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expert reaction to study looking at chemicals in plastics and childhood obesity

Research, published in the *Journal of The Endocrine Society*, reports that exposure to common chemicals in plastic is linked to childhood obesity.

Dr Rod Mitchell, Reader and UKRI Future Leaders Fellow, Research Group Leader, and Honorary Consultant Paediatric Endocrinologist, MRC Centre for Reproductive Health, University of Edinburgh, said:

"This well conducted study reports correlation between a single measurement of Bisphenol S (BPS) and childhood obesity; however, no such association was identified for Bisphenol A (BPA) or for total bisphenol exposure.

"The major challenge in trying to determine causation relates to the fact that a large proportion of bisphenol exposure comes from food packaging. This makes it very difficult to separate bisphenol exposure from effects of diet itself when it comes to obesity. Whilst the study attempted to correct for calorie intake, it was not able to take into account the composition of the diet which is considered to be a major contributor to childhood obesity.

"The study design involved measuring bisphenols in a single 'spot' urine sample. Given the rapid metabolism of these agents it may not reflect bisphenol exposure over extended time periods which is important when trying to determine potential causation.

"It should be borne in mind that diet and activity remain major contributors to overall obesity in the population and as such modification of these lifestyle factors are likely to produce the most benefit in reducing childhood obesity."

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study was observational, and one can simply never draw conclusions about what causes what from an observational study like this. The researchers found plenty of other differences between children with different levels of the chemicals in their urine, apart from the levels of BPA, BPS and BPF. Any of these other differences could have been the real reason for differences in obesity, rather than the chemicals themselves. The researchers did make statistical adjustments to try to take account of these other differences, but that kind of adjustment can never account for everything.

"But there are other points too. The measurements of BPA, BPS and BPF in the children's urine were made at about the same time that their body mass index was recorded, but obesity takes time to develop, and so it would have been exposure to these chemicals at earlier ages that might possibly have increased the chances of obesity. Exposure at earlier ages couldn't be measured in this study. That leads to another set of possible explanations of the findings, besides the possibility that these chemicals do increase the risk of obesity. The researchers themselves point out that cause and effect might even go the other way – different types of food and drink packaging include different amounts of these bisphenols, and perhaps children who are already obese for reasons connected to diet and exercise happen to consume more of the foods and drinks that contain higher levels of the chemicals. In other words, it could be that fatter children have more bisphenols in their urine because they like food and drink with bisphenols in its packaging, so that the obesity causes the raised chemical levels, rather than the raised chemical levels causing increases in the risk of obesity. Or maybe obesity has nothing at all to do with bisphenols in the body, and it's just that more obese children excrete the chemicals more quickly so that there is more of them in the urine. So there are lots of doubts.

"Finally, the increase in the chance of obesity associated with higher levels of bisphenols in the urine is not very great, so even if the chemicals do have some causal effect on body weight, it can't be the whole reason why nearly 40% of these children are overweight. And it's important to notice that several of the possible associations between bisphenols and bodyweight were not statistically significant in this study, that is, they could plausibly be due to chance variability alone.

"The researchers conclude that, despite all these unavoidable issues about their research, it's worth continuing to explore and monitor possible associations between

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suggests it may be involved in human obesity. Due to concerns over bisphenol A (BPA), there has been an increase in manufacturers substituting BPA with analogues of BPA, for which far less is known about their effects as potential obesogens.

"This is an interesting study which used human data from the well-recognised US National Health and Nutrition Examination Surveys (NHANES) to examine the relationship between urinary levels of BPA and its analogues bisphenol S (BPS) and bisphenol F (BPF) with body mass outcome. BPA, BPS and BPF were measurable in the urine of the subjects studied (1831 children and adolescents) and levels correlated with increased prevalence of obesity.

"As the authors rightly acknowledge, their results should be interpreted with caution as they were unable to determine whether obese children may have greater exposures to or excretion of bisphenol compounds. In addition food packaging contains bisphenols, therefore, those who consume more of these products are more likely to have higher exposure levels and perhaps are more likely to be obese."

Dr Katarina Kos, Senior Lecturer in Diabetes and Obesity, University of Exeter, said:

"The study describes that increasing exposure of bisphenol based chemicals used in plastics and linings of various food containers has some potential link with obesity in children. However, the study by design (measurement of this products in one urine sample) is not able to tell us that these chemicals are responsible for weight gain as such. Previous studies do suggest some cause-effect relationship, but this information is yet lacking for the newer products."

*** 'Urinary bisphenols and obesity prevalence among US children and adolescents' by Melanie H. Jacobson *et al.* was published in the *Journal of the Endocrine Society* at 14:00 UK time on Thursday 25 July 2019.**

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Declared interests

Dr Rod Mitchell: "No conflict of interest."

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