
To the Editor On behalf of my coauthors, I write to report a concern raised about the methods and analyses for the Original Investigation, “Association Between Maternal Exposure to Magnetic Field Nonionizing Radiation During Pregnancy and Risk of Attention-Deficit/Hyperactivity Disorder in Offspring in a Longitudinal Birth Cohort,”1 that was published in JAMA Network Open on March 24, 2020. The concern was brought to the attention of the journal editors by a reader and the editors forwarded this concern to us. After discussion and assessment, we have determined that there were errors in the statistical analyses, which required use of different analyses and which result in changes to some of the original findings and limitations to the interpretations of this study. As a result, the editors have asked us to retract and replace this article.

This study was conducted to determine whether maternal exposure to high levels of magnetic field (MF) nonionizing radiation was associated with an increased risk of attention-deficit/hyperactivity disorder (ADHD) in offspring by using measurements of MF nonionizing radiation levels and physician-diagnosed ADHD. We included a longitudinal birth cohort of 1482 mother-child pairs whose mothers were participants of an existing birth cohort and whose level of exposure to MF nonionizing radiation was captured by wearing a monitor for 24 hours during pregnancy in 2 previous studies conducted from October 1, 1996, to October 31, 1998, and from May 1, 2006, to February 29, 2012.

To examine the association of high levels of MF nonionizing radiation with risk of ADHD, we used the 90th percentile of the 24-hour measurements as the MF index, which reflects the MF nonionizing radiation level at or above which a participant was exposed for 10% of the time during the day. We had originally classified participating mother-child dyads into low or high MF nonionizing radiation exposure groups based on the experience of previous studies.2-4 However, we erroneously reported using a 1.3-mG cut point based on the 25th percentile of the MF index’s distribution. And we then conducted analyses with participants dichotomized to a low exposure level (those whose MF nonionizing radiation level was <1.3 mG) or a high exposure level (those whose MF nonionizing radiation level was ≥1.3 mG). These analyses led to the conclusions that “in utero exposure to high levels of MF nonionizing radiation was associated with an increased risk of ADHD, especially ADHD with immune-related comorbidity.”1

At the request of the editors, we have conducted new analyses based on continuous MF exposure levels as well as analyses based on categorical MF exposure levels, without using a cut point level. We have also conducted a dose-response analysis based on the categorical exposure levels with increased MF exposure levels being compared with the same reference group because a dose-response association is commonly examined in epidemiological studies.

With these new analyses, we continue to find in utero exposures to some, but not all, high levels of MF nonionizing radiation were associated with a higher risk of ADHD. However, the associations observed were inconsistent and nonlinear, limiting interpretations. Thus, changes are needed to the original article, including the following:

We removed the cut point–based results in the original Table 1 and replaced the data using mean (SD) based on continuous MF exposure levels. Tables 2 through 4, which previously reported findings based on dichotomous low and high MF exposure levels, have been replaced with findings from the

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analysis using continuous measure and categorical levels of MF exposure. We also replaced the eTable in Supplement 1 with similar analyses.

We have added an eFigure in Supplement 2 showing the findings of the dose-response analysis between MF exposure in quintiles of mother-child dyads and the risk of ADHD. In addition, we have replaced the original dichotomized Kaplan-Meier survival curve with categorical Kaplan-Meier survival curves for multiple maternal exposure levels.

Finally, we have added to the Discussion section the following limitations: "no corrections were made for multiple comparisons and for many of the significant associations observed among children with ADHD and concurrent immune-related comorbidities, the CIs were wide, indicating that these findings should be interpreted with caution."

On behalf of my coauthors, I apologize for any confusion this has caused readers and have requested that the original article be retracted and replaced with a corrected version. The corrections affect the Abstract, text, Tables, Figure, and Supplement 1. The replacement article includes new supplements with a copy of the original article with the errors highlighted and another copy with the corrections highlighted.

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REFERENCE