The Autism-Tylenol Controversy: As they say, Correlation is not Causation

William Menke, September 25, 2025

Let's suppose, for the sake of argument, that Tylenol use increases the rate of autism because the Tylenol molecule interferes with fetal brain development. In this scenario, Tylenol use will correlate with the rate of autism. Abstaining from Tylenol is the *right* thing to do, because it reduces the chance of having an autistic child. Alternatively, let's suppose that fever during pregnancy is the real culprit, because the high body temperature causes fetal brain damage that raises the chance that the baby will later become autistic. As people take Tylenol to reduce fever, its use will correlate with the rate of autism in this scenario, too. But here, "toughing it out" and not using the drug is exactly the *wrong* thing to do, for it increases the rate. Knowledge of the correlation isn't enough to provide guidance on the question "should I take Tylenol while I am pregnant". A more elaborate scientific study is needed to determine whether the drug itself, or the condition it was used to treat, is the culprit. In science-lingo, relevant factors like fever need to be "controlled for". (Actually, with autism, family history is the factor that most needs to be controlled, because autism is known to have a significant genetic component). The most recent such study[1], done in Sweden, finds no link between rate of autism and Tylenol use.

As one of my correspondents pointed out, *correlation does not equal causation*.

Another of my correspondents perceptively asks, *Why has the focus been on Tylenol?* Why not PCBs or micro-plastics or something else? I'm not an expert on the history of medicine, but as far as I can determine, a link between Tylenol and autism was first suggested in 2003 by Anthony Torres, in the form of a "hypothesis paper" published[2] in a medical journal. Such a paper puts forward an untested idea that the author believes is worthy of further study, and is different than the more common type of paper that presents a new scientific finding. Torres argues that the already well-known association between autism and fever during pregnancy might be explained by negative consequence associated with Tylenol *blocking* the fever. Torres' idea is counterintuitive, because high fevers can cause problems during pregnancy. It is centered around the speculation that, as fever evolved as a defense mechanism against infection and involves many complicated chemical pathways, the upsetting of the progression of the fever could possibly interfere with subsequent development of the fetal brain.

As far as I can see, there is nothing particularly outlandish about this idea. It's similar, in some ways, to the so-called hygiene hypothesis (that children who are kept from playing in the dirt are more susceptible to allergies later in life). But it's just an idea. It needs to be tested against observation. Some initial experiments were performed to test it. Some found a correlation, others didn't. All of the earliest studies were "small", meaning they analyzed relatively small groups of patients. Only two large studies – and in this context, large implies better - have been performed to date, the Swedish one mentioned above and a similar Japanese study[3]. Neither support the idea that Tylenol use in pregnancy is a major cause of autism.

Proponents of the autism-Tylenol link have employed a sleight of hand in their arguments. The important question is whether or not Tylenol is the major cause – or at least one of several major

causes – of autism. The best scientific studies indicate that it is not. However, because of statistical variation, no study however large can completely rule out Tylenol as a minor risk factor for autism. Many proponents of the link have conflated the latter with the former, but they are not the same. I remember reading that someone calculated that eating a hotdog knocks thirty-six minutes off of a person's life expectancy. I can't vouch that this estimate is correct, but I am completely certain that eating a single hotdog is not going to cause a normal person to drop dead.

Why Tylenol, as contrasted to pollution, or something else? I think that part of the answer is that when you're looking for a *major* cause of autism, you shouldn't bother with any putative cause that affects much less than 3.2% of pregnancies – for that is the incidence of autism. Gunshot wounds, for instance, cannot be a major cause, because they affect only 0.13% of pregnancies. Tylenol is relatively commonly used during pregnancy, especially because it is the only analgesic recommended for such a use. Finally, you can only screen for putative causes that you can reliably quantify. That's tough with autism, because it usually is not diagnosed until years after birth. In the Swedish study, Tylenol usage was determined from written records that doctors and hospitals made during the pregnancy. (Tylenol availability is more restricted in Sweden than in the US, so I presume that records of its use are more reliable than they would be in the US). Figuring out how much PCBs or micro-plastics a person was exposed to during a pregnancy that occurred five years ago is going to be very difficult.

One statistical issue that needs to be carefully considered in any study – and especially a "small" study – is random fluctuation. And some (but not all) of these small studies have been criticized on statistical grounds. When you scan for correlations between a disease (like autism) and many (say more than twenty) possible causes (like Tylenol usage), statistical variation will probably lead to a seemingly significant (say, to 95% confidence) but bogus correlation with at least one of them.

You pick up a quarter on the street and the date on it is your birth year. You say, How extraordinary; *What's the chance of that?* But you also would have been surprised had it been your sibling's birth year, or your kid's birth year, or your ATM pin, or the address of the apartment where you lived when you were eight years old. Quantifying the chance of your being surprised is tricky.

Notwithstanding my scientist perspective, I empathize with parents who struggle with the question, "*Should I take Tylenol while I am pregnant?*" The desire to do one's best for one's child is rooted very deeply in human nature, as is the sense of guilt that overshadows our decision-making about our children when we are less than certain that our decisions are good ones. To my scientific mind, the problem is not with the parents' thinking but with the seemingly authoritative advice that they are being given. Half-baked advice creates gnawing doubts few can escape, even though those same doubts would never had arisen had it not been offered.

[1]https://jamanetwork.com/journals/jama/fullarticle/2817406

[2]https://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-3-9

[3]https://onlinelibrary.wiley.com/doi/epdf/10.1111/ppe.70071