

# Breast milk sugar may protect babies against deadly infection

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A type of sugar found naturally in some women's breast milk may protect new born babies from infection with a potentially life threatening bacterium called *Group B streptococcus*, according to a new study from Imperial College London.

These bacteria are a common cause of meningitis in new borns and the leading cause of infection in the first three months of life in the UK and globally.

The new research, on 183 women in The Gambia and published in the journal *Clinical and Translational Immunology*, suggests a sugar found in some women's [breast milk](#) protect babies against the bacteria.

The bug is carried naturally in the vagina and bowels by up to one in three women and can be transferred to the baby during childbirth or in breast milk. In the UK pregnant women deemed high risk are offered a test for the bacteria, or women can pay privately. This test consists of a swab a few weeks before a woman's due date. However there is still a chance of a woman picking up the bacteria in her gut at some point between the test and giving birth (once the bug gets into the gut of the mother or baby it can trigger an infection).

However, the new research, from the Centre for International Child Health at Imperial, found that naturally-occurring sugars in a woman's breast milk may have protective effects against *Group B streptococcus*.

Each woman's breast milk contains a mixture of many different types of sugar, called human milk oligosaccharides. These are not digested in the baby's tummy and act as food for the 'friendly bacteria' in a baby's intestine.

The type of sugars a woman produces in her breast milk are partly dictated by her genetic make-up. A type of genetic system in particular, called the Lewis antigen system (which is involved in making the ABO blood group), plays an important role in determining breast milk sugars.

In the study, the team tested all the mothers' breast milk for the sugars that are known to be controlled by these Lewis genes. They also tested women and their babies for *Group B streptococcus* at birth, six days later, and then between 60 and 89 days after birth.

The team found women who produced breast milk sugars linked to the Lewis gene were less likely to have the bacteria in their gut, and their babies were also less likely to get the bacteria from their mothers at birth.

In addition, among the babies who had the bacteria in their guts at birth, the infants whose mothers produced a specific sugar in their breast milk, called lacto-n-difucohexaose I, were more likely to have cleared the bacteria from their body by 60-89 days after birth. This suggests this breast milk sugar, which is linked to the Lewis gene, may have a protective effect.

The researchers then went on to show in the laboratory that breast milk containing this particular sugar—lacto-n-difucohexaose I—was better at killing the *Group B streptococcus* bacteria compared to breast milk without this specific sugar.

Around half of all women in the world are thought to produce the sugar

lacto-N-difucohexaose I.

Dr Nicholas Andreas, lead author of the research from the Department of Medicine at Imperial said: "Although this is early-stage research it demonstrates the complexity of breast milk, and the benefits it may have for the baby. Increasingly, research is suggesting these breast milk sugars (human milk oligosaccharides) may protect against infections in the newborn, such as rotavirus and *Group B streptococcus*, as well as boosting a child's "friendly" gut bacteria."

He added the presence of these sugars allows "friendly" bacteria to flourish and out-compete any [harmful bacteria](#) that may be in the youngster's gut, such as *Group B streptococcus*.

The sugars are also thought to act as decoys, and fool the bacteria into thinking the sugar is a type of human cell that can be invaded. The bacteria latch onto the sugar and is then excreted by the body. This may help protect the baby from infection until their own immune system is more mature to fight off the "bad bugs" at around six months of age.

The team hope their findings might lead to new treatments to protect mothers and babies from infections. The researchers raise the possibility of giving specific breast milk sugar supplements to pregnant and breast-feeding [women](#) who do not carry the active Lewis gene. This may help prevent harmful bacteria getting into the baby's gut at birth and in the first weeks of life.

Some companies are already exploring adding such sugars to formula milk, but Dr Andreas cautioned it would be difficult to replicate the mix of sugars found in breast milk: "These experimental formulas only contain a couple of these compounds, whereas [human breast milk](#) contains dozens of different types. Furthermore, the quantity of sugars produced by the mother changes as the baby ages so that a newborn baby

will receive a higher amount of sugars in the breast milk compared to a six-month-old."

Dr Andreas, who is a post-doctoral fellow at the Centre for International Child Health at Imperial, also suggested that testing new mothers' blood for the Lewis gene may be beneficial: "If we know whether a mother is colonised with *Group B streptococcus* and know if she carries an active copy of the Lewis gene, it may give us an indication of how likely she is to pass the [bacteria](#) on to her baby, and more personalised preventive measures could be applied."

Provided by Imperial College London

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