

Does a mum diet during pregnancy influence their baby's food preferences?

Written by The Conversation

There aren't too many topics about pregnancy more controversial than what a mother-to-be can and can't eat.

No sooner does a couple announce the news of an impending arrival than a woman is bombarded with a list of rules about what she is and isn't allowed to put in her mouth.

"Don't eat foods containing soft cheeses, cold meats, soft-serve ice-cream, salads, raw egg, unwashed vegetables...but don't worry, just take it easy and enjoy the ride". Yeah, right.

While this must drive women barmy, one question that's always intrigued me is about the flavour of the food. The mother and a developing fetus are so tightly connected, an intriguing question is whether a woman's food choices during pregnancy can influence what the child likes to eat after birth.

So, what science is out there?

Strange-smelling newborns

The first scientific hint that specific elements of a mother's diet may affect the developing baby came through intriguing reports from hospitals of infants who were born with distinctive smells.

One of the most famous series of [case studies](#) came from an Israeli team, who described four newborns with distinctive odours reminiscent of a meal the mother ate just prior to giving birth.

Two mothers in this case series had given birth to babies that had a distinct smell of cumin. After a quick quizzing, the mothers told the researchers that in the days leading up to delivery they had both eaten 'schug', which is a Middle-Eastern hot sauce containing cumin, garlic, salt, oil and pepper. The newborn of another woman had a sharp odour of fenugreek, a leguminous plant with seeds that have a slightly sweet, nutty flavour. Similar questioning found that, just prior to delivery, the mother had eaten a good serve of 'hilbeh' – a Yemenite dish prepared from

fenugreek.

These case reports provide our first hint of evidence that this old wives' tale may indeed be true. A mother's diet may have a lasting effect on her baby.

The next step is to explore the biological mechanisms through which this may occur.

Flavouring the amniotic fluid

Food and drink that we ingest are broken down into small molecules by our stomach and intestines, and are then absorbed and transferred to our blood stream. During pregnancy, molecules in the mother's blood stream, including those that may produce a smell, can be passed to the bloodstream of the fetus through the placenta and umbilical cord.

Inside the womb, the fetus sits within a membrane (amniotic sac) that is filled with mucous-like fluid (amniotic fluid). The developing baby is able to urinate into the amniotic fluid, which means that at least a portion of the odourous molecules that originated with the mother can be transferred to the baby via the placenta and umbilical cord, and end up in the amniotic fluid. After bathing in a sac full of smelly fluid for forty weeks, it would be no wonder that a fetus would also come out of the sac with a bit of a pong.

Julie Mennella and colleagues from the United States were the first to demonstrate [experiment ally](#) that a woman's diet can change the odour of the amniotic fluid in the womb. The researchers identified ten women who were about to undergo a routine amniocentesis. Amniocentesis is a procedure in which a small sample of amniotic fluid is drawn out of the amniotic sac by a large needle to undergo medical testing. All of the women were in the second trimester of their pregnancy.

About forty-five minutes before their amniocentesis, five women were asked to swallow a capsule that contained garlic extract, while the other five woman swallowed a capsule containing milk. The researchers then formed an 'odour panel' of thirteen adults, who were presented with one sample of amniotic fluid obtained from a woman who ingested a garlic capsule, and one from a woman who ingested a milk capsule. The panel didn't know which sample was from which woman, and their job was to make a series of judgments about which

of the two samples smelt more like garlic.

The results were unequivocal. Almost without exception, the judging panel chose the sample of amniotic fluid of the women who ate the garlic capsules as smelling more garlic-like. The garlic extract that the women took prior to the amniocentesis had made their amniotic fluid take on that smell.

The reason it is important for us to know that amniotic fluid can be 'flavoured' is because by the second trimester of pregnancy, a fetus is able to swallow amniotic fluid. A near-term fetus can swallow up to 1000 ml of [amniotic fluid](#) per day, which is about 50 per cent of the entire volume of fluid in the sac. The swallowing not only helps regulate the amount of fluid in the amniotic sac, but can also assist with the development of the baby's digestive and respiratory systems.

Is it possible that by swallowing flavoured amniotic fluid in the womb, infants develop a preference for those flavours after birth?

Testing smell preferences

Of course, it is not just our sense of taste that is vital to our perception of flavour, but also our sense of smell.

The 'swallowing' of amniotic fluid through the oral and nasal passages during [prenatal life](#) means that odorous molecules in the amniotic fluid have access to olfactory (smell) receptors in the nose. It is possible that exposure to these 'smells' in utero lead infants to be more attracted to these smells after birth?

This idea was [investigated](#) by a French research group. Two groups of pregnant women were recruited based on their preference for aniseed (liquorice) flavoured food. The first group comprised twelve women who liked the taste and regularly consumed aniseed-flavoured food and drink, while the second group of twelve women never consumed foods or drink with this flavour. In the final two weeks of pregnancy, the first group of women were provided with aniseed lollies, cookies and drinks just to make sure that they consumed a decent amount of this flavour.

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Immediately after the infants were born, the infants had two cotton-tipped swabs held under their nose, one after the other. One swab had been dipped in aniseed flavoured syrup, and the other was dipped in paraffin oil. The researchers then videotaped how the newborn infants responded to the different tastes.

The infants whose mothers regularly consumed aniseed during pregnancy spent more time 'mouthing' (i.e., mouth opening, sucking, tongue protrusion) towards the aniseed swab than towards the paraffin swab. They also directed far more distaste towards the paraffin swab than the aniseed swab. In comparison, the infants of the mothers who didn't consume aniseed during pregnancy spent an equal amount of time mouthing at each of the two swabs, indicating no preference for either smell.

Testing food preferences

The next link in the chain is to determine whether foods eaten during pregnancy influence the taste preferences of infants.

Julie Mennella and colleagues have provided the [best test](#) of this idea to date in their study of twenty-nine pregnant women. Fifteen of these women were asked to drink 300 ml of carrot juice for four days a week for three consecutive weeks during their last trimester of pregnancy. The remaining fourteen women were asked to refrain from eating carrots, and drink 300 ml of water during for that same time period.

The second part of the experiment took place about five to six months after the babies had been born, coinciding with the time that solid foods were being introduced into the babies' diets. At around this time, researchers paid two visits to the family, with each visit focussing on how the child reacted to certain foods during feeding time. At one of the visits, the mother was asked to feed the infant cereal mixed with carrot juice, while during the other visit the mother fed the child cereal mixed with water ('plain cereal'). The mothers were asked to feed the infants as they usually would until the baby refused the cereal three consecutive times.

The results of the study clearly indicated that the infants whose mothers drank carrot juice during pregnancy responded differently to the cereal mixed with carrot juice. These infants showed significantly fewer negative facial expressions for the carrot-flavoured cereal compared with the plain cereal. In comparison, the control infants whose mothers drank water during pregnancy had the same number of negative facial expressions for both the carrot-flavoured

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and plain cereal.

Furthermore, the mothers who drank carrot juice during pregnancy – who were unaware of the hypothesis of the study – believed that their infants enjoyed the carrot-flavoured cereal more than the plain cereal. In comparison, the mothers who drank water felt that their infants had no preference for either cereal.

Myth or reality?

Well-designed studies have found that a mother's diet during pregnancy can change the odour of the amniotic fluid in which a fetus grows. When the fetus swallows this fluid, the olfactory (smell) receptors in the nose are exposed to these odourous molecules. The fetus is then familiar with these 'smells' and so will have a preference for foods with these flavours once they are born. Truly marvellous!

This column is an extract from [Will Mozart Make my Baby Smart](#) .

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Disclosure

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Read more <http://theconversation.com/does-a-mum-diet-during-pregnancy-influence-their-babys-food-preferences-41586>