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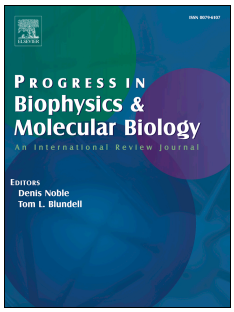


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PII: S0079-6107(17)30082-2

DOI: 10.1016/j.pbiomolbio.2018.02.001

Reference: JPBM 1317

To appear in: *Progress in Biophysics and Molecular Biology*

Received Date: 17 April 2017

Revised Date: 2 December 2017

Accepted Date: 4 February 2018

Please cite this article as: Lan, J.Q., Liang, X., Hong, T., Du, G.H., On the effects of glasses on the SAR in human head resulting from wireless eyewear devices at phone call state, *Progress in Biophysics and Molecular Biology* (2018), doi: 10.1016/j.pbiomolbio.2018.02.001.

# On the effects of glasses on the SAR in human head resulting from wireless eyewear devices at phone call state

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**Abstract:**

This paper evaluates the effects of glasses on the specific absorption rates (SAR) in the human head resulting from wireless eyewear device at phone call state. We mainly concentrate on the SAR in the eyes since their sensitivity to electromagnetic fields (EMF). We find wearing glasses obviously alters the distribution and magnitude of the SAR. The maximal SAR in the ocular tissues with glasses is even 6 times more than that without glasses. Wearing glasses also induce the new hotspot in the eyes which may cause the biggest SAR increment in the ocular tissues. Moreover, calculated results indicate that the maximal SAR is sensitive to the size of glasses and radiation frequency. Because of this，we believe wearing glasses may possibly increase the risk of health hazard to eyes of wireless eyewear device user. These calculated results could be a valuable reference for the glasses designer to reduce the SAR in the eyes.

**Keywords:** SAR; wireless eyewear device; FDTD; eyes; Glasses; phone

## 1. Introduction

The widespread use of mobile phone has lead to strong public concern whether it is harmful to human health. According to the research report from International Agency for Research on Cancer (IARC), radiation from mobile phone may possibly increase the risk of getting glioma and acoustic neuroma (IARC, 2011). For this reason, although safety standards such as IEEE C95.1:2005(IEEE Standard for Safety, 2010) and ICNIRP( Ahlbom et al., 1998), have been established, they are not entirely reliable. SAR is usually used to evaluate the interaction between EMF and biological tissue, which depends not only on the EMF including radiation frequency, field strength, polarization and etc, but also the geometry and material property of biological tissues. There are many valuable researches(Yoshida et al., 2005; Manapati and Kshetrimayum, 2009; Wake et al., 2009; Hossain et al., 2015; Anzaldi et al., 2007; Beard et al., 2006; Chandupatla et al., 2006; Pisa et al., 2005; Schiavoni et al., 2000; Van et al., 1999; Scott, 1988; Cabedo et al.,