Editorial Comment on: The Impact of Dust and Confinement on Fragmentation of Kidney Stones by Shockwave Lithotripsy in Tissue Phantoms by Randad et al.

(From: Randad A, Ahn J, Bailey MR, et al. J Endourol 2019;33:400–406; DOI: 10.1089/end.2018.0516)

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THE DEVIL IS in the details. The authors of this carefully designed study demonstrate that the presence of stone dust (i.e., submillimeter debris), although would not theoretically affect the shockwave transmission, could dramatically influence the treatment outcome of extracorporeal shockwave lithotripsy (SWL). Using plaster stones that generate copiously dust vs calcite stones that create little dust, stone comminution was found to be greatly reduced in the dust-confined calix model, but not in the open calix or mesh model. Moreover, flushing the kidney phantom at the physiologic flow rate does not help, yet dispersing dust at a flow rate an order of magnitude higher will improve stone fragmentation. It was hypothesized that a dust cloud in the fluid near the stone surface might harbor cavitation nuclei and increase residual bubbles that dampen shockwave transmission, leading to reduced treatment efficiency.

These interesting findings and results from previous work¹ suggest that *in vitro* studies should be carefully conducted using appropriate phantoms to mimic clinical SWL. Further studies are warranted to assess the effects of dust produced by kidney stones of various composition and size, and under different energy settings and pulse rates. Ultimately, optimal control of cavitation in SWL² may hold one of the keys to producing maximum stone fragmentation with minimal adverse effects. More importantly, this study serves as an excellent reminder that after decades of clinical use, there is still valuable research in SWL that needs to be carried out meticulously to improve the safety and efficiency of this noninvasive and widely used modality for kidney stone patients. Such improvements are most likely to be achieved through simple and cost-effective upgrades of the lithotripter system,^{3–5} treatment strategy,^{6,7} and education to better utilize the technologies in hand.⁸

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