

# **CASE STUDY OF NORMAL AND HIGH GLUCOSE LADEN CELL RESPONSE TO CELLULAR PHONE RADIATION USING GTEM CELL**

Nattaphong Boriraksantikul

Dr. Naz E. Islam, Dissertation Supervisor

## **ABSTRACT**

The primary objective of this dissertation is twofold. First, to study the response of red and white blood cell and normal and high glucose blood to cellular phone radiation exposures at frequencies of 850 and 900 MHz. Secondly, to analysis the design and fabrications of an in-house GTEM cell. The simulation study of the GTEM cell was carried out by using the Computer Simulation Technology (CST) Microwave Studio 2011 software. The GTEM cell characterizations include the degree of uniformity of electromagnetic fields, voltage standing wave ration (VSWR) and return loss calculations. In the biological effects studies, the blood samples were placed at the testing area inside the GTEM cell operated at 850 and 900 MHz and at 2 W and 60 W power levels; the frequencies and power respectively represent radiations from a hand held cell phone and the cell phone tower.

The simulated return loss and the VSWR values cell from 0 to 4.0 GHz for the GTEM are  $> 10$  dB and  $< 2$ , respectively and provided perfect conditions for EM field exposures of experimental subjects. At 850 MHz statistical results on blood cell showed that there was only one significant change in red blood cell viability compared to the control, while there were five significant changes in the white blood cell viability. At 900 MHz exposure, the statistical results on the blood cell viability showed a significant difference in red blood cell viability when compared with the control samples.