PURPOSE: To determine whether dynamic contrast material-enhanced magnetic resonance (MR) imaging with use of kinetic and morphologic parameters reveals statistically significant differences between malignant and benign solitary pulmonary nodules. MATERIALS AND METHODS: Fifty-eight patients met the inclusion criteria of a solitary 5-40-mm pulmonary nodule without calcification or fat at computed tomography. Fifty-one patients were examined successfully; 46 received a histologic diagnosis, and five received a diagnosis by means of observation over 2 years. Dynamic MR images were acquired every 10 seconds for a total of 4 minutes. Diagnostic characteristics for differentiation were examined by using threshold values for maximum peak enhancement, slope of enhancement, and washout. Receiver operating characteristic curves were calculated to test the usefulness of these parameters. The diagnostic performance of a combination of curve profiles and morphologic contrast material distribution were tested by using a decision tree. RESULTS: Frequency of malignancy was 53% (27 of 51 nodules). Malignant nodules showed stronger enhancement with a higher maximum peak and a faster slope (P<.01% increase in signal intensity per second) was found only in malignant lesions (14 of 27 lesions). Sensitivity,
specificity, and accuracy were 96%, 88%, and 92%, respectively, for maximum peak; 96%, 75%, and 86% for slope; and 52%, 100%, and 75% for washout. When curve profiles and morphologic enhancement patterns were combined, sensitivity increased to 100%. CONCLUSION: Dynamic MR imaging delineates significant kinetic and morphologic differences in vascularity and perfusion between malignant and benign solitary pulmonary nodules. Washout seems to be highly specific for malignancy.