

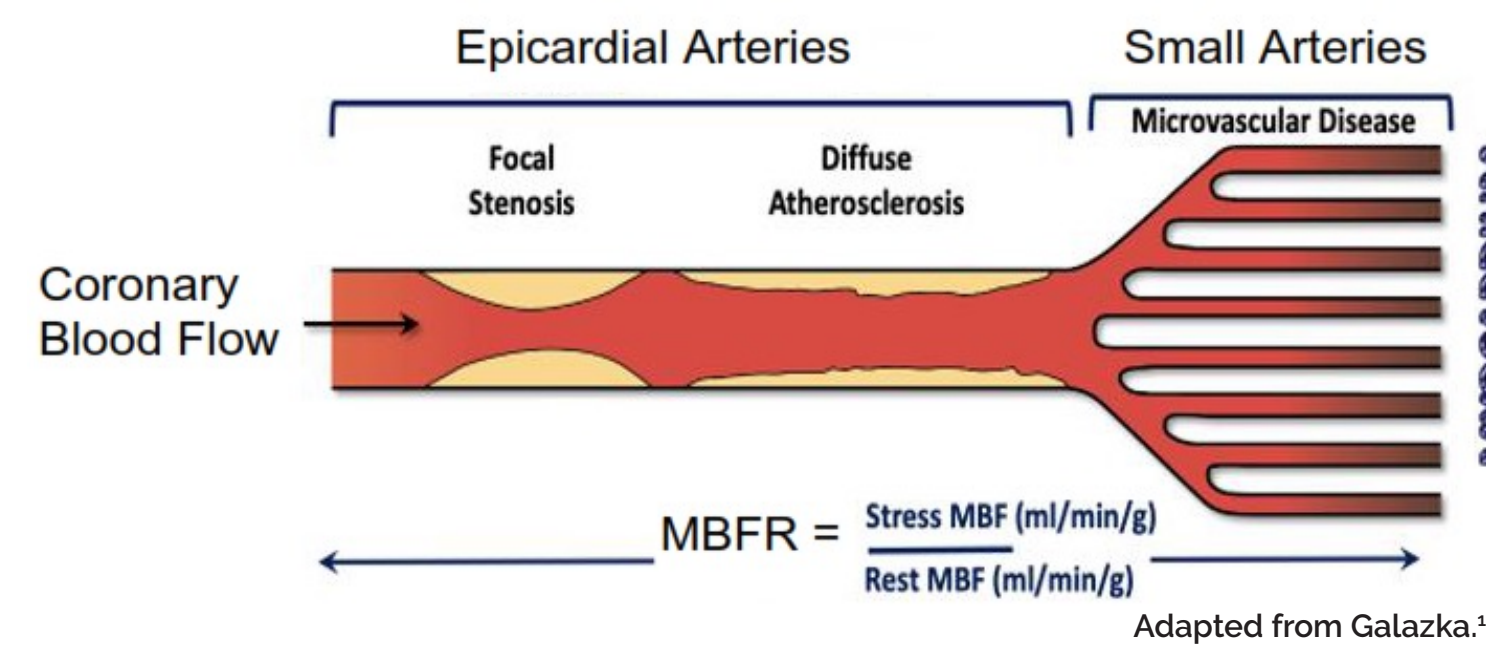
MYOCARDIAL BLOOD FLOW MEASUREMENT WITH POSITRON EMISSION TOMOGRAPHY MYOCARDIAL PERFUSION IMAGING

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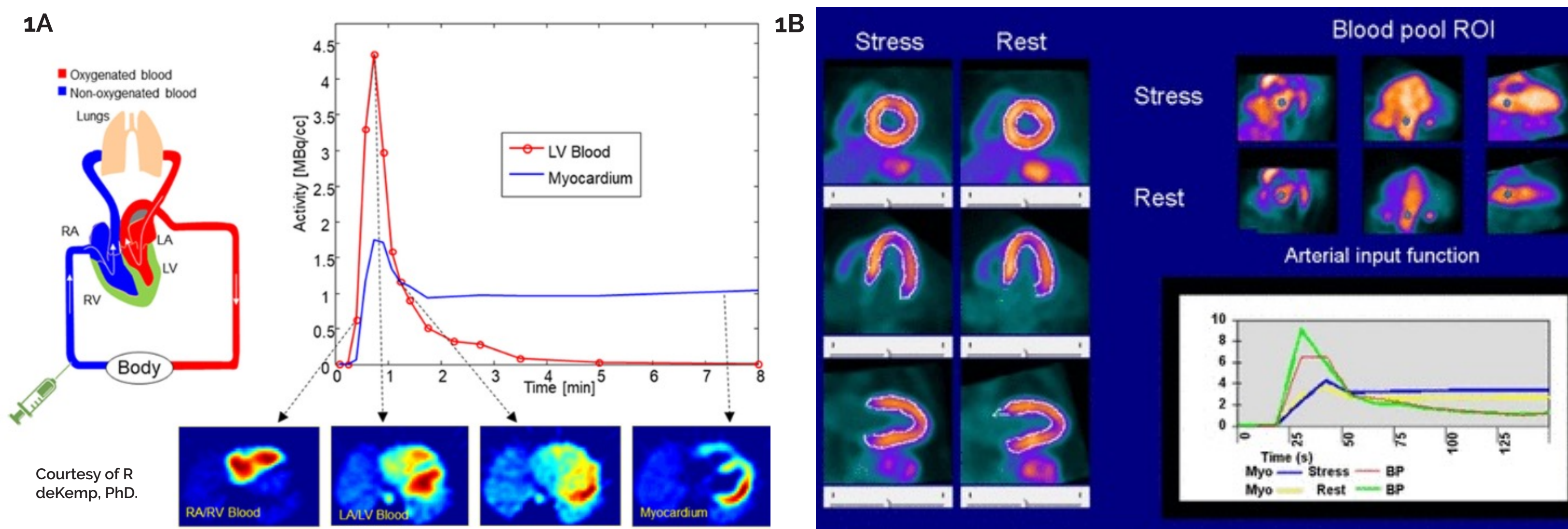
Basic Overview

- Myocardial blood flow (MBF), evaluated globally in the epicardial vessels, small arteries, and microvasculature, is quantified during positron emission tomography myocardial perfusion imaging (PET MPI) at rest and peak stress without additional cost, radiation, or time.
- Ensure free-flowing large gauge intravenous catheter and instruct to avoid arm motion.



Technical Details

- Compartment model: Dynamic images record tracer kinetics from the blood to myocardium and back to blood using a non-linear fit of the acquired data to solve for the regional MBF, tracer washout, and partial volume artifacts. It is sensitive to motion and suited for list mode acquisition (Figure 1A).²
- Retention model: Retention can be quantified from blood pool tracer concentration and irreversible extraction into myocardium. Amount retained is normalized to amount delivered via arterial blood and flow-dependent extraction fraction. It is less vulnerable to motion and works on most PET systems (Figure 1B).²
- Peak stress and rest MBF vary by model, but MBF reserve (MBFR) is less impacted.



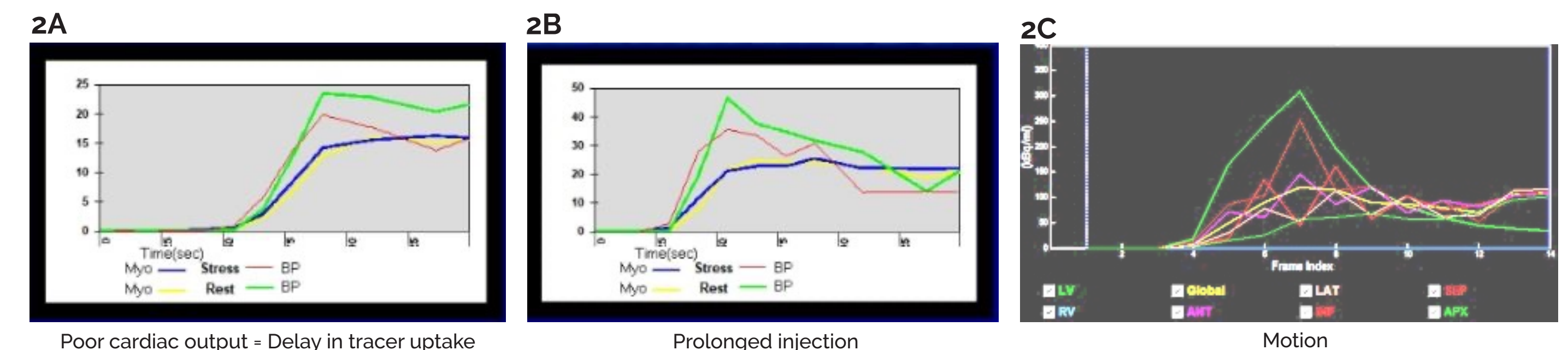
Normal Values

- Resting MBF: 0.4-1.2 mL/g/min and peak stress MBF >1.7 mL/g/min
- MBFR is quantified as stress/rest MBF (clinical significance of values described below).²

MBFR	Interpretation	Relative risk
>2	Normal	Low
1.7-2	Mildly abnormal	Intermediate
1.2—< 1.7	Abnormal	High
<1.2 with a perfusion defect	Highly abnormal	Very high
<1.2 without a perfusion defect	Consider non-diagnostic study	Indeterminate

Artifacts and Troubleshooting

- Normal time activity curves (TACs) for evaluating MBF are shown (Figures 1A and 1B).²
- Image acquisition must begin prior to tracer injection.
- Left ventricle (LV) TAC (the arterial input function): sharp peak with rapid decline.
- Accuracy impacted by broad peaks due to low cardiac output (Figure 2A) or prolonged injection (Figure 2B) or TACs with multiple peaks.
- LV TAC is obtained in retention model by placing region of interest in the location specified by software.
- Myocardial TACs: gradual increase after LV TAC with plateau before end of acquisition.
- Motion can impact MBF quantification (Figure 2C) and should be minimized during acquisition and addressed with motion correction when needed.



Key References:

- Galazka P, Di Carli M. Cardiac PET/CT and Prognosis. CVIA. 2016;2(1):47-59.
- Bateman TM, Heller GV, Beanlands R, Calnon DA, Case J, deKemp R, et al. Practical guide for interpreting and reporting cardiac PET measurements of myocardial blood flow: an Information Statement from the American Society of Nuclear Cardiology, and the Society of Nuclear Medicine and Molecular Imaging. J Nucl Cardiol. 2021;28(2):768-787.