Attenuation correction for myocardial perfusion imaging. A comparison between SPECT and PET imaging by polar map analysis.

AIM: We investigated the impact of photon attenuation in myocardial perfusion imaging with SPECT and PET in patients with coronary artery disease. In fact, the regional tracer distribution can be quantitatively assessed by polar map analysis if the effects of photon attenuation are accounted for. PET imaging permits accurate measurement of and correction for photon attenuation, whereas results of attenuation correction in SPECT imaging have been inconsistent.

PATIENTS, METHODS: We compared photon attenuation in resting perfusion imaging studies with SPECT ((99m)Tc-sestamibi) and PET ((13)N-ammonia) from 21 patients. Transaxial images were reconstructed with and without attenuation correction and reoriented into short axis images. Polar map analysis was utilized to generate regional tracer uptake in six anatomical segments.

RESULTS: Average segmental photon attenuation calculated as the ratio of counts in corrected and uncorrected images was 7.2 +/- 1.4 in SPECT and 14.0 +/- 3.1 in PET imaging (p< 0.01). This attenuation factor was significantly related to body mass index for both methods (p< 0.001). While attenuation correction for SPECT imaging did compensate for attenuation effects in the inferior wall (from -15% to +6% vs. PET), relative tracer uptake in the anterior wall in SPECT images was significantly reduced after attenuation correction.
correction (from -2% to -18% vs. PET, p< 0.01). CONCLUSION: Differential effects of attenuation correction for myocardial SPECT perfusion imaging need to be considered when algorithms designed to compensate effects of photon attenuation in SPECT imaging are employed in clinical practice.