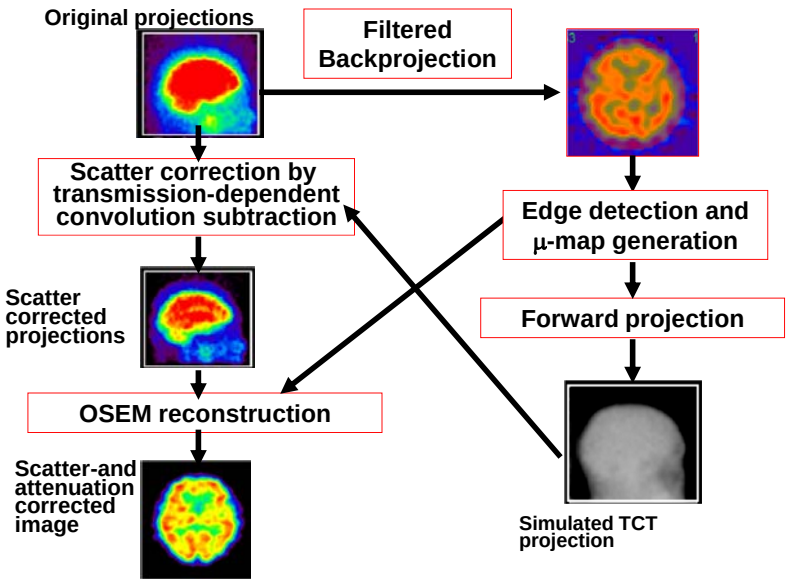
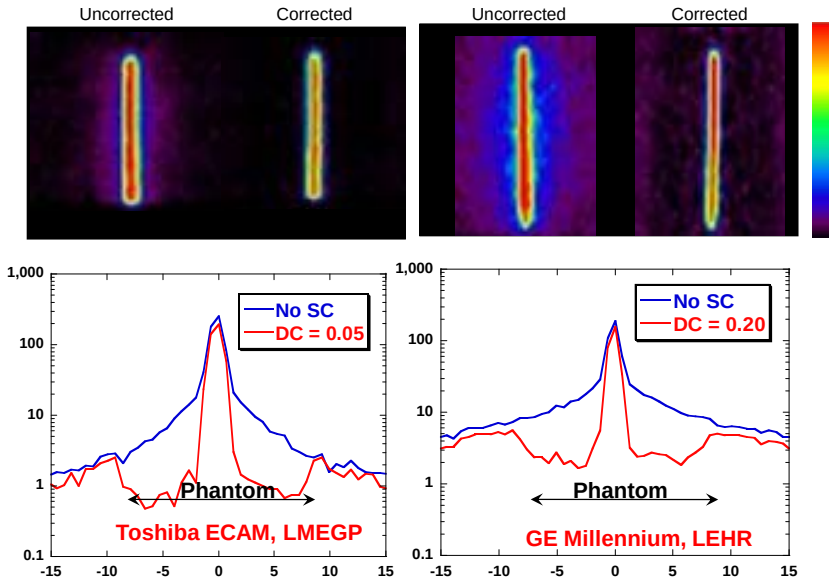


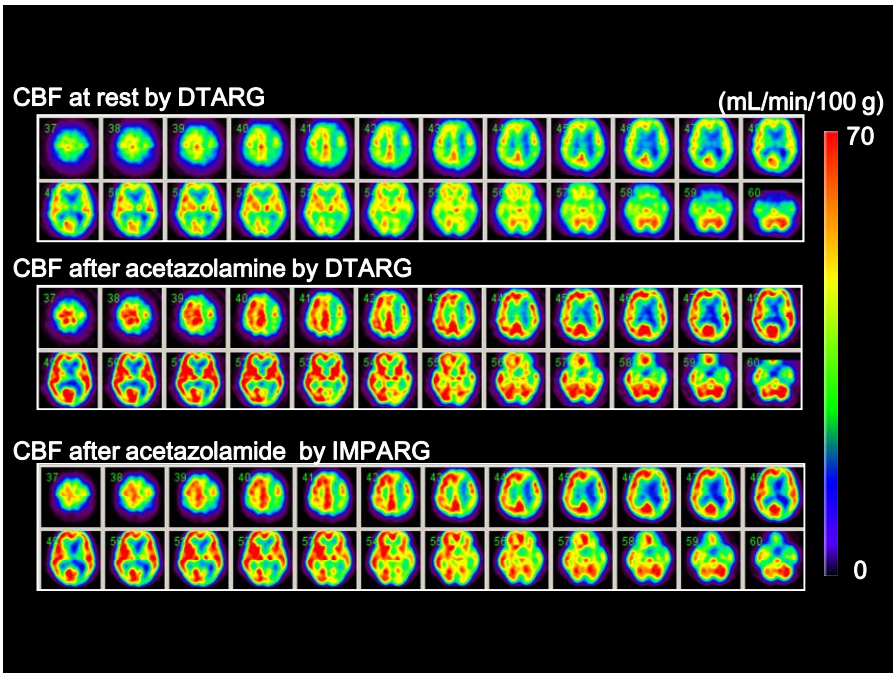
Supplemental Figure 1

Diagram illustrating the quantitative reconstruction protocol employed in this work. The emission data are initially reconstructed with filtered back projection (top right image) to allow the brain outline to be determined and μ-map for attenuation correction to be determined by assigning a uniform attenuation coefficient of 0.160 cm^{-1} to the detected brain volume. The μ-map is forward projected to provide the attenuation projections for the scatter correction (bottom right image) as well as being used by the OSEM reconstruction for attenuation correction. Scatter correction is carried out on the acquired emission projections using TDCS and the generated attenuation projections.



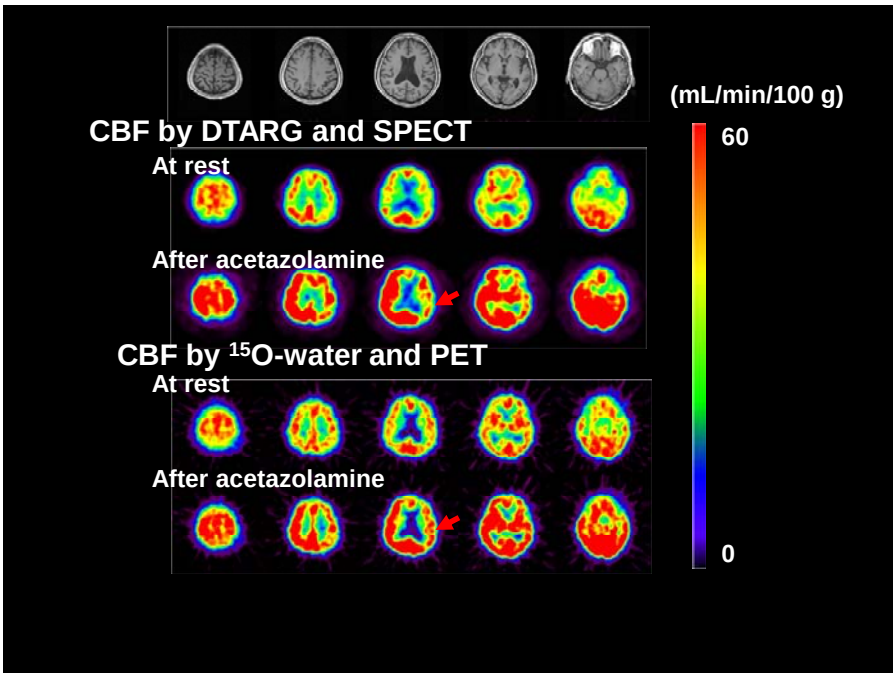
Supplemental Figure 2

Line sources images (top row) and profiles through line sources images (bottom row) before and after TDCS scatter correction for two different collimators. Arrows in the lower column indicate the extent of the cylinder phantom. The higher energy LMEGP (low to medium energy) collimator of the Toshiba-ECAM camera exhibits less scatter and septal penetration compared to the low energy collimator (LEHR) of the GE system. This also translates into improved scatter and septal penetration removal for the LMEGP collimator. A lower estimated offset component for septal penetration ("DC" component) for the LMEGP (DC=0.05) supports the observation of lower septal penetration compared to the LEHR collimator (DC=0.20).



Supplemental Figure 3

A typical example of CBF images from the reproducibility study obtained from a single subject at Institution #1. CBF images obtained at rest (top row) and after acetazolamide (2nd row) with the DTARG, single session spilt dose procedure. Repeat scan (3rd row) within one month using IMPARG method and acetazolamide stress.



Supplemental Figure 4

Additional comparison of the DTARG measured CBF at rest and after acetazolamide stress with corresponding measurements with ^{15}O-water PET ("VS PET" evaluation). The patient suffered from left internal-carotid artery stenosis, and did not show signs of cerebral infarction on MRI. Rest CBF does not show abnormality but acetazolamide CBF showed defect in the left middle-cerebral artery territory. These findings were consistent between SPECT-DTARG and PET studies. Post reconstruction Gaussian filter was not applied to SPECT CBF in this display.

Table 1. Equipment and Calibration Factor Details

Institution No.	Manufacturer and camera	Number of Detectors	Collimator	BCF	%-True Activity Conc.	Well counter	CCF
1	Toshiba GCA9300	3	N2(LMEHRfan)	72,042	85.3	Counter/Timer SCA-01 (Universal, Tokyo, NaI)	0.972
2	Toshiba GCA9300	3	N2(LMEHRfan)	75,642	87.8	Counter/Timer SCA-01 (Universal, Tokyo, NaI)	0.883
3	Toshiba GCA9300	3	N2(LMEHRfan)	76,348	87.3	Counter/Timer SCA-01 (Universal, Tokyo, NaI)	0.829
4	Siemens ECAM	2	SMS-LMEGP fan	147,450	99.7	BeWell QS (MIL, Osaka, NaI)	0.769
5	Toshiba ECAM	2	N2(LMEHRfan)	96,173	85.5	Captus300 (Capintec, USA, NaI)	0.543
6	GE Millennium VG	2	LEHR	129,300	87.0	Superscaller (Aloka, Tokyo, NaI)	0.845
7	Toshiba ECAM	2	SMS.fan	100,173	78.4	DCM-200 (Aloka, Tokyo, Plastic)	0.160
8	Toshiba ECAM	2	N2(LMEHRfan)	66,627	89.4	DCM-200 (Aloka, Tokyo, Plastic)	0.132
9	Shimadzu IRIX	3	LEGP.PAR	64,902	83.1	Universal TDC-521 (Aloka, Tokyo, NaI)	0.834
10	Shimadzu IRIX	3	LEGP.PAR	64,150	91.2	DCM-200 (Aloka, Tokyo, Plastic)	0.134
11	Toshiba ECAM	2	LMEGP.PAR	87,433	89.5	Counter/Timer SCA-01 (Universal, Tokyo, NaI)	0.866
12	Toshiba ECAM	2	LMEGP.PAR	87,175	86.0	Counter/Timer SCA-01 (Universal, Tokyo, NaI)	0.869

Table 1: List of gamma camera models and collimators, well counters used by the participating institutions. The Becquerel and cross calibration factors are also listed. The %-True Activity Conc. is ratio of the phantom activity estimated with SPECT and BCF to the known amount of activity in the phantom expressed as a percentage (mean +/- 1 standard deviation: 87.5 +/- 5.1%).

Collimator abbreviations: LMEHRfan – low to medium energy high resolution fan beam, SMS-fan –Siemens Medical Systems fan beam, LEHR – low energy high resolution parallel hole, LEGP.PAR – low energy, general purpose parallel hole, LMEGP – low to

medium energy general purpose parallel hole.