

Canon

画論

28th

The Best Image

Best Image Awards Compilation

MRI Category

Judging Panel

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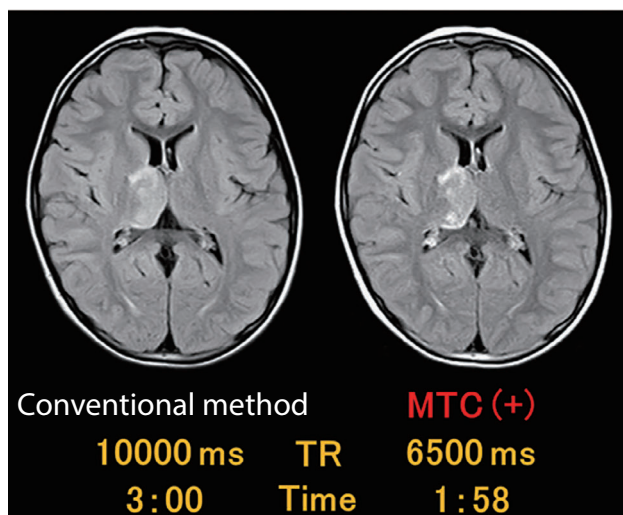
[Technical Award]

Pulmonary arterial/venous malformation

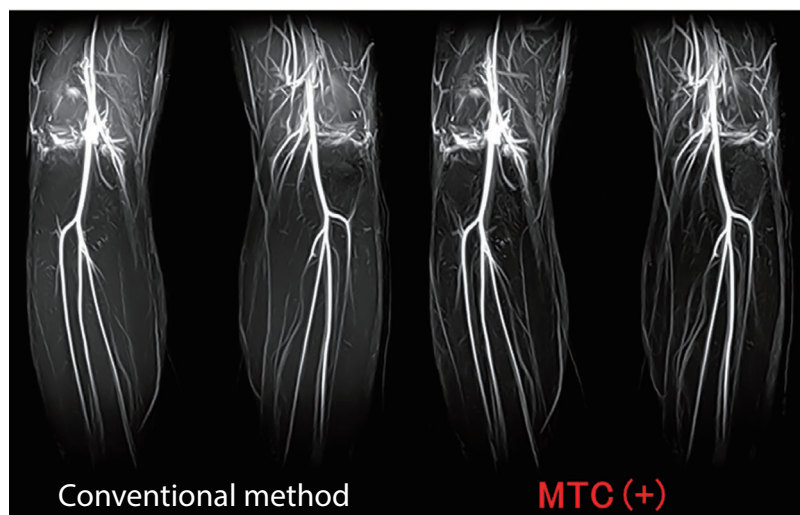
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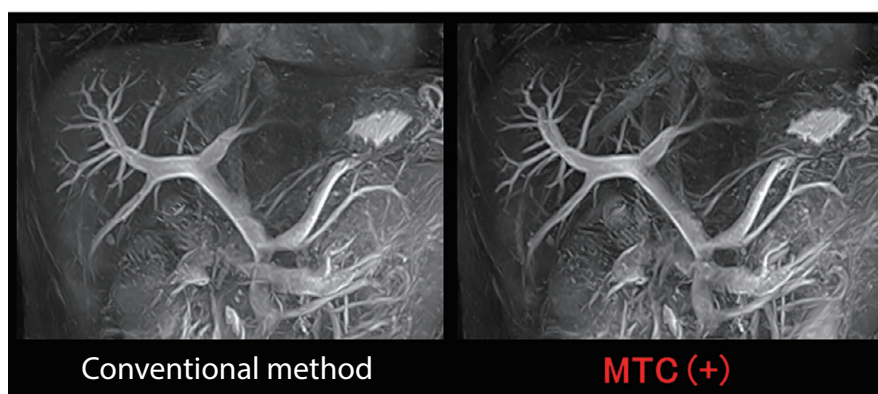
Scan the whole page, including an image with the "medicalAR" icon, and the linked content will be displayed.



(a) Comparison of head T2 FLAIR images (lesion in the thalamus of a 5-year-old boy)



(b) Comparison of lower limb Time-SLIP MRA images (25-year-old healthy male volunteer)



(c) Comparison of portal vein Time-SLIP images (24-year-old healthy male volunteer)

Neurosurgery

Adding the MTC pulse during the wait time improved contrast without prolonging scan times.

KKR Sapporo Medical Center, Hokkaido
Tomohito Watanabe

System used: EXCELART Vantage series

Reason for examination: Image acquisition entails wait times for preparation: 2000 msec or longer to suppress CSF signals via inversion recovery with head T2 FLAIR and around 1500 msec from the application of spatial selective IR pulses to influx of blood, etc., with Time-SLIP MRA. We validated whether the contrast of lesions and blood vessels can be improved without prolonging scan times by

applying an optimized MTC pulse during the wait time.

Clinical comments: Adding the MTC pulse for head T2 FLAIR improved contrast and shortened TR. Due to the patient's age, sedation was required each time this patient underwent examination. T2 FLAIR with shortened scan times for follow-up helps reduce stress associated with sedation. With Time-SLIP MRA, a prolonged BBTI can increase background signals and reduce contrast at lower flow rates. However, adding the MTC pulse improved contrast without prolonging scan times.

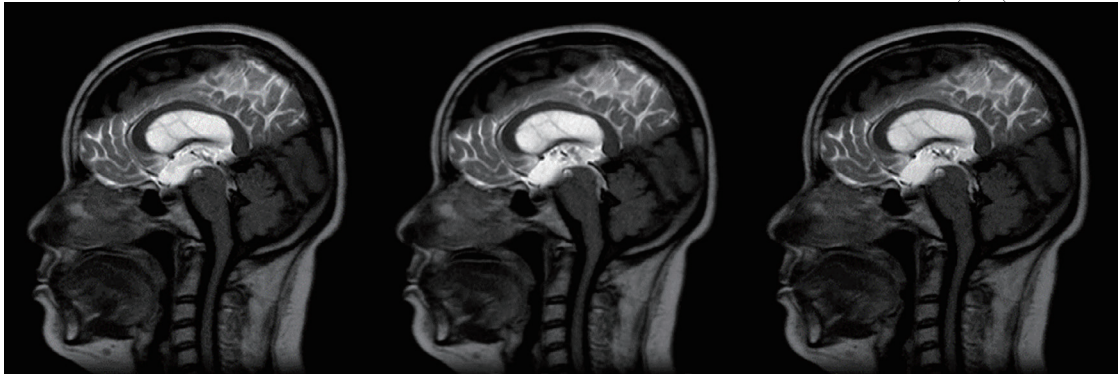
Technical comments: The MTC pulse is generally used for T1 WI but can be also added with a varying number of applications, offset frequency, and FA for T2 FLAIR and Time-SLIP MRA. The MTC pulse was optimized after evaluating its characteristics using an ad hoc model simulating an intended imaging site. Adding the optimized MTC pulse during wait times after the IR pulse reduced scan times and improved contrast for T2 FLAIR and Time-SLIP MRA.

Comments on images: (a) Adding the optimized MTC pulse resulted in better contrast between lesion and normal tissue compared to conventional T2 FLAIR, even when TR was shortened. This also shortened TI and helped reduce artifacts due to CSF influx. (b) Adding the MTC pulse optimized to lower limb Time-SLIP MRA (BBTI: 1500 msec) also reduced background signals, primarily from muscle, and improved the contrast of the arteries of the lower limb. (c) Blood flow is slower in the portal vein than in arteries, resulting in the need to prolong BBTI to 1700 msec. Although this elevated hepatic signals with shorter T1 values, the MTC pulse suppressed signal elevation and improved contrast.

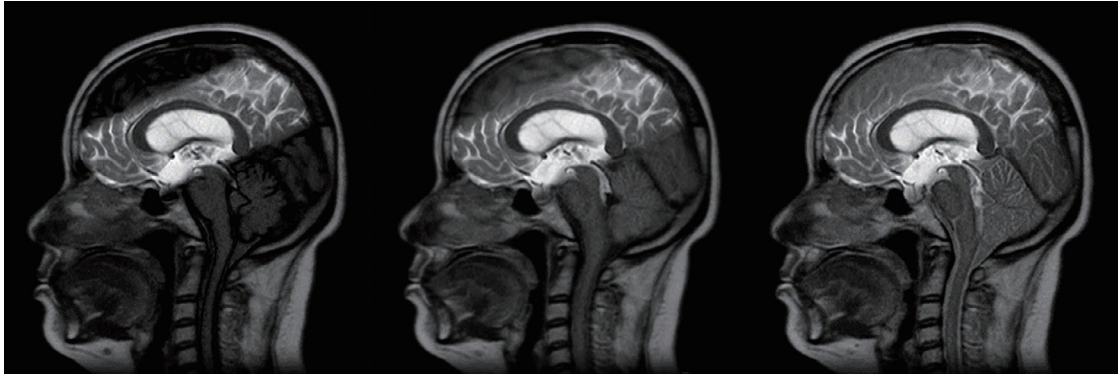
Comments of judges: Applying the MTC pulse reduced scan times and improved lesion contrast. This approach has no disadvantages and offers the potential for widespread application.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	Pediatric (0-6 years)	20-30 kg	V9.51		
Dose	Injection rate	Administration method	Workstation		

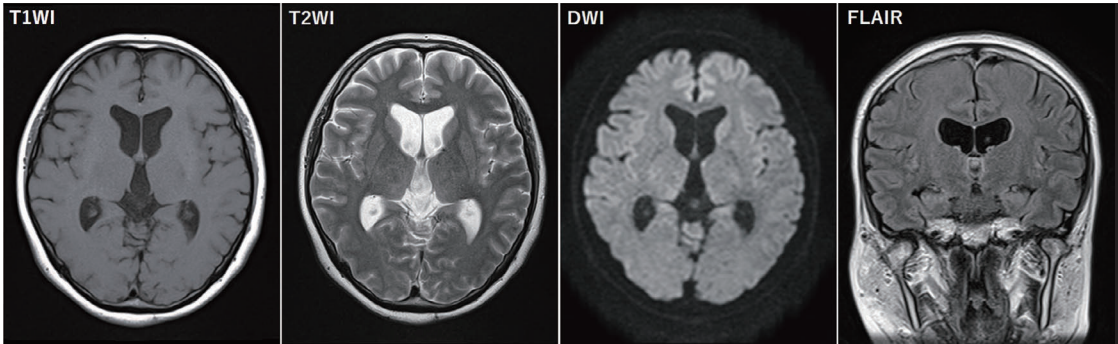
Acquisition conditions for (a) (left)	FSE+10_nBW_slit (23), TR: 10000, TE: 120, FA/Flop: 90/180, TI: 2630, fat suppression: none, gating: none, SPEEDER factor: 2, FOV: 21×21, matrix: 192×256, slice thickness / number of slices: 6 mm / 20, number of acquisitions: 2, scan time: 3:00
Acquisition conditions for (a) (right)	TR: 6500, TI: 2125, scan time: 1:58 Other parameters are identical to those shown at (left).
Acquisition conditions for (b)	FASE: 3D+5_tS, TR: 4704, TE: 30, FA/Flop: 90/180, BBTI: 1500, fat suppression: STIR, gating: pulse wave gating, SPEEDER factor: 2, FOV: 38×38, matrix: 256×256, slice thickness / number of slices: 2 mm / 25, number of shots: 2, number of acquisitions: 1, scan time: 4:19
Acquisition conditions for (c)	FASE: 3D+5_tS, TR: 4949, TE: 30, FA/Flop: 90/180, BBTI: 1700, fat suppression: STIR, gating: respiration gating, SPEEDER factor: 2, FOV/No Wrap: 30×30/2, matrix: 256×256, slice thickness / number of slices: 3 mm / 25, shot number: 2, number of acquisitions: 1, scan time: 4:33
MTC pulse	FA: 1200°, offset: +900 Hz, number of application: 10
Coil used for (a)	QD Head Coil
Coils used for (b) and (c)	QD Torso SPEEDER



(a) FLAIR Time-SLIP technique (at fixed TI of 2500 ms) → time (with variable trigger delay)



(b) Time-SLIP technique (conventional) → time (with variable BBTI)



(c) Routine images

Neurosurgery

Detailed examination for enlarged cerebral ventricle (FLAIR Time-SLIP CSF cine)

Kanazawa Medical University Hospital, Ishikawa
Nanako Kuroda

System used: Vantage Titan
Reason for examination: Patient with Stage 4 breast cancer under hormone therapy for pulmonary metastasis. The patient was observed to have cerebral ventricle enlargement by CT. The patient underwent MRI for detailed examination. The patient has a history of anaphylactic shock in response to contrast media.

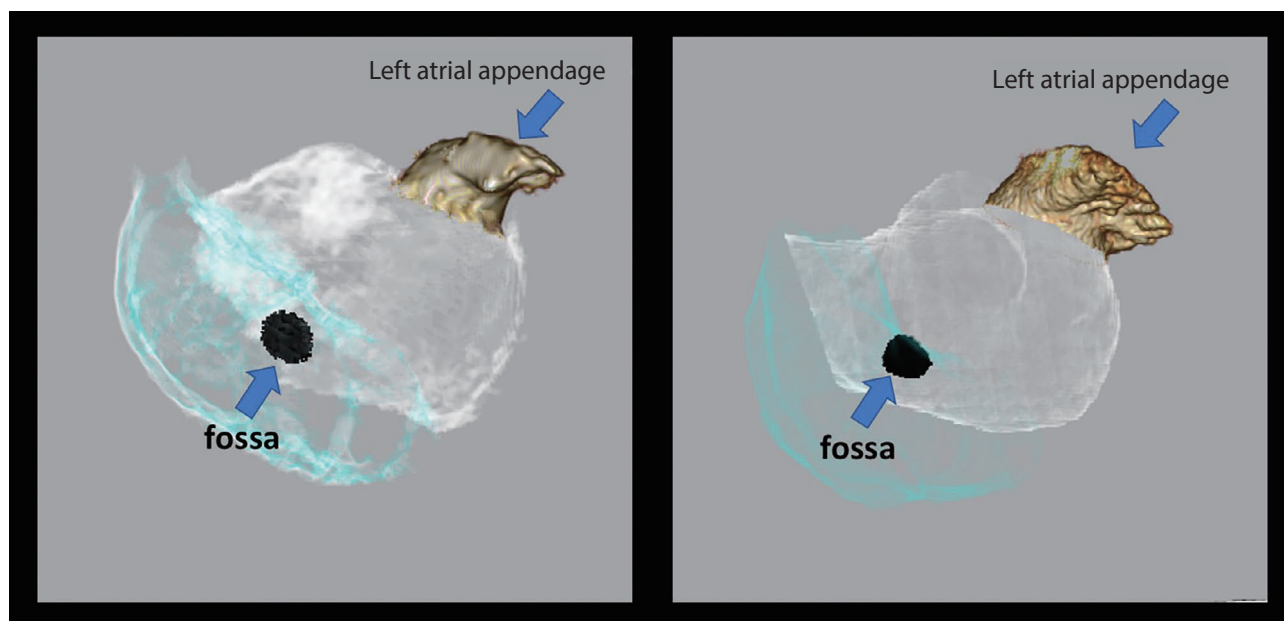
Clinical comments: No findings suggesting metastasis were noted with plain MRI. No infarct area in the brain was observed. Slight enlargement in the 3rd cerebral ventricle, as well as suspected narrowing of the anterior pontine cistern, are observed. Flow into the cerebral aqueduct and turbulent flow in the 3rd cerebral ventricle is visible, but with no finding on the cine image suggesting obstruction.
Technical comments: In general, a Time-SLIP cine image is acquired with BBTI-Prep performed with varied BBTI. This technique produces a hyperintense water signal in early and late TI resulting in few time phases in which CSF influx into the cerebral aqueduct can be observed. A cine image was then acquired at a fixed TI value of 2500, providing a low CSF signal while sequentially changing Trigger Delay (TD) (FLAIR Time-SLIP technique). This technique results in a constantly hypointense signal from the cerebral aqueduct, facilitating CSF bulk flow observations.

Comments on images: (a) FLAIR Time-SLIP cine image. The cerebral aqueduct signal is reduced at a fixed TI of 2500 msec for all time phases (≡FLAIR). CSF flow into this hyperintense region is more readily observed, an advantage for cine imaging. (b) Conventional cine image obtained with CSF Time-SLIP. Because the TI changes along with the time phase, the signals in the cerebral aqueduct and the 4th ventricle change accordingly. This makes it difficult to observe CSF dynamics for all time phases. (c) Routine images. No findings indicating suspected metastasis were found. An enlarged cerebral ventricle is visible.
Comments of judges: FLAIR Time-SLIP technique reduces difficulties for the Time-SLIP technique in terms of limited range of flow observations due to the recovery of background signals.

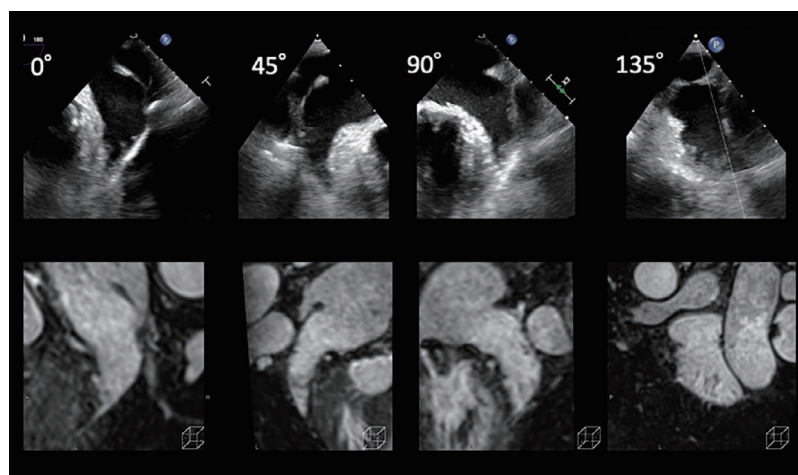
Sex	Age	Weight	Software version	Fasting	Contrast medium
Female	40-50 years	70-80 kg	V4.0	No	
Dose	Injection rate	Administration method	Workstation		

Acquisition conditions for (a)	FASE2D: +6.5, TR: 10400, TE: 91, FA/Flop: 90/160, BBTI: 2500, fat suppression: none, gating: pulse wave gating, SPEEDER factor: 2, FOV: 26×25, matrix: 256×256, slice thickness: 5 mm, number of shots: 1, number of acquisitions: 1, scan time: 3:51
Acquisition conditions for (b)	FASE 2D+6.5, TR: 10257, TE: 91, FA/Flop: 90/160, BBTI: 1500-4500, fat suppression: none, gating: pulse wave gating, SPEEDER factor: 2, FOV: 26×25, matrix: 256×256, slice thickness: 5 mm, number of shots: 1, number of acquisitions: 1, scan time: 3:51
Acquisition conditions for (c)	FOV: 23×23, slice thickness: 5 mm
Coil used	Atlas SPEEDER Head

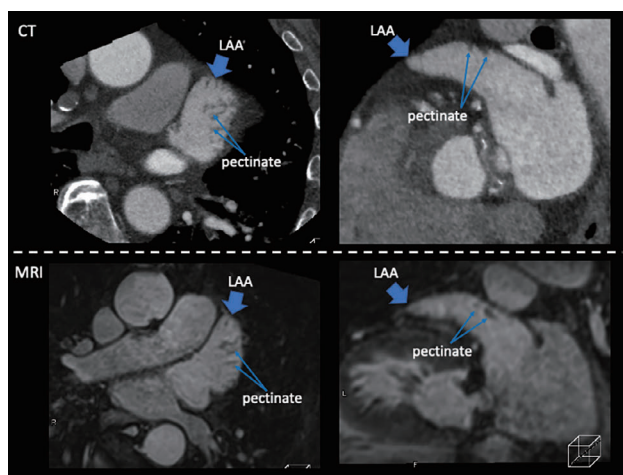




(a) MRI VR image and contrast-enhanced CT



(b) Comparison of intraoperative TEE and plain MRI



(c) Evaluation of thrombus within the left atrial appendage

Thoracic vessels/great vessels

Preoperative evaluation with plain MRI for left atrial appendage closure (LAAC)

Mitsui Memorial Hospital, Tokyo
Naoki Hosoda

System used: Vantage Titan

Reason for examination: The patient was under treatment using oral antiplatelet agent, which poses significant risk of bleeding. The patient had undergone catheter ablation. However, atrial fibrillation recurred with a clear need for continued use of anticoagulant agents. Therefore, left atrial appendage closure (LAAC) was determined, taking the high risk of bleeding (HAS-BLED score: 3) into consideration. Transesophageal echocardiography (TEE) was performed before the operation, which posed various difficulties due to impaired awareness and coughing. Contrast-

enhanced CT was considered but was determined to pose difficulties due to poor renal function. For this reason, evaluation by plain MRI was performed.

Clinical comments: Morphological evaluations, measurements, and assessment of the presence of a thrombus in the left atrial appendage were performed with plain MRI. VR images of the left atrial appendage, atrium, and fossa were generated, allowing easy identification of relative positions. The morphological features were determined to be the chicken-wing type. The inside of left atrial appendage was filled with high intensity blood signals. No signals indicating thrombus were found. Measurement values were generally consistent with those obtained with intraoperative TEE. A device of the size determined based on preoperative plain MRI was successfully placed.

Technical comments: Patients indicated for LAAC have atrial fibrillation. Useful images can be obtained in the absence of artifacts associated with arrhythmia by collecting data in the systolic phase. The sequence for coronary artery imaging was used with increased slice thickness since resolution equal to that for the coronary artery is not re-

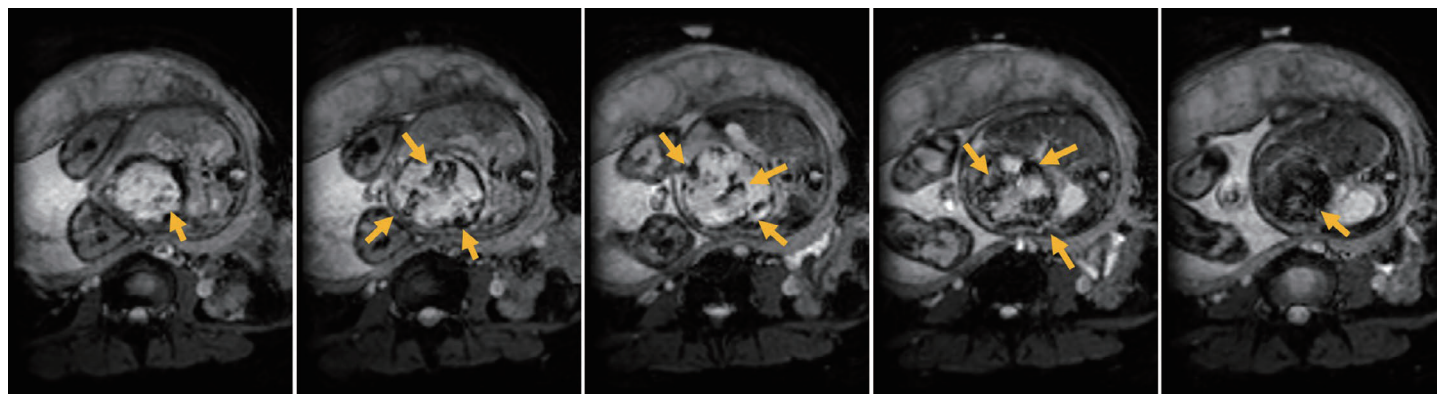
quired to evaluate the left atrial appendage. This can shorten scan times by about 2 minutes (3:40). In VR, the fossa can be easily generated using the MPR image.

Comments on images: (a) The VR image obtained by superimposing the atrium, left atrial appendage, and fossa. Compared to contrast-enhanced CT image of another patient, we find this sufficient to evaluate anatomical morphology. (b) Images for measurements with intraoperative TEE and plain MRI. The cross-sectional images visualized with TEE and plain MRI are similar. The measurement values are likewise consistent. (c) Images for evaluating the presence of thrombus inside the left atrial appendage. The contrast-enhanced CT obtained from another patient is shown above the dotted line. As with contrast-enhanced CT, plain MRI confirms blood and pectinate inside the left atrial appendage.

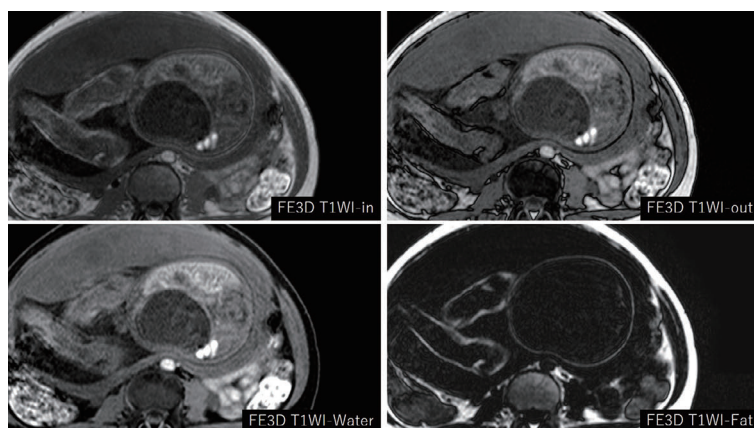
Comments of judges: MRI provides information sufficient for evaluations before left atrial appendage closure (LAAC). This is clinically valuable. Clinical applications of MRI are successful.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	70+ years	60-70 kg	V3.1	No	
Dose	Injection rate	Administration method	Workstation		
			ZIOSTATION2		

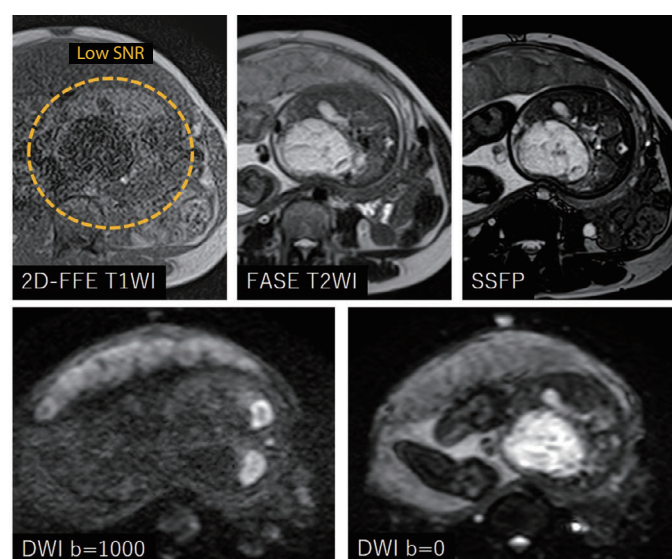
Acquisition conditions for (a), (b), and (c)	FFE3D2.3_ssp200k, TR: 4.5, TE: 2.3, FA:109, fat suppression: FatSAT, gating: RMC, SPEEDER factor: 2.4, FOV: 32×38, matrix: 160×192, slice thickness / number of slices: 2 mm / 50, number of segments: 4, number of acquisitions: 1, scan time: 3:34
Coil used	Atlas SPEEDER Body and Atlas SPEEDER Spine



(a) FE-EPI T2*WI



(b) FE3D WFS T1 WI



(c) Routine images

Pediatrics/fetology

Fetal pelvic tumor mass
(with suspected bleeding)

Kanazawa Medical University Hospital, Ishikawa
Keiya Hirata

System used: Vantage Titan

Reason for examination: A 31-week pregnant woman. Cystic tumor mass with suspected intracystic bleeding was found inside the pelvis of the fetus (female) in ultrasound examination. The patient was referred to our hospital for detailed examination.

Clinical comments: The fetus has a cystic tumor mass on

the dorsal side of stomach, the ventral side of the left kidney, and on the cranial side. Hypointense signals in T1WI as well as dot-like and linear hypointense signals inside the mass in T2WI are observed, with the possible presence of a septal structure. A remarkably hypointense signal region was observed inside the cyst in T2*WI, presumably indicating hemosiderin deposition. No significant increase in signal intensity is visible in the intracystic mass in DWI. No obvious fatty component was noted.

Technical comments: The fetus featured a pelvic tumor mass in which bleeding in ovarian cysts was suspected. A sequence capable of identification of bleeding and fat was used. Single shot imaging was performed to minimize the impact of the fetal motion during imaging. For T2*WI, FE-EPI for perfusion MRI was used. For fat detection, FE3D-WFS (Dixon) was used. With this protocol, imaging requires

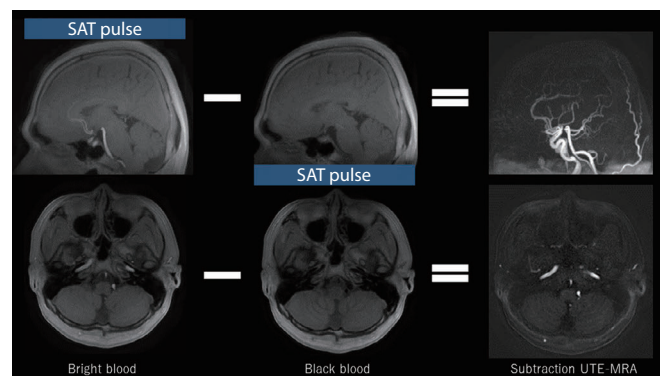
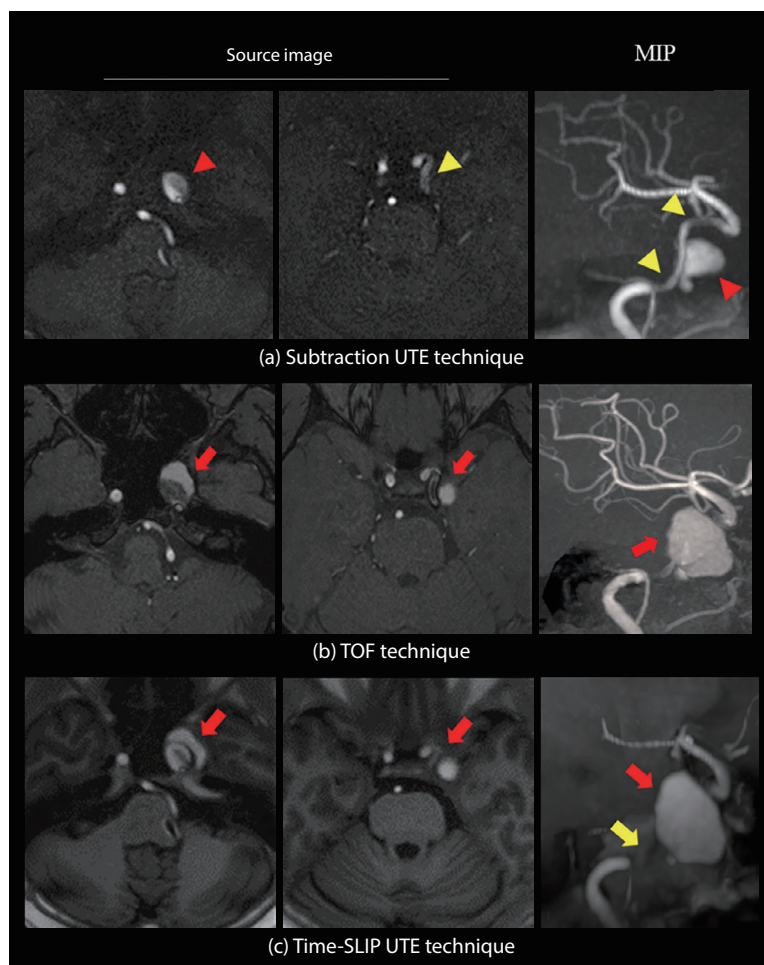
about 15 minutes even including DWI.

Comments on images: (a) FE-EPI T2*WI. With the sequence for perfusion MRI, imaging takes a few seconds. Since it requires one second or less per slice, images are unaffected by motion. (b) FE3D-WFS T1WI images. Because this is a 3D sequence, thin-slice images with high SNR can be obtained over a short time. Compared to FFE2D-T1WI (c), image quality is clearly improved. (c) Routine images of the fetus. With DWI at $b = 0$, a decreased intensity of the bleeding signal is obscured. Images obtained on FFE2D-T1WI cannot be evaluated due to poor SNR at the center.

Comments of judges: Fast imaging and high resolution using a sequence sensitive to hemosiderin deposition provides useful images. This represents a positive development.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Female	30-40 years	60-70 kg	V4.0	No	
Dose	Injection rate	Administration method	Workstation		

Acquisition conditions for (a)	FE-EPI2D+1.2, TR: 4847, TE: 34, FA: 90, fat suppression: FatSAT, gating: none, SPEEDER factor: 2, FOV: 27×25, matrix: 128×128, slice thickness / number of slices: 5 mm / 40, number of acquisitions: 1, scan time: 0:05
Acquisition conditions for (b)	FE3D : WFS, TR: 6.2, TE: 2.2/4.3, FA: 12, fat suppression: none, gating: none, SPEEDER factor: 2, FOV/No Wrap: 32×33.2/2, matrix: 224×224, slice thickness / number of slices: 3 mm / 74, number of acquisitions: 1, scan time: 1:28
Acquisition conditions for (c)	FASE2D+6.5, TR: 20145, TE: 60, FA/Flop 90/160, fat suppression: none, gating: none, SPEEDER factor: 2, FOV: 35×45, matrix: 192×256, slice thickness / number of slices: 4 mm / 40, number of acquisitions: 1, scan time: 0:21
Coil used	Atlas SPEEDER Body and Atlas SPEEDER Spine



(d) Principle of subtraction UTE technique

Neurosurgery

Post-placement of flow diverter stent in left internal carotid aneurysm

Jichi Medical School Saitama Medical Center, Saitama
Yusuke Ayabe

System used: Vantage Titan 3T

Reason for examination: An MRI was scheduled to confirm embolization effects after placing a flow diverter stent for left internal carotid artery aneurysm. The patient had claustrophobia and required the fastest possible examination.

Clinical comments: Visualization of the intra-aneurysmal and in-stent blood flows is important for evaluations following treatment using a flow diverter. This evaluation

proved difficult with TOF and time-SLIP UTE techniques. Evaluation was more readily performed with subtraction UTE technique, which is a clinically useful finding. In addition, with the disadvantage of the prolonged scan time of UTE technique being addressed, the imaging technique used for scanning this patient allows improved workflows with minimized patient burden. This is considered extremely useful.

Technical comments: With TOF and Time-SLIP UTE techniques, the visualization of intra-aneurysmal thrombosis, separation of residual blood flow, and in-stent blood flow are difficult. Given an additional requirement for shortened scan times, we used the subtraction UTE technique with presaturation pulse for the evaluations. To enhance influx effects, the number of segments was set to 1000. The presaturation pulse was applied to the parietal region of the bright blood image, taking into consideration differential errors due to MT effects.

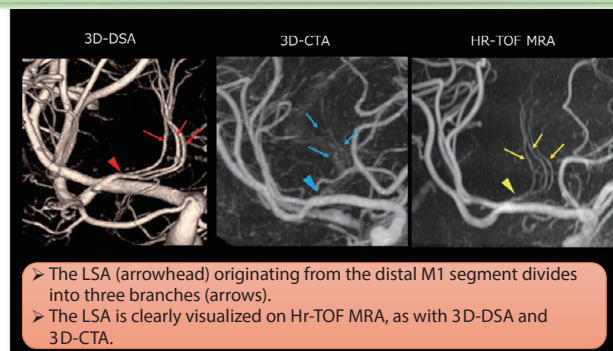
Comments on images: (a) Subtraction UTE technique enables evaluation of in-stent and intra-aneurysmal blood flows (yellow and red arrowheads, respectively). (b) TOF technique does not allow intra-aneurysmal thrombosis to be distinguished from residual blood flow (red arrow). (c) With Time-SLIP UTE technique, evaluation of in-stent/intra-aneurysmal flow (yellow and red arrows) is difficult. (d) Principle of subtraction UTE technique. The background signals are suppressed by subtracting black blood UTE from bright blood UTE. This enables visualization only of blood flow.

Comments of judges: In-stent and intra-aneurysmal blood flows are clearly visualized, providing important information. Since the idea to reduce misregistration due to MT effects is taken into consideration, this imaging technique is user-friendly.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	20-30 years		V4.0		
Dose	Injection rate	Administration method	Workstation		
			Ziostation		

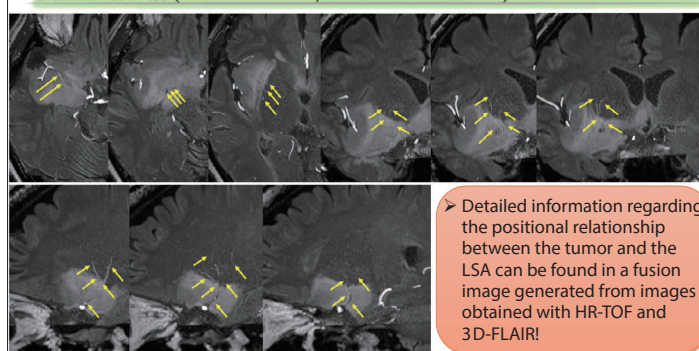
Acquisition conditions for (a)	FFE3D UTE, TR: 3.7, TE: 0.096, FA: 5, fat suppression: none, gating: none, SPEEDER factor: 1, FOV/No Wrap: 23×23/1, matrix: 288×288, slice thickness / number of slices: 1 mm / 200, number of segments: 1000, number of trajectory: 28000, number of acquisitions: 1, scan time: 4:08
Acquisition conditions for (b)	MRA3D, TR: 21, TE: 3.4, FA: 15, fat suppression: none, gating: none, SPEEDER factor: 2, FOV/No Wrap: 20×20/1, matrix: 224×256, slice thickness / number of slices: 0.9 mm / 122, number of acquisitions: 1, scan time: 5:04
Acquisition conditions for (c)	FFE3D UTE, TR: 3.7, TE: 0.096, FA: 5, BBTI: 1000, fat suppression: none, gating: pulse wave gating, SPEEDER factor: 1, FOV/No Wrap: 23×23/1, matrix: 288×288, slice thickness / number of slices: 1 mm / 200, number of segments: 100, number of trajectory: 19968, number of acquisitions: 1, scan time: 4:07
Coil used	32ch Head SPEEDER

Comparison of preoperative LSA visualization capabilities



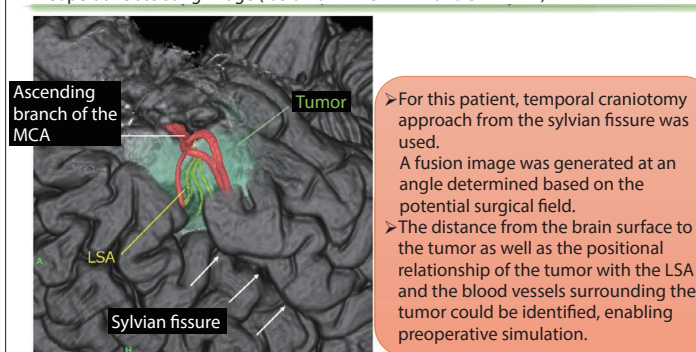
(a) Comparison of preoperative LSA visualization performance (DSA, CTA, and Hr-TOF MRA)

Pre-operative assisting images (fusion of Hr-TOF MRA and 3D-FLAIR)



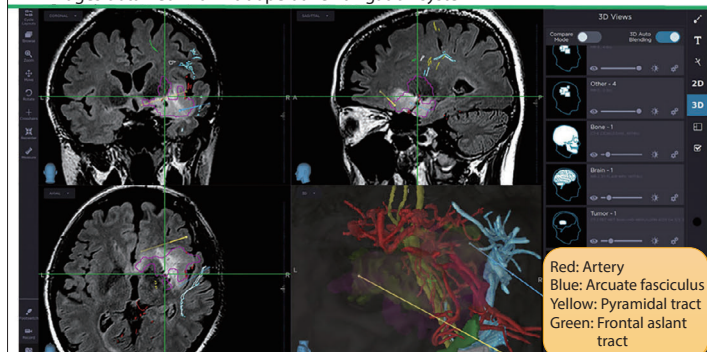
(b) Preoperative assisting images (fusion of Hr-TOF MRA and 3D-FLAIR)

Preoperative assisting image (fusion of Hr-TOF MRA and 3D-FLAIR)



(c) Preoperative assisting image (fusion of Hr-TOF MRA and 3D-FLAIR (VR image))

Images obtained with intraoperative navigation system



(d) Images obtained with intraoperative navigation system

Neurosurgery

Oligodendroglioma of the right frontal lobe

Kyorin University Hospital, Tokyo
Sanae Takahashi

System used: Vantage Galan 3T

Reason for examination: The patient underwent craniectomy for a right frontal lobe oligodendroglioma in 2010. During postoperative follow-up, enlargement of the residual tumor was observed. Thus, repeat craniectomy was planned and preoperative detailed examination with MRI was requested.

Clinical comments: Preserving the lenticulostriate arteries (LSA) responsible for blood perfusion to this region is critical in surgery for tumors extending to the basal ganglia re-

gion. High-resolution time-of-flight MR angiography (Hr-TOF MRA), which offers the TOF MRA characteristic advantage of visualizing only arteries, is effective in visualizing the LSA. The technique can also be incorporated into an intraoperative navigation system to provide useful preoperative and intraoperative images.

Technical comments: The in-plane resolution at which the LSA can be visualized was confirmed using a phantom to simulate the LSA. To ensure introduction in an intraoperative navigation system, the narrowest FOV at which the bilateral MCA was included and no folding artifact appeared was set. The matrix was determined thereafter. Furthermore, an Hr-TOF MRA sequence with the slab number and BW which provide an enhanced in-flow effect was constructed using a fluid phantom.

Comments on images: (a) Comparison of preoperative LSA visualization capabilities. The LSA (arrowhead) originating from the distal M1 segment divides into three branches (arrow). As with 3D-DSA and 3D-CTA, Hr-TOF MRA is capa-

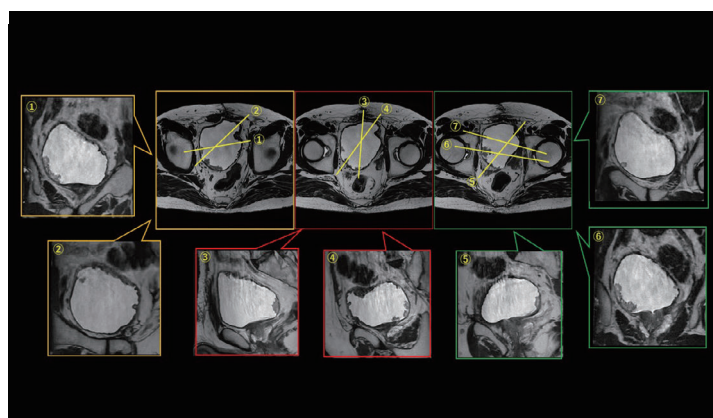
ble of visualizing the LSA. (b) A fusion image for Hr-TOF MRA and 3D-FLAIR was generated for use as a preoperative support image. This makes it possible to accurately determine the relative position between the tumor and the LSA inside the tumor. (c) A fusion of the VR images made it possible to confirm an access route in a transsylvian approach and the positional relationship of the tumor, LSA, and the surrounding blood vessels. This enabled detailed preoperative simulations. (d) Images obtained with intraoperative navigation system. Introducing Hr-TOF MRA to the navigation system makes it possible to determine the relative position of the blood vessels surrounding the tumor and the LSA in real time.

Comments of judges: The fact that the optimal conditions were determined based on the results of the basic investigation and that this helped preoperative planning could be well understood. The LSA is favorably visualized.

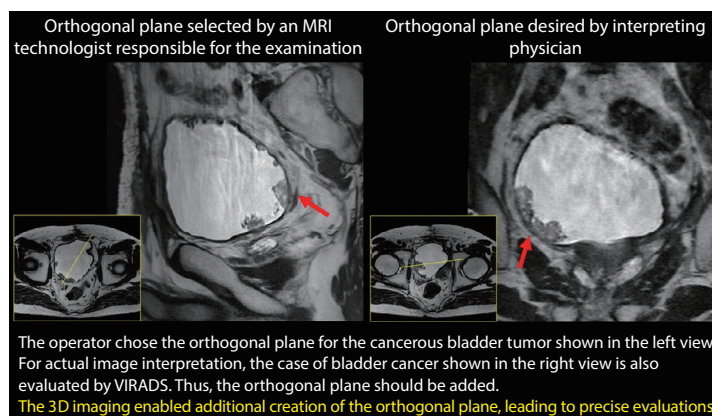
Sex	Age	Weight	Software version	Fasting	Contrast medium
Female	50-60 years	50-60 kg	V5.0	No	ProHance 13 mL
Dose	Injection rate	Administration method	Workstation		
			ZIOSTATION		

Acquisition conditions for (a), (b), (c), and (d)	MRA3D, TR: 16, TE: 3.9, FA: 15, fat suppression: none, gating: none, SPEEDER factor: 2.8, FOV/No Wrap: 13×13/1.5, matrix: 320, slice thickness / number of slices: 0.8 mm/70, number of acquisitions: 1, AiCE: no, scan time: 6:56
Coil used	32ch Head SPEEDER

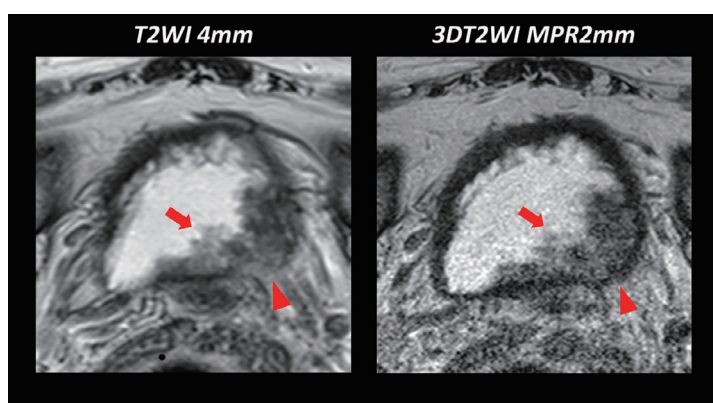
* Advanced intelligent Clear-IQ Engine (AiCE)



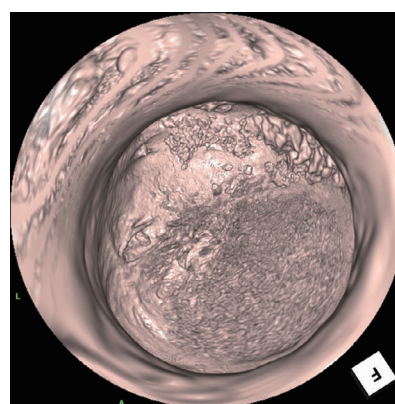
(a) Selection of arbitrary cross-sectional images obtained with 3DT2WI



(b) Improvements in diagnostic performance using 3D imaging



(c) Reduced partial volume effects



(d) Virtual cystoscopy using volume data

Pelvic

Benefits of 3DT2WI in assessing multiple bladder cancer

Kyorin University Hospital, Tokyo
Shun Saito

System used: Vantage Galan 3T

Reason for examination: The bladder imaging reporting data system (VI-RADS) standardizes imaging protocols and reporting for the bladder and evaluates the risk of muscle invasion by combining findings obtained via T2-weighted, diffusion-weighted, and dynamic contrast images. T2-weighted images in particular require image quality characterized by high resolution and imaging at adequate angles. The impact of imaging technique on the diagnostic performance poses a clear challenge. As my report indicates, the 3D sequences make it possible to obtain high quality cross-sectional images of any region.

Clinical comments: Cases of bladder cancer typically require orthogonal cross-section imaging of the tumor attached to the bladder wall for evaluations of muscle invasion. Inter-operator variability in plane angle or cases with multiple tumors make it difficult to obtain optimal orthogonal cross-sectional images, which affects diagnostic performance for 2D imaging. On the other hand, 3D scanning enables retrospective observations into any desired plane. This means it enables evaluation of muscle invasion of individual tumors in detail, even in patients with multiple tumors and regardless of operator. This option is useful.

Technical comments: Prolongation of scan times and SNR reductions due to acquisition conditions allowing greater resolution pose challenges. 3D imaging based on one of the Fast 3D modes—in this case, Wheel (55%)—enabled imaging in less than half the time required for conventional 3D imaging. Denoising through AiCE reconstruction improved SNR even for thin-slice images.

Comments on images: (a) In cases involving multiple bladder cancer, 3D T2-weighted images were useful in evaluating the VI-RADS category due to high resolution and the

flexible acquisition of the arbitrary planes. (b) This involves a case in which selection of orthogonal planes proved difficult. With 2D, planes excluded from imaging cannot be interpreted and therefore cannot be precisely diagnosed. Current imaging in 3D allows reconstruction of the orthogonal plane and precise evaluations. (c) Volume data makes it possible to generate thin-slice MPR images. This reduces the partial volume effect and delineates the boundary between the lesion and the muscle layer for more precise evaluations of muscle invasion. (d) The volume data can be used to generate a virtual cystoscopy image. This enables preoperative simulations of TURBT and should prove useful for identifying the morphology of the lesion in advance.

Comments of judges: The ability to rapidly obtain clinically useful 3D multi-sectional images for precisely evaluating invasion depth into the bladder wall by imaging orthogonal cross-sections of the bladder wall for individual tumors is a welcome development. Additionally, AiCE makes up for a weakness of the high-speed imaging technique.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	70+ years	60-70 kg	V5.0	No	
Dose	Injection rate	Administration method	Workstation		

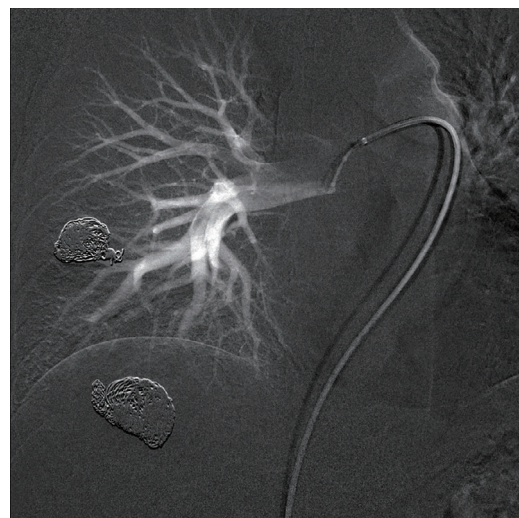
Acquisition conditions for (a), (b), and (c)	FASE3D : MPV : F3W, TR: 5810, TE: 99, FA/Flop 87/128, fat suppression: none, gating: none, SPEEDER factor: 2.0, FOV/No Wrap: 25×25, matrix: 384×400, slice thickness / number of slices: 0.8 mm / 170, number of shots: 1, number of acquisitions: 1.0, AiCE: yes, scan time: 6:38
Acquisition conditions for (d)	Fat suppression: none, gating: none
Coil used	Atlas SPEEDER Spine and 16ch Flex SPEEDER Large

* Advanced intelligent Clear-IQ Engine (AiCE)

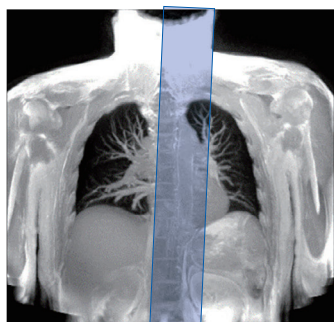




(a) MIP image of the pulmonary artery



(b) Angiography after IVR



(c) Position for setting Time-SLIP tag



Source image of pulmonary artery/vein



Source image of pulmonary vein with Time-SLIP technique



Source image of pulmonary artery

(d) Visualization of pulmonary artery with Time-SLIP UTE



Thoracic vessels / great vessels

Pulmonary arterial/venous malformation

Juntendo University Hospital, Tokyo

System used: Vantage Galan 3T

Reason for examination: Follow-up after coil embolization for pulmonary arterial/venous malformation in right lower lobe

Clinical comments: The subject underwent pulmonary artery imaging in follow-up after coil embolization for pulmonary arterial/venous malformation in the right lower lobe. This imaging was performed without contrast en-

hancement, as requested by a physician. Postoperative follow-up requires check for reduced size of venous sac, recanalization due to coil compaction, and collateral blood channels. This can be achieved with Time-SLIP UTE MRA. This approach enables clear separation between the pulmonary artery and vein and easy acquisition of pulmonary artery-dominant images. This technique is potentially useful for conditions such as pulmonary arterial/venous malformation.

Technical comments: The pulmonary artery/vein were imaged in FFE 3D UTE sequence. Time-Slip UTE sequence in combination with an additional (non-selective) IR pulse was used to obtain subtraction images. Choosing a specific TI value for the IR pulse allows the artery signal to be null for enhanced hypointense pulmonary artery. Subtraction resulted in a weighted image obtained by application with

Time-SLIP technique to eliminate vein signals to the extent possible.

Comments on images: (a) MIP image after subtraction No findings were found suggestive of recanalization or the presence of alternative blood supply route after treatment of pulmonary arterial/venous malformation.

(b) Angiographic image after IVR

(c) Position for setting of Time-SLIP tag

(d) Method to visualize the pulmonary artery with Time-SLIP UTE The pulmonary artery/vein are clearly visualized. Additionally, no coil artifacts are visible.

Comments of judges: The impact of magnetic susceptibility is reduced by the UTE technique to provide high quality images. This method is capable of evaluating coil embolization without contrast enhancement, a clinically significant development.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	30-40 years	60-70 kg	V5.0	No	
Dose	Injection rate	Administration method	Workstation		

Acquisition conditions for (a), (b), (c), and (d)	FFE3D UTE, TR: 4.2, TE: 0.096, FA 5, TI: 250, BBTI: 1000, fat suppression: none, gating: respiration gating, FOV: 45×45, matrix: 384 384, slice thickness / number of slices: 1.5 mm / 150, number of segments: 128, number of acquisitions: 1, AiCE: no, scan time: 6:24
Coil used	Atlas SPEEDER Body and Atlas SPEEDER Spine

* Advanced intelligent Clear-IQ Engine (AiCE)

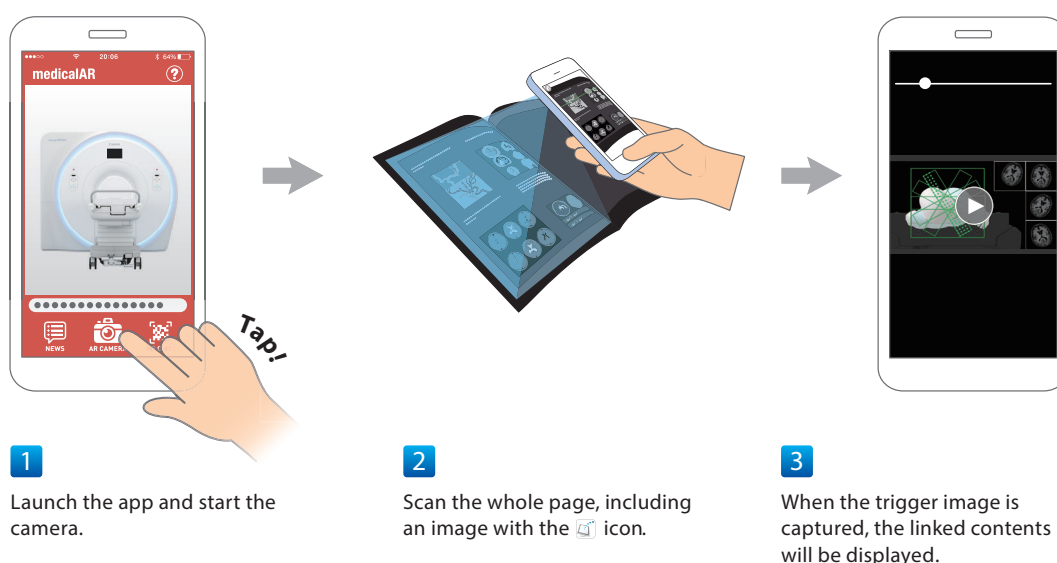


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