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**Short- and long-delay tandem shock waves for application in  
medicine**

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Long-delay tandem shock waves with an inter-pulse delay between about 200 and 500 microseconds have shown to enhance fragmentation of artificial kidney stones during in vitro and in vivo extracorporeal shock wave lithotripsy (SWL) in the past. Cell-permeabilization and inactivation of bacteria using tandem shock waves have also been proposed. The purpose of this research was to study the influence of short-delay (less than 50 microseconds) tandem shock waves on cavitation induced damage to kidney stones during SWL. A multipurpose piezoelectric shock wave generator was designed to generate shock waves at variable delays. The effect of short- and long-delay dual-pulse shock waves on the surface of artificial kidney stones was evaluated by microscopy. An adequate selection of delays was possible by means of a numerical model and high speed photography. Stone fragmentation was compared to that of standard (single-pulse) shock waves. Our results indicate that specific combinations of short- and long-delay tandem shock waves could improve damage to kidney stones by acoustic cavitation.