Entering the Age of Simultaneous Diagnosis and Treatment by Using Low-Intensity Ultrasound Energy

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Although Japan is among the countries with the longest life expectancies in the world, we have reached an age in which malignant tumors develop in approximately 1 of every 2 people, with approximately 1 in 3 people dying of malignant tumors. While Japan is a developed country, the percentage of deaths from cancer is high internationally and we are in a situation, which urgently requires further review of anti-cancer strategies and development of new cancer treatments. In recent years, research on the usage of ultrasound for cancer treatment has developed and while High Intensity Focused Ultrasound (HIFU, FUS) has already been clinically applied to several types of cancers, it is not yet considered as an established treatment. On the other hand, studies using ultrasound energy for cancer treatment have advanced, thus revealing the enhancement of drug effects by employing low-intensity ultrasound. Furthermore, anti-angiogenesis against tumors is now attracting attention as a new cancer treatment. Therefore, our research focused on the biological effects and the enhancement of drug effects brought by this low-intensity ultrasound energy and reported on the efficacy against a uterine sarcoma model, revealing it as an important biological effect that can be applied to cancer treatment. Results supporting apoptosis induction were also obtained in our study using a uterine sarcoma model, revealing it as an important biological effect, together with the enhancement effect of drug penetration in our method. Based on research achievements in recent years, we predict that the current diagnostic device for color Doppler ultrasound imaging will be improved in the near future, bringing with it the arrival of an age of "low-intensity ultrasound treatment that simultaneously enables diagnosis and treatment of cancer in real time."

References

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