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Mobile phone specific radiation disturbs cytokinesis and causes cell death but not acute chromosomal damage in buccal cells: Results of a controlled human intervention study

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Abstract

Several human studies indicate that mobile phone specific electromagnetic fields may cause cancer in humans but the underlying molecular mechanisms are currently not known. Studies concerning chromosomal damage (which is causally related to cancer induction) are controversial and those addressing this issue in mobile phone users are based on the use of questionnaires to assess the exposure. We realized the first human intervention trial in which chromosomal damage and acute toxic effects were studied under controlled conditions. The participants were exposed via headsets at one randomly assigned side of the head to low and high doses of a UMTS signal (n = 20, to 0.1 W/kg and n = 21 to 1.6 W/kg Specific Absorption Rate) for 2 h on 5 consecutive days. Before and three weeks after the exposure, buccal cells were collected from both cheeks and micronuclei (MN, which are formed as a consequence of structural and numerical chromosomal aberrations) and other nuclear anomalies reflecting mitotic disturbance and acute cytotoxic effects were scored. We found no evidence for induction of MN and of nuclear buds which are caused by gene amplifications, but a significant increase of binucleated cells which are formed as a consequence of disturbed cell divisions, and of karyolitic cells, which are indicative for cell death. No such effects were seen in cells from the less exposed side. Our findings indicate that mobile phone specific high frequency electromagnetic fields do not cause acute chromosomal damage in oral mucosa cells under the present experimental conditions. However, we found clear evidence for disturbance of the cell cycle and cytotoxicity. These effects may play a causal role in the induction of adverse long term health effects in humans.

Keywords: Buccal cells; Cell phone radiation exposure; Micronucleus; Nuclear anomalies.

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