

spherical, hard-boundaried lesions, different lesion geometries were studied. One such case is where a lesion will not have rigidly defined boundaries and may “fade” into the background healthy tissue. To investigate this, lesions with blurred boundaries that fade into the background were studied using all three elastography modalities. The characterization curves of a lesion with a radius of 10 mm which was blurred using a kernel blur radius of 7.5 mm across the three modalities are given in Fig. 6.3. As expected, shear wave speed quantification again revealed itself to produce the most accurate results with a nearly one-to-one mapping between true and measured lesion stiffness. Quasi-static elastography and ARFI imaging paralleled each other however quasi-static elastography was generally unable to distinguish unstiff blurred lesions against the background, making ARFI imaging much more preferable than quasi-static elastography when examining late-stage DTI.

Again as expected, shear wave speed quantification resulted in substantially less error for characterizing all stages of deep tissue injuries than both quasi-static elastography and ARFI imaging as Fig. 6.4 shows. Once again, the least stiff lesions that were investigated—those with a relative stiffness ratio of 0.32—were the most difficult to detect accurately and presented with the greatest amount of error. Of further note is that although quasi-static elastography was worse at accurately detecting unstiff deep tissue injury lesions than ARFI imaging, quasi-static elastography portrayed less error when detecting stiff (early) deep tissue injury lesions. This suggests that quasi-static elastography is not well suited for detecting unstiff lesions and that the more reliable ARFI imaging should be used where possible if shear wave speed quantification cannot be used.

Since lesionous regions may not be completely homogeneous regions of