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Titel des Beitrags: Initial characterization of an 18F-labeled myocardial perfusion tracer.

Abstract: PET allows for quantitative, regional myocardial perfusion imaging. The short half-lives of the perfusion tracers currently in use limit their clinical applicability. Here, the biodistribution and imaging quality of a new 18F-labeled myocardial perfusion agent (18F-BMS-747158-02) in an animal model are described.

METHODS: The biodistribution of 18F-BMS-747158-02 was determined at 10 and 60 min after injection. The first-pass extraction fraction of the tracer was measured in isolated rat hearts perfused with the Langendorff method. Small-animal PET imaging was used to study tracer retention.

RESULTS: The biodistribution at 10 min after injection demonstrated high myocardial uptake (3.1 percentage injected dose per gram [%ID/g]) accompanied by little activity in the lungs (0.3 %ID/g) and liver (1.0 %ID/g). The tracer showed a high and flow-independent myocardial first-pass extraction fraction, averaging 0.94 (SD = 0.04). PET imaging provided excellent delineation of myocardial structures. The heart-to-lung activity ratio increased from 4.7 to 10.2 between 1 and 15 min after tracer injection (at rest). Adenosine infusion (140 microg/kg/min) led to a significant increase in myocardial tracer retention (from 1.68 [SD = 0.23] s(-1) to 3.21 [SD = 0.92] s(-1); P = 0.03).

CONCLUSION: The observation of a high and flow-independent first-pass extraction fraction promises linearity
between tracer uptake and myocardial blood flow. Sustained myocardial tracer uptake, combined with high image contrast, will allow for imaging protocols with tracer injection at peak exercise followed by delayed imaging. Thus, 18F-BMS-747158-02 is a promising new tracer for the quantitative imaging of myocardial perfusion and can be distributed to imaging laboratories without a cyclotron.