



Dental metal-induced innate reactivity in keratinocytes



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ABSTRACT

In their paper that is published in *Toxicology in Vitro*, Rachmawati et al. have recently claimed that in spite of the growing concern about the safety of amalgam, negative reports about the health effects of dental amalgam are still scarce or controversial. Substantial evidence indicates that mercury release from dental amalgam fillings may adversely affect human health. Over the past years, we have shown that exposure to electromagnetic fields (EMFs) can increase the release of mercury from dental amalgam fillings. It is worth mentioning that the results of investigations on the microleakage of amalgam fillings following MRI have confirmed our results. Furthermore, exposure to X-rays as a part of the electromagnetic spectrum has also been linked to increased mercury release from dental amalgam fillings. Considering the explosive rise in human exposure to electromagnetic fields, the role of human exposure to EMF as a key factor in increasing the release of mercury from dental amalgam restorations cannot be simply ignored.

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Dessy Rachmawati et al. (2015) have recently published a paper entitled “Dental metal induced innate reactivity in keratinocytes” (*Toxicology in Vitro*, 2015, <http://dx.doi.org/10.1016/j.tiv.2015.10.003>). These authors have explored the potential of distinct metals, frequently used in dental applications, including gold, nickel, copper and mercury to activate the innate immune pathway in keratinocytes. As the authors of this paper stated, recent years have witnessed a global growing concern regarding the safety of dental amalgam fillings “The use of mercury-based amalgam for material fillings in dentistry has declined over recent years due to its potential negative health effects”. However, we cannot agree to the authors’ claim that “Yet, negative reports are still scarce or disputed, and certainly in developing countries amalgam fillings are still widely being used nowadays”. In contrast with what is claimed by the authors, now substantial evidence indicates that mercury release from dental amalgam filling adversely affects human health (Bailer et al., 2001; Mutter et al., 2005; Bellinger et al., 2006; Geier et al., 2009; Martinez et al., 2014; Obrenovich et al., 2015).

We have previously shown that exposure to MRI and electromagnetic fields (EMFs) emitted by mobile phones can increase the release of mercury from dental amalgam fillings (Mortazavi et al., 2008; Mortazavi et al., 2014a, 2014b; Mortazavi and Mortazavi, in press). In

2008, we showed that the mercury concentrations of saliva samples of the patients after MRI were significantly higher than those of before MRI. Furthermore, the mean urinary mercury concentrations of the students who used mobile phones were higher than those of the controls after 1, 2, 3 and 4 days after restoration (Mortazavi et al., 2008). Recently, we conducted another study to investigate the effect of high-field MRI on the release of mercury from amalgam restorations. In this study, students with identical tooth decays who required a similar pattern of restorative dentistry were divided into MRI exposure (magnetic flux density of 1.5 T) and controls. In this experiment, urinary mercury levels in MRI-exposed individuals increased linearly from a baseline value of 20.70 ± 17.96 to 24.83 ± 22.91 $\mu\text{g/L}$ 72 h after MRI, while in the control group, the concentration decreased linearly from 20.70 ± 19.77 to 16.14 ± 20.05 $\mu\text{g/L}$. The difference between the concentrations of mercury in the MRI exposed and control group, 72 h after imaging was statistically significant (Mortazavi et al., 2014a, 2014b).

Furthermore, the results of investigations on the microleakage of amalgam fillings following MRI have confirmed our results (Yilmaz and Misirlioğlu, 2013; Shahidi et al., 2014). Exposure to X-ray as a part of the electromagnetic spectrum has also been linked to increased mercury release from dental amalgam fillings (Kursun et al., 2014). It is worth mentioning that due to the explosive rise in human exposure to electromagnetic fields (Fiocchi et al., 2014; Sadetzki et al., 2014; Urbinello et al., 2014; Tang et al., 2015; Zhang et al., 2015), the role of human exposure to EMF as a key factor in enhancing the release of mercury from dental amalgam restorations cannot be ignored.

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Furthermore, in Section 2.7 of the article, there is a controversy over the unit of concentration of the metal exposure.

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