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Address correspondence to:

Michael R. Bailey

Applied Physics Laboratory

Center for Industrial and Medical Ultrasound

University of Washington

1013 NE 40th Street

Seattle, WA 98105

USA

E-mail: bailey@apl.washington.edu

Abbreviations Used

BWL = burst wave lithotripsy
 CIMU = Center for Industrial and Medical Ultrasound
 COM = calcium oxalate monohydrate
 CT = computed tomography
 IU = Indiana University
 PNP = peak negative pressure
 PRF = pulse repetition frequency
 PVC = polyvinyl chloride
 SWL = extracorporeal shockwave lithotripsy

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Editorial Comment on: “*In Vitro* Evaluation of Urinary Stone Comminution with a Clinical Burst Wave Lithotripsy System” by Ramesh et al.

Pei Zhong, PhD

THE UNIVERSITY OF WASHINGTON team deserves to be congratulated for developing burst wave lithotripsy (BWL) technology within 5 years from concept, through *in vitro*¹ and *in vivo*² studies, to a complete system ready for clinical trials. BWL utilizes pressure waves of 390 kHz frequency in 20-cycle bursts to crumble renal calculi by progressively opening up microcracks in the stone material. Compared with extracorporeal

real shockwave lithotripsy (SWL), BWL may provide an office-based modality for stone management solely driven by ultrasonic (US) technologies to image, fragment, and reposition stones in the kidney. In this *in vitro* study,³ the authors confirm that 5–7 mm kidney stones of various compositions can be comminuted within 30 minutes in tissue phantoms under clinically relevant test environments. Moreover, the potential of US

propulsion combined with B-mode imaging is demonstrated for assessing the treatment endpoint.

Although US imaging is beneficial for treatment guidance and monitoring in BWL, the main challenge in the clinical translation of this novel technology may also hinge on the achievable image quality in human patients with potentially complex body habitus. Compared with the turnkey operation of SWL guided by C-arm fluoroscopy, BWL will require extensive training and practice beyond what is demonstrated in this *in vitro* study. Furthermore, the operational parameter space (peak negative pressure, pulse repetition frequency, and cycles) of BWL is tightly defined so far, which may need to be carefully expanded to account for the large variations in patient size, stone location, tissue attenuation, and available acoustic windows. More importantly, technological advances in real-time US monitoring of cavitation activities in the renal parenchyma and collecting system from 2D to 3D will be crucial for ensuring the safety and efficacy of BWL in patients, as envisioned for SWL.⁴

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Address correspondence to:

Pei Zhong, PhD
 Department of Mechanical Engineering
 and Materials Science
 Duke University
 101 Science Drive
 Durham, NC 27708
 USA

E-mail: pzhong@duke.edu