AbstractID: 8994 Title: Measurements of the Anisotropic Properties of Myocardial Ultrasonic Attenuation Obtained from Analyses of M-mode Images

Objectives: The objectives of this investigation were to measure from M-mode echocardiographic images the anisotropy of myocardial ultrasonic attenuation as a function of the angle of insonification relative to the predominate myofiber orientation and to determine the feasibility of obtaining estimates of systematic variations in attenuation over the heart cycle.

Methods: M-mode image data were acquired from 23 cylindrical specimens from 6 sheep hearts immersed in a water bath using a Philips/ATL HDI 5000 imaging system with a phased-array probe. Images were acquired as the specimens were rotated and, hence, insonified at a series of specific angles relative to the predominate myofiber orientation. In addition, reference images of an ultrasonic tissue-mimicking phantom, whose ultrasonic properties were well-characterized, were obtained. Measurements of the anisotropy of attenuation were obtained from analyses of the M-mode images of the specimens and reference phantom utilizing the *Video Signal Analysis* method.

Results: Myocardial attenuation exhibited a maximum for parallel insonification relative to the myofibers (1.9 ± 0.1 dB/(cm•MHz); mean ± SD) and a minimum for perpendicular insonification (1.0 ± 0.1 dB/(cm•MHz)).

Conclusion: The anisotropic behavior of myocardial attenuation estimated from analyses of M-mode images is very similar to that obtained from previous RF-based measurements. These data suggest that analyses of M-mode images can yield reliable estimates of myocardial attenuation. Furthermore, this approach may provide a method to obtain measurements of the systematic variation of attenuation over the heart cycle in the clinical setting. [NIH HL40302]