



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jeongmin Shin</b>	<b>Project Number</b> <b>S1619</b>
<b>Project Title</b> <b>Biophysical Studies of Cytotoxic Effect of TiO(2) Nanoparticles on Human Cervical Carcinoma in vitro: Computational Stud</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The main objective is to demonstrate how deterministic mathematical modeling and Monte-Carlo stochastic technique can be used to model the dynamics of the growth and response to titanium dioxide nanoparticles of human cervical carcinoma. In Vitro.</p> <p><b>Methods/Materials</b> Implementing the monte carlo model and the cellular automaton method, the computer model was coded by using MATLAB. The algorithm itself involves seven kinds of species, six sets of equations, and various parameters.</p> <p><b>Results</b> The simulation results match those of the experiment as they both show the correlation between the titanium dioxide percentage and the quantitative and qualitative measures. Using data from the experiment, the model is highly reliable and presents an effective algorithm that models the phenomenon. The radius of the cell colony agrees with the observation obtained from the previous experiment and the roughness of the tumor cell shows the quality of the cell being reduced.</p> <p><b>Conclusions/Discussion</b> An interesting approach to cancer research, the particular model can be used for investigating the nature of titanium dioxide nanoparticles and cancer cells. The model is applicable for future use as it presents the experiment in a macroscopic scale, making it more attainable. Future research can be made by adjusting the parameters to illustrate another phenomenon that is similar to the model presented. Research can also be led on to derive specific mathematical formulas from the model presented. The works of this project are expected to show substantial impact in cancer research.</p>	
<b>Summary Statement</b> The project focuses on constructing a computer model from the results of an experiment that examines the anti-cancerous nature of titanium dioxide nanoparticles.	
<b>Help Received</b> Used lab at Mahidol University under the supervision of Dr. Wannapong Triampo; Participant in Knowledge Exchange Institute Program; Learned MATLAB under the supervision of the Biophysics group of Mahidol University	