

# What happens to your brain when you're pregnant?

November 11 2015, by Jordan Gaines Lewis

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Credit: AI-generated image ([disclaimer](#))

My friend recently asked me: "Why have I become so forgetful since I became pregnant?" I told her I didn't know, but that I'd look into it. She then followed with: "I was going to ask you to explain something else to me, but I totally forgot what it was."

It's a common claim that pregnancy makes you forgetful. But does "pregnancy brain" actually exist? There's no doubt that many changes happen to a woman's body during pregnancy, but how do these changes affect – or originate in – the brain? To answer my friend's question, and in an effort to address whatever else she was forgetting at the time, here is part one of my expectant mother's guide to the crazy neuroscience of pregnancy.

## Morning sickness

More than half – perhaps even [up to 90%](#) – of [pregnant women](#) experience nausea or vomiting to some degree, particularly in the morning. Thrust into the limelight as a result of the [Duchess of Cambridge's hospitalisations](#), around 1% of pregnant women experience more severe, prolonged [morning sickness](#) called hyperemesis gravidarum, which can result in dehydration and weight loss, and may require medical attention. For most women, morning sickness goes away after 18 weeks.

The cause of morning sickness isn't entirely clear. The most popular theory is that morning sickness is the body's reaction to the increase in the pregnancy hormone, human chorionic gonadotropin (hCG). Studies have shown a [temporal relationship](#) between hCG and morning sickness, meaning that levels of hCG in the bloodstream and frequency of vomiting appear to peak at the same time. The correlation is interesting, but it doesn't explain why morning sickness happens.

We do know that the first three months (the first trimester) is an important time in foetal development. The central nervous system forms during this time, and this delicate process is [easily disrupted by toxins](#) circulating in the mother's bloodstream. [A more recent theory](#) suggests that vomiting during early pregnancy serves a beneficial function by ridding the body of food that may unsettle this important developmental

stage.

Vomiting is controlled by an area in the hindbrain called the area postrema. Importantly, the area postrema lacks a blood-brain barrier, which means it can detect toxins in the bloodstream and cerebrospinal fluid. Research has shown that the [area postrema has receptors for hCG](#), which may explain why it's particularly sensitive during pregnancy.

This "toxin theory" is supported by [several pieces of evidence](#), including the fact that morning sickness is more common in societies with "risky foods", that it only occurs in humans (we have very broad diets, after all), and that more severe morning sickness is associated with lower rates of miscarriage. Many women also naturally tend to be more "turned off" to eating meat, fish, and certain plants during this time.

Of course, these so-called toxins are really not toxic at all to healthy adult women, and [the placenta](#) does a superb job of filtering out waste and fighting infection. Rather, morning sickness is likely more associated with foods prone to microorganisms in the times before refrigeration (like meats), or bitter vegetables, the taste of which signalled "poison" to our early human ancestors. It's a sensitive system, and despite how crappy it makes pregnant women feel, morning sickness probably provides an evolutionary advantage for the baby's development.

## **Stronger sense of smell**

According to many women, a heightened sense of smell, called hyperosmia, is one of their earliest signs of pregnancy. Although anecdotes of hyperosmia have existed for a century, scientific literature on the topic is sparse. Subjectively, around [two-thirds of women](#) rate their sense of smell as stronger than usual while pregnant. [Another study reported](#) that, compared with women who aren't pregnant, pregnant women are particularly sensitive to odours such as cooking foods,

cigarette smoke, spoiled food, perfumes, and spices.

[A few studies](#) have examined scent detection thresholds (the smallest volume of air that still results in odour detection) in pregnant versus non-pregnant women. But, in a [study where six different scents](#) were tested, there was no difference in detection threshold between the two groups.

Given the inconsistency between subjective and objective reports on hyperosmia, research suggests that pregnant women don't necessarily have a stronger sense of smell, but are perhaps better at *identifying* smells. [A recent study](#) found that pregnant women were more likely to rate a variety of smells as significantly less pleasant than non-pregnant women. Early in pregnancy – much like the body rejects foods that may be toxic to the developing foetus – it appears that [women have a greater "disgust sensitivity"](#) that motivates them to avoid other possible contaminants. That may explain why things like cigarette smoke and spoiled food become particularly pungent.

As with morning sickness, there's a link between the timing of hCG levels and when a woman's odour perception changes. But it's thought that these hormonal changes aren't affecting our noses. When a Swedish research group presented scents to pregnant and non-pregnant women and [measured their brains' responses](#), they found a larger amplitude and shorter latency in the P300 wave of pregnant women, a voltage change [thought to reflect neural processes](#) related to a person's assessment and evaluation of an event. This suggests that hormonal changes may be acting on higher-order cognitive processes related to our perception of odours.

## **The question about forgetfulness**

While a number of women – like my [friend](#) – complain that pregnancy has made them more forgetful than usual, the research on this topic is

mixed. Like most changes that occur during pregnancy, hormonal fluctuations are an obvious possible culprit. Some women report no cognitive changes during pregnancy.

A [2008 meta-analysis](#) reported that, compared with women who weren't pregnant, pregnant women perform worse on some measures of memory. In particular, pregnant women tend to perform worse on working (short-term) memory and free recall tasks.

In a [study published in 2014](#), researchers in the UK administered a spatial recognition memory task to non-pregnant women, as well as to women during each trimester of their pregnancy. Compared with their first trimester, pregnant women scored, on average, 11.7% lower on the memory tasks with each subsequent trimester. When the researchers compared memory test scores to levels of six different hormones measured from blood plasma, however, there was no association – in other words, hormones may not be playing a role in these memory deficits.

Interestingly, [a 2008 study](#) reported a decrease in neurogenesis, or birth of new neurons, in the hippocampus of mice during pregnancy. The hippocampus is involved in consolidation of short-term to long-term memory, as well as spatial navigation, such as remembering where you parked your car. Similarly, [an earlier study](#) showed no differences in brain sizes between pregnant and non-pregnant rats except for the hippocampus. The hippocampus was smaller in pregnant rats, and also related to deficits in spatial memory. No studies have imaged the brains of pregnant [woman](#) to examine potential changes in the human hippocampus, though.

Some have postulated that sleep deprivation or the new-found stress of dealing with a major life change could contribute to absentmindedness during pregnancy. [Some research](#) suggests that there's a cultural

expectation at play, as the popular concept of "pregnancy brain" may simply make women more aware of their everyday slip-ups. A change in daily routine with a new pregnancy might disrupt some women's memory abilities, too.

Although there's a lot we don't know about all the crazy changes that happen during [pregnancy](#), one thing is clear: babies do a great job of making their presence known well before they come kicking and screaming into the world.

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