

# **Reducing the In-Vitro Electromagnetic Field Effect of Cellular Phones on Human DNA and the Intensity of Their Emitted Radiation**

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## **ABSTRACT:**

Several studies have demonstrated detrimental effects of cellular phone radiation on in-vitro biological systems. This article introduces a novel *in-vitro* method for demonstrating conformational changes in human DNA induced by a 5 minute exposure to cellular phone radiation emitted by an actual contemporary cellular phone. Dynamic changes in DNA conformation was determined in real-time by measuring the rate of DNA rewinding (in a spectrophotometer) following exposure to heat which causes the unwinding of the two strands of the helix. Cellular phone radiation produced a 40% increase in the rate of DNA rewinding. This effect was 95% attenuated when the experiment was repeated with the same cellular phone to which was attached a commercially available shielding disk shaped sheet containing a paramagnetic mineral. In a separate series of experiments the intensity of the cellular phone radiation was measured using an electromagnetic frequency spectrum analyzer. The intensity was reduced by approximately 50% in the presence of the shielding disk. Taken together these studies indicate the efficacy of a shielding disk to protect the body from cellular phone radiation.

**Key Words:** Cellular phones; EM radiation; DNA rewinding; DNA conformation; EM shielding device

## **INTRODUCTION**

While there is growing evidence that many types of electromagnetic (EM) energies such as those involved in bone healing, wound healing and pain relief have beneficial effects on the body, other types of EM fields are harmful to the body. UV light for example is well known to cause skin cancer (melanoma) [1]. The science behind these phenomena is being studied within the emerging field of Bioelectromagnetics which now makes

recommendations to the public regarding public safety. Original epidemiological studies demonstrated an increase incidence in respiratory tract cancer in US Navy personnel exposed to occupational microwave exposure [2]. Animal studies then demonstrated that microwaves and radiofrequency EM fields are also co-carcinogenic since they increase chemically induced skin cancer [3]. Cellular studies have verified that these carcinogenic effects are mediated by DNA since relatively weak EM fields increase DNA synthesis [4] and can modulate DNA repair [5]. Most definitive were studies demonstrating that electric fields could break or nick DNA strands [6], a phenomenon known to be associated with cancer [7]. Then these studies were extended to EM fields generated from common household devices like microwave ovens and computers which were also shown to be carcinogenic [8, 9]. It wasn't long until cellular phones were added to the list when it was discovered that they increased specific oncogenes known to promote cancer [8, 9]. Further elucidation of the role of DNA in EM field induced cancers came from Russian scientists who measured changes in the secondary structure (conformation) of DNA [10]. Since these carcinogenic effects of EM fields were exacerbated by repeated and prolonged exposure [8, 9] and occurred at relatively low EM field strengths, the safety of the public at large became a real concern.

By this point, scientists had figured the experimental resonance conditions required to reproduce these harmful biological effects [11]. Fortunately one of these experimental variables, the strength of the geomagnetic field at the time of the experiments, turned out to have a surprising effect. It was discovered (using nerve cells in tissue culture) that DC magnetic fields could interact with the offending radiofrequency fields and actually cancel out their detrimental effects [12]. The interference or neutralization of harmful bio-effects was subsequently confirmed and extended to include not only DC magnetic fields but all magnetic fields which are temporally incoherent and function as noise [13].

The present study measured the effects of cellular phone radiation on DNA conformation *in-vitro* and measured the intensity of the radiation emitted by cellular phones. DNA conformation was measured using classical biochemical renaturation techniques [14] as a measure of DNA rewinding. The intensity of cellular phone radiation was measured using a spectrum analyzer. The results demonstrate that cellular phone radiation speeds up DNA rewinding and that this effect is prevented when a commercially available shielding disk is placed in the presence of the cellular phone radiation. A second series of experiments demonstrated that this same shielding disk also reduced the intensity of radiation emitted from cellular phones.

## MATERIALS AND METHODS

### Experimental Design

In the first series of experiments, conformational changes in human DNA were measured in this study by monitoring rewinding in real-time. The procedure involved measuring the recovery of DNA after heat exposure known to unwind (denature) the two strands of the double-helix. Within 10 minutes after heating, the DNA quickly recovers by rewinding back to its original intact helical conformation [14] (Figure 1). The rewinding process can be monitored by measuring the absorption of light by chromophores in the DNA strands. Control experiments were conducted first in ambient EM fields. Then