

**Purpose:** The aim of this work is to investigate the feasibility of accelerating phase contrast MR angiography by the fast imaging method of Simplified Skipped Phase Encoding and Edge Deghosting with Array Coil Enhancement (S-SPEED-ACE).

**Methods:** The parallel imaging method of Skipped Phase Encoding and Edge Deghosting with Array Coil Enhancement (SPEED-ACE) has been simplified with enhanced acceleration for imaging sparse objects and is termed S-SPEED-ACE. As demonstrated previously with a computer simulated study, S-SPEED-ACE partially samples k-space with multiple coils in parallel and yields a deghosted image based on a least-square-error solution. Without differential filtering and full central k-space sampling, S-SPEED-ACE uses more straightforward reconstruction and achieves further scan time reduction as compared with SPEED-ACE. In this work, S-SPEED-ACE is further developed to accelerate real human 3D phase-contrast MR angiography. The proposed method was tested with a 3D head PC-MRA scan, which was acquired using a clinical 1.5T scanner on a healthy volunteer

**Results:** Images are reconstructed by S-SPEED-ACE to achieve an undersampling factor of up to 8.3 with four receiver coils. The reconstructed images generally have comparable quality as that of the reference images reconstructed from full k-space data. Maximum-intensity-projection (MIP) images generated from the reconstructed images also demonstrated to be consistent as those from the reference images.

**Conclusions:** By taking advantage of signal sparsity naturally existing in the data, SPEED-ACE was simplified and its efficiency was improved. In this work, the previously proposed parallel imaging method named S-SPEED-ACE has been further developed to accelerate a 3D head PC-MRA scan.