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Targeting cells with ultrasound: from theory to reality

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A major limitation in current treatment of cancer is the inability to deliver enough of the therapeutic load to the target location, i.e., the tumour. Simply increasing the amount of therapeutic agent results in systemic toxicity, hence is not an option. In an aim to solve this problem, numerous targeted therapies are being developed; <<sonoporation>> being one of these techniques.
Sonoporation is the use of ultrasound and microbubbles to enhance the delivery and/or efficacy of a therapeutic agent in a targeted location.

The work presented here will cover the concept of sonoporation, from mechanistic studies, in-vitro evaluation and optimisation, pre-clinical work, and the results from the world first clinical trial using sonoporation to treat patient with pancreatic ductal adenocarcinoma.

To date our results show that low-intensity ultrasound has the ability improve the therapeutic efficacy from in-vitro all the way into clinical trials where patient survival was doubled. Nevertheless, this field is only in its infancy requiring substantial research to fully understand the biological interactions and further improve its efficacy.