RATIONALE AND OBJECTIVES: The detection of pulmonary embolism is still challenging due to the often nonspecific clinical findings. The aim of this study was to investigate the potential of molecular targeted magnetic resonance imaging (MRI) of pulmonary emboli using low-dose application of a fibrin-specific contrast agent (EP-2104R; Epix Pharmaceuticals, Cambridge, MA).

METHODS: Fresh clots from human blood were engineered ex vivo and delivered in the lungs of 11 swine. Subsequently, a T1-weighted breath-hold three-dimensional gradient-echo sequence was performed before as well as 5 minutes, 1 hour, and 2 hours after systemic administration of 7.5 (n = 5) or 4 (n = 5) micromol/kg EP-2104R. One swine that did not receive any contrast agent served as a control. MR images were analyzed by two investigators and contrast-to-noise ratio between the thrombus and the surrounding tissue (blood pool and lung parenchyma) was assessed. Localization of thrombi was compared with 16-row multislice computed tomography. Finally, the animals were killed and thrombi were removed for assessment of gadolinium concentration. MAIN RESULTS: Before contrast media application, thrombi were not visible on MR images. At 1 and 2 hours after contrast media injection, pulmonary emboli were selectively visualized with high-signal intensity foci, independent
of the dosage used. A high gadolinium concentration in thrombi was found after both dosages (83 +/- 41 microM for 4 micromol/kg and 130 +/- 57 microM for 7.5 micromol/kg), resulting in a similar high contrast-to-noise ratio on MR images (between 11 and 13). CONCLUSION: Systemic low-dose application of EP-2104R allows for selective molecular MRI of fresh pulmonary thromboembolism in a swine model.