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## Histotripsy

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High Intensity Focused Ultrasound (HIFU) is a non-invasive ultrasound technique which has been used to thermally necrose solid tumours without disruption to surrounding tissue. In recent years, an alternative HIFU technique to thermal ablation has been developed. This is known as mechanical tissue fractionation or histotripsy. Acoustic peak positive and negative pressures at the HIFU focus used in histotripsy are comparable to those in the shockwaves used in lithotripsy for kidney stone fragmentation. In histotripsy, there are two different methods of creating pure mechanical damage of soft tissue by (a) pulsed ultrasound cavitation (i.e., Cavitation cloud based histotripsy) or (b) shock wave heating and millisecond boiling (i.e., Boiling histotripsy, Pressure-modulated shockwave histotripsy). A well-defined lesion in the form of a cavity can be produced by histotripsy without any significant thermal damage at the periphery of the cavity. In boiling histotripsy, shockwave heating enables a boiling vapour bubble to be induced at the HIFU focus. Further interaction of incoming shockwaves with this bubble then leads to the generation of cavitation clouds which appear between the HIFU source and the bubble (i.e., shock scattering effect). Pressure-modulated shockwave histotripsy uses a pressure modulated HIFU pulse to control the dynamics of boiling bubbles which initially formed by shockwave heating resulting in the creation of a smaller lesion in the shape of an oval-like than a typical tadpole shaped lesion produced by boiling histotripsy.