PET/CT artifacts in Clinical Practice

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Good-practice patient management mandates accurate diagnostic imaging. However, artifacts may arise frequently from technical or methodological pitfalls and affect the accuracy of diagnostic imaging. These artifacts can be interpreted as structures in the images that are not typically present but that are produced by an external agency or action.

PET/CT imaging, in particular, mandates accurately aligned anatomical and functional image information. Misalignment effects of the data as well as artifacts on the CT images are known to generate artifacts on attenuation-corrected PET/CT image fusion, and therefore need to be addressed to avoid diagnostic pitfalls.

We relate clinical (not technical) image distortions in PET/CT to:

A) Patient motion
   - respiration, cardiac motion, muscle relaxation, patient discomfort
B) High-density agents and objects
   - metal implants, i.v. and oral CT contrast
C) Patient set-up and preparation
   - arm positioning and beam hardening effects, truncation artifacts from the object extending beyond the CT field-of-view, the use of additional positioning aids

and present solutions for improving the diagnostic quality of PET/CT imaging in routine, clinical practice.

Learning objectives:

1. To assist in the recognition and interpretation of artifacts specific to clinical PET/CT imaging
2. To understand retrospective corrections (e.g., improved co-registration, metal artifacts)
3. To review prospective measures to avoid or reduce PET/CT image artifacts
4. To accept strategies to improve the diagnostic quality of combined PET/CT examinations