What can I eat, doctor?
Food safety in pregnancy

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Be aware of what foods to avoid during pregnancy.

Which foods are real threats during pregnancy? Your patients are anxious for answers and welcome your practical advice about coffee, alcohol, mercury, and more.

Key Points

- Avoid eating large amounts of liver in their first trimester.
- Advise expectant mothers to limit coffee to 2 cups per day and add milk.
- Suggest patients treat herbal remedies like drugs and be aware of possible interactions.

The good news for all Americans—and pregnant women in particular—is that the United States has one of the world's safest food supplies; in fact, the rates of many food-borne illnesses have dropped since 1996. That said, the food system continues to face new challenges, including the high turnover of food industry workers and the possibility of someone intentionally contaminating the food supply.

Nowadays, your pregnant patients eat a wider variety of foods, including more imported products and foods prepared outside the home. Food imports are up by 35%, to 48 million metric tons, over the past decade. Although imports now comprise roughly 15% of the US diet, the percentages of imports in some food categories are much higher. In 2005, 54% of tree nuts and 84% of fish and seafood eaten were imported.

The safety of imported foods has raised concerns, especially because more of the inherently high-risk foods (ready-to-eat food, fresh produce, and seafood) are imported. However, by recent estimates, the US Department of Agriculture (USDA) physically examines only 10% of imported meat and poultry, and 4% of the imports get microbial testing. The FDA (responsible for most other food and drink) estimates it physically examines or tests only 1% of food imports.

Home-grown headaches

We're far from home free on domestically produced foods. Although the USDA must be present in meat and poultry processing plants for at least part of each day, the FDA inspects "high-risk" facilities once per year; others are inspected only every 5 to 10 years. Despite concern that imported food may pose more risks, this hasn't been determined, and some imported foods have been found to be less contaminated than domestically produced foods.
Pregnancy is one "window of susceptibility" during which the risk of environmental contamination may be higher. Exposure to toxins during pregnancy can affect the developing fetus far more than it would an adult, depending on how easily the toxin crosses the placenta, whether the toxin con-centrates in the fetus, and whether the toxin affects metabolically active tissues.

Our goal is to address the risk to the expectant woman and her baby of toxin exposure in commonly ingested foods. (Part 1 of this series in the November 2009 issue addressed the general food safety concerns of listeriosis, toxoplasmosis, raw fish, sprouts, eggs, peanuts, and cultural differences.) This article contains additional informational sources and Web sites for both Parts 1 and 2. Please see the section "Food safety Web resources" and online at http://www.contemporaryobgyn.net/oktoeat

Is it okay to eat fish during pregnancy?

Many people wonder about mercury, polychlorinated biphenyls (PCBs), and other contaminants, as well as parasitic, bacterial, and viral contamination.

**Methylmercury**

Mercury accumulates in the tissue of fish, and levels may be especially high in older, larger, predatory fish. Because methylmercury is bound to amino acids, not fat, cooking doesn't remove it. Many people may be at risk, given the high levels of mercury that have shown up in the systems of those who have eaten these fish, according to National Health and Nutrition Examination Survey (NHANES) data.

Mercury passes through the placenta, crosses the blood-brain barrier, and is retained and neurotoxic. The fetus accumulates mercury, and the levels in cord blood are 70% higher than maternal levels.

In 2004, the FDA and the Environmental Protection Agency (EPA) jointly updated the US advisory for pregnant and lactating mothers, young children, and reproductive-aged women. The latter are included in the advisory because it often takes more than a year to clear mercury from the system naturally. (Please see "Fish guidelines for pregnant patients" and "Food safety Web resources" 25 and online at http://www.contemporaryobgyn.net/oktoeat for guidance.) Counsel patients who fish on the importance of heeding local advisories. State and territory advisories can be found at http://www.epa.gov/waterscience/fish/states.htm and often propose limits on the frequency of consumption depending on the size and type of fish, as well as on the person's risk category. Advisories from other countries (eg, Faroe Islands) address those fish eaten locally.

**Do the benefits of docosahexaenoic acid (DHA) outweigh the risk of mercury exposure?**

The FDA recommendations regarding mercury are controversial. Some feel the EPA reference dose for mercury should be lowered because of the high cord-blood mercury concentration. However, the selenium in the fish may protect against high mercury levels.
In addition, the positive effects of omega-3 fatty acids were not considered when these agencies were making their mercury recommendations. The long-chain polyunsaturated fatty acids, especially DHA, are important in the development of the nervous system, and the fetus accumulates DHA rapidly in the third trimester of pregnancy. Fatty fish are the most concentrated sources of DHA. Some believe that the risk of eating less fish (and thus, less omega-3 fatty acids) outweighs the increased risk of mercury exposure.

Specific questions arise for tuna. Different species accumulate different levels of mercury, but, in general, smaller fish accumulate less. For that reason, advise caution with tuna steaks and sushi tuna. As for canned tuna, white (albacore) has higher mercury levels than light tuna. See FDA mercury data links in "Food safety Web resources" and online at http://www.contemporaryobgyn.net/oktoeat.

Fish are contaminated by more than mercury

The problem with fish is not only mercury, but other poisons as well, although contamination levels have declined over recent decades. Prenatal exposure to PCBs and dioxins has been linked to neurologic deficits in children. Both farmed and wild salmon can contain PCBs, but freshwater fish are worse, especially those from the Great Lakes. Other sources of PCBs are milk, meat, and vegetables. Heeding local advisories can minimize risk. In general, tell patients to trim the fat and avoid eating the skin if they are concerned about PCBs.

Eating wild rather than farmed salmon has been controversial. Research shows that farmed Atlantic salmon is higher in contaminants (PCBs, dioxins, polybrominated diphenyl ethers [PBDEs], and some pesticides) than wild Pacific salmon, but it also contains higher levels of omega-3 than wild Pacific salmon. Researchers have stated that the benefit (lives saved by preventing coronary disease) from North and South American farmed sources outweighs the risk (lives lost from cancer) and is on par with the wild sources.

Let patients eat caviar

As a rule, the benefit of eating fish outweighs the risk, perhaps especially during pregnancy. Fish highest in DHA and lowest in methylmercury are salmon, trout, mackerel (but not king mackerel), sardines, anchovies, and herring. Caviar and brains are particularly high in DHA. Advise patients to lessen their risk by choosing smaller fish, handling and cooking fish carefully, and staying away from raw fish or seafood (see Part 1, November 2009 issue).

Liver in moderation

Nutrient-rich liver can be eaten during pregnancy. Despite concern by some that a high intake of preformed vitamin A from supplements or liver (>15,000 IU s per day) could be teratogenic, others have questioned the threshold. (Beta-carotene, found in fruits and vegetables, is not of concern.) Although it may not be necessary, we suggest that our patients avoid large amounts of liver (also liverwurst, braunschweiger, or pâté) during their first trimester.
What about caffeine?

The safety of consuming caffeine during pregnancy continues to raise questions. There seems to be no increased risk of birth defects associated with caffeine. Lowering a prenatal patient's intake doesn't necessarily improve birth weight or length of gestation. One recent British study reported a trend toward lower birth weight (60-70 g for those expectant mothers consuming >200 mg per day, mainly as tea—smaller than the effect of smoking); however, that study was not random, and its outcome differed from that of the only randomized study available.

As for the risk of fetal loss, 2 recent studies haven't clarified the situation. One found that those women consuming more than 200 mg per day were twice as likely to miscarry, independent of pregnancy-related symptoms. However, another found no increased risk with intakes between 200 mg and 350 mg per day. Although there's weak evidence for significant harm from caffeine, new research says moderate intake may protect against gestational diabetes.

So we're back to advising moderation (up to 1-3 cups per day). We suggest expectant mothers limit their coffee to 2 cups per day (or switch to decaf) and add lots of milk. For more information about caffeine, visit http://www.contemporaryobgyn.net/oktoeat.

Abstaining from alcohol

It is well known that high intake of alcohol during pregnancy causes fetal alcohol syndrome (FAS). Heavy drinking (defined as 1 or more drinks per day) has been associated with a 5-fold increased risk of low birth weight and double the risk of preterm delivery, and the cognitive and behavioral deficits seen with moderate intake can affect school performance. Problems appear to be more severe with bingeing or getting drunk for older mothers and for those in poor health or who smoke or use drugs. However, susceptibility also varies, and no safe threshold has been identified. For this reason, ACOG, citing the Surgeon General, the AAP, and the CDC, recommends abstinence during pregnancy as well as periconceptually. Even brief interventions can be effective in helping a mother reduce her alcohol use. Cautiously reassure a worried mother who has taken only a few drinks during early pregnancy that stopping now should improve the likelihood of a healthy baby.

Sweeteners in moderation—for most

How safe are nonnutritive sweeteners during pregnancy? Despite limited research, FDA says acesulfame-K (Sunett, Sweet One), neotame, and sucralose (Splenda) are safe in moderation. Aspartame (Equal, Nutrasweet), although safe in moderation for most, is not safe for anyone with phenylketonuria (PKU) because it contains phenylalanine. Saccharine (Sweet 'n Low) is of concern during pregnancy because it crosses the placenta and could accumulate in fetal tissue because of slow fetal clearance. However, the National Toxicology Program has taken it off the list of human carcinogens.

Practically speaking, because artificial sweeteners are often found in foods with few other nutrients, they often need to be limited so that they don't displace more valuable, nutrient-dense foods.
How about hot dogs?

Nitrates and nitrites raise 2 concerns. The biggest worry is contaminated water causing infant methemoglobinemia. Both inorganic (fertilizers, airborne emissions) and organic (sewage, manure) nitrates migrate to groundwater. Nitrogen in the water is taken up by plants, and we get perhaps more than 70% of our dietary nitrates from vegetables. Those with the most nitrates include cauliflower, spinach, collards, broccoli, and root vegetables.

Nitrates versus nitrites

Nitrates aren't considered toxic. They may even be beneficial by enhancing host defenses. However, some nitrates are converted to nitrites, which may combine with hemoglobin to form methemoglobin, a process that happens more readily in fetal hemoglobin. Well water should be tested for nitrate contamination before being used to make infant formula.

Nitrates, nitrites, and N-nitroso compounds can cross the placenta, and the expectant mother and the fetus may be more sensitive to the insult at around 30 weeks.

Some studies have raised concerns that high nitrate consumption could be linked to anemia, preeclampsia, intrauterine growth restriction (IUGR), premature labor, sterility, miscarriages, and neural tube defects. However, there are many problems with the studies, and they seem to lack sufficient evidence to say that the relationship is causal.

Cancer concerns

The second key issue concerns nitrates and nitrites in processed meats (lunch meats, hot dogs, bacon, or ham) forming nitrosamines, raising the risk of cancers. The most important reason that nitrites are added to cured and smoked meats is to reduce the risk of botulism. Nitrite concentrations in cured meats have gone down in the last 30 years, and antioxidants have been added, both with the goal of lowering the formation of N-nitroso compounds. The link with cancer seems to be even less likely now.

Cooking in aluminum pots

Your patient may wonder if cooking in aluminum cookware is off limits, after hearing about aluminum deposits in the brains of patients with Alzheimer's disease. Small intakes of aluminum, the most common metal in the earth's crust, appear to be of little concern.

If your patient is concerned about aluminum, advise her not to use aluminum-containing antacids. Anodized aluminum cookware, being a harder surface, appears to prevent leaching; patients can use nonaluminum cookware if they prefer.

Herbs and other dietary supplements

Although a detailed discussion of medications is beyond the scope of this article, herbal supplements merit attention. Many haven't been tested during pregnancy and lactation, so advise
caution.45 Foods made with herbs pose little risk, but the dose is much higher in dietary supplements, and there's also the issue of the lack of oversight of their content, effectiveness, and safety. Advise patients to treat herbal remedies with the same respect as drugs and to be aware of possible interactions.46

Some herbs of particular concern during pregnancy may include flax oil (possible risk of preterm labor),47 devil's claw (oxytocic effects),48 schizandra (uterine stimulant), licorice (abortifacient, estrogenic effects, uterine stimulant), papain (teratogenic, embryotoxic), black cohosh (uterine stimulant), blue cohosh (uterine stimulant, potentially teratogenic, toxicity in infant), oral aloe (latex may induce abortion), green tea (large amounts—high caffeine, possible antifolate activity), and sida cordifolia (ephedrine constituent).

With so many potential dietary risks during pregnancy, many women find it difficult to select a safe and nutritious diet. You can play an important role in providing expectant mothers with needed education and reassurance. In the end, how much risk a pregnant patient is willing to accept is her decision. Yet, with each concern, there are clear ways to lower the patient's risk and still enjoy eating.

For additional useful information about food safety, see "Food safety Web resources" and online at http://www.contemporaryobgyn.net/oktoeat.

**Food safety Web resources**

**General food safety**

www.foodsafety.gov

http://www.fsis.usda.gov


American Medical Association. Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and Other Health Care Professionals. Information on diagnostic features and lab testing for bacterial, viral, parasitic, and various noninfectious causes of foodborne illness. Includes some patient scenarios, a quiz, and lists sources of additional information (Web sites, toll-free phone numbers, and published material). Booklets can be ordered, but the information is also available online. Currently being updated. See "Reporting a Foodborne Illness: Healthcare Professionals" at http://www.cdc.gov/foodborneoutbreaks/reporting_professionals.htm.

CDC. Division of Foodborne, Bacterial, and Mycotic Diseases (DFBMD). Includes links to specific disease information, as well as programs and research projects. http://www.cdc.gov/ncidod/dbmd/diseaseinfo/files/foodborne_illness_FAQ.pdf
CDC. Healthy Pets Healthy People. Portal searchable by animal and by disease.  
http://www.cdc.gov/healthypets/


FDA. Annex 3. Hazard Analysis, Managing Food Safety: A Regulator's Manual for Applying HACCP Principles to Risk-based Retail and Food Service Inspections and Evaluating Voluntary Food Safety Management Systems. Lists issues involved in evaluating risk; includes tables of specific pathogens, common food sources, and control measures. The complete manual is available at 
http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/ManagingFoodSafetyHACCPPrinciples/Regulators/default.htm.


http://www.fda.gov/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBugBook/default.htm

FDA. Bad Bug Book. A compilation of information from FDA, CDC, USDA FSIS, and NIH.  
http://www.fda.gov/food/default.htm

FDA. Food. Center for Food Safety and Applied Nutrition (CFSAN) portal.  
http://www.fda.gov/Food/FoodSafety/RetailFoodProtection/default.htm

FDA. Retail Food Protection: A Cooperative Program. Portal; includes links to "Foodborne Illness and Risk Factor Reduction" and "Food Defense and Emergency Response."

http://www.foodrisk.org/index.cfm

http://FoodRisk.org/. Portal to resources for professionals working on risk-assessment issues.

http://www.fightbac.org/

Partnership for Food Safety Education. Fight bac! Keep Food Safe From Bacteria. Nonprofit organization of US government, industry associations, professional societies, and consumer groups. Portal focuses on food safety education.

USDA. Economic Research Service. Food Safety: Economic Costs of Foodborne Illness. Description of the process of making cost estimates. Includes a link to the foodborne illness interactive cost calculator.

http://www.fsis.usda.gov/Factsheets/Keep_Food_Safe_Food_Safety_Basics/index.asp