

# Dental amalgam fillings and the use of technological devices as an environmental factor: Updating the cumulative mercury exposure-based hypothesis of autism

Dear Editor,

The molecular basis of autism spectrum disorders (ASD) still remains obscure and little is known about the specific gene-environment interactions that may increase the prevalence of the disorder.<sup>[1,2]</sup> There has been a lot of controversy in the past regarding the association of thimerosal, mercury (Hg)-containing preservative in vaccines, and the increased probability of developing autism among children. With the lack of information concerning amalgam hazards, it has been suggested that the traces of Hg found in dental fillings could be considered safe; however, this may not be true since the link between Hg exposure and autism also needs to include the individual's susceptibility. In 2011, as a more consensual theory, we alternatively proposed the "cumulative Hg exposure-based hypothesis" which considers not only one but the total contribution of different environmental sources of this element, such as (i) maternal amalgam fillings, (ii) pollution, (iii) food, and also (iv) thimerosal-preserved vaccines together with a genetic/biochemical susceptibility to remove Hg from the body.<sup>[3]</sup>

Common technological devices (e.g., mobile phones, mobile base stations, and magnetic resonance imaging machines and other wireless devices) produce electromagnetic fields (EMFs). Neurobehavioral and neurodevelopmental symptoms such as retarded memory, learning, cognition, and attention have been attributed to EMF exposure.<sup>[4]</sup> Of note, these symptoms are also attributed to ASD and attention deficit hyperactivity disorders. A recent *in vivo* study observed autism-relevant social abnormalities in mice exposed to extremely low-frequency EMFs during perinatal development.<sup>[5]</sup> This may indicate a potential direct link between EMFs and the prevalence of autism in specific window/s of vulnerability that would deserve further investigation. An indirect link might be also plausible since high-field magnetic resonance and microwave radiation emitted by common mobile phones have been reported to increase the release

of mercury from dental amalgam fillings.<sup>[6,7]</sup> These recent evidence (2014), far from being conflictive, is consistent with our previous cumulative Hg exposure-based hypothesis of ASD (2011) and could be included as the fifth (v) additional environmental factor, synergistically contributing to the release of Hg in mothers with dental amalgam fillings, and increasing the probability of developing and/or aggravating autism among children. Nevertheless, this updated version of our hypothesis would require more extensive clinical confirmation and supporting evidence.

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## Conflicts of interest

There are no conflicts of interest.

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