

## Bad Eating Habits Start in the Womb

### By Kristin Wartman

The solution to one of America's most vexing problems — our soaring rates of obesity and diet-related diseases — may have its roots in early childhood, and even in utero.

Researchers at the Monell Chemical Senses Center, a nonprofit research organization in Philadelphia, have found that babies born to mothers who eat a diverse and varied diet while pregnant and breast-feeding are more open to a wide range of flavors. They've also found that babies who follow that diet after weaning carry those preferences into childhood and adulthood. Researchers believe that the taste preferences that develop at crucial periods in infancy have lasting effects for life. In fact, changing food preferences beyond toddlerhood appears to be extremely difficult.

"What's really interesting about children is, the preferences they form during the first years of life actually predict what they'll eat later," said Julie Mennella, a biopsychologist and researcher at the Monell Center. "Dietary patterns track from early to later childhood but once they are formed, once they get older, it's really difficult to change — witness how hard it is to change the adult. You can, but it's just harder. Where you start, is where you end up."

This may have profound implications for the future health of Americans. With some 70 percent of the United States population now overweight or obese and chronic diseases skyrocketing, many parents who are eating a diet high in processed, refined foods are feeding their babies as they feed themselves, and could be setting their children up for a lifetime of preferences for a narrow range of flavors.

The Monell researchers have identified several sensitive periods for taste preference development. One is before three and a half months of age, which makes what the mother eats while pregnant and breast-feeding so important. "It's our fundamental belief that during evolution, we as humans are exposed to flavors both in utero and via mother's milk that are signals of things that will be in our diets as we grow up and learn about what flavors are acceptable based on those experiences," said Gary Beauchamp, the director of the Monell Center. "Infants exposed to a variety of flavors in infancy are more willing to accept a variety of flavors, including flavors that are associated with various vegetables and so forth and that might lead to a more healthy eating style later on."

There is another reason these exposures have a lifelong impact, he said: "This early exposure leads to an imprinting-like phenomenon such that those flavors are not only preferred but they take on an emotional attachment."

This puts babies fed formula at a disadvantage because the flavors in packaged formula never change. But according to Ms. Mennella, the opportunity to expose those babies to a range of flavors is not lost. "Just because you're formula-fed, it's not hopeless," she said. "Babies learn through repeated exposure, so the more varied the diet, the more likely they'll be to accept a novel food."

Another recent study conducted at the FoodPlus research center at the University of Adelaide in South Australia found that exposure to a maternal junk food diet (defined

in the study as any food that was energy dense, highly palatable and had a high fat content) results in children with a preference for these same foods. In a rodent model, the study found that being exposed to too much junk food in utero and through breastmilk leads offspring to develop a reward pathway in the brain that is less sensitive than normal. Mothers who were fed foods like Froot Loops, Cheetos and Nutella during pregnancy had offspring that showed increased expression of the gene for an opioid receptor, which resulted in a desensitization to sweet and fatty foods. "The best way to think about how having a desensitized reward pathway would affect you is to use the analogy of somebody who is addicted to drugs,"

Jessica R. Gugusheff, a Ph.D. candidate at FoodPlus and the lead author of the study, wrote in an email. "When someone is addicted to drugs they become less sensitive to the effects of that drug, so they have to increase the dose to get the same high," she wrote. "In a similar way, by having a desensitized reward pathway, offspring exposed to junk food before birth have to eat more junk food to get the same good feelings."

Ms. Mennella at Monell has also done research on reward pathways for sweetness and has found that sweet flavors have an analgesic effect on babies and children such that babies will cry less and children will leave their hand in a cold water bath for longer periods with sweet flavors in their mouths. Ms. Mennella has also found that in obese children, while the level of sweet they prefer is the same as that of normal-weight children, sweet flavors are not as effective as an analgesic. "I hypothesized maybe it's because of some disruption in the opioid system, so maybe they need more sweet to get the same effect," she said.

These research studies call into question the ethics of marketing poor-quality foods to children as well as the marketing of infant formula.

In the United States, according to the Centers for Disease Control and Prevention, about 15 percent of mothers breast-feed exclusively for six months, with rates significantly lower for African-American mothers. The American Academy of Pediatrics recommends that women breast-feed exclusively for at least six months and then continue some breast-feeding as they introduce solid foods for the next six months. The World Health Organization recommends breast-feeding up to 2 years of age or beyond.

But infant formula is a booming billion-dollar industry with three companies controlling almost 98 percent of the market: Mead Johnson, maker of Enfamil, Abbott, manufacturer of Similac, and Nestlé (now Gerber), maker of Good Start.

Functional foods, or foods that allegedly deliver nutritional benefit beyond what is available in natural foods, are a food industry creation to convince consumers that their products are superior to, or can replace, natural, whole foods. Globally, infant formula is the fastest growing functional food; the market is on track to grow by nearly \$5 billion in 2013 alone.

But formula is only part of the problem since breast-fed babies of mothers eating too many refined and processed foods are also at risk. Claims by the food industry that personal responsibility, exercising more, and eating less are the solutions to obesity and diet-related disease are turned on their head with these studies. If babies are developing food preferences in utero and before 2 or 3 years of age through no fault

of their own, how can we then blame them when they become obese children and adults?

If we hope to reverse the tide on obesity and diet-related disease in America, regulating processed food products and infant formula, and creating clear warning labels to deter parents from feeding their children potentially harmful foods may be our best shot. Let's make sure future generations have the best chance to become healthy adults.