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The effect of fat, muscle and kidney on stone fragmentation by shockwave lithotripsy: An *in vitro* study

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Background: Skin-to-stone distance (SSD) has been shown to influence the outcome of SWL. SSD is composed of different tissues including the subcutaneous fat, abdominal muscles and renal tissue. The aim of this *in vitro* study was to investigate the effectiveness of extracorporeal shockwaves to fragment standard stones after passing through these tissue media.

Methods: Standard stones (Dornier's artificial model stones) were exposed to similar-intensity shockwaves which had to pass through different media before fragmenting the stones. The media which were placed in a special container between the stones and the lithotripter head, included: saline ($n=5$), pure liquid animal fat ($n=6$) and animal fatty tissue ($n=6$), muscle ($n=6$) and kidney tissue ($n=6$). The number of shockwaves and energy required to completely fragment the stones were measured.

Results: There was no significant difference in the number of shockwaves required to completely fragment the stones when using pure liquid animal fat, animal fatty tissue, muscle or kidney tissue (19908 ± 3447 , 21255 ± 4051 , 22845 ± 3964 and 19648 ± 3691 , respectively). However, when saline was used, the number of shockwaves were lower than in the other 4 media (5866 ± 1018 , $P<0.001$ for all the media). The total energy required in each media followed the same trend.

Conclusions: The findings of his study indicated that the shockwaves had the same effectiveness in fragmenting stones whether they pass through the fatty or non-fatty tissues (muscle and kidney) which compose the SSD.

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