# Prenatal BPA Exposures (Don't) Affect Birth Weight

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**Summary**

Recent media stories have reported on two new scientific studies involving BPA's effects on birth weight. One study reported a statistical association between prenatal exposure to BPA and increased birth weight, while the other reported an association with decreased birth weight.

However, both of the new studies use cross-sectional study designs that are inherently incapable of providing much meaningful information on whether exposure to BPA has any effect on birth weight. Furthermore, the BPA exposure measurements reported in one of the studies are not likely to be valid at all.

In comparison, multiple comprehensive studies on laboratory animals have found that exposure to BPA has no effect on birth weight. The lesson to be learned (again) is that cross-sectional epidemiology studies are unlikely to provide useful information on any potential health effects from exposure to BPA.

**Background**

For 10 years or more, the popular media has repeatedly written about the chemical bisphenol A(BPA). Particularly popular are stories about new scientific studies, along with the suggestion that we're all at risk of one health effect or another due to everyday exposure to BPA. In that context, recent reports on prenatal exposure to BPA and birth weight were just more of the same.

In scientific terms, more of the same might be called replication, which generally is a good thing. The results of one study are more likely to be valid if the results are replicated in another study, in particular a study conducted independently by other researchers. In fact, one of the hallmarks of the scientific method is replication, or reproducibility of results.

**New Studies and Results**

But replication isn't what happened a couple of weeks ago, although you wouldn't have known that from a quick review of media stories. What did happen is that two new studies were

published in the scientific literature, about a week apart, on the subject of prenatal exposure to BPA and birth weight, and both studies were separately covered by the media. Along with birth weight, both studies measured BPA exposure at the time of birth and both studies reported an association between BPA exposure and birth weight.

The problem is that one study reported that prenatal exposure to BPA was statistically associated with decreased birth weight while the other study reported an association with increased birth weight. So which is it, does prenatal exposure to BPA increase or decrease birth weight? Digging a little deeper into the study designs and some of the data reveals that neither study is capable of answering the question.

A fundamental limitation of both studies is that these associations with birth weight were based on cross-sectional study designs in which health outcome and exposure data are collected at a single point in time. With cross-sectional study designs, it is simply not possible to know if the exposure preceded the health effect, which is a necessary element to establish causation.

The lack of a temporal sequence is a particular issue for BPA because it has a very short half-life in the body and it is well established that exposure measured at one point in time says very little about exposure at preceding times. For this reason alone, neither study can speak to the effect of prenatal exposure on birth weight.

Furthermore, the BPA exposure measurements in one of the studies are likely to be invalid. It is well known that BPA is efficiently metabolized and quickly eliminated from the body in urine. Accordingly, urine is the "optimal matrix for measuring nonpersistent, semivolatile, hydrophilic agents," such as BPA. That's not just an uninformed opinion but represents the views of a group of highly qualified experts led by a prominent scientist from the U.S. Centers for Disease Control and Prevention (CDC), which is recognized as a worldwide authority on biomonitoring.

In contrast, measurement of BPA in blood is not optimal due to significant challenges, including the high demonstrated potential for sample contamination with BPA. The same group led by CDC previously advised against using blood measurements, stating that "it is seldom possible to verify that [blood] concentrations of [BPA] are valid measures of exposure."

Recognizing the difficulty in measuring trace levels of BPA in blood, researchers from the Pacific Northwest National Laboratory and the U.S. Food and Drug Administration (FDA) recently published clear criteria to identify contaminated blood samples. For oral exposure to BPA, which is the primary way we contact BPA through our diets, blood samples

containing "<1% BPA [in unmetabolized form as a percentage of total measured BPA including its metabolized forms] are likely contaminated."

This makes sense since extensive research in human volunteers has shown that very little unmetabolized BPA would ever be present in human blood. The levels of unmetabolized BPA reported in the recent study are frequently above 90% (!), a clear indication of contamination rather than a measure of exposure.

**Does Prenatal BPA Exposure Affect Birth Weight?**

Although the two recent studies provide essentially no meaningful information on this question, we have a wealth of relevant information from comprehensive, high-quality studies in laboratory animals. These studies provide extensive, replicated evidence that prenatal exposure to BPA has no effect on birth weight, in particular at any level of exposure even remotely close to actual human exposures.

What we should have learned from the two new studies, contrary to the headlines they generated, is that cross-sectional epidemiology studies on BPA are generally incapable of providing any useful information on whether exposure to BPA could cause health effects. That lesson is not new, but bears repeating based on recent history since misunderstanding of the value of cross-sectional studies certainly contributes to misinformation in the popular media.