COMMON ARTIFACTS WITH CARDIAC PET-CT MYOCARDIAL PERFUSION IMAGING

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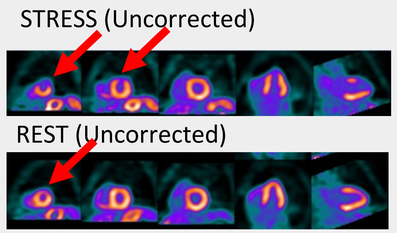
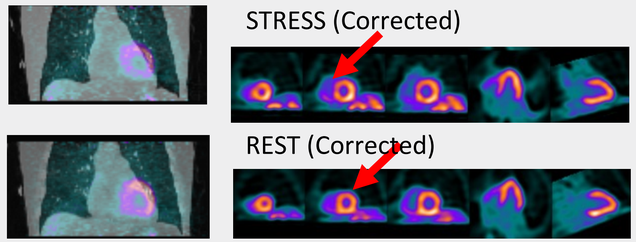
BACKGROUND: Cardiac PET/CT perfusion imaging presents the interpreting physician with much fewer artifacts than SPECT primarily due to attenuation correction on every study. There are several PET/CT-related artifacts that occur that can generally be prevented or corrected when they do occur.

- **Misregistration** occurs when the patient moves between CT attenuation scan (transmission map) and PET perfusion data scan (emission data).
- **Intrascan motion** is a result of the patient moving during the emission scan either at rest or stress, or both.
- **Respiratory motion/breathing artifact** generally occurs during the stress study after administration of the pharmacologic stress agent. The patient is uncomfortable and breathes rapidly, creating artifacts in the emission and/or transmission data.

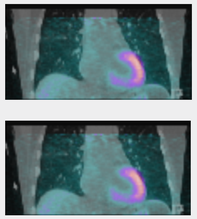
Misregistration:
Emission/transmission images are shifted relative to each other



Misregistration:
Emission and transmission images not aligned

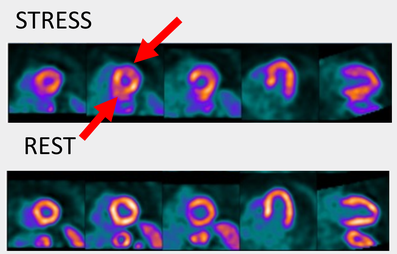


Misregistration:
Corrected by shifting the transmission and emission datasets

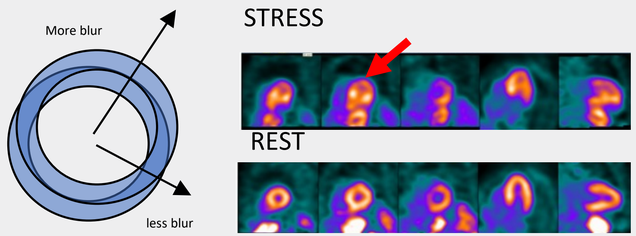


Scan for video explanation

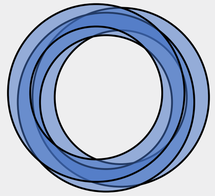
Intrascan Motion:
Emission only motion artifact



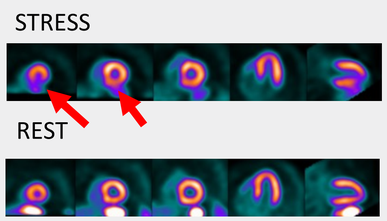
180° Artifact:
From a single movement



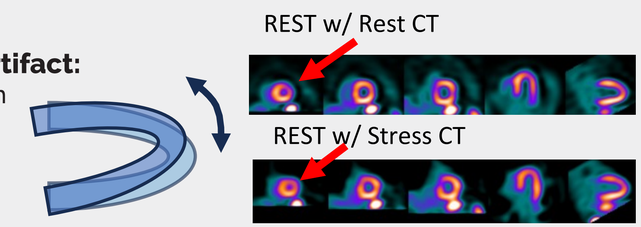
Smear Artifact:
From a multiple movements



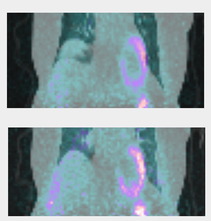
Breathing Artifact:
Respiratory motion in the transmission and/or emission data



Infero-apical Artifact:
From a diaphragm movement



Mushroom Artifact:
Replace the rest CT with the stress CT



	Identification	Prevention	Correction
Misregistration	Review the overlay images for mismatch between the emission and transmission data	Instruct the patient not to move between the CT and PET scans.	Reregister emission and transmission data prior to reconstruction using post acquisition software.
Intrascan Motion	Either 180° artifact in the case of a single motion or abnormal left ventricle cavity size and shape, blurry images	Make patient comfortable prior to image acquisition, work with patient during PET scan to remain still. No talking or sleeping during emission scan.	Rescanning patient is only viable option. There are no commercially available post acquisition solutions for correcting this artifact.
Breathing Artifact	Sharp infero-apical defect that can appear between 4 and 7 o'clock on the short axis cuts. Deep breath hold artifact: Uncorrectable misregistration	Instruct patients to use shallow breathing during CT scan. No talking, or sleeping during emission scan	Infero-apical: Rescanning or breathing motion correction. Deep breath hold: Rescanning or replace CT with alternate CT.

Key References:
Heller GV, Bateman TM, Case JA, Arumugam P. *Cardiovascular PET Current Concepts.* New York: McGraw-Hill; 2019: pp133-142.

Van Decker WA. *Image Artifacts.* In: Iskandrian AE, Hage FH, eds. *Nuclear Cardiac Imaging: Principles and Applications.* 6th ed. Oxford University Press; 2024.