Induction and enhancement of ultrasonic bioeffects

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Ultrasound has a few different kinds of bioeffects. Its heating effect arising from ultrasonic absorption by tissue has been clinically used in HIFU (high-intensity focused ultrasound) coagulation treatment for about a decade. In the existence of microbubbles, whether they may be ultrasonically generated or hypodermically injected, the ultrasonic particle velocity in tissue is multiplied by orders of magnitude, resulting in the induction and strong enhancement of ultrasonic bioeffects. Material transportation in tissue can greatly be enhanced. DNA can be transfected into cells by sonoporation. Tissue can be mechanically destroyed and emulsified. Even the heating effect can greatly be enhanced. Violent collapse of microbubbles can initiate sonochemical reactions generating highly active species. The induction and enhancement of such bioeffects and their medical application will be discussed in this session.

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