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**Biochemistry**

**Evaluating the cytotoxicity of Electromagnetic Wavelengths emitted by Cell Phones and Wi-Fi on HEK-293 cells**

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Cell phones and Wi-Fi routers have become an invaluable part of people's lives around the globe. As of 2014, the United States had more than 327.5 million cell phone subscribers. With a population of only 325 million, over 90% of people in the United States have at least one or more cellphones. As cell phone and Wi-Fi users steadily increase, many have begun to question the safety of these tiny yet powerful machines. The main concern involving devices like these is the radiofrequency electromagnetic radiation (RF-EMR) they emit. Mobile phones today emit anywhere between 450 and 2700 MHz (Isabona and Srivastava 2017), while Wi-Fi routers can go up to 5000 MHz (5 GHz).

Along with the FDA's Radiation Control provisions efforts, many researchers in the scientific community have attempted to assess the cytotoxicity of RF-EMR emitted by cellphone and Wi-Fi. The purpose of this experiment is to see if the electromagnetic radiation similar to the amounts emitted by cell phones and Wi-Fi routers could have cytotoxic effects on HEK-293, a neuron-like cell. In this study, the effect of RF-EMR is evaluated on the cellular viability and cell growth. The HEK-293 cells were grown in an incubator that mirrored human physiological conditions. They were treated with RF-EMR for 24 hours and then given 24 hours to recover. The cells then were counted and the cellular viability was accessed using a MTT, a colorimetric assay.

Radio frequency electromagnetic radiation of 2.5 and 2.0 GHz affected the cell's ability to effectively replicate causing a decrease in the number of cells present in the dishes grown at these frequencies. There was a 21% decrease in cell number when comparing the treated vs. the untreated groups. The MTT assay (cellular viability) also reinforced this trend, with the treated group being less viable than the untreated group. RF-EMR of 1.5 GHz affected the cell in a converse way; it caused an increase in the number of cells present in the dishes grown at these frequencies and the MTT assay reinforced this trend. There was a 38% increase in cell number when comparing the treated vs. the untreated groups. The MTT assay (cellular viability) also reinforced this trend, with the treated group being less viable than the untreated group. Although some interesting data was found, there are still some unanswered question as to is what is happening to the treated cells on a molecular level. The research will be continuing throughout the school year in hopes to uncover the full molecular, cytotoxic effect of RF-EMR.