Food-borne illnesses during pregnancy

Prevention and treatment

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ABSTRACT

QUESTION After hearing about outbreaks of illness resulting from *Listeria* and *Salmonella*, many of my patients are wondering about the risks of food-borne illnesses during pregnancy and what they can do to reduce their chances of contracting them.

ANSWER Although heating or cooking food is the best way to inactivate food-borne pathogens, improved standards and surveillance have reduced the prevalence of contaminated foods at grocery stores. Therefore, it is no longer necessary for pregnant women to avoid foods like deli meats and soft cheeses (associated with *Listeria*); soft-cooked eggs (associated with *Salmonella*); or sushi and sashimi. Regardless of whether seafood is raw or cooked, pregnant women should choose low mercury seafood (eg, salmon and shrimp) over higher mercury varieties (eg, fresh tuna). Pregnant women should ensure that their food is obtained from reputable establishments; stored, handled, and cooked properly; and consumed within a couple of days of purchasing.

RÉSUMÉ

QUESTION Après avoir entendu parler d'éclosions de maladies causées par les *Listeria* et les *Salmonella*, plusieurs de mes patientes se posent des questions sur les risques des maladies transmises par les aliments durant la grossesse et sur les façons de réduire les possibilités de les contracter.

RÉPONSE C'est en chauffant ou en cuisant les aliments qu'on peut le mieux inactiver les pathogènes qu'ils contiennent, mais de meilleures normes et une plus grande surveillance ont aussi réduit la prévalence d'aliments contaminés dans les épiceries. Par conséquent, il n'est plus nécessaire pour les femmes enceintes d'éviter des aliments comme les charcuteries et les fromages à pâte molle (associés avec les *Listeria*), les œufs à la coque (associés aux *Salmonella*) ou encore les sushis et les sashimis. Qu'importe si les fruits de mer sont crus ou cuits, les femmes enceintes devraient choisir des produits à faible teneur en mercure (p. ex. saumon et crevettes) plutôt que les variétés à plus forte concentration en mercure (p. ex. thon frais). Les femmes enceintes doivent assurer que leurs aliments proviennent d'établissements dignes de confiance, qu'ils sont entreposés, manipulés et cuits correctement, et consommés dans les quelques jours qui suivent leur achat.

In general, populations at increased risk of illness relating to infected food are characterized by compromised immune function.[1] Hormonal changes that occur during pregnancy decrease cell-mediated immune function, thus increasing the susceptibility of pregnant women to certain types of infections.[2] Food-borne pathogens of special concern for pregnant women include *Listeria monocytogenes* and *Salmonella enterica*, as maternal infection might increase the risk of adverse pregnancy outcomes.

Soft-ripened cheeses, deli meats, refrigerated ready-to-eat foods

Unpasteurized milk, soft-ripened cheeses, and refrigerated ready-to-eat meats and seafood have been implicated in past outbreaks of listeriosis,[3] an infection caused by the Gram-positive bacterium *L monocytogenes*. Although increased surveillance of potential sources of contamination has reduced the frequency of outbreaks of listeriosis,[4] the incidence among pregnant women remains about 20 times higher compared with the general population.[5]

Maternal infection might be asymptomatic or it might present with mild flulike symptoms, including fever, muscle aches, and gastrointestinal symptoms, such as nausea or diarrhea.[6] In contrast to maternal illness, fetal or neonatal infection is often severe and potentially fatal. Sequelae of intrauterine infection include spontaneous abortion, stillbirth, preterm labour, and early-onset neonatal sepsis.[6-8] Appropriate management of maternal listeriosis with a broad-spectrum antibiotic (eg, ampicillin or penicillin) can reduce the risk of adverse fetal outcomes.

Anecdotal reports suggesting an association between recurrent miscarriage and chronic or asymptomatic listeriosis remain unsubstantiated.[8] In a prospective study of 86 women with 2 or more previous miscarriages, *L monocytogenes* was not isolated from the reproductive tract of any of the women.[9]

If food is properly handled and stored, the risk of being infected with *L monocytogenes* appears to be low. Therefore, pregnant women need not avoid soft-ripened cheeses or deli meats, so long as they are consumed in moderation and obtained from reputable stores. Hard

cheeses, cream cheese, cottage cheese, and shelf-stable items are not associated with *L monocytogenes* and are generally safe to consume.[10]

Raw or soft-cooked eggs

Eggs are among the most common causes of *Salmonella* infection, a food-borne illness caused by nontyphoid *Salmonella* bacteria.[11] The collaborative effort of numerous regulatory agencies has helped increase the safety of eggs.[12,13] In the United States, estimates of the frequency of infected eggs range from approximately 1 in 30 000 to 1 in 10 000.[14,15]

Like other food-borne illnesses, *Salmonella* infection (for which pregnant women are not at increased risk) typically presents with fever and gastrointestinal symptoms, such as nausea, vomiting, stomach cramps, and diarrhea[16]; however, bacteremia, which is estimated to occur in approximately 4% of cases, might lead to intrauterine sepsis.[17] Therefore, pregnant women should avoid raw or undercooked eggs, unless pasteurized eggs have been used in place of shell eggs. Homemade foods that often contain raw eggs include mayonnaise and salad dressings; custards and ice creams; and raw cookie dough and cake batter. Commercial products are made using pasteurized eggs; therefore, these items are safer to consume.

Raw fish and shellfish

Seafood-related food-borne illness is most commonly associated with the consumption of raw or undercooked seafood. In general, shellfish account for more seafood-related infections than finfish, as the latter are usually consumed fully cooked.[18] Pathogens associated with the consumption of seafood include noroviruses, Vibrionaceae and *Salmonella* (bacteria) species, and some helminthic and protozoan species.[18,19]

Infection by seafood-related pathogens has not been well studied in pregnancy, and for the most part infection is limited to the gastrointestinal tract and is usually self-limiting.[18] Treatment is aimed at maintaining adequate fluid and electrolyte balance,[18] with severe or invasive bacterial infection requiring treatment with antibiotics.[18] Penicillins, cephalosporins, and fluoroquinolones are commonly used and are not associated with an increased risk of birth defects or any other adverse pregnancy outcomes.[20-24] Most parasites found in seafood do not cause illness in humans[19]; however, when infection does occur, nutritional deficiencies might result.

Seafood marketed for human consumption undergoes screening for microbial contamination,[19] thus increasing the safety of commercially available products. Cooking is the most effective method for inactivation of parasites, although flash-freezing is also effective and is often used for sushi-grade fish. Pregnant women need not avoid raw fish if it is obtained from a reputable establishment, stored properly, and consumed soon after purchase. Women should limit their consumption of high mercury fish and shellfish, including fresh tuna and yellowtail,[25] although low mercury alternatives (eg, salmon, crab, and shrimp) can be consumed more regularly.[25]

Honey

Botulism is a paralytic disease caused by neurotoxins produced by the *Clostridium botulinum* bacterium. The consumption of honey, which might be contaminated with clostridia spores, has been identified as a risk factor for infant botulism,[26] a form of botulism that occurs when bacterial spores germinate and colonize the lumen of the large intestine of the neonate.[27] Compared with that of the neonate, the adult gut is less conducive to the growth of the clostridia bacteria owing to increased colonization with protective microflora.[28] Therefore, colonization botulism, which describes the analogous disease in adults, is extremely rare and occurs almost exclusively among individuals with underlying gastrointestinal abnormality or recent antibiotic treatment.[29,30]

The molecular weight of the botulinum toxin is approximately 150 kDa; therefore, it is unlikely to cross the placenta via passive diffusion.[31] A case report in which a woman acquired botulism during pregnancy suggested that there is no increased risk to the fetus.[28] Together with the low risk of colonization botulism among healthy adults, women without gastrointestinal pathology do not need to avoid honey during pregnancy.

Conclusion

Food safety is a concern for all individuals but even more so for the pregnant woman and the fetus, as they might be more susceptible to some food-borne illnesses with serious sequelae. Food-borne pathogens of concern for pregnant women include *L monocytogenes* and *S enterica*; these organisms can be passed to the fetus and increase the risk for spontaneous abortion, stillbirth, or perinatal complications. If properly handled and prepared, the chance of a food being infected with *L monocytogenes* is low. Therefore, pregnant women can consume soft cheeses, deli meats, and refrigerated ready-to-eat foods in moderation, so long as they are obtained from reputable establishments and consumed soon after purchase. Similarly, raw fish (eg, sushi and sashimi) can be consumed in moderation, although women should still choose low mercury fish, such as salmon and shrimp, over higher mercury varieties, such as fresh tuna. Although consumption of raw shell eggs is among the most common cause of *Salmonella* infection in humans, the overall risk appears to be low; however, safer alternatives (eg, pasteurized eggs) are widely available and can be used as substitutes in most recipes requiring raw eggs. As general guidelines to food safety, pregnant women should ensure that their food is obtained from reputable establishments; stored,

handled, and cooked properly; and consumed in a timely manner.

Competing interests
None declared

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MOTHERISK

Motherisk questions are prepared by the Motherisk Team at the Hospital for Sick Children in Toronto, Ont. **Ms Tam** is a graduate student in clinical pharmacology at the University of Toronto. **Dr Erebara** is a member and **Ms Einarson** is Assistant Director of the Motherisk Program.

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