Method and apparatus for generating a steerable and non-axisymmetric pressure field in a shock wave lithotripter

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Publication(s)

External Link(s)

- From the lab of Pei Zhong

Unmet Need

A lithotripter is a device used to noninvasively break up kidney stones using electromagnetic shock waves in a water bath. Lithotripters provide an advantage over surgical means by allowing for stones to be broken into smaller pieces and pass into urine. Lithotripters with broader bean sizes have been shown to be better for stone fragmentation which can be attributed to several factors, including difficulty in stone alignment with the beam in more narrow beam devices. Thus, broadening of the transverse beam can benefit stone fragmentation efficiency. However, beam width is severely limited by the simultaneous increase in the longitudinal beam size as well as in clinical side effects since the longitudinal beam determines pressure and amplitude at the patient’s flank and correlates with discomfort and skin lesions at the shock wave entrance/exit sites. No practical methods have been developed to solve this problem up to now.

Technology

This invention is design and methods to produce a steerable and nonaxisymmetric focused pressure field in a shock wave lithotripter. This is achieved by providing an acoustic barrier which can selectively block a portion of the shock wave generated by the shock wave source such that the substantially axisymmetric pressure field is transformed into a modified acoustic pressure field.

Advantages

- This new and unique characteristic in a shock wave lithotripter can be used to improve stone fragmentation while reducing tissue injury at the shock wave entry/exit site.
- This invention allows for enlargement of the effective transverse beam size without increasing the longitudinal beam size.