# *Investigating the Mechanical Behavior of Soft Tissues*

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Mechanical engineers think about the design, construction, material properties, and operation of mechanical devices that allow functionality. They have responsibility for understanding how engines work, how buildings can be more efficiently built, and how the environment affects bridge architecture. They also apply their knowledge to the workings of the human body.

Consider the structure all humans have their first experience with: the womb. Much more than a structure that protects a growing fetus, the womb is made up of many parts that work together to incubate and then birth the baby. One of those parts is the cervix—the lower end of the uterus—and its strength holds a baby inside the mother while it is developing. To prepare for birth, the cervix must dramatically soften. When the cervix fails as a structure and dilates prematurely, miscarriage or premature birth can be the result. By better understanding the mechanical properties of the cervix, better prenatal diagnostic and screening techniques can be developed to reduce premature births, which is the leading cause of fetal deaths.

Kristin Myers investigates the mechanical behavior of soft tissues in order to understand how their tissue architecture influences constitutive behavior and disease development and to aid in early diagnosis and treatment. One of her main focuses is the characterization of the cervix during normal pregnancy and the pre-term labor condition known as cervical insufficiency. A woman with cervical insufficiency has a softer, weaker, or abnormally short cervix, which may efface and dilate without contractions in the second or early third trimester as the weight of a baby puts increasing pressure on it. Myers works to identify abnormal extra cellular matrix components that lead to the altered mechanical function of the tissue and is developing new instruments that can test the strength of the cervix.

Myers joined Columbia after completing her doctoral work at Massachusetts Institute of Technology and post-doctoral work at Johns Hopkins University. In addition to her cervical research, she also studies glaucoma and examines the strength of the collagen fibers that make up the white part of the eye, or sclera. In this research area she works to determine if corrections to the mechanical structure of the eye can correct glaucoma. She is exploring whether people who are diagnosed with glaucoma have a weaker eye structure, and if so, could there be a way to correct the structure mechanically.

*B.S., University of Michigan, 2002; M.S., Massachusetts Institute of Technology, 2005; Ph.D., MIT, 2008*