

Medical/healthcare & biotechnology

Central Research Laboratory
Medical Systems Research Department.

Hitachi, Ltd., web site [12th Oct 2010 News Release] <http://www.hitachi.com/New/cnews/101012a.htm>

Development of a tumor tissue necrotizing technology using nano-sized droplets and ultrasound



Prototype ultrasonic wave transducer

Tumor tissue necrotizing technology using nano-sized droplets (nano-droplets) was developed. This technology reduces the ultrasound intensity required to cause necrosis to about one-tenth that of conventional technique.

Nano-droplets are able to reach the tumor tissue region due to their small size. Upon application of an ultrasound pulse, they turn into micron-sized bubbles (microbubbles), which enhance contrast of the tumor tissue. A continuous ultrasonic wave is then applied to necrotize the tumor tissue. It was confirmed that in addition to the microbubble-enhanced ultrasound thermal effect, the mechanical interaction between the microbubbles and ultrasonic pulse induced necrotization of the tissue.

■ Features of the technology developed

As the technology allows the microbubble state to be maintained for over 10 second, a amount of tissue can be necrotized with a single shot of continuous ultrasound wave, leading to shorter treatment time. Further, as the tissue necrosis effect is enhanced by the presence of the generated microbubbles, the duration of the ultrasonic pulse is can be reduced and the ultrasonic pulse intensity can be reduced to one-tenth that of conventional methods.

■ Future directions

Additional research will be conducted to enhance the accuracy and reliability of this technology.

■ Conference presentation

This study was presented at the 2010 IEEE International Ultrasonics Symposium (IUS), held from 11th-14th October 2010 in San Diego, California, U.S.A.

■ A word from the development team

We aim to establish a technology using nano-droplets and ultrasound which can be used in continuum from diagnostics to treatment.