H446 cell growth inhibition by sonodynamic therapy using DVDMS

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BACKGROUND:Sonodynamic therapy (SDT),which was developed from photodynamic therapy (PDT), is a relatively new and promising approach for cancer treatment.Use of ultrasound has the advantage of being noninvasive, with deep-penetration properties, and convenient because of the low or no sensitivity of sonosensitizers to light. A sonosensitizer is a key component in the process of SDT. Recently, a novel photosensitizer, sinoporphyrin sodium (DVDMS), which has gained China’s independent intellectual property. This sensitizer has shown which was preferentially accumulated in tumor tissues, was metabolized quickly in normal tissues and displayed slight skin phototoxicity. The antitumor effects of ultrasound combined with DVDMS treatment were studied by measuring changes in H446-small cell lung cancer cells.

HYPOTHESIS: We hypothsis that ROS(Reactive Oxygen Species) was generated by SDT with DVDMS and damaged H446 cells, resulting in necrosis and prevention of tumor growth. This noninvasive treatment with no adverse effects such as skin sensitivity is therefore promising for therapy of cancers located deep within patients.

METHODS: In order to determine the the optimum timing and concentration of DVDMS, CCK-8 was used. DCFH-DA staining was used to detect the generation of ROS after SDT with DVDMS. An annexin V-PI apoptosis detection kit was used for necrosis analysis. Mitochondrial membrane potential was measured by fluorescence microscope. ROS scavenger(NAC) was used to reduce the ROS.

RESULT: In our study, the optimum timing and concentration of DVDMS was 3 hours and 4 umol/L in H446 cells. The ROS was generated by SDT with DVDMS and reached the peak at 2hours after SDT ,then slowly attenuated. Increse of mitochondrial membrane potential was found using Mitochondrial membrane potential kit with JC-1.Administration of the NAC

suppressed DVDMS-SDT-indued necrosis and the mitochondrial membrane potential, which confirmed that the DVDMS-SDT-indued H446 cells necrosis is through the generation of ROS.