Chromosomal studies of human amniotic cells exposed to GSM-900: karyotyping and FISH.

C. Yardin[1], Bourthoumieu[2], P. Leveque[3], A. Collin[4]

[1]Department of Histology, Cellular Biology and Cytogenetics, EA3842, Univ./ CHU 87042 Limoges Cedex, France. catherine.yardin@unilim.fr,

[2]sylvie.bourthoumieu@unilim.fr

[3]XLIM Department OSA, UMR CNRS 6172, Faculty of sciences, 87060 Limoges Cedex, France, leveque@unilim.fr,

[4]alicecollin3@gmail.com

Abstract

The possible effects of radiofrequency (RF) exposure on the genetic material of cells are very important to determine since DNA damage of somatic cells may be linked to cancer development. The first objective of our studies was to study the complete R-banded karyotype of cultured human amniotic cells exposed to RF similar to those emitted by mobile phones of second generation (GSM). Our second objective was to investigate whether the GSM-exposure may induce aneuploidy by FISH (Fluorescent in Situ Hybridization) using the same probes as those used by Mashevich et al. (2003) and Mazor et al. (2008).

1. Introduction

Since DNA damage of somatic cells may be linked to cancer development, the effects of radiofrequency (RF) exposure on the genetic material of cells are considered as very important to determine. One of our objectives was to investigate whether the exposure to radiofrequency radiation similar to those emitted by mobile phones of second generation standard Global System for Mobile communication (GSM) induces genotoxic effects in cultured human amniotic cells by studying the complete R-banded karyotype. This assay allows visualizing all the chromosomal rearrangements, either numerical or structural. To the best of our knowledge, karyotyping has never been performed before in this area of research. Furthermore Mashevich et al. in 2003 [1] and Mazor et al. in 2008 [2] found an increase in the rate of aneuploidies in human lymphocytes exposed to radiofrequencies using FISH (Fluorescent in Situ Hybridization). Secondly, our objective was then to investigate whether the GSM-exposure may induce aneuploidy in cultured human cells by FISH using the same probes as those used by the pre-cited authors.

2. Materials and methods

All the exposures were carried out in wire-patch cell (WPC) under strictly controlled conditions of temperature. i) At first the cytogenetic effects of GSM-900 MHz radiofrequency (GSM-900) were investigated using R-banded karyotype after *in vitro* exposure of human cells (amniotic cells) for 24 h. The average-specific absorption rate (SAR) was 0.25 W/kg. The genotoxic effect was assessed immediately or 24 h after exposure from four different samples. One hundred metaphase cells were analysed per assay. Positive controls were provided by using bleomycin. ii) Secondly the rate of aneuploidy of chromosomes 11 and 17 was determined by interphase FISH immediately after independent 24 h-exposure of amniotic cells providing from three different donors to SAR of 0.25, 1, 2 and 4 W/kg in the temperature range of 36.3-39.7°C. At least one hundred interphase cells were analyzed per assay.

3. Results

According to our results, no direct cytogenetic effect (either numerical or structural) of GSM-900 was found (either 0 h or 24 h post exposure). In the same way, no significant change in the rate of aneuploidy of chromosomes 11 and 17 was observed following exposure to GSM-900 for 24 h at average SAR up to 4 W/kg.

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4. Conclusion

In our experimental conditions, the results showed that neither *in vitro* aneuploidogenic (karyotyping and FISH) nor induction of structural aberrations (karyotyping) occured in embryonic cells exposed *in vitro* to GSM-900 for 24h (SAR up to 4W/kg).

5. References

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