

5th World Congress on **Cancer Therapy**

September 28-30, 2015 Atlanta, USA

Combining ultrasound and nanoparticle for cancer treatment

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We will present the concept and data for a cancer-specific treatment that combines ultrasound and nanoparticles to induce cytotoxicity in cancer cells relative to normal cells. Co-cultures of BEAS-2B normal lung cells and A549 cancerous lung cells labeled with green- and red-fluorescent proteins respectively, were treated with focused ultrasound beams with the addition of gold and magnetic nanoparticles. There were significantly more necrotic A549 cells than BEAS-2 cells when gold nanoparticles were added to the culture medium. This selective damage to cancer cells was also observed for MDA-MB231 breast cancer cells compared with MCF-10A normal breast cells after treatment with magnetic nanoparticles. The data obtained for different cell lines indicate that nanoparticle-assisted ultrasound therapy could be an effective new tool for cancer-specific treatment and could potentially be combined with conventional methods of cancer diagnosis and therapy to further increase the overall cancer cure rate.

Biography

Chung Hsuan Chen got his B.S. degree from Chemistry Department, National Taiwan University in 1969. He got his Ph. D in Chemical Physics from University of Chicago in 1974. Then, he went to Oak Ridge National Laboratory to become a research staff. In 1989, he became Group Leader of Photophysics. During his tenure at Oak Ridge National Lab, his major effort was placed on development of ultra-sensitive detection technology. They include the first detection of single atom and isotope-selective atom counting. He is also one of the pioneers in developing mass spectrometry for DNA analysis and sequencing. His recent research has focused on novel mass spectrometry technology developments including cell mass spectrometer, accelerator mass spectrometer and portable biomolecular mass spectrometer. In 2007, he was appointed as Director of Genomics Research Center in Academia Sinica. He also has adjunct professor appointment at Chemistry Department, National Taiwan University. He has published more than ~250 papers in referred journals. He obtained 3 R&D-100 (100 top inventions in the year worldwide) awards. He was elected as Fellow of American Physical Society in 1993, and AAAS in 2009 due to his contribution on ultrasensitive detection technology development. He was elected as Academician of Academia Sinica in 2010.

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