Special Birth Defects Prevention Month Blog! The Flu: Why Prevention is Key during Pregnancy

By MotherToBaby, a service of the Organization of Teratology Information Specialists (OTIS)

Why should pregnant women care about influenza? Isn't Zika a bigger deal?

The second you get pregnant, the advice starts coming in from everyone. No eating unpasteurized cheese (Listeria!), don't change the cat litter (Toxoplasmosis!), and definitely don't travel to South America (Zika!). While these are all valid concerns, influenza tends to get forgotten, and dismissed as "just the flu." The Influenza virus may not make sensational headlines, but it's a serious problem every year, and pregnant women are especially vulnerable to this infection.

In 2009/2010, the United States (U.S.) experienced a flu pandemic. The flu hit the public hard, and many pregnant women were hospitalized. The U.S. saw higher rates of admission to intensive care units for pregnant women, and 109 pregnant women died from confirmed or suspected flu infection. In comparison, Zika virus, which received much media attention and continues to be a source of great concern for many pregnant women, rarely results in hospitalization and has not resulted in any maternal deaths.

5 Quick Flu Facts:

- The flu is a risk year-round, and is not limited to a particular area of the country.
- Changes with the immune system, heart, and lungs put pregnant women at an increased risk of developing serious complications from the flu, such as respiratory distress. Pregnant women who get the flu are also much more likely to be hospitalized, and can even die from influenza complications.
- Fever is a common flu symptom. Research shows that an untreated high fever early in pregnancy can result in an increased risk for a certain class of birth defects known as neural tube defects (spina bifida is one example).
- Being very sick from the flu can increase the risk of pregnancy complications such as miscarriage and preterm delivery.
- For pregnant women looking to ensure the healthiest start to life for their little one, influenza is an important infection to be aware of, and to try to prevent.

Is it too late to get a flu shot? It's January, isn't flu season over?

It's never too late to get a flu shot! Flu season can start as early as October, and runs as late as May some years. However, research shows that the highest number of flu cases each year usually occurs in February. While vaccine effectiveness can vary from season to season, the flu vaccine is thought to reduce the risk of illness by about 50% to 60% when the flu viruses that end up circulating in the community closely match the viruses included in that year's vaccine. Even during years when the flu vaccine is not a good match, it is still thought to provide some protection against the flu. If you haven't received this year's flu vaccine yet, talk to your health care provider as soon as possible.

10 Quick Flu Vaccine Facts:

- The best way to avoid getting the flu virus is to receive the flu vaccine.
- Women who are planning a pregnancy and women who are currently pregnant are strongly encouraged to get the seasonal flu shot as early as possible during the flu season.
- There is no known risk from getting the flu shot during pregnancy. The seasonal flu shot is an inactivated virus vaccine, which means that it won't cause you to get sick with the flu.

- Pregnant women are asked to avoid the live attenuated flu vaccine (also called the nasal spray vaccine) as it contains a tiny amount of weakened live virus.
- There is no trimester during pregnancy when the flu shot has to be avoided.
- Studies of thousands of women who have received the flu shot just before or during pregnancy have found no increased risk for birth defects.
- Studies have found that when pregnant women get the flu shot, their baby is born with protection against the flu for anywhere from 2 to 6 months after birth.
- Most women who receive the flu shot will not experience any problems.
- A small number of individuals who receive the flu vaccine may experience soreness/redness/swelling at the injection site, headache, fever, nausea and/or muscle aches. Reassuringly, these symptoms are usually mild and go away on their own within a few days.
- Anyone with a severe, life-threatening allergy to any of the vaccine ingredients should talk with their health care provider before getting the flu vaccine.

Is there anything else I can do to avoid the flu?

In addition to getting vaccinated, healthy habits can further reduce your risk of getting the flu. Avoid close contact with other individuals who are sick. If you're caring for someone with the flu (like a partner or a child), make sure to clean and disinfect common surfaces that may be contaminated with germs. Wash your hands frequently with soap and water. Cover your mouth and nose while coughing or sneezing, and practice good health habits like staying well hydrated and eating nutritious food.

If you develop symptoms of the flu, you should contact your health care provider as soon as possible. When indicated, antiviral medications may be prescribed (ideally within 48 hours) to lessen flu symptoms and reduce the risk of serious illness.

MotherToBaby is a suggested resource by many federal agencies including the Centers for Disease Control and Prevention (CDC), the Food and Drug Administration's (FDA) Office of Women's Health, and HRSA, and provides the most up-to-date information. More than 100,000 women and their health care providers seek information about birth defects prevention from MotherToBaby every year. Additionally, MotherToBaby conducts observational research studies in order to contribute more information to the published literature about a variety of exposures. To be connected with a MotherToBaby expert, please call (866) 626-6847, text questions to (855) 999-3525 (standard messaging rates might apply) or visit www.MotherToBaby.org.

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Peaks In February: https://www.cdc.gov/flu/about/season/flu-season.htm
MTB Flu Shot Fact Sheet: https://mothertobaby.org/fact-sheets/seasonal-influenza-vaccine-flu-shot-pregnancy/
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By Ginger Nichols, Licensed Certified Genetic Counselor at MotherToBaby Connecticut

I was pregnant in 2004 when the Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) released guidelines on limiting fish consumption in pregnancy because of methylmercury. That pregnancy was definitely the most amazing time of my life; however, it was also stressful. It was the 5th time I had been pregnant, but due to miscarriages and the death of a son who was born very prematurely, I had yet to bring a baby home from the hospital. I became hyper-vigilant about anything that might be a possible exposure of concern for a pregnancy. I freely admit that my frame of mind for that pregnancy could not be called logical. Therefore, with the new and somewhat scary information about fish and methylmercury, fish was quickly added to my list of "don't eat that." I also admit that I don't eat the recommended amount of fish anyway, so it was not that big of a leap to stop eating all fish.

It turns out that I wasn't the only 'fish out of water.' According to a FDA study of the dietary habits of over 1,000 pregnant women in the U.S., around 21% of the women said that within the past month they had eaten zero fish. For the women who said that they did eat fish, most were eating less than the recommended dietary guidelines. However, fish is healthy for you! You don't want to stop eating fish altogether, so instead of avoiding fish, let's learn the facts.

By now, you may be asking: *"What is methylmercury and why is it in fish?"* As a Genetic Counselor and MotherToBaby specialist, I often talk to women about eating fish during pregnancy, so let me explain…. Methylmercury is an organic form of mercury. Mercury occurs naturally in the environment and it is also released into the air as a by-product of some industrial processes. When mercury gets into the soil and the water (including lakes, rivers, and the ocean), bacteria and fungi found in soil and water change mercury into methylmercury. Since methylmercury is in our water, it is found in different levels in pretty much all fish and shellfish. In general, larger fish with long life spans that eat other fish are typically going to have higher levels of methylmercury than smaller, younger fish. If you are interested, there are lists of average mercury levels in fish available online, such as this FDA web site: https://www.fda.gov/food/foodborneillnesscontaminants/metals/ucm115644.htm

Methylmercury is found in all tissues of the fish, so cleaning or cooking the fish will not reduce the levels of mercury. People who eat a lot of fish with high levels of methylmercury can also accumulate methylmercury in their bodies. Our

bodies easily absorb methylmercury from our gastrointestinal (GI) tract and it takes a long time for our bodies to get rid of it.

"So why should I be concerned about eating too much seafood with high levels of methylmercury?" We know that even if you are not pregnant, methylmercury is toxic to our nervous system and organs. The effects of methylmercury poisoning have been known since the 1950s. People who became sick from methylmercury poisoning had many symptoms that included numbness in the hands and the feet, muscle weakness, tremors (shaking), and personality changes (irritable, shy, nervous). Now before you panic, be aware that these people had been exposed to fish with levels of methylmercury far higher than even the most contaminated fish in your grocery store!

We know that methylmercury can cross the placenta in pregnancy. With very high exposures, babies have been born with small head size and brain damage that can lead to seizures, developmental delay, blindness, and muscle weakness. Since methylmercury can affect the baby's developing brain, high exposure is a concern at any stage of pregnancy. For more info, visit the MotherToBaby fact sheet on methylmercury in pregnancy and breastfeeding at https://mothertobaby.org/fact-sheets/methylmercury-pregnancy/.

By now you may feel like you just need to stay away from eating fish in pregnancy, when in fact studies are showing that women who eat fish during pregnancy have better pregnancy outcomes than women who do not eat fish. Recent studies have also looked at how nutrients in fish, including Omega-3 fatty acids, might have positive effects for baby's development and actually may help to protect against any possible harm that might occur from prenatal methylmercury exposure. And what's more, women in the U.S. generally do not depend upon fish as their only protein intake, so are unlikely to eat enough fish to cause harmful effects in a pregnancy. So, to reap the full health benefits of fish consumption for you and baby, the key is to eat a variety of fish that are low in methylmercury. This is where the FDA's updated 2017 guidelines can provide some assistance.

"What are the current FDA guidelines?" The FDA's recently revised advice is designed to encourage women who are pregnant and/or breastfeeding to consume up to 12 ounces of fish that are low in methylmercury each week, and provides guidance on which fish are the best options by breaking the fish into categories of Best Choices, Good Choices, and Choices to Avoid. The easy-to-read guide can be found here: https://www.fda.gov/downloads/Food/ResourcesForYou/Consumers/UCM536321.pdf. You'll notice that on the FDA's guide, different types (species) of tuna and tilefish are listed under different categories – so take note of which type you are buying so you know which list it is on.

Following current recommendations, if you are planning to become pregnant, currently pregnant, or currently breastfeeding:

- A typical serving of fish is 4 to 6 ounces, measured before cooking.
- Each week, you may eat up to 2-3 servings of a variety of fish from the Best Choices list; there are over 35 different types of fish on this list!
- If choosing a fish from the Good Choices list, limit yourself to just the one serving of that fish for the week.
- Avoid the following fish, as they are highest in methylmercury: shark, swordfish, mackerel, marlin, orange roughy, bigeye tuna, and tilefish from the Gulf of Mexico.
- If you are eating fish caught by family or friends, check for local fish advisories. The EPA has a search option to check for fish/shellfish advisories based on where you live: https://fishadvisoryonline.epa.gov/General.aspx. You can also check in with your state Department of Public Health. If there isn't an advisory, limit yourself to just one serving of that fish and do not eat any other fish that week.

So now that we've got you on the hook and reeled you in, what's the takeaway? With around 60 fish listed as Best and Good Choices on the FDA's 2017 fish guidelines, 'there are plenty of fish in the sea' for pregnant and breastfeeding moms!

Ginger Nichols is a licensed certified genetic counselor based in Farmington, Connecticut. She currently works for MotherToBaby CT, which is housed at UCONN Health in the division of Human Genetics, Department of Genetics and Genome Sciences. She obtained her Bachelor of Science degree in Biology and Sociology from Juniata College and her Master's Degree in Medical Genetics from the University of Cincinnati. She has a special interest in occupational and environmental exposures.

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By Patricia Markland Cole, MPH, MotherToBaby Massachusetts

November is Diabetes Awareness Month and both of my parents in recent years have been diagnosed with Type 2 diabetes (a preventable form of diabetes where the body can no longer control the amount of sugar in the blood), so it's a particularly relatable month for me. Because "the apple does not fall far from the tree" the discussion with my doctor has started to change – Now I am at risk., Therefore, if I become pregnant, a family history of diabetes would put me at increased risk of developing diabetes during pregnancy (called gestational diabetes mellitus, or GDM). I have to think more about living a healthy lifestyle to lower my risk.

Here's what we know about GDM:

- GDM is still a common public health problem and could impact 1 in 10 women. It has been considered a national health priority.
- GDM poses an elevated chance for pregnancy complications such as:
  - Preeclampsia (high blood pressure, swelling and protein in the urine)
  - Preterm birth (birth before 37 weeks of pregnancy)
  - C-sections
  - Development of Type 2 Diabetes (35-70% of women who had GDM will develop Type 2 Diabetes 10 to 15 years after pregnancy; 15-25% will develop it within 1 to 2 years after pregnancy)
  - Renal disease (problems with kidney function)
  - Cardiovascular Disease (problem with the heart and blood flow)
- GDM also poses increased short- and long-term risks for the infant, including:
  - Increasing the chance of complications at birth
  - Difficulty breathing
  - Large in birth size and weight (over 10 pounds)
  - Increased chance of developing Type 2 diabetes
  - Childhood Obesity

There are quite a few risk factors for GDM that cannot be changed such as age, family history of diabetes, and race; those over age 35, those with a family history of diabetes, and non-whites are at higher risk. However, some risk factors are changeable like weight, diet and exercise. The funny or peculiar thing about diabetes and pregnancy is that while there are many reports of how beneficial diet, exercise and maintaining a healthy weight are in reducing general health risks, the studies that specifically examined the effectiveness of reducing the rate of GDM during pregnancy through lifestyle changes versus routine or standard care have been mixed. Sometimes the results showed that it did reduce the rate of GDM, but other times it did not. Surprising, right? Here are some of those mixed results:

For women who did not have the typical risk factors, researchers studying diet and exercise interventions did not always find a difference in the rate of GDM between comparison groups. It has been stated that the risk of GDM was four to eight times higher in women who were overweight or obese. However, methods to reduce excessive weight gain during pregnancy found no significant change in GDM and increased physical activity had only a small effect. However not all of the results were mixed; some studies actually had strong results for other health benefits. For

example, one study showed a 50% reduction in the rate of Type 2 diabetes diagnosis for women who had been previously diagnosed with GDM when lifestyle changes were introduced, while another study found a 95% reduced risk for gestational hypertension and a 90% reduction in preeclampsia for pregnant women with obesity. Why such mixed results? Some fault study design flaws. For example, the studies were different in the methods used to screen and diagnose GDM, the duration and time the study was conducted and the differences among the women that participated, just to name a few.

SO…Can gestational diabetes be prevented?
According to the author of one research article I read: "The answer remains optimistic." Do not let the mixed results give you a reason to not be the healthiest you can before going into pregnancy. There is overwhelming proof that a healthy weight, physical activity and a healthy diet are important to one's overall health and can reduce your chance of developing sickness and disease. The earlier that one starts living a healthy lifestyle, the more there can be an impact in reducing the rates for GDM and its associated risks for childhood obesity and Type 2 diabetes. Surprisingly, many women in the studies were not asked about their diets during pregnancy. It will take a multi-level approach and better study designs to come to some better conclusions. I am sure that once research designs and methods are tweaked, we'll have a much better idea of how GDM can be prevented or reduced because there will be more proof in the pudding … and how sweet that will be!

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Patricia Cole, MPH, is the Program Coordinator for MotherToBaby Massachusetts. She obtained her Bachelor's degree in Biology from Simmons College in Boston and her MPH in Maternal and Child Health from Boston University School of Public Health. She has been the serving the families of New England as a teratogen counselor since 2001 and provides oversight for the day-to-day functions and outreach of the program. She has also provides education to graduate students and other professionals.

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By Lorrie Harris-Sagaribay, MPH, Teratogen Information Specialist and Coordinator, MotherToBaby North Carolina

Back in the early 1970s, pregnant women and their health care providers didn't talk about alcohol and drugs in pregnancy. Birth defects caused by alcohol? Unheard of! Then, along came two pediatric specialists at the University of Washington who changed everything: Drs. David W. Smith and Kenneth Lyons Jones noticed that a group of babies who had been exposed to high amounts of alcohol during pregnancy were all born with a similar pattern of unusual facial features and developmental delay. Their astute observations, along with further research and collaboration, led them to coin the term Fetal Alcohol Syndrome (FAS) in 1973.

The discovery that alcohol was a teratogen (an exposure that can cause birth defects) fueled the research on other exposures and opened up a world of questions. What about other drugs? What about medications? In order to share findings from the limited but ongoing research, Dr. Jones established the first teratogen information service in 1979, housed in a small apartment in San Diego and run by a dedicated staff of three. This service was the beginning of what would later become MotherToBaby.

Fast forward to June 2017, when experts from MotherToBaby and other teratogen information services around the world gathered in Denver, Colorado for the 30th Annual Meeting of the Organization of Teratology Information Specialists (OTIS). There, dozens of experts presented the latest research on exposures during pregnancy. Speakers summarized what we've learned, pointed out what we still don't know, and suggested priorities for future research. Here are a few highlights from the meeting:

Prescription Opioids
At one time, opiates were peddled as remedies for fatigue, menstrual cramps, and even teething in children (search Mrs. Winslow's Soothing Syrup as an example). Now, more than a century later, we are in the middle of an epidemic of substance use disorders from opioid pain relievers. And according to a 2014 study, more than 14% of pregnant women in the U.S. are prescribed opioids at least once during pregnancy for reasons such as back pain and migraines. Pregnant women who develop opioid use disorders (either before or during the pregnancy) are encouraged to undergo

maintenance therapy such as methadone treatment, which is less risky to the baby and more likely to result in successful recovery than sudden withdrawal would be.

Infants with ongoing exposure to opioids during pregnancy can experience withdrawal symptoms at birth, commonly called neonatal abstinence syndrome (NAS). Like Fetal Alcohol Syndrome, NAS was first described in the literature in the 1970s, by Dr. Loretta Finnegan. The syndrome has gotten renewed attention during the current opioid epidemic as providers and researchers consider the best ways to prevent and manage NAS. Studies have shown that hospitalized infants with NAS have better outcomes–less severe symptoms, less need for medication, and shorter hospital stays–when they are breastfed, even if the mothers are still on opioid maintenance therapy. But some health care providers hesitate to encourage breastfeeding in these cases out of concern about baby's ongoing exposure to the mother's medication through the milk. Continued funding can help address these concerns by developing consistent standards of care for infants with NAS. If you are using opioids for any reason, be sure to talk to your health care provider as soon as you find out you are pregnant. Together, you can work on a plan for the best possible care for you and baby during and after the pregnancy.

Cocaine
To study the effects of cocaine in pregnancy, researchers have followed a group of young adults, now in their early 20s, since they were born. About half the group was exposed to cocaine before birth. Early on, the researchers observed that those with cocaine exposure had challenges with attention and remembering what they saw when compared to the children who had not been exposed to cocaine. In older years, exposed children had more difficulty with language skills, more behavior problems at school and at home, reported more substance use and risk-taking behavior, and had more difficulty with everyday skills such as staying organized, thinking ahead, and controlling their own behavior. Some dropped out of school. Interestingly, having a positive home environment seemed to help with some, but not all, of these challenges. For example, children in foster or adoptive homes had better language and reasoning skills than children who still lived with their birth mothers who used cocaine, but there was no difference in their behaviors. As the study continues, researchers hope to learn more about how prenatal cocaine exposure affects these individuals into adulthood.

E-cigarettes
E-cigarettes are marketed and often seen as a "safer" option to cigarettes. In fact, the most common users are current and former cigarette smokers who are using e-cigarettes to replace or reduce the number of cigarettes they smoke. In a study of over 1,300 pregnant women, those using e-cigarettes reported doing so because they felt they were less harmful than cigarettes, or to help with smoking cessation. They also preferred the sweeter flavors, and thought they were even less harmful than the tobacco-flavored liquids.

E-cigarettes don't expose users to the combustion by-products of traditional cigarettes, but even those labeled "nicotine-free" do contain nicotine, and vaporization creates its own potentially harmful by-products. Since e-cigarettes are liquid-filled and can be smoked longer, it's more difficult to monitor actual exposure to nicotine than it is with traditional cigarettes. Plus, because e-cigarettes are not regulated by the FDA, there is no way of knowing exactly what they contain and what your pregnancy is exposed to when you use them.

Past studies have observed that prenatal exposure to nicotine affects baby's brain development and increases the chance of later behavior problems and depression in adolescence. It even predicts baby's own cigarette use in his/her teen years. And recent studies have shown that those adolescents who use cigarettes are more likely to also use e-cigarettes as teens and adults than their peers who don't use cigarettes. We will learn more about the possible long-term effects of prenatal e-cigarette use as the first generation of children who were exposed to them in pregnancy gets older.

Marijuana
Marijuana is the most common "illicit" drug used in pregnancy. Some health care providers in Colorado, where marijuana is now legal, are seeing more pregnant women who believe that using it is not harmful and might even be beneficial. For example, pregnant women in one survey reported using marijuana to help manage depression or anxiety, help with pain, or ease nausea and vomiting, among other reasons. Without crucial data about exactly how marijuana might be harmful to a pregnancy, some health care providers are hesitant to talk to women about it, even if they know they are using it in pregnancy.

There is little doubt that marijuana can be harmful in pregnancy: THC crosses the placenta and, even in very early pregnancy, can affect the cells that form the baby's brain. But studies on its effects on overall brain development and

pregnancy outcomes have had mixed results so far, and they face challenges such as co-exposures (women using other substances along with marijuana) and, in some cases, relying on self-reporting to know how much of the drug a pregnancy is exposed to (this can skew the data if users do not accurately reveal how much and how often they use.) As researchers forge ahead to provide better answers, the best advice is still to avoid marijuana altogether in pregnancy.

Alcohol
Since those early years, we have discovered that the facial features and developmental delay often seen with FAS are not the only possible effects of prenatal exposure to alcohol. In some children, subtle changes to the brain might not be noticed until the child is older and begins to struggle with learning and behavior problems that can follow them into adulthood. This range of possible effects has been more recently named Fetal Alcohol Spectrum Disorder (FASD). According to Dr. Jones, FASD affects about 2% of babies born in the U.S. each year–more common than autism–despite the fact that it is 100% preventable.

Looking ahead.
The decades ahead require not only continued research, but also increased awareness of what we already know. To that end, each September we observe FASD Awareness Month. MotherToBaby is happy to answer your questions about alcohol and other exposures in pregnancy—in fact, check out **our brief YouTube video here.** Together, we can continue the work towards the best possible outcomes for future generations.

Lorrie Harris-Sagaribay, MPH is the Coordinator of MotherToBaby North Carolina and a bilingual Teratogen Information Specialist. After working with midwives as a community health educator with the Peace Corps in Honduras, she earned her Master of Public Health at the University of North Carolina at Chapel Hill. She has worked in the field of maternal and child health for over 25 years.

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Presented at the (joint) Annual Meetings of OTIS (Organization of Teratogen Information Specialists), DNTS (Developmental Neurotoxicology Society), RSA (Research Society on Alcoholism) and the Teratology Society in Denver, Colorado on June 25-27, 2017:

- ***From the FAS to OTIS – A Long Strange Trip.*** Buzz Chernoff, California Environmental Protection Agency (Retired).
- ***The Opioid Epidemic and Impact of Prenatal Exposure on Child Development.*** Lynn Singer, Case Western Reserve University.
- ***Project Newborn: What We Have Learned from 20 Years of Research on Prenatal Cocaine Exposure.*** Sonia Minnes, Case Western Reserve University.
- ***Epigenetic Changes Induced by Prenatal Nicotine and Cocaine Exposure.*** Pradeep Bhide, Florida State University.
- ***Effects of Prenatal Nicotine Exposure on Adolescent Dopamine Systems.*** Frances Leslie, University of California at Irvine School of Medicine.
- ***Electronic Cigarette Use in Pregnancy: Patient and Provider Perspectives.*** Katrina Mark, University of Maryland School of Medicine.
- ***Pathways from Prenatal Tobacco Exposure to Electronic Cigarette Use.*** Natacha M. DeGenna, University of Pittsburgh School of Medicine.
- ***Perceptions and Use of Electronic Cigarettes during Pregnancy: Implications for Infant Outcomes.*** Laura Stroud, Brown Medical School.
- ***Pathways from Prenatal Exposures to Tobacco and Cannabis to Adult Electronic Cigarette Use.*** Natacha De Genna, University of Pittsburgh Medical School.
- ***Counseling Women about Prenatal Marijuana Use: Weeding through the Data.*** Torri D. Metz, University of Colorado-Denver.
- ***Introduction: Marijuana and Child Development Symposium.*** Diana Dow-Edwards, SUNY/Downstate Medical Center.

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By Kurt Martinuzzi, MD, Asst. Professor in the Dept of Ob/Gyn at Emory University and Claire D. Coles, PhD, MotherToBaby Georgia Director

Aryan* and Shanaya had been married for two years and very much wanted to start a family. When they were not successful at getting pregnant, they were tested for fertility (all tests came back as normal) and months of expensive medical treatments were tried without success. Emotionally and financially spent, the couple sought the counsel of friends and family. A childhood friend from India recommended an over-the-counter herbal fertility supplement called **vasantha kusumakaram**. The product is described as being "100% natural" so she was certain that it must be safe. Shanaya took this daily for 5 months and hoped for a baby.

In India, the traditional approach to medical care is referred to as **ayurvedic medicine**. In this 2000-year-old tradition, naturally occurring herbs are mixed with other substances and are prescribed for a range of symptoms. Vasantha kusumakaram is reported to be a treatment for many illnesses and problems including diabetes, lung, heart and kidney diseases as well as heavy periods, impotence and tuberculosis. It is also felt by some to be an aphrodisiac!

During the months that Shanaya took the herbal treatment she did not become pregnant. Eventually, her husband suggested checking in again with her primary health care provider because she had started to suffer from abdominal pain, constipation, fatigue and loss of appetite. At that return visit, her blood pressure was surprisingly elevated and her blood count was low (anemia)….the combination of symptoms was a dead ringer for lead poisoning.

After recognizing the symptoms of lead poisoning, her doctor took a detailed history.

- Renovating a home that was built prior to 1978 can expose occupants to high lead levels from old paint, but Aryan and Shanaya's apartment had been built in 2002.
- Some occupations such as construction, plumbing, and auto refinishing cause exposure to lead, but Aryan was an engineer and Shanaya was an accountant.
- Hobbies such as pottery, target shooting and working with stained glass involve lead, but Aryan and Shanaya mostly spent their free time hiking with their dog and watching movies on Netflix.
- Her doctor knew that 1 out of 5 ayurvedic medicines purchased over the internet contain heavy metals such as lead, mercury, and arsenic suggesting that the vasantha kusumakaram might be responsible.

Lead Shouldn't Be In Your Body At All
Lead levels greater than 5 micrograms/deciliter (ugm/dl) are considered harmful. Shanaya's level was 114 ugm/dl! Unfortunately, the lead in her body had become incorporated into her bones where it would be released over the next decade.

At Shanaya's next visit she reported that she had missed a period and had a positive home pregnancy test result. She and Aryan had thought that they would never be able to have children and now they had gotten pregnant on their own!

Lead + Babies = Not Good. Now what?
Lead is not good for babies. During pregnancy, calcium is released from bones to help form the baby's bones… bringing any lead along with it. Thankfully, prior to Shanaya's surprise pregnancy, she underwent chelation treatment in order to get lead out of her bones more quickly. This is a process in which a medication is given that sticks to the lead and allows the body to excrete it. The chelation worked and her lead levels came down to 70 and then 22 ugm/dl over 6 months of treatment.

After discovering her pregnancy, a repeat lead level showed a slight climb in lead levels to 30 ugm/dl. While Shanaya and Aryan's developing baby was at an increased risk for problems such as miscarriage, brain and kidney development issues, and the potential for learning and behavior issues and decreased IQ, chelation was not an option to reduce lead levels. It is potentially harmful in pregnancy and unless lead levels climb above 45 ugm/dl, it is not recommended.

Essential Supplements Are Musts
As her OBGYN, I saw Shanaya and Aryan at 7 weeks along in their pregnancy. We were all relieved to see a healthy fetus with a normal heart rate! I made recommendations to improve chances for a healthy baby, including taking in 2,000 mg of calcium through diet and supplements to provide the calcium that the baby's bones would need. Green leafy vegetables, almonds and dairy products are excellent sources of calcium. Because of her anemia, we had her start to take iron twice a day. Vitamin D is also involved with bone development so this was the final supplement that we added. At 7 weeks into her pregnancy, her lead level was 17 ugm/dl and by the second part of pregnancy it was stable at 13 ugm/dl.

We performed an ultrasound scan at 20 weeks and their healthy daughter is developing perfectly with no signs of birth defects. While it appears that all will turn out well for this couple, they are already investigating ways to enrich their daughter's early years to make up for any possible small decrease in IQ as a result of the lead exposure.

Avoiding Lead Exposure
Lead is a metal that doesn't belong in any of us, but especially in pregnant women. Sadly, though, the only two states that require pregnant women to have lead levels checked are New York and Minnesota. Here's what you can do to avoid lead:

- Avoid natural or herbal supplements unless your doctor tells you that they are 100% safe.
- Don't be misled by advertisements that are designed to sell products that haven't been evaluated for safety and quality.
- Doctors should consider screening all women (not just those who are pregnant) exposed to lead through work or hobbies, who are recent immigrants, live in homes built before 1978, or who have cravings to eat non-food items (pica).

For more information, visit MotherToBaby's Lead Fact Sheet, or contact a MotherToBaby expert via phone, text, live chat, or email. In addition, MotherToBaby has a whole section dedicated to lead exposure education including videos and brochures here.

The names and some of the details of this couple have been changed to protect their identity.

About the Authors

Kurt Martinuzzi, MD, is an assistant professor and specialist in Obstetrics and Gynecology at Emory University in Atlanta, Georgia. His interests include resident and medical student education, recurrent pregnancy loss, premature ovarian failure and polycystic ovary syndrome. He has been an active member of the Region 4 Pediatric Environmental Health Specialty Unit since 2015. Over his 25 plus year career he has been awarded multiple teaching awards and presented at many national and regional Ob/Gyn meetings.

Claire D. Coles, PhD, is Professor of Psychiatry and Behavioral Sciences and Pediatrics at Emory University, Director of the Maternal Substance Abuse and Child Development Laboratory, and Director of MotherToBaby Georgia. Her expertise is in the developmental and behavioral effects of prenatal exposure to drugs and alcohol and the interaction of these effects with the postnatal environment. She was among the first to describe the behavioral effects of prenatal alcohol exposure and to investigate the effects of cocaine exposure on child development. Dr. Coles established the only multidisciplinary clinic in the Southeastern United States that provides specialized services to individuals prenatally exposed to drugs and alcohol. Her team also designed interventions for those affected, including the Math Interactive Learning Experience and the GoFAR intervention.

About MotherToBaby

MotherToBaby is a service of the Organization of Teratology Information Specialists (OTIS), suggested resources by many agencies including the Centers for Disease Control and Prevention (CDC). If you have questions about exposures, like lead, during pregnancy and breastfeeding, please call MotherToBaby toll-FREE at 866-626-6847 or try out MotherToBaby's new text information service by texting questions to (855) 999-3525. You can also visit MotherToBaby.org to browse a library of fact sheets about dozens of viruses, medications, vaccines, alcohol, diseases, or other exposures during pregnancy and breastfeeding or connect with all of our resources by downloading the new MotherToBaby free app, available on Android and iOS markets.

References

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Guidelines for the identification and management of lead exposure in pregnant and lactating women. https://www.cdc.gov/nceh/lead/publications/leadandpregnancy2010.pdf