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Self-oscillating Vocal Fold Model Mechanics: Healthy, Diseased, and Aging[1] ELIZABETH P. HIUBLER, LUCAS F. E. POLLOK, ADAM G. APOSTOLI, ADRIENNE B. HANCOCK, MICHAEL W. PLESNIAK, George Washington University — Voice disorders have been estimated to have a substantial economic impact of $2.5 billion annually. Approximately 30% of people will suffer from a voice disorder at some point in their lives. Life-sized, self-oscillating, synthetic vocal fold (VF) models are fabricated to exhibit material properties representative of human VFs. These models are created both with and without a polyp-like structure, a pathology that has been shown to produce rich viscous flow structures not normally observed for healthy VFs during normal phonation. Pressure measurements are acquired upstream of the VFs and high-speed images are captured at varying flow rates during VF oscillation to facilitate an understanding of the characteristics of healthy and diseased VFs. The images are analyzed using a videokymography line-scan technique. Clinically-relevant parameters calculated from the volume-velocity output of a circumferentially-vented mask (Rothenberg mask) are compared to human data collected from two groups of males aged 18-30 and 60-80. This study extends the use of synthetic VF models by assessing their ability to replicate behaviors observed in human subject data to advance a means of investigating changes associated with normal, pathological, and the aging voice.

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Michael Plesniak
George Washington University

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