

# INVESTIGATIONS ON THE MUTAGENICITY OF 1800 MHZ GSM- AND UMTS-ELECTROMAGNETIC FIELDS WITH THE *TRADESCANTIA* MICRONUCLEUS BIOASSAY

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**Abstract:** The Tradescantia micronucleus bioassay (Trad-MCN) is used to detect possible mutagenic effects of mobile phone electromagnetic fields. Endpoint of the bioassay is the number of micronuclei (MCN) in the meiotic pollen mother cells of the plants. Different characteristics of electromagnetic fields (frequency, intensity, modulation, polarisation) will be tested in several experiments. Potential mutagenic effects of electromagnetic fields are of great relevance to all organisms.

## 1. Introduction

Investigations of mutagenic effects of electromagnetic fields on organisms show contradictory results [1]. Rapid increases in the applications of electromagnetic fields produce a need to clarify their potential effects.

The Tradescantia micronucleus bioassay (Trad-MCN) is commonly used for the detection of genotoxicity of environmental pollutants [2,3]. This biological test system is very sensitive, easy to use and can be applied in laboratory and the field.

We have used the Trad-MCN test for several years to investigate the effect of electromagnetic fields on organisms (see for instance [4]).

## 2. Objectives

The Trad-MCN will be used to detect possible mutagenic effects of mobile phone electromagnetic fields (both GSM and UMTS) in laboratory studies. The study will provide information about the mutagenic potential of these fields. Effects will be linked to different characteristics of the electromagnetic fields.

## 3. Methods

Several series of experiments under well-defined laboratory conditions are planned. A special exposure unit is constructed which allows to generate electromagnetic fields of different frequencies (0.9 and 2.1 GHz), intensities (in the order of magnitude of the exposure limits), modulations (unmodulated, GSM and UMTS signals) and polarisations (vertical and horizontal).

The Tradescantia-plants (clone #4430) are cut in the nursery where a background probe is fixed. The plant cuttings were exposed in the exposure unit for 30 h, fixed and analysed. A negative and a positive control (maleic hydrazide is known to induce mutagenic effects [2]) are placed in a Faraday cage.

The endpoint of this test is the number of micronuclei (MCN) in the pollen mother cells. These MCN are a result of chromo-

somal damage during the meiosis. The increase in frequency of MCN is the indicator of mutagenicity.

A total of 20 experiments is planned.

## 4. Perspectives

Potential mutagenic effects of electromagnetic fields are of great relevance to all organisms. The application of the sensitive Trad-MCN allows an early recognition of such effects. The short duration of one experiment permits to screen the effect of different characteristics of electromagnetic fields in a relative short time. The clarity of the Trad-MCN bioassay simplifies the transfer of scientific results to the public. This investigation helps to de-emotionalize the public discussion and to increase the knowledge of the effects of magnetic field on organisms.

## 5. References

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