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Arsenic and Children's Health Update from the Children's Environmental Health and Disease Prevention Research Center at Dartmouth



The presence of measurable amounts of arsenic in common foods such as rice and apple juice has received significant media coverage in recent months, and this may prompt questions from concerned parents.^{1,2} In addition, as described in the Granite State Pediatrician article in July

2012 by Paul Susca from NH Department of Environmental Services (DES) and others, NH residents have the potential for additional exposure to arsenic from their drinking water if they are members of the estimated 40% of NH households that rely on private wells.³ In this article, we will outline why **both** dietary and drinking water exposure to arsenic are emerging and important pediatric health issues. We will also highlight the role of the Children's Environmental Health and Disease Prevention Research Center at Dartmouth (CEHC) in better understanding how these exposures occur, their potential human health implications and what prevention approaches may be reasonable to incorporate into clinical practice now as further information emerges.

Why the concern about arsenic?

Much like the experience with lead, our awareness that arsenic may pose significant and differential human health effects at lower and lower doses has occurred as the metal has become more widely detected and disseminated in our environment. As with lead, potential human exposure pathways to arsenic have expanded in parallel to its environmental dissemination and persistence, and now are recognized to include food sources such as rice, in addition to drinking water. In adults, chronic arsenic exposure has been causally linked to bladder, lung and skin cancer. In children with higher levels of

exposure, epidemiological studies have demonstrated links with decreased birth weight, altered immune function and infection. In response to large population studies indicating cancer risk estimates as high as 1 in 100 for adults drinking water containing arsenic at the then permissible level of 50 PPB, the EPA in 2001 lowered the limit to 10 PPB for public water supplies. This standard is enforceable only in public water systems, not private wells. For dietary sources, the epidemiology of arsenic's human health effects is just emerging and there is not yet a regulatory framework in place to address its content in foods.

What is the Children's Environmental Health and Disease Prevention Research Center at Dartmouth?

The Children's Environmental Health and Disease Prevention Research Center at Dartmouth (CEHC) is one of the national centers funded jointly by the National Institute of Environmental Health Sciences (NIEHS) and the Environmental Protection Agency (EPA) to conduct research that will help reduce the burden of children's health problems associated with environmental contaminants.⁴ The impetus for the creation of these Centers was the recognition that children were uniquely vulnerable to adverse health effects of environmental exposures. In comparison to adults, children in general experience higher exposure doses to toxicants, have underdeveloped mechanisms for "detoxification" and a longer life span in which to manifest diseases with long latency. Led by environmental epidemiologist, Margaret Karagas, PhD, research at Dartmouth's CEHC is focused on understanding the extent and health effects of *in utero* and childhood exposure to arsenic and other metals from well water and food. The centerpiece of the Dartmouth CEHC's research is the New Hampshire Birth Cohort Study.



(Continued on page 2)

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What is the New Hampshire Birth Cohort Study?

Since January 2009, nearly 1000 pregnant NH women using private wells have been enrolled in this longitudinal study designed to quantitate and better understand exposure to arsenic and other metals during pregnancy. Funding was granted to the CEHC to add longitudinal periodic follow-up of these children to evaluate potential health effects of their early life exposures. This follow up currently includes detailed food diaries, health status information, and collection and analyses of a wide range of biological materials including urine, blood, and stool, as well as toenails, which are particularly well suited for evaluating arsenic exposure. The combination of detailed dietary information paired with biomarkers of arsenic exposure allows for much more precise estimates of individual exposure to arsenic and other metals and estimation of contributions from food versus water. CEHC researchers are currently looking at a range of clinical data including children's immune response, infection and allergy history, as well as growth and development assessments in relation to arsenic exposure *in utero* and in early life. Studies looking at cellular changes in biologic materials are also underway, with particular emphasis on the effects of arsenic on specific cellular pathways in the placenta. Results of these studies will be forthcoming as data is collected and analyzed and the cohort continues to be followed over time.

What have CEHC researchers found to date about arsenic in foods?

From analyses of the food diaries, drinking water samples, and biomarkers of arsenic exposure from the women in our cohort, we have been able to characterize the amount and proportion of total arsenic exposure coming from their rice consumption and, in the absence of dietary standards, relate this to what is currently targeted as the "safe" exposure level in drinking water.² We have also analyzed NHANES data and showed that urinary arsenic measured in a representative sample of US children correlated with their dietary history of consuming rice products.² In addition, collaborators here have also published a "market basket" study identifying measureable amounts of arsenic in popular foods, including sports energy bars that contain brown rice syrup as their sweetener of choice, as well as one "toddler" formula that used this sweetener.² This research serves to highlight previously unrecognized sources of arsenic exposure in our current diet, as well as illustrate methods to analyze biomarkers of exposure. However, it is important to note that **we do not as yet have evidence that these low levels of dietary arsenic exposure are linked to a particular human health effect.** The need for this health effects data underscores the importance of our work here at CEHC.

What can I tell parents now about arsenic and their child's health?

First, emphasize to your concerned parents that our best evidence about human health and arsenic comes from drinking water studies, so if they are on a private well, they should have their well tested for arsenic and any other contaminants that may be relevant to their type of well and home location. This information is available on the NH DES website at:

http://des.nh.gov/organization/commissioner/lisu/documents/water_testing.pdf

Pediatricians can include well testing recommendations during well child visits when the topic of fluoride supplementation is addressed and advise parents to include arsenic in the testing of their well water for natural fluoride. The Children's Center is actually in the process of piloting a program to do just that in a selection of primary care practices enrolled in the Dartmouth Co-op Network to identify ways in which clinical practices can play a role in this important public health initiative. There are remediation options available for those households who find their well water arsenic levels exceed the Safe Drinking Water standard of 10 PPB. Note that public water systems are required to test and ensure that the arsenic concentration is below this level, so families who obtain their drinking water from their town or city do not have to test their water.

In terms of food sources of arsenic, continue to advise parents to select a variety of grain sources and avoid or minimize sweetened snack foods and fruit juices. Snack foods such as granola bars that include ingredients such as brown rice syrup should be limited in the same manner that we advise limitation of foods containing high fructose corn syrup or other sweeteners. In the absence of testing and labeling requirements for arsenic in foods, it is impossible to know for certain the arsenic content of specific types of rice, brands of rice or forms of rice products. It is important to acknowledge that we do not yet have evidence of specific health impacts of these low levels of exposure and that rice remains an important nutritional food staple. Rinsing rice well before cooking and choosing white rice rather than brown rice are two approaches that have been shown to decrease arsenic content. Where concern is high, options such as selecting oatmeal rather than rice cereal as a transitional food or alternating the two could decrease potential arsenic exposure but not at the expense of important nutritional sources of iron and other minerals. Parents should be discouraged from pursuing specific testing of their children for arsenic, as arsenic is excreted rapidly after ingestion and test results would not be useful in a clinical setting.

Please visit our website for more information at:

<http://www.dartmouth.edu/~childrenshealth/>

We look forward to continuing to share relevant information from our studies with you in the coming months. We welcome your questions or concerns. Let us know how we can help you in addressing pediatric environmental health concerns that arise in your practice. Log onto our website and click "contact us".

Submitted by:

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(Continued on page 3)

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Dr Chuck Wins Pediatric Award



Chuck Cappetta, past president of the NH Pediatric Society, has been selected to receive the American Academy of Pediatrics Council on Community Pediatrics **Local Hero Award**. This award recognizes pediatricians who lead community action and advocacy for children in their local communities. The award is presented to individuals

who epitomize the "community pediatrician" and is presented to two pediatricians annually.

Chuck is a worthy recipient of this award as he has been a tireless advocate for children in his community and beyond. His major advocacy efforts have involved health education for 4th graders. He developed and personally teaches a unique six weeks program that currently reaches out to 45 elementary schools in the greater Nashua area. The curriculum includes games and other interactive learning activities which are also available on the Granite State Fit Kids website. In addition to his health education efforts, Chuck developed and leads a support group for new dads that has helped countless fathers become better parents.

Chuck will receive the Local Hero award at the Council on Community Pediatrics luncheon at the AAP National Conference and Exhibition on Sunday, October 27th at 12 noon in Orlando, Florida. Please request a ticket for the luncheon when you register for the meeting so there will be many New Hampshire pediatricians there to congratulate Chuck!

- Suzie Boulter
- Wendy Gladstone

ALEXANDRA CORIA- 2013 GEISEL SCHOOL OF MEDICINE AT DARTMOUTH NHPS AWARD WINNER

On Friday, June 7, 2013, since President Greg and VP Bill were both at the combined District I/ District VI meeting in Minneapolis, I had the pleasure of presenting the New Hampshire Pediatric Society Award at the Geisel School of Medicine at Dartmouth Award Ceremony. The New Hampshire Pediatric Society Award is given to "the graduating



medical student who best exemplifies those qualities one looks for in a pediatrician, specifically one who is competent, caring, good humored and who I would want to take care of my children". This year's winner is an amazing young woman from Southern California by the name of Alexandra Coria.

Alexandra graduated from Brown University in 2005 with a Bachelor's degree in Environmental Sciences. Between college and medical school she worked as a media consultant for a firm specializing in global health issues, and co-founded The Advocacy Lab, a New York City-based human rights organization. In 2008 she completed her post-baccalaureate pre-medical studies at Bryn Mawr College, and then entered Dartmouth Medical School.

During medical school, Alexandra served as the President of Dartmouth's chapter of Physicians for Human Rights and went on to be three year member of that organization's National Student Advisory Board. She also served on Geisel's Social Justice Vertical Integration Group. While at Geisel she published an article about the work of the Social Justice VIG as well as original

(Continued on page 4)

Please Take Notice!

The New Hampshire Pediatric Society wants to improve immediate communication with and among our members. If your email address is not on our master list (or if you're not sure) please add your preferred address to the list by contacting Gil Fuld.

Our plan is to periodically send out the updated address list to everybody on it. If you haven't recently received a copy, we don't have your address.

**-Gil Fuld
Communications and
Public Relations Chair
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(Continued from page 3)

research on the post-partum management of HIV-positive women in Port-au-Prince, Haiti. Between her third and fourth years, she spent a year in Tanzania working as a Fogarty International Fellow on a large clinical trial of Vitamin A supplementation in neonates and mortality outcomes under one year of age.

Most recently Alexandra has contributed several pieces to Narratively, an online news media outlet, including a feature length on refugee health services in New York City. This summer she joined Boston Children's Hospital and Boston Medical Center as a pediatric intern, in the Urban Health and Advocacy Track of the Boston Combined Residency Program. She plans to spend her career providing and advocating for medical services for underserved populations in the US and abroad.

Alexandra is certainly most deserving of our NHPS Award and I feel confident that she will continue to be on track toward making significant contributions to the care of children throughout the world.

- Sol Rockenmacher, MD

September is National Preparedness Month

Preparedness Month is an annual campaign to encourage Americans to prepare for emergencies and disasters. The American Academy of Pediatrics (AAP) asks members to promote pediatric preparedness during September.

Consider posting a sign of a Disaster Supply Kit. The below is a brief list I found on NH's website. The below Family Readiness link is from the AAP website and has some very good and detailed examples for families. It was just one example I found.



<http://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Children-and-Disasters/Documents/aapfrkfull.pdf>

The AAP has a specific web page dedicated to Children and Disasters. They have an on-line manual called Pediatric Preparedness. Consider being involved in your local emergency response plans. If you need to know who your local contacts are, please contact me.

Disaster Supply Kit:

Water – at least 1 gallon daily per person for 3 to 7 days

Food – at least enough for 3 to 7 days

- non-perishable packaged or canned food / juices /drinks
- special foods for infants or the elderly
- snack foods

(Continued on page 5)

First, a pop quiz:

Which of the following represents a genetic condition? (Circle all that apply) Autism, ADHD, Asthma, Obesity*

This title of this piece is also the title of the first webinar offered this year by AAP's *Genetics in Primary Care Institute* (GCPI). The GCPI is a new resource for the primary care pediatric health care community aimed at improving health care for patients living with genetic conditions.

The overall vision of the Genetics in Primary Care Institute: to increase primary care provider (PCP) knowledge and skills in providing genetic-based services. The GCPI is comprised of medical geneticists, primary care pediatricians and professionals at AAP dedicated to addressing the needs of families who have children with genetic conditions.

The methods utilized by the GCPI include webinars (which can be viewed anytime), slide sets, infographics, and short web videos.

Time Out for Genetics is the name of the first webinar series completed this year and is now available for viewing on the GCPI site (free): www.geneticsinprimarycare.org.

This webinar includes the following topics:

- Integrating Genetics in Primary Care—Why Does it Matter?
- Building an Accurate Family History, Constructing a Pedigree—An Overview for Primary Care.
- Ordering the Right Tests—Genetics in Primary Care.
- Genetics Evaluation, Referrals, and More—What To Do Next.
- Myths of Primary Care Providers and Patients/Families Regarding Genetics—Setting the Record Straight.
- Heard About Genetic Counseling? What Does it Mean for You, Patients and Families?
- Genetics and Coding: What the Primary Care Provider Needs to Know.
- Top 10 Genetics Resources for Pediatric Primary Care Providers.
- Genetics Across the Lifespan—Putting It All Together.



(Continued on page 5)

(Continued from page 4)

Coming soon is the second webinar series: *Integrating Genetics into Your Practice*.

As the GPCI states in the materials, pediatric primary care physicians are in an ideal position to evaluate and treat patients with genetic diseases. Potential roles for primary care providers in genetic medicine include:

1. **Identifying individuals who may benefit from genetic services.** These individuals include those with a genetic disorder as well as those at increased risk for having or transmitting a genetic disorder.
2. **Recognizing historical and physical features of common genetic conditions.**
3. **Monitoring the health of individuals with a genetic disorder.** Primary care providers can collaborate with appropriate subspecialists to monitor the health of patients with a genetic disorder or those with an increased risk for having a genetic disorder.
4. **Providing basic genetics information to patients and families.** By providing information regarding genetics to patients and families, primary care providers facilitate increased understanding and informed decision making.
5. **Providing a medical home.** Individuals with complex genetic service needs require a care team that works together to meet their needs.
6. **Recognizing special psychosocial issues.** Primary care providers need to recognize and address relevant psychosocial issues for a family in which one or more members are affected with a genetic disorder or susceptibility.
7. **Possessing knowledge of how to access the full range of genetics services from which patients might benefit.**
8. **Appropriately referring patients.** Primary care providers are in the position to know which patients with additional genetics services needs require referral and are able to appropriately refer.

Facilitating the use of genetics services.

The GPCI is designed to help primary care pediatricians with implementing the above actions.

Furthermore, the GPCI is pairing primary care pediatric medical homes with clinical geneticists to design an office project to improve genetic health care in the medical home.

Finally, if you are interested in going to Chicago in August (9th-10th), the GPCI is hosting a CME event: **Dive into the Gene Pool: Integrating genetics and genomics into your pediatric primary care practice.**

Providing effective genetic health care requires a tight-

ly coupled system of family, medical home and specialty centers. We all have work to do to make this system work so that the health of those with genetic conditions is optimal. I appreciate that the people at the GPCI and their partners are leading this important work.

*Answer: All! (with varying degrees of environmental influences)

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AAP site for GPCI CME is:
<http://www.geneticsinprimarycare.org/Provider%20Education/Pages/Dive-into-the-Gene-Pool.aspx>

(Continued from page 4)

- non-electric can opener
- cooking tools/fuel – (Do not use grills or any other open flame devices indoors due to fire and carbon monoxide risks)
- paper plates / plastic utensils
- Blankets / Pillows, etc.
- Clothing – seasonal / rain gear/ sturdy shoes / boots / hats and mittens
- First Aid Kit / Medicines / Prescription and over the counter medications
- Special Items – for babies and the elderly
- Toiletries – hygiene items, moisture wipes
- Flashlight / Batteries
- Radio – Battery operated and NOAA weather radio
- Cash – Banks and ATMs may not be open or available for extended periods
- Keys
- Toys, Books and Games
- Important documents – in a waterproof container
- insurance, medical records, bank account numbers, Social Security card, etc.
- document all valuables with videotape if possible
- Tools – keep a set with you during the storm
- Vehicle fuel tanks filled

- Diana Dorsey, MD, FAAP
NH Chapter –Pediatric Preparedness
ddorsey@dhhs.state.nh.us
603 271-5377



SAVE THE DATE

NH Safe Sleep Symposium

October 29, 2013

Come learn about the latest research on why infants are dying suddenly and unexpectedly in a sleep setting, and how we can reduce the risks.

❖ *The free, day-long Symposium will be held in Concord, NH.*

❖ *For more information, email barbara.a.white@dhhs.state.nh.us or call 603-271-4517, or 1-800-852-3345, ext. 4517. Registration information will be emailed in September 2013.*

Hosted by the NH Department of Health and Human Services, Maternal and Child Health Section in collaboration with the NH Children's Trust and the March of Dimes, NH Chapter



NEWS FROM CHILDREN'S HOSPITAL AT DARTMOUTH (CHaD) JULY 2013

CHAD PROGRAMMATIC NEWS

Dr. John Modlin to Move from New England to International Health Arena

By Roddy Young



Those who know Dr. John Modlin can tell you about how his eyes twinkle with enthusiasm when he talks about his passion for pediatric care, teaching and infectious disease prevention. For Dr. Modlin, there is a favorite time of week that brings all of this together. Each Friday at 11 a.m., pediatric ward medical students and residents choose a case that he does not know and present the patient at the bedside, often with the child's family present, without revealing the diagnosis. Dr. Modlin describes it as "an occasion to demonstrate clinical skills, critical thinking, and to teach by example." Revealing his human quality, he adds "sometimes I'm right, and sometimes it becomes an opportunity to demonstrate humility as a clinical virtue."

"For the past two decades, Dr. Modlin has been in lead roles at Dartmouth-Hitchcock and the Geisel School of Medicine at Dartmouth. He always took on much more than was expected, because he was driven to help those in need. Across the region, he is well known for being an unwavering champion of children. Nationally, John is highly regarded for his work in vaccines and viral disease—he was the first pediatric infectious disease physician in New Hampshire and has served as a leading expert for his discipline at the CDC. But, perhaps most importantly, his well-earned reputation as a kind doctor and colleague to us all here at Dartmouth-Hitchcock will not be forgotten," said Dr. Jim Weinstein, CEO and President.

On June 30, 2013, Dr. John Modlin will leave his positions at Dartmouth-Hitchcock and the Geisel School of Medicine at Dartmouth, moving to Seattle where he will join the Bill and Melinda Gates Foundation and focus on the World Health Organization's goal to eradicate poliomyelitis worldwide. He plans to remain a faculty member at Geisel during this time with the intent to return to teaching and research at some point in the future.

Dr. Modlin came to Dartmouth in 1991 from Johns Hopkins where he conducted research on perinatal viral infections, HIV, and poliovirus vaccines. "I brought my family to the Upper Valley to raise our two young children in a supportive environment, but it has been the collegiality and professionalism of colleagues and enthusiasm for learning that I see in our students and residents that has kept me here." In reflecting on his 14 years as Chair of the Department of Pediatrics, Dr. Modlin cites the support of senior leaders, his fellow clinical chairs, and the support of the community in making the job manageable. Despite an adverse reimbursement environment for children's clinical services in New Hampshire, the Department of Pediatrics has more than doubled in size under his leadership, general pediatrics has developed a new model of care, pediatric subspecialties have expanded, and new clinical services have been introduced including hospital medicine, emergency pediatrics, and normal newborn specialty service. He is optimistic about the outlook for the Children's Hospital at Dartmouth. "CHaD will need to adapt to a future of low population growth, but the opportunity exists to improve children's health and advance our academic mission through innovation and by creating new clinical partnerships in the region."

Taking over as interim director of CHaD will be Dr. Keith Loud. Dr. Loud completed his pediatric residency at CHaD 13 years ago and, following fellowships in adolescent medicine and sports medicine at Boston Children's Hospital, joined the faculty at Northeast Ohio Medical University, serving at Akron Children's Hospital, before his recruitment in 2010 to lead the Section of General Academic Pediatrics. "Dr. Loud is well positioned to lead the academic, research and clinical programs. He is a strong communicator and commands the trust of the faculty and house staff. I know he will do a superb job in leading pediatric care," Dr. Modlin added.

Dr. Gregg Meyer added, "There has been tremendous strength built by our community to support CHaD. As we look ahead, there will be new partnerships formed in New England to ensure that we provide the best care for the children of New Hampshire, Vermont, Maine and their hometowns even further away. We remain committed to delivering on our promise for generations to

(Continued on page 8)

(Continued from page 7)

come: the right care, at the right time, in the right place.

"Creating a sustainable health system for pediatrics means that we support the population, our communities, in a way that allows patients to get care close to home and the best care when they need it," Meyer added. "That is the goal of working with regional partners to deliver the best care for the children of New England. I am looking forward to working closely with Dr. Loud and the Pediatrics team here at Dartmouth-Hitchcock as this work evolves."

*** SAVE THE DATE ***

Vulvar Disease Update – September 20, 2013

SERESC Conference Center, Bedford, NH

Purpose: This course will update the participants on common vulvovaginal diseases.

Target Audience: Physicians, nurse practitioners, PAs, RNs and others specializing in gynecology, dermatology, and providing care to women and adolescent girls.

Topics:

Vulvar Skin Dermatoses

Ulcers

Hidradenitis Suppurativa

Evaluation and treatment of vulvar pain

Management of recurrent Vaginitis

Speakers Include:

Debra L. Birenbaum, MD – Dartmouth-Hitchcock Medical Center

Claire Danby, MD – Southern Maine Medical Center

Peter Lynch, MD – University of California, Davis

Lynette J. Margesson, MD, FRCPC – Dartmouth-Hitchcock Medical Center

Elizabeth Stewart, MD – Harvard Vanguard

Cynthia Rasmussen, MD – Harvard Vanguard

Adolescent Meeting – November 15, 2013

SERESC Conference Center, Bedford, NH

CHaD and the New England Regional Chapter of the Society for Adolescent Health and Medicine (NERC-SAHM) are collaborating to present this conference on hot topics in adolescent medicine.

Target Audience: Primary Care Physicians, Nurses, Psychologists, Social Workers, and all health care professionals involved in the care of adolescents

Topics:

Concussions

Back Pain

Burnout/Sports Psychology

Female Athlete Triad

Obesity

Overuse Injuries

Sports Nutrition

For more information on these conferences, please contact Jacqui Alexander at (603) 653-1770 or Jacqueline.B.Alexander@Hitchcock.org

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