

2008 TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Medicine and Health

**PROJECT : Remote Activated Chip-Based Drug
Release System Using Nanoparticles as
an Anti-Cancer Therapeutic**

AWARDS : Medicine and Health Second Award

SCHOOL : Herricks High School

FINALISTS : Sanchita Singal

COUNTRY : United States

ABSTRACT

The pharmaceutical industry is constantly searching for methods that allow drugs to be delivered as a direct response to a specific stimulus, in which the locus of delivery is in the vicinity of required region. A unique thermo-reversible hydrogel, F127 modified with dimethacrylate (DMA), that can deliver drugs at physiological temperatures was synthesized. Nanoparticles which are specific for targeting human body cancer cell were absorbed by this hydrogel. The toxicity of nanoparticles with different diameters and coating was measured using the MTT assay. It was found that nanoparticles with smaller diameters and folate coating were most toxic to the cancer cells. The release rate of the nanoparticles from the hydrogel was measured as a function of temperature with the hydrogel releasing approximately 3 μL nanoparticles per hour. Exposing this drug delivery system to cancer cells would effectively inhibit MCF7 cell proliferation. By grafting this nanoparticle-loaded hydrogel onto a thermoelectric module, the release of the drug would be controlled. Thus, a successful temperature sensitive hydrogel was synthesized that releases cancer-targeting nanoparticles which inhibit cancer cell proliferation, thereby engineering a controlled drug delivery system.

評語

- 1) It is a really good idea and the overall approaches should be patented.
- 2) Unfortunately, the real application (animal/human tricks) would be difficult.