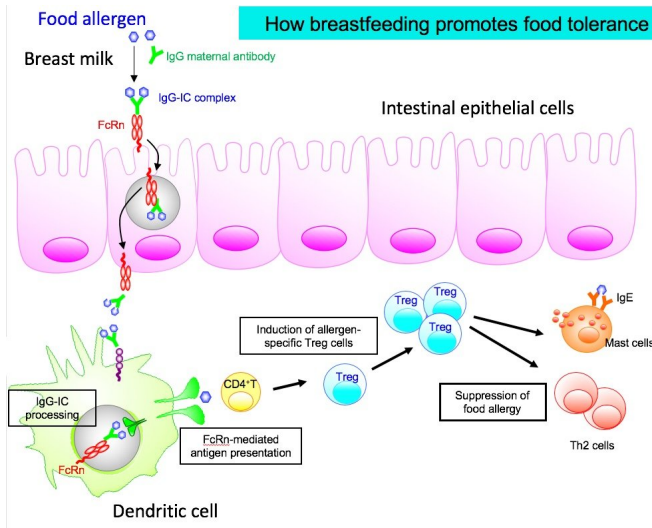


Breast milk found to protect against food allergy

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As this schematic shows, mothers exposed to food allergens transfer antibodies to their offspring via breastmilk. Their immune systems make a complex of the antibody and allergen (IgG-IC complex), which is transferred to offspring through cells in the intestine, with the help of a receptor called FcRn. Dendritic cells, a type of immune cell, then process the Ig-IC complex and present it on their surface. This stimulates production of allergen-specific T regulatory (Treg) cells that interact with other immune cells to suppress food allergy. Credit: Michiko Oyoshi /Nancy Fliesler, Boston Children's Hospital

Eating allergenic foods during pregnancy can protect your child from food allergies, especially if you breastfeed, suggests new research from Boston Children's Hospital. The study, published online today in the *Journal of Experimental Medicine*, is the first controlled investigation to demonstrate protection against food allergy from breast milk, while also pointing to a biological mechanism for inducing food tolerance.

In the study, pregnant mice that consumed [allergy](#)-provoking foods such as eggs and peanuts

transferred protective [antibodies](#) to their offspring through [breast milk](#). The antibodies caused the baby mice to produce allergen-specific regulatory T [immune cells](#), which made them tolerate the [allergenic foods](#).

The findings support recent allergy-prevention guidelines, which reject prior advice urging [mothers](#) to avoid highly allergenic foods during pregnancy or while breastfeeding.

"Whether mothers should eat allergenic foods during pregnancy or avoid them has been controversial," says Michiko Oyoshi, PhD, of Boston Children's Division of Allergy and Immunology, who led the study in collaboration with her co-senior author Richard Blumberg, MD, of Brigham and Women's Hospital. "Different studies have found different results, in part because it's hard in human studies to know when mothers and babies first encountered a specific [food](#). But in a mouse model, we can control exposure to food."

The study showed that breast milk from mothers who consumed allergenic foods protected against food allergy, preventing anaphylaxis as well as production of immunoglobulin E and expansion of mast cells, both hallmarks of an allergic response. Breast milk was protective even when fed to unrelated offspring not exposed to food allergens in utero.

In other experiments, mothers who had never consumed allergenic foods were given food-specific antibodies from other mothers. This, too, protected their breastfed offspring.

Human breast milk, fed to mice with humanized immune systems (tailored to respond to human antibodies), was also protective, suggesting that the mouse findings may translate to human infants.

The biology of food tolerance

Finally, Oyoshi and colleagues had mice born to allergen-exposed mothers nurse from mothers that had never consumed allergenic foods. "We still saw protection from the in-utero exposure, but the protection was better when the mice were also exposed through breastfeeding," says Oyoshi, who is also an assistant professor of pediatrics at Harvard Medical School. "If you combine both in utero and breastfeeding exposure, you have optimal induction of food tolerance."

The study also revealed the stepwise process of food tolerance:

- Antibodies in the mother's breast milk are transferred into offspring with the help of a receptor called FcRn on intestinal cells.
- The dendritic cells process a complex made up of antibody and allergen (called IgG-IC) and present it on their surface (also with the help of FcRn)
- This kick-starts production of allergen-specific T regulatory (Treg) cells.
- The Tregs then interact with other immune cells to suppress food allergy.

Offspring remained food-tolerant even after the mother's antibody disappeared from the babies' circulation, suggesting a long-lasting effect.

Human studies now enrolling

Do the same protective mechanisms apply to humans? To find out, and to better understand what factors in breast milk are protective, Oyoshi and colleagues are now collecting milk from actively breastfeeding mothers. They will compare milk from mothers whose infants are at high versus low risk of food allergy (based on whether an older sibling is allergic, or whether the baby has early risk factors such as eczema).

"We are asking: Why is this protective mechanism not functioning in the allergic population? Is it just lack of antibodies?" Oyoshi says. "Maybe the mother cannot make the antibodies, or maybe something is blocking the protective pathway. We don't really know how tolerance is induced in normal circumstances, and what causes breakdown in normal tolerance."

If the infant is at low risk for food allergy, the researchers will compare breast [milk](#) samples before and after the mothers eat egg or peanut. Mothers with or without a personal or family history of food allergies are eligible to enroll.

Pending the results of these studies, Oyoshi sees the possibility of treating infants at risk for [food allergy](#) with purified antibodies to those foods. In the meantime, she says, her team's findings indicate that "you should be eating every food to create antibodies to everything."

"Our study does not suggest that mothers' peanut eating will guarantee a healthy baby," she adds. "Given the complicated interactions between genetic and environmental factors, there is not going to be just one diet or one set of behaviors that will make children allergic or healthy."

Provided by Children's Hospital Boston

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