

# **Blood-Pool imaging properties of non protein-binding extracellular unspecific Gadolinium-based contrast media**

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## **Purpose:**

To determine whether non protein-binding extracellular unspecific Gadolinium-based contrast media have a blood-pool effect that allows equilibrium phase MR angiography (MRA).

## **Materials and Methods:**

The local institutional review board approved the study. A total of 30 patients referred for whole-body MR-angiography (WB-MRA) were examined on a 1.5 Tesla MR system (MAGNETOM Avanto, Siemens Healthcare, Erlangen, Germany) using a dedicated total-body phased array surface coil system and the spine-array coils. 15 consecutive patients received 10 ml of the protein-binding blood-pool contrast medium gadofosveset trisodium (Vasovist<sup>®</sup>, Bayer-Schering Pharma AG, Berlin, Germany) and 15 consecutive patients received 15 ml of the non-protein binding unspecific extracellular contrast medium gadobutrol (Gadovist<sup>®</sup>, Bayer-Schering Pharma AG, Berlin, Germany). After 4 station first-pass WB-MRA, blood-pool phase imaging was obtained in 4 consecutive stations in an unchanged order from the head to the lower legs. For blood-pool phase imaging, a high spatial resolution 3-dimensional gradient-echo sequence with an acquisition time of 3 minutes 26 seconds was used (TR 9.95 ms, TE 4.67 ms, flip-angle 21°, bandwidth 540 Hz/Pixel, voxel size 1x1x1 mm, parallel imaging with an acceleration factor of 2,

**Table 1:** time interval between bolus injection and blood-pool phase imaging of the respective station

station	1	2	3	4
gadobutrol	9.1 min	12.9 min	16.9 min	21 min
gadofosveset trisodium	9 min	13.1 min	17.4 min	21.7 min

GRAPPA algorithm). The time interval between the contrast injection for arterial phase imaging and the respective blood-pool phase acquisition of each station was recorded (table 1). In the quantitative evaluation, signal intensities (SI) were measured in 2 vessels per station and one muscle (internal reference). Subsequently, relative contrast values (RC) were calculated. In the

qualitative evaluation, the vessel contrast was rated by two radiologists in consensus applying a 5 point scale. The Mann-Whitney-U-test was used for statistical analysis.

## **Results:**

The mean time intervals between contrast injection and blood-pool phase imaging of the respective station did not significantly differ between the two contrast media (table 1). Compared to gadofosveset trisodium, gadobutrol enhanced imaging revealed significantly lower RC values ( $p < .05$ ) for those two stations (3 and 4) that were

**Table 2:** relative contrast values of evaluated vessels

(station) vessel	gadofosveset trisodium	gadobutrol	p value
(1) right common carotid artery	0.34	0.27	n.s.
(1) right internal jugular vein	0.35	0.29	n.s.
(2) abdominal aorta	0.34	0.27	n.s.
(2) inferior vena cava	0.35	0.28	n.s.
(3) right superficial femoral artery	0.51	0.40	< .05
(3) right superficial femoral vein	0.50	0.39	< .05
(4) right anterior tibial artery	0.49	0.34	< .05
(4) right popliteal vein	0.49	0.32	< .05

acquired more than 15 minutes after contrast medium injection (table 2). In the qualitative evaluation, lower ratings for gadobutrol (3.6, 3.4, 3.9, 3.9) were observed in comparison to gadofosveset trisodium (3.9, 3.7, 4.2, 4.6) regarding all 4 stations. The differences, however, were not significant ( $p > .05$ ).

## **Conclusions:**

Non protein-binding extracellular unspecific Gadolinium-based contrast media have the potential of blood-pool phase imaging within a time window of less than 15 minutes, which might be suitable for many clinical questions where high-spatial resolution vascular images are necessary.

## **References:**

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