- 心臓PET -
臨床と基礎研究における
分子イメージングのこれから

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第60回北陸循環器核医学研究会　平成25年7月27日　ホテル金沢

本日の内容

- 心臓核医学の現状とこれから
  - N-13 心筋血流PETの認可、FDGの心臓サルコイドーシスへの適応と次世代PETCT
- 心臓分子イメージング
  - 虚血性心疾患の診断から次のステージへ

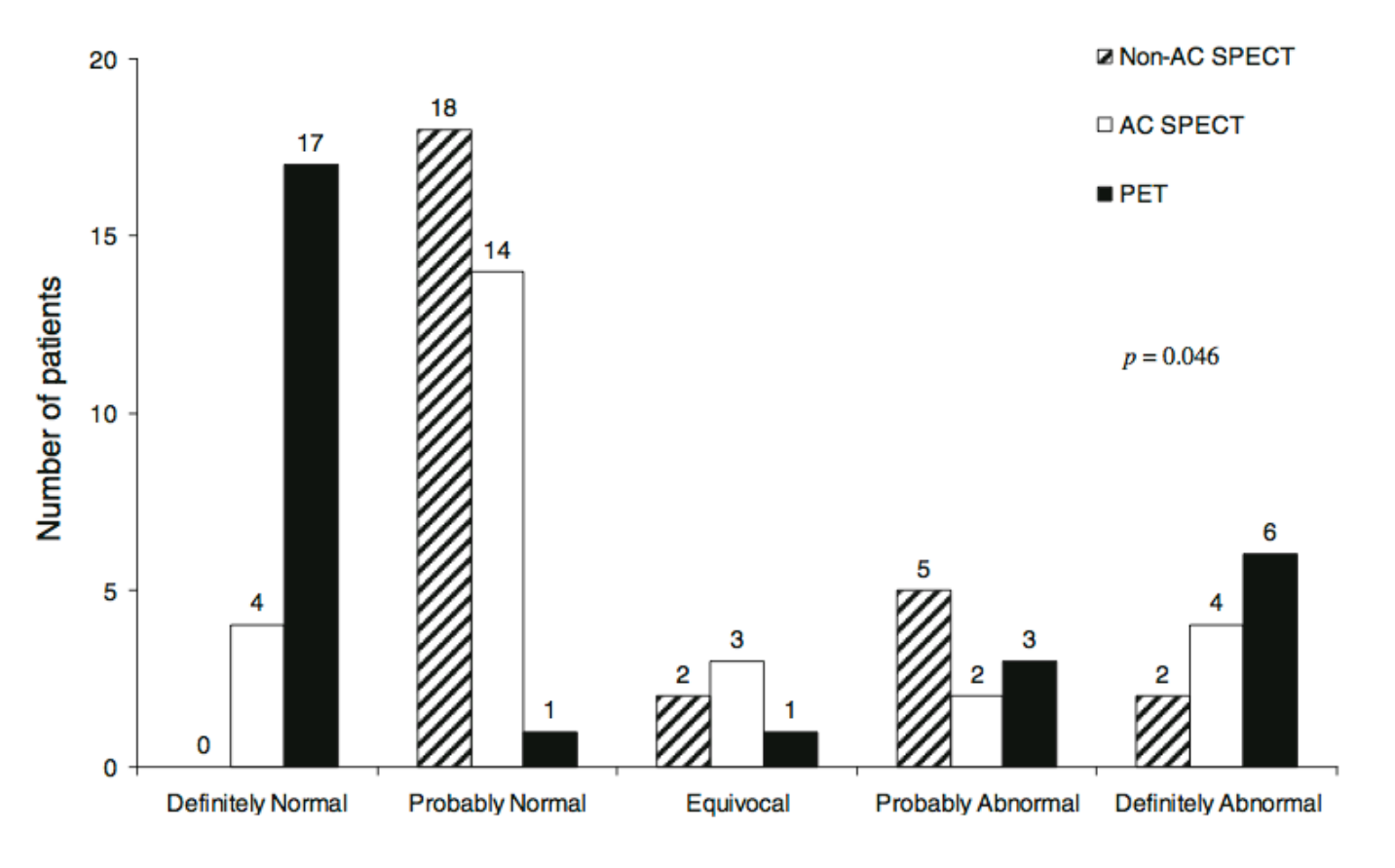
Myocardial Perfusion PET tracers

PET Tracers	Half life	Production	First Pass Extraction	Kinetic Properties
^{13}N Ammonia	10 min	Cyclotron	85%	Metabolic trapping
^{82}Rb	76 sec	Generator	65%	Na/K ATPase channel
^{15}O H_2O	122sec	Cyclotron	100%	Freely diffusible
^{18}F flurpiridaz	110 min	Cyclotron or Delivery	90%	Binds to mitochondrial complex-1

2012年　保険認可：　7500点

Heart Fail Rev 2011

Myocardial PET vs. SPECT for visual analysis

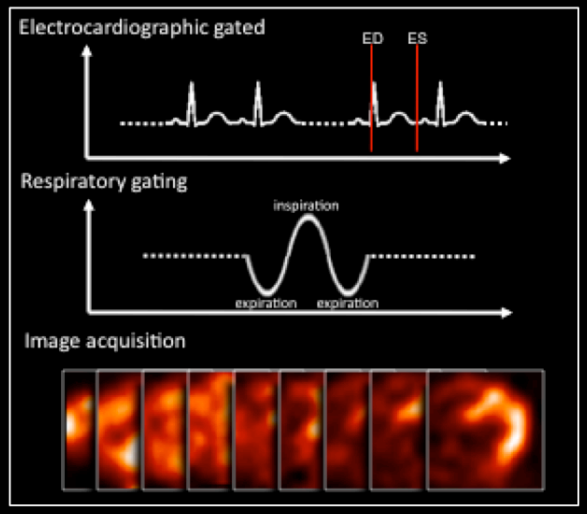


n=27
BMI: 34±7

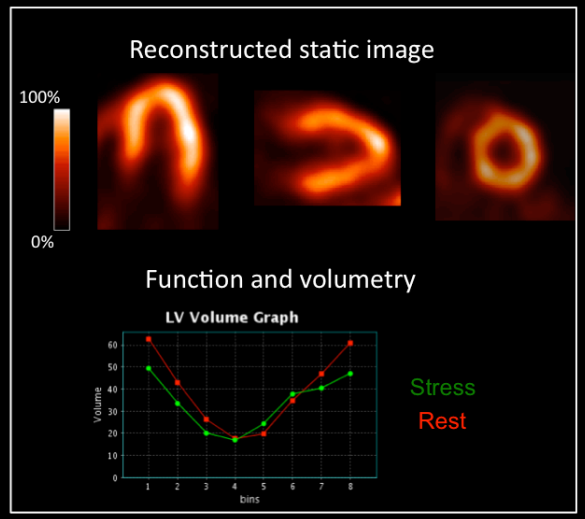
Interpretive confidence of SPECT (with and without attenuation correction) and PET

Flotats A, Bravo P, Fukushima K et.al Eur J Nucl Med 2012; 39: 1233-1239

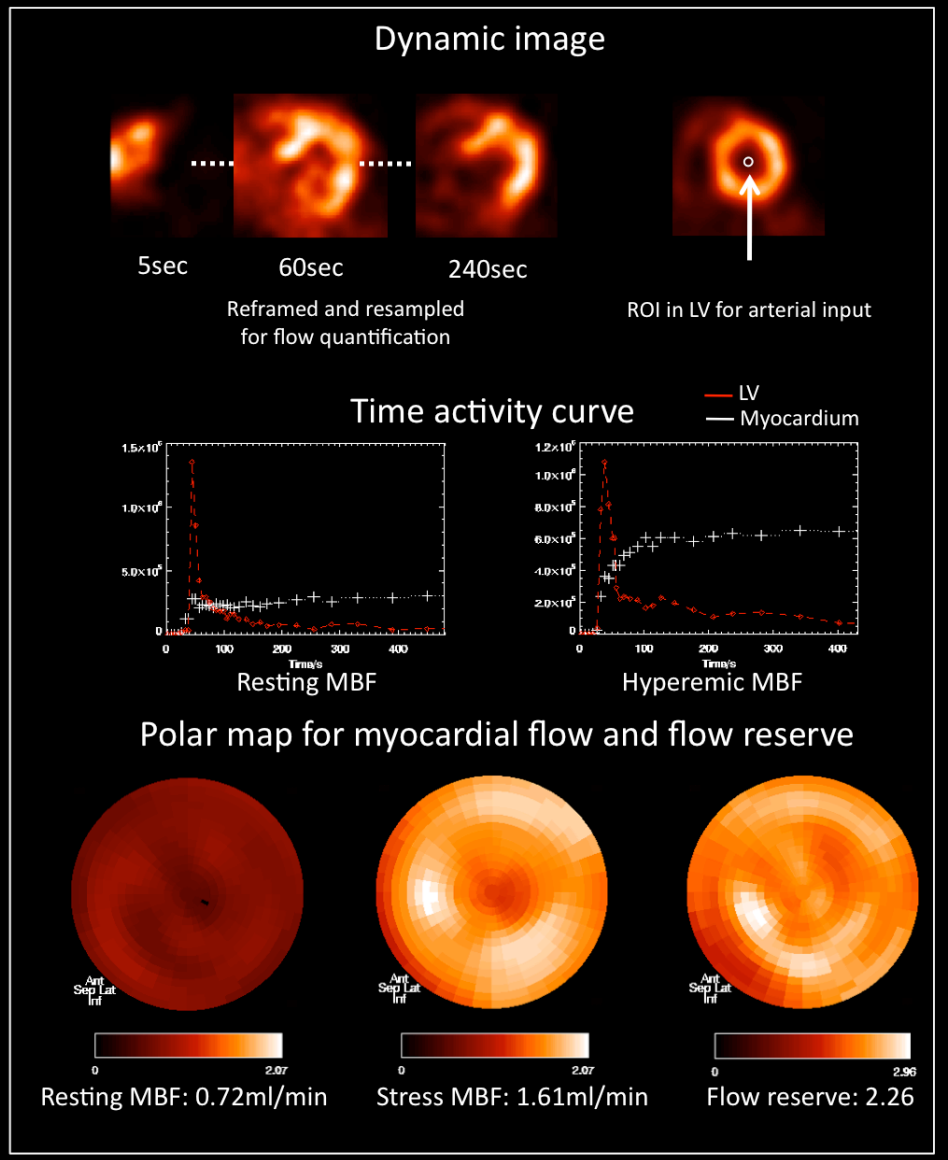
Myocardial Flow Measurement with Dynamic PET



List-mode dynamic acquisition



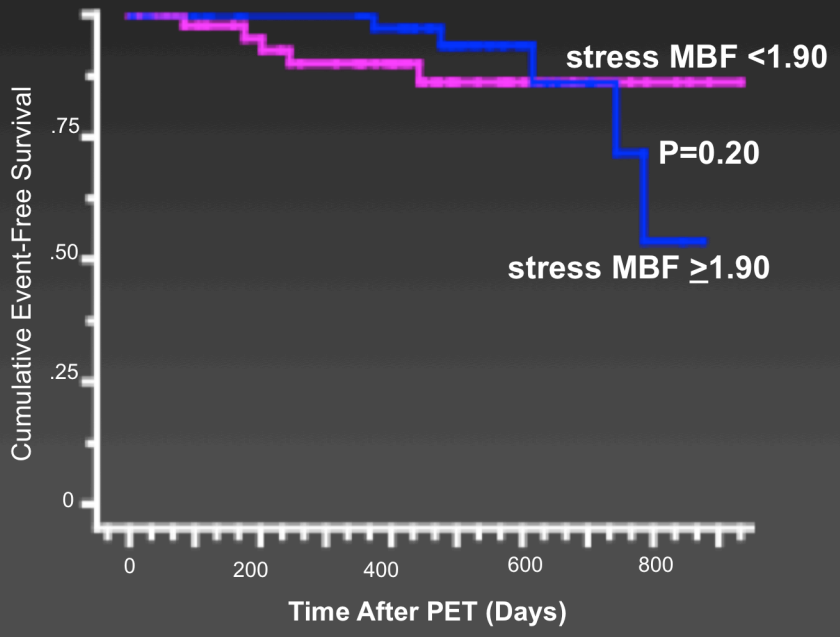
Conventional image analysis



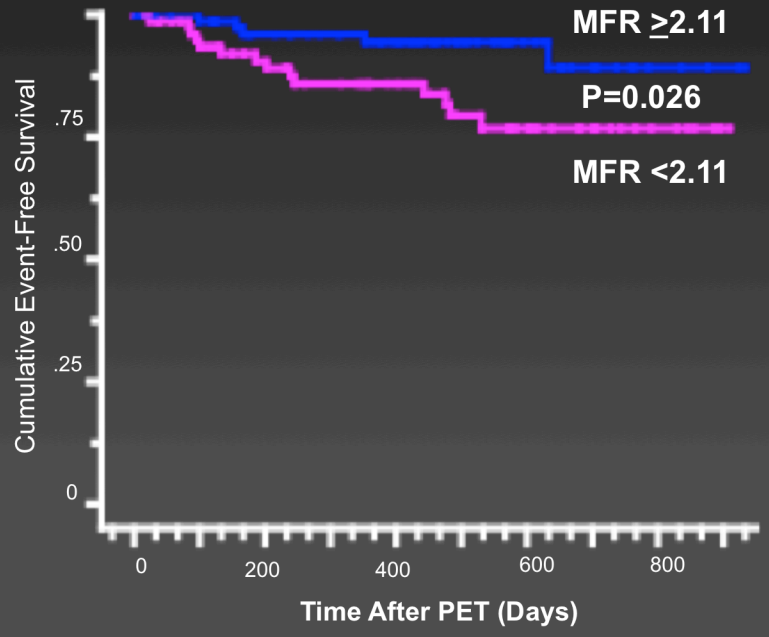
Absolute flow quantification

Boogers M, Fukushima K et.al Heart Fail Rev 2010

Survival Analysis of myocardial perfusion and reserve by ^{82}Rb Patients with Normal Perfusion (N=178)



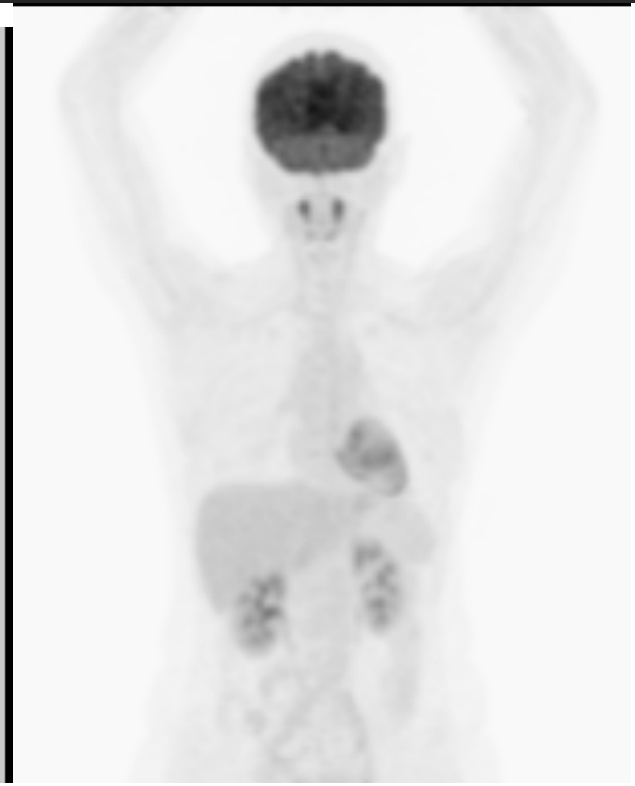
Stress MBF



Flow Reserve

Fukushima K, Javadi MS, Higuchi T etal. J Nucl Med 2011 52:732-736

The barrier: Physiological uptake of the hearts

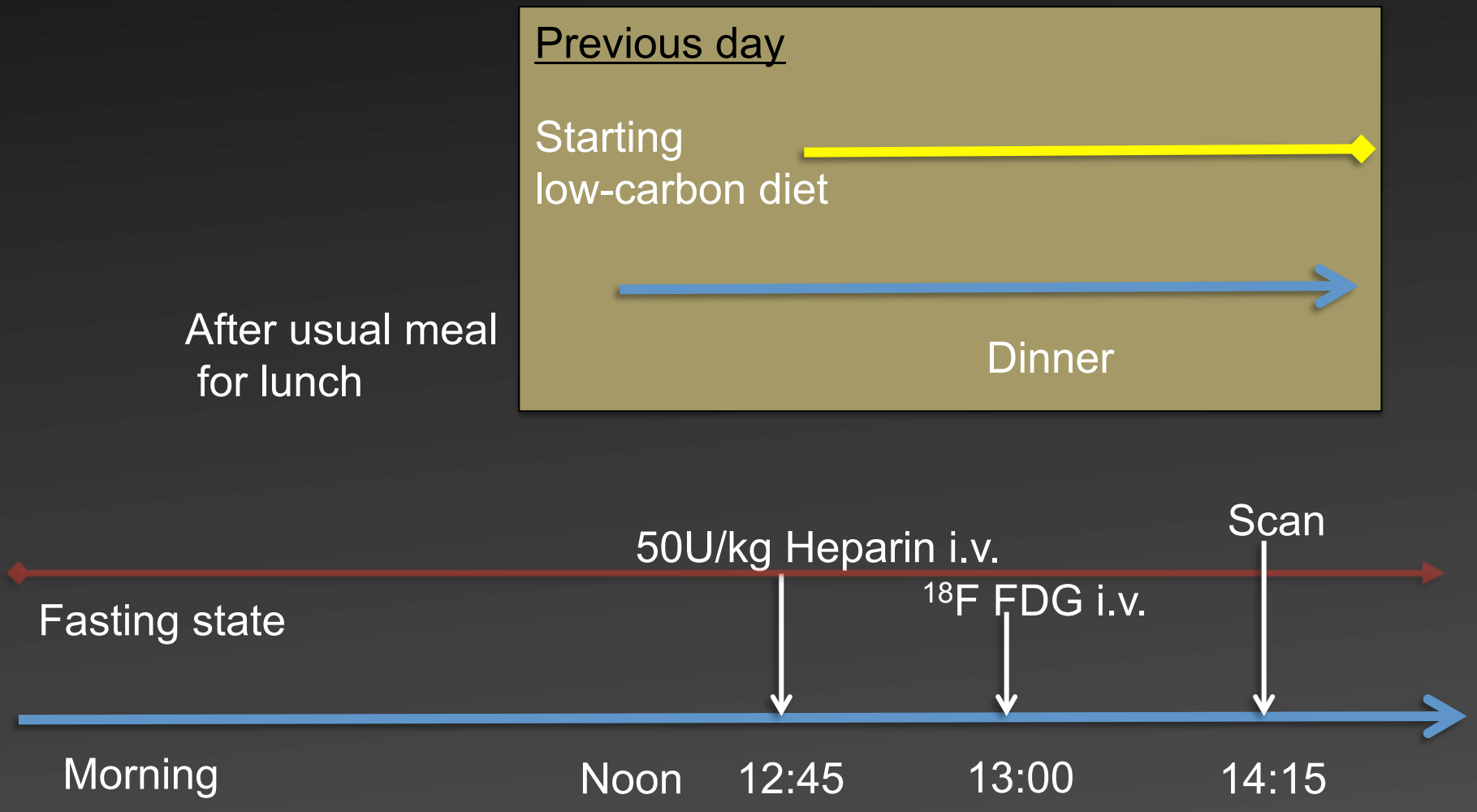


Reducing physiological myocardial uptake by low-carbohydrate diet

Normal volunteer
(Kenji Fukushima, 41ys Male)
with usual fasting preparation

Follow up for abdominal uptake
(Kenji Fukushima, 41ys Male)
with low-carbohydrate diet,
nearly 18hrs fasting, 3500U heparin

Protocol of ^{18}F FDG-PET for cardiac sarcoidosis



まとめ：心筋SPECTから心筋PETへ

- 従来のSPECTでの問題点であった吸収の影響を排除出来るだけでなく、TOFを搭載した次世代PETCTによる分解能改善。
- Extraction fractionのより高いトレーサを選択でき、負荷検査での血流の定量評価
- FDGによる心臓サルコイドーシスの診断の確率
  (ベストな前処置の検証)