is over the level of certainty needed before taking action. "All of the pediatricians I know are worried about this because they see increases in abnormalities and birth defects," Zoeller says. "The people who have become the most vocal are the ones who have been on the ground seeing what's happening." EN

SEABORG IS A FREELANCE WRITER BASED IN CHARLOTTESVILLE, VA. HE WROTE ABOUT FRACTURE LIAISON SERVICES IN THE MAY ISSUE.

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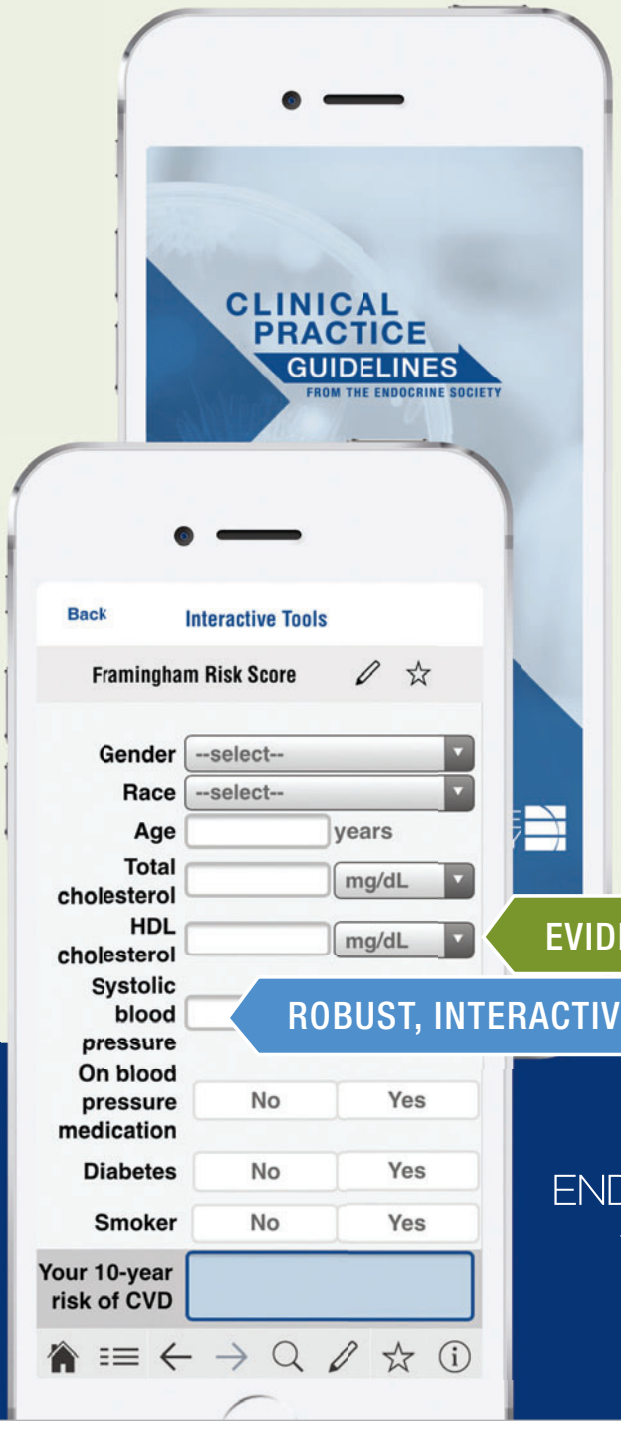

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BPA
FREE

WARNING signs

BY DEREK BAGLEY

While stickers are showing up declaring certain products "BPA Free," that doesn't mean they're necessarily safe. Could bisphenol S be even *worse* than the compound it is supposed to be replacing?

Last month in California, customers in the checkout lines in grocery stores started seeing warning signs that read, in part: **"Many food and beverage cans have linings containing bisphenol A (BPA),** a chemical known to the State of California to cause harm to the female reproductive system."

The label included the URL to the state's website for Proposition 65, which requires businesses to warn Californians about exposure to any chemicals that cause cancer, birth defects, or reproductive harm.

Human exposure to BPA is as ubiquitous as the stickers showing up now that proclaim products BPA free. The chemical used to make plastic has been linked to all kinds of reproductive issues and even thought to play a role in the development of obesity and cardiovascular events, so industry is taking some steps to correct the problem (after much wailing and gnashing of teeth on their part). These stickers read "BPA FREE" and "NON-TOXIC PLASTIC" in bold letters and usually feature leaves and a green motif, the implication being that these products are safe and healthy.

But "BPA free" does not mean "EDC free," and many products now contain bisphenol S as a substitute for BPA. Bisphenol S (BPS) is a similar chemical and has been found in everything from canned soft drinks to receipt paper to baby bottles. (The FDA banned BPA in baby bottles.) It's been found in indoor dust samples and is beginning to show up in human urine, and it has been reported to be less biodegradable than BPA. Animal studies have implicated BPS in impaired offspring development. And the production of BPS is increasing annually.

BPS is a chemical similar to BPA and is beginning to show up in human urine. Animal studies have implicated BPS in impaired offspring development. And the production of BPS is increasing annually.

> “There is a growing realization that **we are poisoning ourselves with products that were designed to make our lives more convenient.** And convenience is big business.”
>
> — NANCY L. WAYNE, PHD, PROFESSOR OF PHYSIOLOGY, DAVID GEFFEN SCHOOL OF MEDICINE AT UCLA, LOS ANGELES

“Recent studies testing BPS and comparing it to BPA show that BPS is as bad, if not worse, than BPA as an EDC,” says Andrea Gore, PhD, professor and Vacek Chair of Pharmacology at the University of Texas in Austin, and editor-in-chief of *Endocrinology*. “‘BPA free’ can give consumers a false sense of security about the product.”

BPS studies are relatively new, and they’re following a similar trajectory to BPA and other EDC studies — aquatic species first, since these chemicals are released into the water supply, then mammalian models, and then on to human models.

According to Kimberly H. Cox, a postdoctoral fellow studying reproductive endocrinology at Massachusetts General Hospital in Boston, the effects of BPA and BPS are subtler than say, PCBs or pesticides, in which exposures came at high levels, with devastating effects. The effects of BPA and BPS depend on the timing, length, and dose of exposure, and numerous studies have shown that there are effects on the reproductive system, for example, at doses of BPA much lower than what has been determined as a “safe” exposure by the EPA. And now there also seem to be effects of BPS on the development of the reproductive system, as well as the brain regions that control reproduction. “As studies continue to investigate the impacts of BPS, all of these factors [timing, dosage, etc.] will have to be taken into account,” says Cox. “Fortunately, with years of studies on BPA, I think that the new research can learn from past mistakes, standardize methods, and also make direct comparisons to better understand how these two chemicals are similar and where they differ.”

Fish Tales

A study on BPS using aquatic species was published in *Endocrinology* in February, showing that BPA and BPS alter many aspects of the reproductive neuroendocrine system in zebrafish. The work was led by Nancy L. Wayne, PhD, a professor of physiology at David Geffen School of Medicine at UCLA, and Wenhui Qiu, a senior graduate student at Shanghai University, who received a Chinese fellowship to work in Wayne's lab for a year. Wayne and her postdoctoral fellow Siddharth Ramakrishnan had shown in 2008 that BPA profoundly affected embryonic development of medaka fish, even just 24 hours after exposure.

"[Qiu] was very interested in our 2008 study and wanted to follow-up on the impact of BPA on development of the reproductive system using our zebrafish model system," Wayne says. "We worked out an experimental design — and she wanted to include BPS, as there were a few studies at that time suggesting that it was an EDC."

Wayne, Qui, and their team exposed zebrafish to low levels of BPA and BPS, using the zebrafish model because the embryo is transparent, which makes it a popular model for investigating molecular genetics. "We took advantage of these characteristics by generating a transgenic zebrafish in which the GnRH3 promoter and signal sequence drives expression of a bright variant of green fluorescent protein," Wayne says. "We are able to visualize development of GnRH3 neurons in the live embryo in real time."

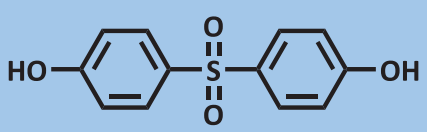
The researchers found that BPA and BPS accelerate embryonic development, increase GnRH neuron numbers in the forebrains of zebrafish embryos, and increase expression of reproductive neuroendocrine-related genes. Both chemicals also mimic thyroid hormones. "When endocrinologists talk about BPA, they frequently describe it as estrogenic — and do not point out the other endocrine systems that are being altered, such as thyroid hormone," Wayne says. "Our paper emphasizes that BPA and BPS are activating *both* estrogenic and thyroid hormone pathways. This suggests that EDCs are having much broader effects on health and disease than just mimicking estrogens [which is bad enough]."

"'BPA free' does not necessarily mean safer," she continues. "It's been marketed in that way. But when you look at the structure of BPA and BPS, there is very little difference. What were manufacturers thinking? It was merely an EDC swap."

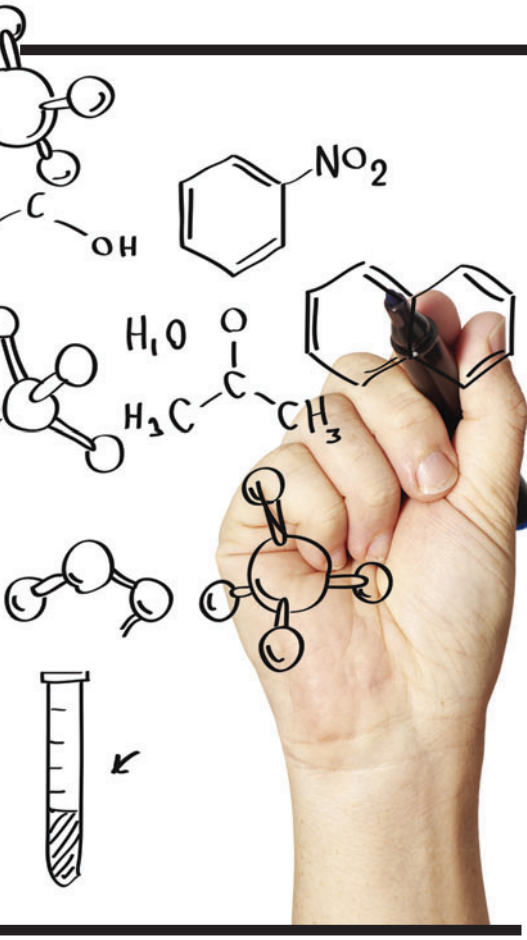
Cox wrote an editorial in the same issue of *Endocrinology*, pointing out that "Qiu et al., are the first to report on direct effects of low-dose developmental exposure across multiple signaling pathways" and that their work could lay the groundwork for future studies of BPS. She writes that the mounting evidence obligates the scientific community "to extend beyond traditional endpoints and pathways to more whole-system, unbiased approaches."

AT A GLANCE

- Products that announce they are "BPA free" do not necessarily mean that they are EDC free.
- Studies are being conducted on bisphenol S (BPS), a very similar analog to BPA, and researchers are finding that BPS has very similar effects as its more infamous cousin.
- More studies need to be done on BPS, and researchers have ideas on keeping harmful chemicals from getting into consumer products, but it will be a battle.



Bisphenol S



> “Recent studies testing BPS and comparing it to BPA show that BPS is as bad, if not worse, than BPA as an EDC. **‘BPA free’ can give consumers a false sense of security about the product.”**
>
> — ANDREA GORE, PHD, PROFESSOR AND VACEK CHAIR OF PHARMACOLOGY, UNIVERSITY OF TEXAS, AUSTIN; EDITOR-IN-CHIEF, *ENDOCRINOLOGY*

Cox says that since a lot of EDC researchers got their starts conducting research in either pharmacology or endocrinology, many studies can have focused endpoints that were specific to the field of the primary investigator. “For example,” she says, “a behavioral endocrinologist might focus on the effects of EDC exposure on reproductive or social behaviors. Other systems would not be evaluated at the same time.”

Researchers may also become too focused on narrower questions, and that focus can introduce biased approaches to their studies, which, according to Cox, are things like selecting candidate genes to examine the effects of EDCs on their expression.

“While there is nothing wrong with either of these approaches, they require pieces to be put together on the back end and for another study to be conducted to answer the next question,” Cox says. “What other behaviors are altered with the same exposures? What other genes are changing?”

“Prideful Plastophobia”

So far, there are many more studies on BPA than BPS. Studies on BPA have been going on for decades, and many have reached the same conclusion — that BPA leads to negative health outcomes, which is why industry has felt the need to assuage the public’s fears with cutesy and reassuring stickers. But, and this shouldn’t come as a surprise, the plastic and chemical industries aren’t exactly thrilled with the work on BPS.

When Wayne and Qui published their paper in February, UCLA sent out a press release highlighting the results, and the media ran with it. “It made quite a splash on the Internet,” Wayne says. And then, on February 12th, *Plastics Today* published an article titled, “UCLA BPA/BPS Study Tainted by Plastophobia.” “The author was highly disparaging of our study, EDC studies in general, and accused me of ‘prideful plastophobia,’” Wayne says. “It felt like a personal attack.”

Last October, the Endocrine Society hosted a Twitter chat on EDCs. Chemical and plastic industry Twitter accounts joined in, and it got, to say the least, interesting. And it makes sense; these industries will be affected by any policy that regulates their products. But none of the researchers studying these chemicals is out to destroy these industries or the products they create; they just want to make sure these industries are producing everyday items as intelligently as possible. And these researchers have some ideas on how that can happen.

Testing chemicals before they are put into consumer products seems like an elegant and simple solution. “While we may never be able to test for every possible outcome, this would be a really important way for chemical companies to at least make sure that known pathways affected by other EDCs are not likely to be impacted by their products,” Cox says.

Researchers found that BPA and BPS accelerate embryonic development, increase GnRH neuron numbers in the forebrains of zebrafish embryos, and increase expression of reproductive neuroendocrine-related genes. Both chemicals also mimic thyroid hormones.

No Easy Answers

But just because it seems like a simple answer, that doesn't mean it will be an easy answer. Gore agrees that only by testing before a chemical is introduced into products that come into contact with food and beverages and lotions and personal care products and intravenous tubing and on and on, only then can we be confident that a consumer product is free of EDCs. "However, that is not how we do testing in this country," she says, "so that system will need to change."

Wayne says she would like to see future EDC work that focuses on practical problems that the public is asking about, like whether the plastic containers that people use and reuse are leaching EDCs. But she points out that this will be hard work; the FDA still claims BPA is safe, even though it banned its use in baby bottles and sippy cups. The official statement is: "The Food and Drug Administration's assessment is that the scientific evidence at this time does not suggest that the very low levels of human exposure to BPA through the diet are unsafe."

"I don't know what studies they are reading," Wayne says, "but the ones in peer-reviewed papers point to an entirely different conclusion. Until the FDA is convinced by the mass of data showing that BPA below their NOAL [no observed adverse effect level] has an impact on biological functions, the powerful chemical and manufacturing industries will not be motivated to make changes."

However, she says the public can help by insisting on safe products, and federal agencies can help by stepping up and funding unbiased research. "There is a growing realization that we are poisoning ourselves with products that were designed to make our lives more convenient," Wayne says. "And convenience is big business." EN

BAGLEY IS THE ASSOCIATE EDITOR OF *ENDOCRINE NEWS*. HE WROTE ABOUT THE POSSIBLE LINK BETWEEN GROWTH HORMONE AND THE RISK OF STROKE IN THE JULY ISSUE.

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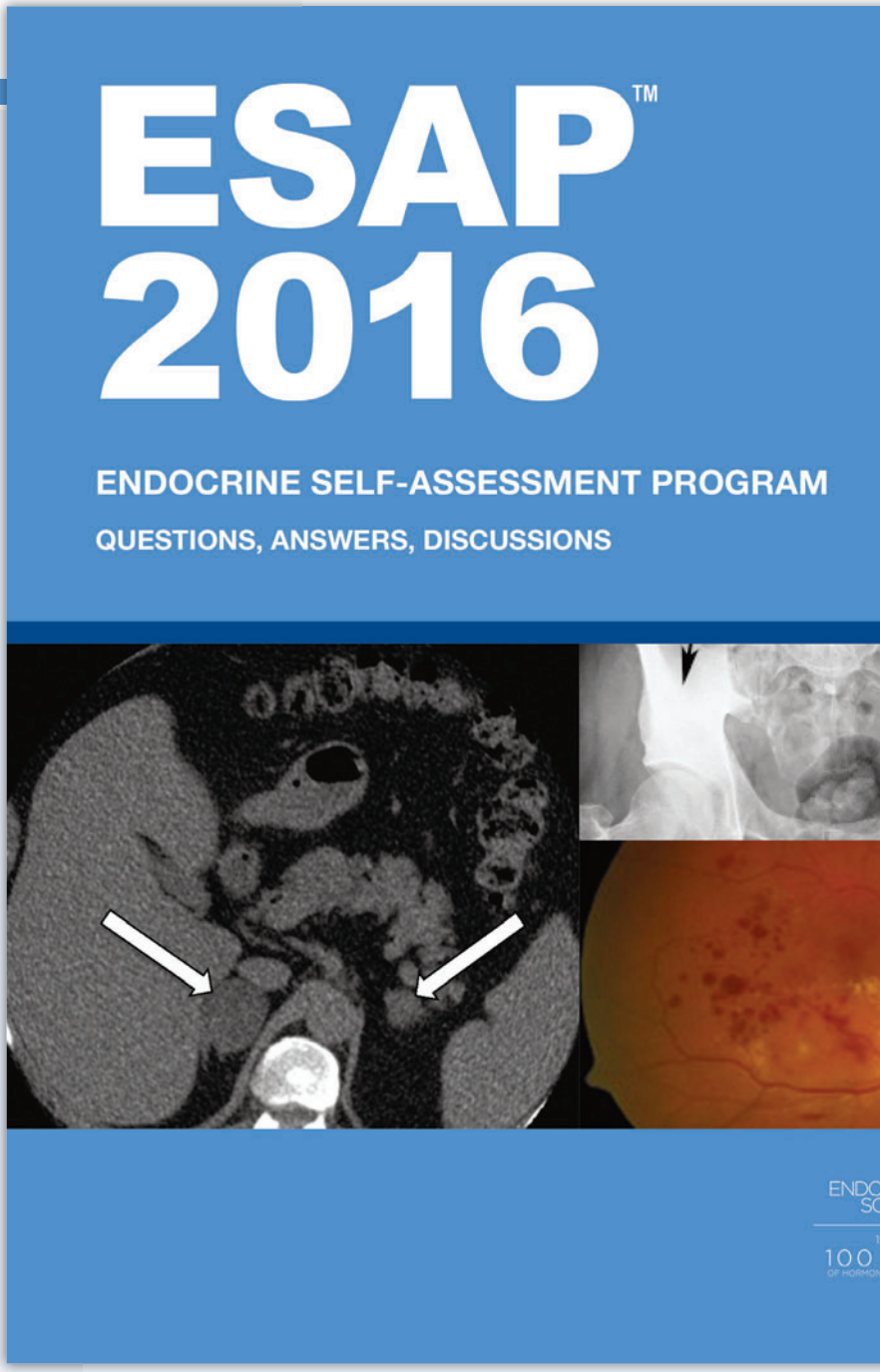

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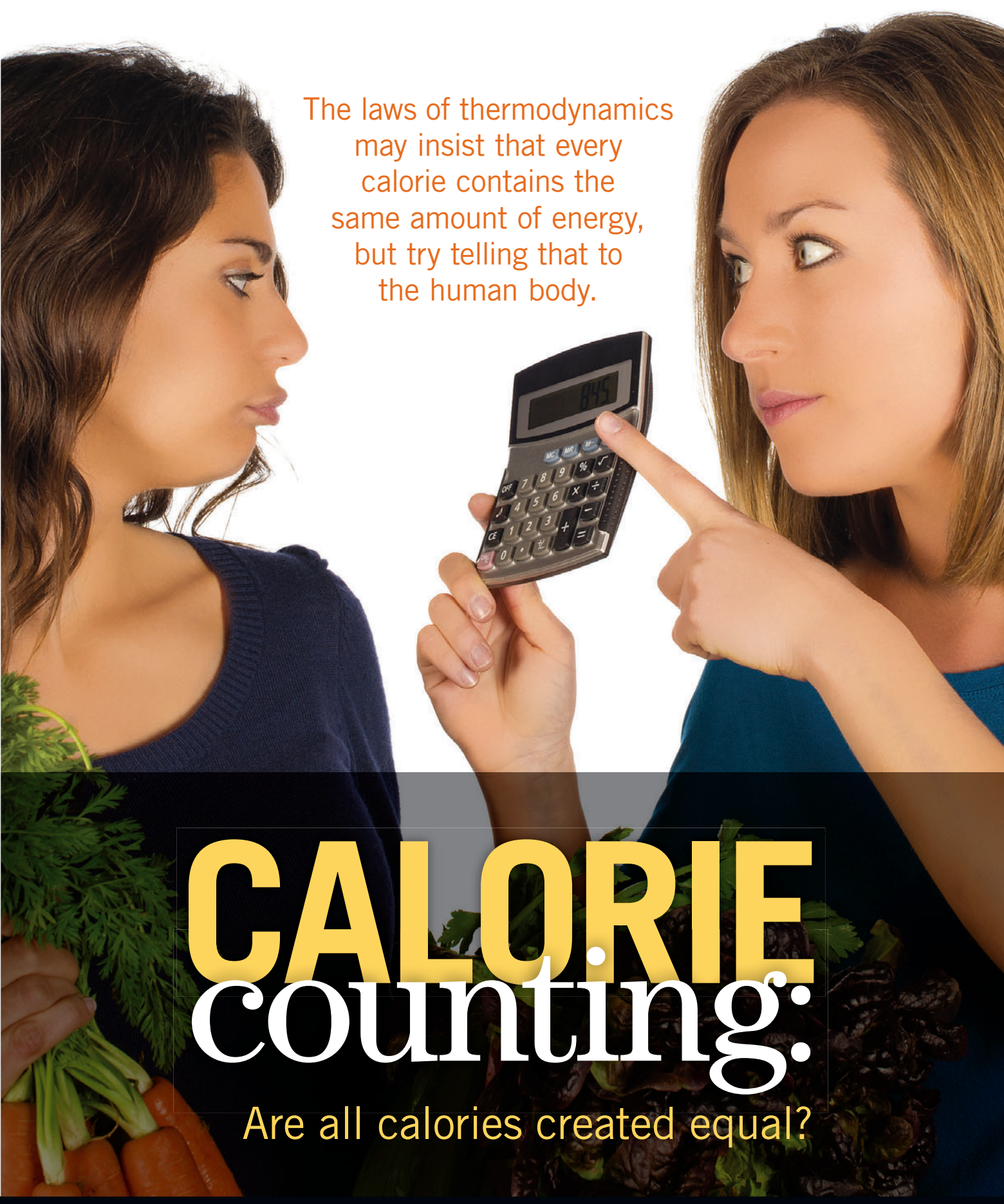


The laws of thermodynamics may insist that every calorie contains the same amount of energy, but try telling that to the human body.

CALORIE counting:

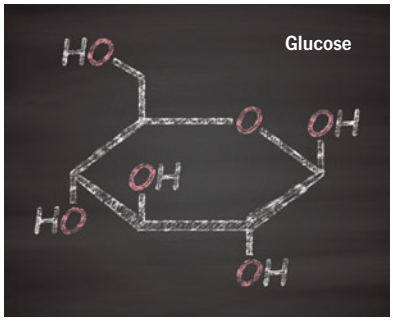
Are all calories created equal?

BY ERIC SEABORG

We're taught that a gram of carbohydrate contains 4 calories, a gram of protein has 4 calories, and a gram of fat has 9 calories. However, you can put the same calories into different bodies with different results: Two similar individuals can eat and exercise the same amounts but end up with dramatically different results in their weight.

And you can put the same calories into the same body at different times and get different results: Metabolisms slow with age and respond to calorie restriction by deriving sustenance from fewer calories.

The idea that metabolisms can be ramped up or down helps fuel the debate over which can lead to more weight loss — a low-fat, a low-carbohydrate, or some other diet. But as that controversy over macronutrients continues, some researchers are finding it more fruitful to look at specific micronutrients. Evidence is growing that a nutrient's metabolic pathway can have important effects downstream, including signaling properties that have been compared to the actions of hormones.



JUST ANOTHER SUGAR?

For example, fructose and glucose have the same chemical formula but can have very different effects. "Fructose is a sugar like any other sugar," says C. Ronald Kahn, MD, a prominent diabetes researcher at Harvard Medical School. "But it affects brain metabolism and liver metabolism in ways that are different from glucose. It is handled through metabolic pathways which are much more involved in fat metabolism, whereas glucose is involved in metabolic pathways that are much more like carbohydrate and other sugar metabolism."

In contrast to glucose, fructose is not significantly regulated by insulin. It is taken into cells and goes through its first step of metabolism very quickly. "It uses up ATP in its metabolism, and it therefore changes a lot of downstream enzymes in a way that makes it more lipogenic. It promotes more synthesis of fat in the liver than glucose, and fat in the liver tends to produce insulin resistance," Kahn says.

FOOD AS A HORMONE

The effects of some foods on metabolism are comparable to those of hormones, says Randy Seeley, PhD, professor of surgery at the University of Michigan School of Medicine and former director of the Cincinnati Diabetes and Obesity Center. For example, omega-3 fatty acids have received a lot of attention because epidemiological studies indicate that they have benefits against metabolic syndrome and weight gain. The source of the positive effect could be that omega-3 fatty acids activate the cell-surface receptor GPR 120, a receptor in adipose tissue and muscle that is associated with reduced inflammation, reduced weight gain, and improved glucose control in mice and humans.

Fatty acids also affect the appetite-stimulating hormone ghrelin, which requires a fatty acid attached as a side chain in order to signal. Different fatty acids can increase or decrease its signaling ability — and the source of these fatty acids is food, not endogenous production. This action raises the possibility that certain foods could help switch appetite on or off.

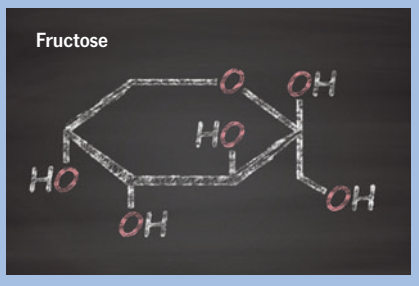
The branched-chain amino acid leucine is another food with signaling properties.

"Leucine regulates an enzyme in the cell called mTOR, which is a very important step in protein synthesis and cell growth," Kahn says. "So if you expose cells to a lot of leucine, you can actually stimulate this pathway of protein synthesis more than if you put in other amino acids." Many body builders have heard about this, which is one reason you'll find leucine supplements for sale on the Internet and in drug stores.

But leucine also causes insulin resistance, so its use by someone with type 2 diabetes or similar problems could have undesirable metabolic results, Seeley notes. "The question becomes, when you start mixing nutrients in a diet in a complex way, are you getting more or less of the signaling pathways that you are looking for?" he asks.

AT A GLANCE

- **Some foods can act as hormones in turning on and off signaling pathways that can determine how food is metabolized and perhaps aid in weight gain or loss.**
- **No specific dietary approach has been proven to be superior for long-term weight loss.**
- **Research may identify the micronutrients that could be used to tailor diets to individual needs.**



MASSIVE WEIGHT LOSS SLOWS METABOLISM

Fast, massive weight loss appears to lead to a long-term reset of metabolism.

In a study in *Obesity* that received a great deal of media attention, Kevin Hall, PhD, of the National Institute of Diabetes and Digestive and Kidney Diseases and his colleagues documented the long-term slowing of metabolism among contestants on the reality TV show, *The Biggest Loser*. The participants had lost large amounts of weight — and in many cases gained much of it back.

Six years after participating in the program, and despite substantial weight regain, their resting metabolic rate remained 500 calories per day "lower than expected based on the measured body composition changes and increased age of the subjects," the study says.

The participants' appetites remained hard to satisfy, and their leptin levels remained very low. Because of the extreme circumstances, how the findings apply to the general population is unknown, but they do illustrate how hard the body can fight back after weight loss.

> **"The differences [in weight loss] among diets are very small.** There have been many studies of this now, and even meta-analyses of these many studies. In a given study one diet can prove to be slightly more effective than another. But in another study, a different one will."
>
> — C. RONALD KAHN, MD, MARY K. IACOCCA PROFESSOR OF MEDICINE, HARVARD MEDICAL SCHOOL

WHICH DIET TO FOLLOW?

That's a question that could take some time to sort out. Further research should reveal whether these kinds of nutrient effects are limited or widespread — and whether they can be applied at the level of macronutrients and dietary recommendations at the population level. In the meantime, the debate rages on over what kind of diet can help patients burn calories more effectively — low fat, low carbohydrate, or something else.

LOSE THE FAT WITH LOW FAT

In a study published last year in *Cell Metabolism*, Kevin Hall, PhD, of the National Institute of Diabetes and Digestive and Kidney Diseases and colleagues confined 19 obese adults to a metabolic ward for two-week periods. Following five days of a baseline diet, for six days participants received a low-carb or a low-fat diet, then repeated the process and received the other diet. "Calorie for calorie, restriction of dietary fat led to greater body fat loss than restriction of dietary carbohydrate in adults with obesity. This occurred despite the fact that only the carbohydrate-restricted diet led to decreased insulin secretion and a substantial sustained increase in net fat oxidation compared to the baseline energy-balanced diet," the authors write.

RAMP UP METABOLISM WITH LOW GLYCEMIC

But it's easy to find studies with opposite results. In a 2012 study published in *JAMA*, 21 obese and overweight participants who had already lost 10% to 15% of their body weight went on three different diets in random order for four weeks each: low fat (60% carbohydrates, 20% fat, and 20% protein with a high glycemic load); low glycemic index (40% low-glycemic carbs, 40% fat, and 20% protein with a moderate glycemic load); and Atkins-style very

low carbohydrate (10% carbs, 60% fat, and 30% protein with a low glycemic load), then crossed over to receive each of the other diets. The study found that resting and total energy expenditures were the highest with the very low carb diet, intermediate with the low glycemic index diet, and lowest with the low fat diet. Participants burned 325 fewer calories a day on the low-fat diet compared with the low-carb diet.

"The results of this study challenge the notion that a calorie is a calorie from a metabolic perspective," says study author David S. Ludwig, MD, PhD, professor of pediatrics at Harvard Medical School. Ludwig's best-selling book, *Always Hungry?*, promotes a low glycemic load diet because it leaves people more satisfied and less hungry. "The design of the meal plan and the lifestyle program is to lower insulin levels and calm chronic inflammation. We think that when you do those two things weight loss occurs in a more natural fashion with less struggle." But he acknowledges, "We don't know what the optimal diet is for the long term, or if there is one. More likely, optimal diets will vary from person to person based on insulin resistance and other individual factors."

THE OPTIMAL DIET

Others agree with this last point. "The differences [in weight loss] among diets are very small," Kahn says. "There have been many studies of this now, and even meta-analyses of these many studies. In a given study one diet can prove to be slightly more effective than another. But in another study, a different one will." Any differences tend to disappear over the long term.

The authors of a 2014 *JAMA* meta-analysis that compared weight loss results from 49 randomized trials involving overweight and obese adults who followed low-carb and low-fat diets concluded: "Weight loss differences between individual ... diets were small. This supports the practice of recommending any diet that a patient will adhere to in order to lose weight."

"I think that is the biggest impact factor for sure," Kahn agrees. "Whichever diet patients can stay with the longest does the most good overall."

For the future, Seeley notes research into the actions of specific micronutrients could "lead us to the possibility of doing much more tailored nutritional intervention, saying, for this kind of individual we want to have diets that turn on or off these signaling pathways." EN

SEABORG IS A FREELANCE WRITER BASED IN CHARLOTTESVILLE, VA. HE WROTE ABOUT FRACTURE LIAISON SERVICES IN THE MAY ISSUE.

FORBIDDEN FRUITS

BY GLENDA FAUNTLEROY

Endocrine-disrupting chemicals known as "obesogens," found in many fungicides, have been shown to alter the function of fat cells in animal studies. Are fruits and vegetables the next items added to the list of known endocrine disruptors?

The list includes food, plastics, household goods, and cosmetics.

It's a list of items so long — and growing — that they seem impossible to avoid, yet experts say avoidance is the only current protection against endocrine-disrupting chemicals (EDCs). The use of EDCs has now emerged as one of the most urgent threats to global public health.

EDCs are hundreds of chemicals, or mixture of chemicals, that mimic, block, and interfere with the body's natural hormones. EDCs can alter the ways cells develop and grow, and exposure can increase the risk of developing two of the most significant health epidemics — diabetes and obesity. Both human and animal studies have also connected EDC exposure to infertility, early puberty, hormone-related cancers such as breast and ovarian cancer, thyroid disorders, and neurological issues.

"We have now more conclusive evidence than ever that EDC exposure alters hormone actions and affects human health," says Angel Nadal, PhD, professor of physiology at the Institute of Bioengineering and CIBERDEM at Miguel Hernandez University of Elche, Alicante, Spain. Nadal co-authored the Endocrine Society's second Scientific Statement on EDCs published in last December's *Endocrine Reviews*.

The Statement emphasizes EDCs that are well-investigated, including: bisphenol A (BPA), phthalates, pesticides, persistent organic pollutants such as polychlorinated biphenyls, and dioxins.

But has the medical community and general public been made adequately aware of these chemicals' threat?

"I believe that the characteristics of EDC exposure as well as 'how' and 'when' their effects are noticed has not alarmed the public to the global and urgent matter that EDC exposure represents," Nadal says. "We are not fronting an easy situation in which a single chemical is causing an evident health effect in a short period of time after exposure. There are hundreds of thousands of chemicals on the market, and thousands of new ones are being synthesized each year. Each of them has the potential to cause harm."

"EDCs produce a subtle effect on health a long time after exposure, which often occurs during fetal development," Nadal adds. "Furthermore, EDCs do not directly initiate a pathology, yet they increase the probability of an individual suffering from chronic diseases…that have multifactorial causes. To me, the fact of not having a straightforward cause-effect relationship avoids the public alarm of EDC exposure."

> “I was not acutely aware of **all the additional chemicals present in such commonplace items,** such as dishes, foods, and grooming items.”
>
> — TRONYA HAWKINS, MD, OBSTETRICIAN-GYNECOLOGIST, ST. VINCENT MEDICAL GROUP, INDIANAPOLIS, IN

The Obesity Trigger

The role of EDCs in metabolic syndrome and obesity is based on a subset of EDCs known as “obesogens.” Chemicals such as BPA, phthalates, tributyltin, and arsenic have been shown in animal studies to affect adipose tissue by altering programming of fat cell development, increasing energy storage in fat tissue, and interfering with neuroendocrine control of appetite and satiety. EDC-induced weight gain depends on the timing and exposure and the age of the animals. Evidence also shows that exposures during the perinatal period can trigger obesity later in life.

A recent expert review in the *American Journal of Obstetrics and Gynecology* (*AJOG*) reported that while the obesogen field is still in its early stages, it has numerous ramifications for prenatal and postnatal care and the control/prevention of obesity and metabolic syndrome.

Review author Bruce Blumberg, PhD, professor in the departments of developmental and cell biology and pharmaceutical sciences at the University of California, Irvine, summarized both animal and human studies that revealed that increasing numbers of fungicides routinely applied to fruits and vegetables are being identified as obesogens and metabolic disruptors. There are also numerous chemicals shown to be obesogens in animals (and humans) that are intentionally added to foods, including artificial sweeteners, preservatives, and added sugars, especially high-fructose corn syrup.

“While EDCs are pervasive in our environment, it is reasonable to expect, and some studies show, that avoidance can be successful and reduce exposures and body burdens considerably,” Blumberg says. “It is not easy to measure your levels of particular chemicals, but eating fresh food [preferably organic] and avoiding plastics for foods and beverages together with minimizing the use of EDC-containing personal care products will make a big difference in body burdens. In turn, this can only have beneficial consequences for pregnancy outcomes and the health of our children.”

Blumberg urges that this should be a top priority for women of reproductive age who plan to become pregnant, are pregnant, or who have pre-pubertal children. “These are the most sensitive times, as far as we know, and the times that reducing exposures will have the greatest benefit,” he says.

The *AJOG* review further reported that although many obstetricians believe counseling patients would help avoid environmental contaminants, only 45% routinely discuss mercury and just 5% – 10% discuss the EDCs BPA and phthalates during prenatal care. The reviewers suggest that EDCs should be routinely added to the discussion.

Tronya Hawkins, MD, an obstetrician-gynecologist with St. Vincent Medical Group in Indianapolis, says her patients’ potential for exposures are discussed at the beginning of their prenatal care and includes tobacco cessation, environmental/work hazards, foods to avoid, as well as general toxins, though not specifically BPA. She says the list of potential hazards seems to be growing daily.

"I was not acutely aware of all the additional chemicals present in such commonplace items, such as dishes, foods, and grooming items," she says. "When I am informed about a new endocrine-disrupting chemical, I put forth the effort to discuss it with my patients during their office visits. It's very challenging to keep up with the changing landscape of environmental interactions, as well as continuing routine prenatal care. It is helpful, however, that patients are seen at multiple visits, giving adequate opportunity to address as many concerns as possible."

Hawkins adds that the methods for distributing emerging health information to physicians has long caused her some concern.

"It's most often done through peer-reviewed journals and discussions during regional and national conferences," she explains. "I would like to see a more robust effort to inform and protect society from these worrisome compounds."

Decreasing the Toll on the Next Generation

To protect future generations against the serious harm of EDCs, Nadal stresses that urgent global solutions need to be orchestrated within the next five to 10 years.

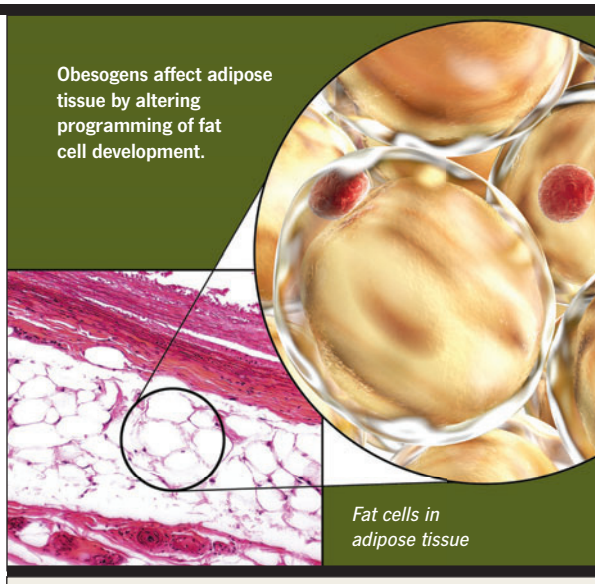
"It is important to bear in mind that we cannot live without chemistry," he says. "Chemistry is not bad. It helped us to improve our quality of life, and to increase the expectancy of life very rapidly along the last 60 years. However, this is not for free; there is a toll we pay, which is called pollution. After all, EDCs are a kind of pollution that affects health in a subtle manner."

"We need to develop new methods, using up-to-date technology, to test new chemicals released to the market, making sure that they do not alter our hormones," Nadal continues. "We cannot continue any longer following the assumption that a chemical is safe until proven otherwise."

Nadal adds that educating the public is essential but education should be started in schools. "We need to continue educating the medical community as well, many of them still believe that EDCs do not represent an important health problem."

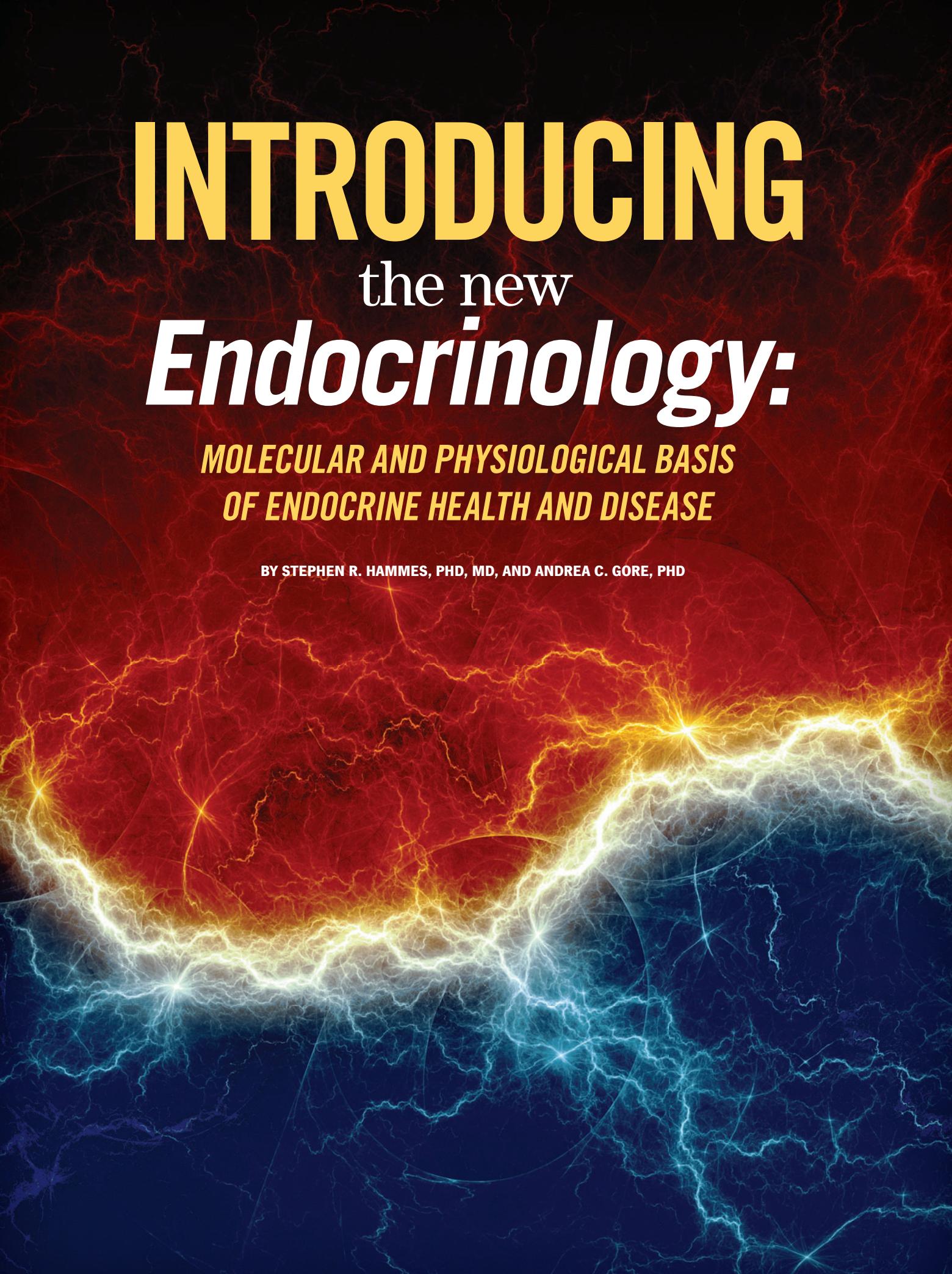
Nadal says he agrees with his fellow chemists that toxicology should be incorporated into their curriculums so that students — and perhaps future endocrinologists — can learn early on the problems that EDCs represent and that the problem will only get bigger if something is not done now. "Chemistry has to turn to 'green chemistry' and governments must invest in this direction," he says. "In a mid-, or perhaps long term, only using green chemistry will we be able to develop paying the lowest toll." EN

FAUNTLEROY IS A FREELANCE HEALTH WRITER BASED IN CARMEL, IND., AND A REGULAR CONTRIBUTOR TO *ENDOCRINE NEWS*. SHE WROTE ABOUT TESTOSTERONE THERAPY FOR OLDER MEN IN THE JUNE ISSUE.

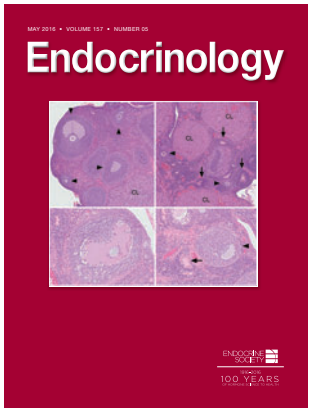


AT A GLANCE

- The use of EDCs has now emerged as one of the most urgent threats to public health.
- The role of EDCs in metabolic syndrome and obesity is based on a subset known as "obesogens."
- Increasing numbers of fungicides routinely applied to fruits and vegetables are being identified as obesogens and metabolic disruptors.


INTRODUCING
the new
Endocrinology:
MOLECULAR AND PHYSIOLOGICAL BASIS
OF ENDOCRINE HEALTH AND DISEASE
BY STEPHEN R. HAMMES, PHD, MD, AND ANDREA C. GORE, PHD

January 1, 2017, will mark a new era for two of the Endocrine Society's prestigious journals when *Endocrinology* and *Molecular Endocrinology* merge into a single journal. The journals' editors-in-chief explain why this was undertaken and how it will make the new *Endocrinology* even stronger.



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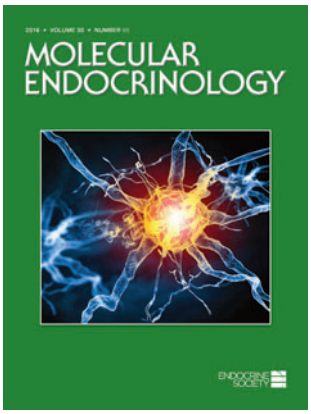


Two of the Endocrine Society's journals, *Endocrinology* and *Molecular Endocrinology*, will soon merge into a single, comprehensive journal that incorporates the breadth and depth of content currently published separately. You may be asking yourself: Why is this merger happening? In short, the Endocrine Society took a hard look at the publication options that are available to basic and translational endocrine researchers, and how best to serve its constituency. To do this, in 2015 surveys were sent to basic science members of the Endocrine Society to determine how they felt about *Endocrinology* and *Molecular Endocrinology*, and to provide feedback about their needs as authors and readers.

The responses painted a clear picture: While there was excellent general support for the journals, the readership felt strongly that changes were needed to improve service to the basic science constituents. The merged journal, named *Endocrinology* because of the latter's 100-year history, will provide expanded benefits to the endocrine community. To emphasize its broader content, the merged journal will include the tag line "*Molecular and Physiological Basis of Endocrine Health and Disease*." We hope that this editorial, written by us in anticipation of our service as co-editors-in-chief of the merged *Endocrinology* will inspire you to submit your best papers in basic and translational endocrinology to the Society's flagship journal.

Choosing the right journal for our manuscripts — the currency of career success and the products of our best ideas, hard work, and grant monies — involves many decisions. Authors must consider what venues are available to the discipline, the journal's Impact Factor, rapid turn-around time to review and publish, and post-publication benefits such as media notifications. This leads to many questions: Should authors publish in a specialty journal that will be read by a limited but knowledgeable audience, or should they publish in a more generalized journal that caters to a wider audience? Should they shoot for the journal with the highest Impact Factor possible, or should they go for the journal that gives them the best chance at straightforward and rapid acceptance based on a history of fair and rigorous review?

THE URGE — TO — MERGE

The merged journal will publish with the retained title, ISSN, and Impact Factor (4.159) of *Endocrinology*, and the new tagline of, "*Molecular and Physiological Basis of Endocrine Health and Disease*."

New features include:

- **Free color for online figures (currently available only to authors of *Molecular Endocrinology*)**
- **Relaxed word-count and figure-count limits for authors**
- **Simplified submission process**
- **Expedited peer review**
- **Video profiles of the authors of each month's Featured Article**
- **Spotlights on the winners of the Endocrine Society's Young Investigator Award**
- **Media promotion of ground-breaking articles**
- **Centennial celebration of *Endocrinology* in 2017**
- **Altmetric tool to provide an at-a-glance summary of online coverage and metrics (see sidebar Discovery Channels)**

"We are using this opportunity to come up with new ideas and features that will make the merged journal far greater than the sum of its parts."

— STEPHEN R. HAMMES, MD, PHD

After all, haven't we been told that promotions and tenure committees, as well as the National Institutes of Health (NIH) and non-U.S. federal study sections, are looking at journal Impact Factors? If one really thinks about it, in these days of Internet searches and online publishing, the distinctions mentioned above are really not that relevant anymore. How many people still read tables of contents for a specific journal? Don't we find our articles of interest through PubMed searches?

The world of scientific publishing is changing at a rapid rate, making it difficult for any scientist to keep up. How many emails do we receive each day inviting us to submit to, publish in, serve on the editorial board for, or even serve as editor-in-chief for journals of which we've never even heard? This proliferation has been alarming, in part, because it is difficult to ascertain the quality of journals from unknown publishers. We are particularly concerned for young investigators who may not have the experience to differentiate journals with virtually identical names.

These are complex issues, indeed, and enough to make any scientist pull out his or her hair. However, we firmly believe that the best solution to all of these questions, and potential problems, is to publish in the Endocrine Society journals. Society journals were created and exist for one purpose: To serve their constituents by giving them opportunities to publish in journals that are run, reviewed, and then read by their peers. Both *Endocrinology* and *Molecular Endocrinology* have been doing this for many decades (in fact, for a full century in the case of *Endocrinology*) and have published approximately 40,600 articles for Society members and other basic researchers over the years. The senior editors and editorial boards are basic and translational researchers who are nearly all members of the Endocrine Society — so they really are your colleagues, peers, and most importantly, your advocates.

The merged *Endocrinology* will have a broader scope and more resources for our members. By combining our entire editorial teams, including the associate editors and the editorial boards, we will create an unprecedented broad base of expertise that will exceed what we can offer as separate journals. We are confident that we will be able to appropriately and expeditiously handle any

manuscript that comes our way, from the most physiologic *in vivo* studies to the more molecular *in vitro* analyses. Our ultimate goal is, without sacrificing the high quality of science that already exists in *Endocrinology* and *Molecular Endocrinology*, to put forth a new journal that is affordable and user-friendly, has expedited and straightforward peer review, and offers opportunities for promotion of science through author features and multimedia promotional support from the Endocrine Society.

A few examples of how we aim to make the new *Endocrinology* your destination spot include a simplified online submission system; rapid notification to authors as to whether a submission has been selected to continue to peer review; an efficient peer-review process with straightforward and thoughtful comments that will not overly burden authors during resubmission; continuous online publishing of articles as they are accepted; free color for online publishing; and aggressive promotion of ground-breaking articles through the journal website and through the Endocrine Society media relations department, and features in *Endocrine News*.

Furthermore, we plan to expand the types of articles that we will consider for publication in *Endocrinology* that will include full-length research articles, mini-reviews, rapid communications, technical papers, and resource articles. Most importantly, manuscripts will continue to be handled by your peers in the Endocrine Society from the moment of submission through publication, meaning that they will get the fairest treatment possible from the people most qualified to evaluate them.

We are extremely excited about the new merged journal, and we are committed to its success. You will see some changes in the two journals over the rest of 2016 as the merger begins, until its launch on January 1, 2017. We strongly reassure the molecular community, in particular, that all articles that were or will be published in *Molecular Endocrinology* before January 1, 2017, will be indexed, archived, and accessible for citation in PubMed and elsewhere — in perpetuity — and its content will be merged with *Endocrinology* online.

The 2017 centennial celebration for *Endocrinology* comes at an auspicious time. We are planning exciting monthly features commemorating the incredible history of *Endocrinology* and the Endocrine Society. Beyond the fireworks, we reiterate that the primary reason why any of our journals exists is to serve the Endocrine Society members. No matter what we plan for and how hard we work, the success of the journal depends upon participation by the Society membership. The better the science submitted and published, the better the journal will become. Therefore, we are encouraging Society members (and nonmembers) to keep the new merged journal at the top of your list when submitting your next, best paper.

We began this article by asking: **Why is this merger happening?** We think the more important question is: **Why hasn't this happened sooner?** Please give us a try — we think that you will like what you see. Operators are standing by! EN

DISCOVERY CHANNELS

***Endocrinology* and the rest of the Society's journals are getting another exciting new author and reader benefit in 2017 — the Altmetric tool from Digital Science for article-level discoverability and usage metrics.**

Altmetric

Altmetric is being increasingly used by publishers, institutions, researchers, and funders — including the NIH for its Biosketch entries — as an immediate and fine-grained measure of scholarly impact and sharing. It tracks mentions of individual articles from across the web as soon as the article is published, including newspapers, blogs, tweets, social media, Wikipedia, Mendeley bookmarks, and, increasingly, scholarly citations in other publications. These usage data and their scores can be accessed by readers and authors alike via a link in each article that displays an at-a-glance summary of its online attention: literally, who is saying what about the research.

Q&A with Andrea C. Gore and Stephen R. Hammes

The old adage goes that "the more things change, the more they stay the same." That's not entirely true when it comes to the merging of *Endocrinology* and *Molecular Endocrinology*. While the journal will continue to publish research from outstanding scientists in the field of endocrinology, there will be some significant changes to look forward to.

In fact, there are so many changes that *Endocrinology's* co-editors-in-chief, Andrea C. Gore, PhD, and Stephen R. Hammes, MD, PhD, spoke with *Endocrine News* editor Mark A. Newman about what to expect from the revamped *Endocrinology*:

Endocrine News: Since you were both editors-in-chief (EIC) of your own respective journals, how will your duties change with this merger?

Stephen R. Hammes: One of the greatest outcomes of planning this merger was that I realized what a terrific person Andrea is. We get along great and share a similar vision for the merged journal. Therefore, the transition has been easy, and I don't anticipate that our duties will change much. We will still make many decisions by ourselves but will make the bigger ones as a team. And having somebody with whom I can discuss important issues is only going to make those big decisions more meaningful. From an author's standpoint, things will be better. Authors will choose which EIC will handle their manuscript and will be able to suggest potential associate editors and editorial board members from the merged boards. Therefore, no matter the focus of the manuscript, authors can be assured that their manuscripts will be handled in a thoughtful and appropriate fashion.

Andrea C. Gore: My job is going to get easier with the merger! The combined expertise of the EICs, our associate editors, and the editorial board, will double. Currently, *Endocrinology* receives submissions that are high quality, but for which we don't have the perfect match in expertise. By joining forces with the *Molecular Endocrinology* team, I predict that we will cover the full gamut of basic endocrinology.

EN: What is the mission and overall goals of the new journal that was not being achieved by *Endocrinology* and *Molecular Endocrinology*?

SRH: I do not think that the mission or overall goals of the new journal will change. The journals have always done a terrific job serving Society members and providing a forum to publish their basic research. Where I hope the new merged journal will reach new heights is in the WAY that it supports its mission. The merged journal will be more expansive, will have new features and article types, will simplify and speed up the submission, review, and publication processes, and will provide better promotional support for its content.

ACG: *Endocrinology's* current mission statement is: "to publish papers that provide significant and novel information at the molecular, cellular, tissue, or organismal level of hormone function in the field of endocrinology." On reading this and thinking about my vision for the merged journals, this mission statement seems entirely apropos and makes me wonder why we didn't merge earlier!

EN: The Impact Factor of the merged journal will be a continuation of the *Endocrinology* Impact Factor. Will the merging of *Endocrinology* and *Molecular Endocrinology* make a difference?

SRH: I have no idea how the merger will affect the Impact Factor. However, from my perspective, Impact Factor is not a major issue. There is great and important research being published in many journals with varying Impact Factors — in the end, good science gets read and gets cited. To me, the primary purpose of the Endocrine Society journals is to provide colleagues with a place where their work will be handled, reviewed, and then advocated in a fair fashion by their peers. We think that the merged *Endocrinology* will accomplish this, and that its broader scope and new features will improve the quality of published manuscripts as well as the exposure that these manuscripts receive.

ACG: My job as EIC is to review and publish the strongest possible content. How that plays out as Impact Factor has never affected how I do business. *Endocrinology* fills a niche for our members — we publish highly mechanistic studies, but we also publish comparative work and descriptive studies. The latter may not be as highly cited as others, but they need to be published in *Endocrinology* because they are fundamental to basic endocrinologists and should appear side by side with highly mechanistic discoveries.

"WE WANT THE NEW MERGED JOURNAL TO BE A DESTINATION POINT FOR OUR MEMBERS."

EN: Will the new journal essentially be an amalgamation of *Molecular Endocrinology* and *Endocrinology*, or will there be new features and article types included?

SRH: The new merged journal will NOT be a simple amalgamation of the two current journals. In fact, we are using this opportunity to come up with new ideas and features that will make the merged journal far greater than the sum of its parts. This includes a more efficient review process, from submission to publication, as well as better options for publication charges. This also includes new article types that will broaden our appeal to authors. We will also have enhanced features on the website and better cross talk with promotions and with the other Society journals. We want the new merged journal to be a destination point for our members.

ACG: I agree — there will be great synergy with the merger. As I've worked with Steve over the past year, I've felt that our visions, experiences, areas of expertise, and passion for the science and the journals, have been highly complementary. We have somewhat different styles in running our respective journals and as we've gotten into the nuts and bolts of the merger, we've been sharing best practices and making sure that the merged journal has the best of both journals. At the same time, we can clean house of any old practices that were less efficient. This may sound incremental, but I think we have big changes in store that will be of great advantage to our readers.

EN: It's been stated previously that the new journal will be both more affordable and more user-friendly. Can you explain?

ACG: The merged journal will provide several new advantages. We will streamline the manuscript submission process for authors, and the review process will be easier for reviewers. This will enable everyone to focus attention entirely on the quality of the science. The price structure will also change to the advantage of our authors. Free color online is already available in *Molecular Endocrinology*; this will be extended to *Endocrinology's* authors. As we speak, the Society is reviewing the pricing structure to make it more favorable to members. We have also been developing an enhanced website that will allow "one-stop shopping" for endocrinologists to find out about the state of the science, Society-related activities, highlights of the Annual Meeting, and other features that will benefit the endocrine community.

SRH: I could not have said it better. Our main goal with the merged journal is to make it as user-friendly as we possibly can. Since we are both basic researchers ourselves, we know how painful it can be to publish our work. There can be so many hoops to jump through, not to mention hidden costs that come up after acceptance and therefore cannot really be avoided. We want our constituents to feel that publishing basic research in this Society journal is straightforward, efficient, and a great value, while still being discerning and of high quality.

EN: What sorts of changes in *Endocrinology* and *Molecular Endocrinology* can regular readers and contributors expect to see both before and after the merger?

ACG: The two journals will continue to publish separately in 2016 and at a designated point *Molecular Endocrinology* authors will be directed to send new submissions to *Endocrinology*. To prepare for a seamless transition, the journals have already begun to undergo a "soft merger," during which the editors-in-chief, associate editors, and editorial board are working together to ensure that current needs of authors from the basic endocrinology communities are being met.

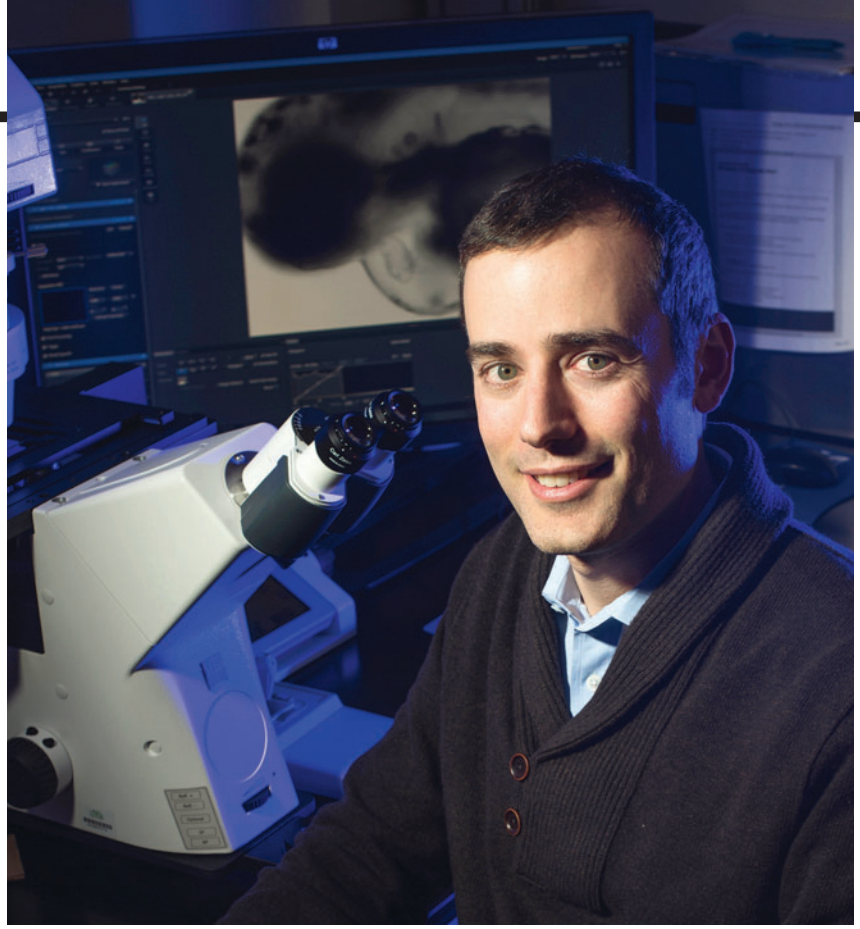
SRH: This issue is especially relevant to those who publish in *Molecular Endocrinology*, who might worry about where their previously published work will go as well as what will happen to manuscripts submitted late in the year. Rest assured that all papers ever published in *Molecular Endocrinology* will remain on PubMed and will be available in the *Endocrinology* archives. As for papers submitted to *Molecular Endocrinology* in 2016, we have a plan to ensure that they will be handled by the *Molecular Endocrinology* board throughout the review process. If accepted, the work will be published in either *Molecular Endocrinology* or the merged journal *Endocrinology*, depending on the date of acceptance.

EN: What are your future goals for *Endocrinology,* and what do you hope to accomplish?

ACG: I am excited about *Endocrinology's* second century of publishing. So much of the seminal work in basic endocrinology has been published in the journal, and I am amazed by the groundbreaking research we are publishing today that will lay the groundwork for the future. I've always felt that a merged journal would better serve the Society than two separate journals, but this was absolutely cemented when Steve and I started working together and I realized that our combined expertise, and that of our editors, is far greater than the sum of its parts. We are also planning special features that will be particularly valuable to young investigators and rising stars who are the future of the field. I fully expect that we will be the premiere journal for Endocrine Society members and non-members in the basic and translational sciences.

SRH: I don't have much to add to Andrea's response. I think both of us feel a strong loyalty to the Endocrine Society, and we just want to do our best to make *Endocrinology* a great place for our members to showcase their work. EN

Hitting *the* High Notes



How Daniel Gorelick, PhD, goes from harmonies to hormones in his lab at the University of Alabama at Birmingham.

BY MELISSA MAPES

For many endocrinologists, the path to finding a specialty is not a straight line. This fact rings especially true for Daniel Gorelick, PhD, an investigator at the University of Alabama at Birmingham. Prior to establishing his lab, which focuses on the influence of steroid hormones and environmental endocrine disruptors on development, he pursued his passion for music — completing a Bachelor of Arts at the University of Pennsylvania.

Fast forward to the present, and Gorelick is receiving the 2016 Outstanding New Environmental Scientist award from the National Institutes of Health (NIH). His work with zebrafish is greatly expanding our knowledge of how hormones affect the development and function of the heart, brain, and other non-reproductive tissues, while he continues to moonlight as a musician.

Endocrine News spoke to Gorelick about the high notes of his career so far and what's next for him and his laboratory.

Endocrine News: How did you transition from music to medicine? And how did you discover your specific specialty?

Gorelick: Growing up, I had many interests — including music, theater, and science. When I got to college, I wasn't sure what I wanted to be, so I decided to focus on something I found fun: music.

I did take some science courses, but the classes were generally large and dull — not nearly as engaging as my music classes. But I still loved science, and I managed to get a job during the summers working in a lab at the NIH. This is when I started gravitating toward biomedical research.

When I graduated from college, I was fortunate to get a job as a lab tech in Russell Margolis's lab at Johns Hopkins University. I also won a spot in the Baltimore Symphony Chorus. This was an amazing time — during the day, I was helping to identify genetic mutations that cause spinocerebellar ataxias, and, at night, I would perform with an incredible orchestra and chorus, led by world-famous guest conductors. I was in heaven. And I realized that if I became a scientist, I could still find musical fulfillment.

With Russ's support, I started taking biochemistry and organic chemistry courses at night. I ultimately applied to grad school and here I am. In addition to my research, I sing with the Alabama Symphony Chorus.

EN: What projects are you most proud of and why?

Gorelick: We developed a genetically modified zebrafish that allows scientists to visualize estrogen-responsive cells in a living embryo in real time. During my postdoctoral fellowship, we initially created these fish to investigate estrogen activity in the brain, but we wound up discovering a previously unappreciated site of estrogen activity in the heart. We also were unexpectedly able to use these fish as sentinels for environmental pollution.

These fish are, by far, the reagent that other scientists request most frequently from my lab, and we're happy to share them.

I'm also proud of demonstrating that estradiol regulates heart rate via the G protein-coupled estrogen receptor. This was the first finding my lab made, so really the first discovery that was completely independent of anything I'd done as a postdoc.

A grad student, Shannon Romano, made the initial observation by chance, but it went on to spawn numerous questions and follow-up projects. It also propelled my lab into studying the function of the G protein-coupled estrogen receptor, an estrogen receptor that mediates non-canonical estrogen signaling. We know relatively little about its function in vivo compared to the canonical nuclear estrogen receptors. This project has been the most difficult to get funded, but I see the results as cutting edge, controversial, and potentially high impact.

We've used CRISPR-Cas technology to generate sex hormone receptor mutant zebrafish. Some of these mutants are turning out to be very interesting and will likely supply research projects for years to come.

EN: What kinds of cross-discipline collaborations occur in your work, and how do they influence your research?

Gorelick: I like to think that our work, by definition, crosses disciplines. In one project, we are studying how estrogens influence the development and function of the heart. That makes us endocrinologists. And since we're studying the development of the heart, we are developmental biologists and cardiovascular scientists, too.

As part of this project, we're doing a chemical screen to determine whether other estrogens, besides estradiol, exert similar effects on heart function and on estrogen receptors in the heart. This places us within pharmacology. The point is that we try to follow the science wherever it leads without worrying about labels.

EN: Where do you see your research heading in the future?

Gorelick: Honestly, I have no idea. As a postdoc, if you told me I'd be studying estrogen signaling in the heart, I would have stared back in disbelief. As a new assistant professor, if you told me I'd be focusing on non-canonical estrogen signaling and the G protein-coupled estrogen receptor, I would have been surprised.

So here's my best guess: We'll continue to focus on the G protein-coupled estrogen receptor (GPER) and maybe branch out into studying GPER function in other tissues like the brain. We will also develop genetically engineered zebrafish that report androgen receptor activity, glucocorticoid receptor activity, and so on. As was the case with estrogens, the glucocorticoids and androgens probably have functions in embryonic development that are waiting to be discovered. Additionally, we hope to become more involved in chemical screens using zebrafish to identify selective nuclear receptor modulators.

EN: What advice do you have for researchers interested in your field?

Gorelick: Find a unique niche. This happened to me by accident when we started using the transgenic zebrafish that we developed to detect environmental endocrine disruptors. Also, make sure to network like crazy.

To learn more about Gorelick's work, visit his lab's website: **gorelicklab.org**. EN

MAPES IS A WASHINGTON, D.C.–BASED FREELANCE WRITER AND A REGULAR CONTRIBUTOR TO *ENDOCRINE NEWS*. SHE WROTE ABOUT HOW MENTORING STYLES IN BUSINESS CAN BE CARRIED OVER INTO THE LAB IN THE JUNE "LABORATORY NOTES."

FISHING *for* KNOWLEDGE

Gorelick's No. 1 collaborator is the zebrafish. His studies largely rely on this creature as the conduit to answers for the questions his lab seeks to answer. The rapid rate of organ development in zebrafish embryos — just five days — and their transparent bodies allow Gorelick and his colleagues to quickly observe developmental influences, in addition to other unique qualities.

"For our projects, the zebrafish is ideal because the fish have no sex up until about 10 days old," he explains. "They are neither male nor female and have the potential to develop into either, which means that we don't need to control for variability in sex hormone levels."

If working with mice, for example, Gorelick would have to perform a gonadectomy to remove a large source of sex hormone production to make the sex hormone level similar in all experimental subjects. "Zebrafish embryos are a natural gonadectomy, or nature's gonadectomy," he says.

Legislation Will Reduce Risk of EDCs — Your Support is Needed

BY SENATOR DIANNE FEINSTEIN (D-CA)

The prevalence of endocrine-disrupting chemicals (EDCs) is a serious public health concern. EDCs have been linked to a wide range of health problems, including diabetes, obesity, reproductive disorders, and even cancer. These effects are exacerbated in children whose bodies are still developing and absorb chemicals at a higher rate than adults. And, these chemicals are present in thousands of items that we use every day including personal care products, canned food items, soda cans, and plastics.

With exposure so prevalent, we simply must do a better job overseeing the use of these chemicals in common products and ensuring consumers can make informed choices. As the United States continues to work to reduce healthcare costs, it's critical that we look at environmental factors, such as increased chemical exposure, that may be contributing to health problems and increased rates of chronic disease.

I'm grateful to have the Endocrine Society's support on two important pieces of legislation to help reduce the risk of EDCs — the Personal Care Products Safety Act and BPA in Food Packaging Right to Know Act.

The lack of safety rules for personal care products is particularly concerning. Our skin is our largest organ, and it quickly absorbs the chemicals in these products — including endocrine disruptors. The law governing the safety of personal care products — the Food, Drug and Cosmetic Act — has not been significantly updated since 1938. The products on the market today are much different than those on the market in 1938. Due to these outdated safety rules, the Food and Drug Administration (FDA) has prohibited or restricted only 11 substances, including mercury and chloroform, from use in personal care products. By contrast, the European Union has banned more than 1,300 chemicals from personal care products and restricted an additional 256. The FDA is also unable to set limits on the concentration levels of chemicals in products — limits are particularly important for children's products.

The Personal Care Products Safety Act would finally address these glaring safety loopholes. A key component of the bill is an FDA review process for ingredients frequently used in personal care products. The FDA would review at least five chemicals per year, chosen based on input from consumers, medical professionals, scientists, and companies. An ingredient-review process is already in place in the European Union, and companies are required to use only pre-approved colors and preservatives.

The ingredient-review process would address which chemicals can continue to be used in personal care products, and if so, what the concentration levels should be. The FDA may determine that EDCs are not appropriate in any products or are only appropriate in small amounts. For example, after conducting a scientific review, the FDA may determine that a particular chemical is only safe at a concentration of one part per million. Going forward, all companies would need to reformulate their products so that they contained no more than one part per million of that ingredient.

The chemical bisphenol-A (BPA) is another cause for concern. BPA is most commonly found in the lining of metal cans and other food packaging. More than 200 scientific studies have linked BPA exposure to breast and other cancers, reproductive disorders, cardiac disease, diabetes, early puberty, and other health issues. In 2008, the FDA banned the use of BPA in many baby products, including bottles and formula cans. This decision came after significant pressure from members of Congress and the public. And in the years following this decision, some chemical companies and manufacturers have stopped using BPA altogether. Retailers have also stopped selling products containing the chemical. But despite mounting scientific evidence that BPA exposure is a risk to human health, many companies continue to use it.

The BPA in Food Packaging Right to Know Act would simply require labels on consumer food packaging that contain the chemical and a revised safety assessment from the FDA that takes into account low-dose, long-term exposure. Consumers deserve the ability to make informed decisions about the products they purchase for themselves and their families.

The bottom line is: There is increasing urgency to address the

health effects caused by endocrine-disrupting chemicals, through updated federal safety oversight.

I look forward to continuing to work with the Endocrine Society to advance these important pieces of legislation.

—Dianne Feinstein is the senior senator from California. She introduced both the Personal Care Products Safety Act and the BPA in Food Packaging Right to Know Act.

TAKE ACTION: Endocrine Society Members are encouraged to join our campaign supporting the Personal Care Products Safety Act.

Please visit www.endocrine.org/advocacy to contact your senators. Our online advocacy campaign will provide you with a letter and send your correspondence directly to your senators after you provide your ZIP code.

House Appropriations Committee Passes Funding Bill for NIH; Final Outcome Uncertain

On July 14, the House Appropriations Committee approved its fiscal year (FY) 2017 Labor, Health and Human Services (LHHS), Education and Related Agencies Appropriations spending measure that includes funding for the National Institutes of Health (NIH). The House LHHS bill provides an additional $1.25 billion for biomedical research, which would raise the NIH budget to $33.3 billion (a 4% increase) compared to FY 2016. Within the $1.25 billion increase, the following amounts are included to support specific NIH initiatives:

- $511.5 million for Clinical and Translational Sciences (CTSA) Awards
- $333.3 million for the Institutional Development Awards (IDeA) Program
- $350 million increase for Alzheimer's research
- $195 million for the Brain Research through Application of Innovative Neuro-Technologies (BRAIN) Initiative
- $300 million for the Precision Medicine Initiative (PMI)
- $12.6 million for pediatric cancer research

The following is a summary of provisions in the House LHHS bill report language that we advocated for and that will impact Endocrine Society members:

NIH Success Rate/Research Project Grants/ Extramural Funding — The report states that the committee expects the NIH to use the 4% funding increase to support a success rate of not less than 20% and fund at least 11,175 new research project grants. The committee "strongly urges" the NIH to restore extramural support to at least 90% of all NIH funding and directs the NIH to support a consistent agency-wide inflationary policy across all of the Institutes & Centers (I/C) that is no less than the 2.5% general increase provided to all I/Cs for non-competing awards.

Young Investigators — The Committee encourages the NIH to continue the focus on emerging investigators and first-time renewals of young investigators "with actions NIH has taken to significantly reduce the average age of an NIH-supported new investigator." The Committee requests a report and a plan outlining concrete steps the NIH will take to lower the median age at which investigators receive their first R01 award and instructs the NIH to "convene a working group that includes stakeholders from academia, young researchers, industry leaders, and government officials to move forward on this goal."

Office of the Director — The Committee directs the NIH director to ensure that all I/Cs provide continued support for the Pathways to Independence Program and support an increase in the New Innovator and Director's Pioneer Awards, as well as the Transformative R01 Program.

Basic Biomedical Research — The report includes a statement in support of maintaining basic biomedical research "as a key component of both the intramural and extramural portfolio at NIH." The report adds that the NIH should take actions to ensure that at least 55% of the NIH's total budget should be allocated to extramural basic research.

Evaluation and Management (E&M) Codes — The Committee requests CMS provide an update in the FY 2018 budget request on planned or ongoing research related to E&M codes.

National Diabetes Prevention Program (NDPP) — The Committee provided a significant increase in funding for the NDPP — $25 million in FY 2017 — and noted it continues to strongly support the successful NDPP and directs all new funds provided in FY 2016 and 2017 to support an increase in the number of new competitively awarded program providers. Specifically, the focus should be on rural providers where the risk and burden of diabetes is greater, and where the program has the potential for the biggest impact.

Next Steps: *The bill is not expected to come before the full House for a vote. Rather, it is expected that the House and Senate will need to pass a stop-gap funding measure known as a Continuing Resolution (CR) by October 1. While a CR will avoid a federal government shut down, it would only fund programs at their current level. The Endocrine Society is urging Congress to pass a short-term CR with the hope that when Congress returns for a "lame duck" session following the election, it will pass a real funding measure that would allow increases for the NIH, NDPP, and other federal programs important to Society members.*

25 Years of Endocrine Disruption: Past Lessons and Future Directions

BY LINDA S. BIRNBAUM, PHD, DABT, ATS

This has been a landmark year for the endocrine disruption field. Not only is 2016 the 25th anniversary of the Wingspread Conference on environmental endocrine disruption, the 50th anniversary of environmental health research at the National Institutes of Health (NIH), and the 100th anniversary of the Endocrine Society, it is also the 20th anniversary of *Our Stolen Future*, the bellwether book by Theo Colborn, Dianne Dumanoski, and John Peterson Myers that drew widespread attention to the endocrine disruption field and the potential for multi-generational impacts.

The Wingspread Conference has proven to be a key turning point in the development of the field of endocrine disruption. It was there that the terms "endocrine disruption" and "endocrine disruptors" were coined. A consensus statement by the meeting participants began with an unequivocal claim: "We are certain of the following: A large number of man-made chemicals that have been released into the environment, as well as a few natural ones, have the potential to disrupt the endocrine system of animals, including humans." [1]

Over the past 25 years, the concept EDCs has risen from a position of total obscurity to become a focus of research, regulation, and public policy. The emergence and development of this field of study has not always followed a smooth path, and researchers continue to wrestle with questions about the low-dose effects and non-monotonic dose responses seen within EDCs, their biological mechanisms of action, the true pervasiveness of these chemicals in our environment and in our bodies, and the extent of their effects on human and wildlife health.

It is now clear that some environmental substances contribute to the burden of disease by interfering with the human endocrine system. For some chemicals, documented health effects have prompted regulatory action to restrict human exposure. Many other potential EDCs, including mixtures of chemicals and chemical exposures in combination with changing diet and stress, are still being studied and still being used in consumer products.

In commemoration of these historic events, the National Institute of Environmental Health Sciences (NIEHS) will be hosting a meeting titled, *25 Years of Endocrine Disruption: Past Lessons and Future Directions*, on the main NIH campus in Bethesda, MD., September 18 – 20, 2016. This meeting will chronicle the development of the field of endocrine disruption, highlighting what we have learned about the threat of EDCs and lessons we have learned during the process. It will also highlight perspectives on the future research in the field and opportunities to better protect human health.

The scientific program will include sessions on:

- Scientific Principles Underlying EDCs
- The Mechanisms and Health Effects of EDCs
- EDC Testing and Biomonitoring
- Lessons Learned from EDC Research
- Bridging the Gap: Effects Across Species and Generations
- Translating Science to Action
- Safer Chemicals and Better Research Strategies
- The Next 25 Years: A Discussion on a Safer Future

The meeting will also include an opening session that will honor the founding scientists in the field and a session titled, "Recollections of Wingspread by Attendees." The meeting is open to the public and has no registration fee. We invite members of the scientific community to attend. EN

— *Birnbaum is the Director of the National Institute of Environmental Health Sciences (NIEHS) and the National Toxicology Program (NTP).*

1. Colborn T, Clement C. *Chemically-Induced Alterations in Sexual and Functional Development: The Wildlife/Human Connection*. Princeton, NJ: Princeton Scientific Publishing Co.; 1992.

THE FIVE W'S OF EDCs

Hormone Health NETWORK®
Keep your body in balance

WHAT are EDCs?

Endocrine disrupting chemicals, or EDCs, are substances in the environment (air, soil, or water supply), food and beverages, and manufactured products that can interfere with the normal functioning of our body's endocrine system. Many of their effects on humans are still unknown and require more research.

(The endocrine system controls the way your body develops and functions. It produces hormones that travel to all parts of your body to maintain your tissues and organs, and to participate in overall health.)

Visit hormone.org for more information.

WHY should I be concerned about EDCs?

EDCs are found in everyday household products. As of October 2013, there are nearly 1,000 chemicals on The Endocrine Disruption Exchange (TEDX) list: **endocrinedisruption.org**.

These chemicals are found in:

- Contaminated soil, water and air
- Food contaminated through chemicals in the food chain
- Food packaging: lining of cans, plastic
- Workplace: industrial chemicals, pesticides, fungicides
- Common household items: plastics, household chemicals, toys, flame-retardant fabrics, cosmetics, medications, antibacterial soaps

Plastics Bisphenol A (BPA), phthalates	**Industrial solvents/lubricants** Polychlorinated biphenyls (PCBs), dioxins	**Pesticides** Dichlorodiphenyltrichloro-ethane (DDT), methoxychlor, chlorpyrifos
Fungicides Vinclozolin	**Herbicides** Atrazine	**Antibacterials** Triclosan
Personal care products Phthalates	**Textiles, clothing** Perfluorochemicals (PFCs)	**Children's products** Lead, phthalates, cadmium

Advocate for more research and improved federal regulations by contacting members of Congress:
endocrine.org/advocacy-and-outreach/take-action/contact-congress

WHERE do EDCs impact my body?

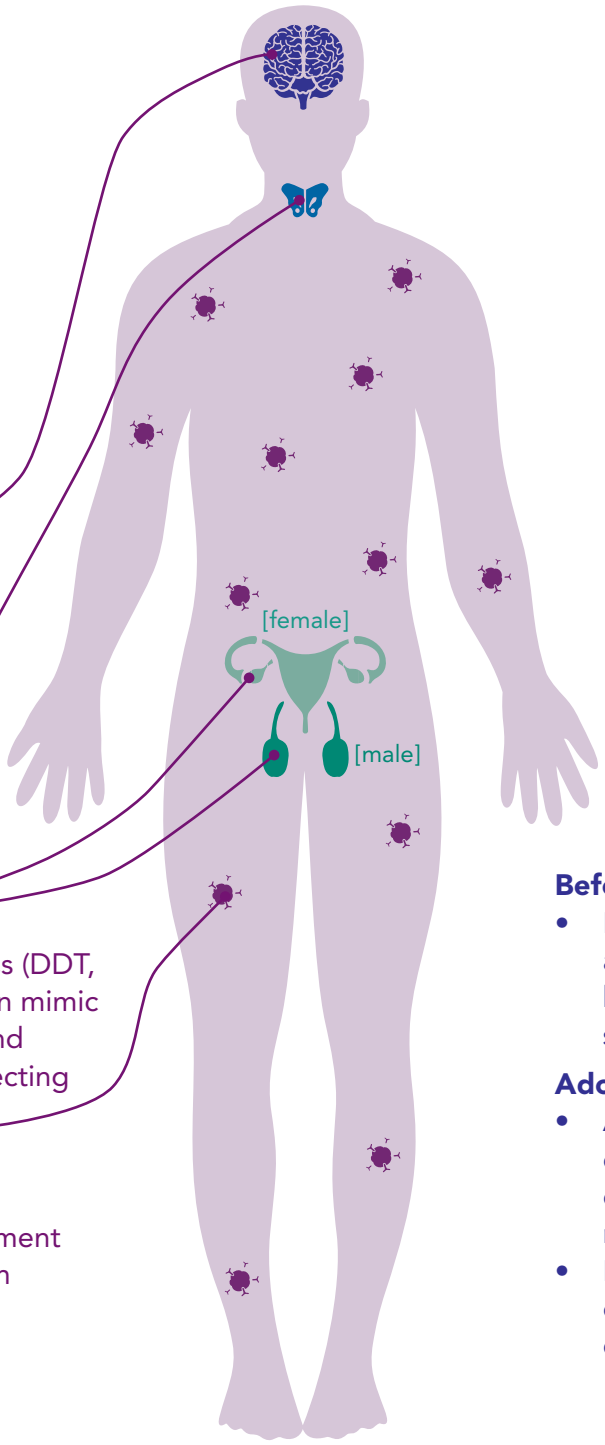
More research is needed, but we know EDCs affect:

Response to stress
- Neurological and behavioral changes
- Reduced ability to handle stress

Metabolism
- Industrial chemicals can interfere with thyroid function

Reproduction
- Virtually all classes of EDCs (DDT, BPA, phthalates, PCBs) can mimic or block effects of male and female sex hormones, affecting reproductive health

Growth and development
- Neural development
- Disrupted sexual development
- Weakened immune system



WHEN do the effects take shape?

Endocrine, reproductive and/or neurological problems occur more frequently in humans with higher amounts of EDCs in their bodies. Health impact of low-level EDC exposure is still being researched.

Before birth
- Interferes with fetal growth and development while the body's organs and tissues are still developing

Adolescence, adulthood
- Affects sexual development, decreases fertility, causes diseases of male and female reproductive systems
- Increased risk of diabetes, obesity, and certain types of cancer

WHO regulates EDCs?

The federal government

- The Toxic Substances Control Act passed in 1976
- In 1996, Congress passed the Food Quality Protection Act and the Safe Drinking Water Act Amendments
- Current chemical screening programs are inadequate for finding endocrine disruptor effects
- Researchers are still working to define the relationship between the dose (low/high) of EDCs and how the body responds to it

You have questions. We have answers.
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Additional editing by Andrea Gore, PhD, University of Texas at Austin

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