CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
S1802

Project Title
Novel Nanotubes: New Agent for Photothermal Therapy for Cancer

Abstract

Objectives/Goals
The use of functionalized nanoparticles as a method for treating cancer has become increasingly popular. Nanoparticles circumvent problems traditional cancer therapies succumb to, such as nonspecific destruction of cells or drug resistance. As more and more agents are found to have the potential for photothermal ablation of cancer, it is clear that several key tradeoffs remain. For a molecular agent to effectively absorb energy to heat up and kill the cancer, it must have a large cross-sectional area. On the other side of the coin, a larger area means that the agent suffers from a decreased circulation time in the system. Single walled carbon nanotubes were thought to have solved this problem, being extremely long (200nm), but extraordinarily thin (2nm). Unfortunately, immense laser power is needed to kill the cells, making them unfeasible in a clinical setting. This project aims to validate the use of a novel molecule (carbon nanotubes conjugated to ICG) as a potential agent for photothermal therapy for cancer.

Methods/Materials
Thorough in-vitro experiments were conducted to fully investigate this molecule and its potential for photothermal therapy. In-vivo experiments were performed to further vet the potential applications for this agent.

Results
Results indicate that extensive cell death (~90%) occurs after a mere 15 minutes of irradiation at a low power density.

Conclusions/Discussion
The agent has the potential to be a viable photothermal agent.

Summary Statement
This project aims to test a novel photothermal agent for its potential use as a therapeutic drug.

Help Received
Used Lab Equipment at Stanford University under the supervision of Adam de la Zerda (graduate student).