

Abstract Submitted  
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**Acceleration induced water removal from ear canals.**<sup>1</sup> HOSUNG KANG, KATELEE AVERETT, SUNGHWAN JUNG, Virginia Tech — Children and adults commonly experience having water trapped in the ear canals after swimming. To remove the water, individuals will shake their head sideways. Since a child's ear canal has a smaller diameter, it requires more acceleration of the head to remove the trapped water. In this study, we theoretically and experimentally investigated the acceleration required to break the surface meniscus of the water in artificial ear canals and hydrophobic-coated glass tubes. In experiments, ear canal models were 3D-printed from a CT-scanned human head. Also, glass tubes were coated with silane to match the hydrophobicity in ear canals. Then, using a linear stage, we measured the acceleration values required to forcefully eject the water from the artificial ear canals and glass tubes. A theoretical model was developed to predict the critical acceleration at a given tube diameter and water volume by using a modified Rayleigh-Taylor instability. Furthermore, this research can shed light on the potential of long-term brain injury and damage by shaking the head to push the water out of the ear canal.

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