Meeting Modern Needs
Higher Concentration Contrast Media (HCCM)
Iodine Delivery Rate (IDR)

Arterial enhancement is critically dependent on the iodine delivery rate (IDR)\(^2\).

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\text{IDR (gI/sec)} = \frac{\text{injection rate}}{\text{contrast concentration}}
\]

There are two methods to ensure rapid administration of iodine:\(^3\)

- Increase the \textit{injection rate}, which can lead to complications with some patient groups (elderly, poor venous access);
- Increase the iodine delivery rate by increasing the \textit{iodine concentration} of the agent administered.

Contrast Agent Delivery Rate

The IDR depends on the iodine concentration of contrast solution and the injection rate. In the table below, IDRs are estimated based on both parameters. High injection rates may cause contrast extravasation, especially in patients with fragile or damaged veins or in case of contrast injection in small distal veins.\(^5\)

Increasing the concentration of the contrast media obviates the need to increase the injection rate.
Cardiac CT

Contrast bolus optimization for cardiac 16-slice CT: Comparison of contrast medium formulations containing 300 and 400 milligrams of iodine per millilitre\textsuperscript{12}

Objectives
To assess the performance of two different contrast materials (Iomeron\textsuperscript{®} 400 and Iomeron\textsuperscript{®} 300) in terms of cardiac attenuation via test bolus curves parameters and final contrast density of the main bolus.

Methods
60 patients prospectively randomized into 2 groups:

A. 83mL of Iomeron\textsuperscript{®} 300 (3.3mL/sec);
B. 63mL of Iomeron\textsuperscript{®} 400 (2.5mL/sec).

Results

Contrast between plaque and adjacent coronary vessel lumen

Findings
Equivalent enhancement of the ventricular cavities and coronary arteries from using a standard concentration of 300mgI/mL can be obtained using high concentration contrast media at 400mgI/mL with lower overall volumes and reduced injection flow rates.
Angiography of the pulmonary arteries

MDCT angiography for detection of pulmonary emboli: comparison between equi-iodine doses of Iomeron® 400 and iodixanol 320

Objectives
To compare Iomeron® 400 and iodixanol 320 in pulmonary artery MDCTA.

Methods
- 80 patients were randomized to receive equi-iodine intravenous doses (48g) of either Iomeron® 400 or iodixanol 320 via power injector 4mL/s;
- Subjects scanned on 4 or 64 slice scanners.

Results

Findings
CT attenuation of the pulmonary arterial vasculature is significantly higher with the use of high concentration Iomeron® 400, compared with iodixanol 320 when administered at identical iodine dose and injection rates.
Peripheral arteries

Four-Detector Row Computed Tomographic Angiography in the Evaluation of Infrarenal Aorta and Peripheral Arterial Occlusive Disease: Influence of Contrast Medium Concentration

Objectives

To prospectively compare the diagnostic accuracy and quality of vascular enhancement of two contrast agents with different iodine concentration in 4-detector row computed tomographic angiography of abdominal aorta and lower-extremity arteries.

Methods

- 40 patients with peripheral arterial occlusive disease;
- 90 mL of lomeron® 400;
- 120 mL of lomeron® 300.

Results

Iomeron® 400 demonstrated an increased arterial enhancement in aortoiliac and femoral districts in comparison to Iomeron® 300 and a significant better qualitative assessment in the aortoiliac segments without an increase in venous opacification or the presence of venous overlap.

Findings

The use of a small volume of a high-concentration contrast medium yielded higher arterial enhancement from the abdominal aorta down to the femoral arteries with absent or minimal venous overlap and without significant differences in diagnostic ability.
Imaging of the Liver

Enhancement and safety of Iomeron® 400 and iodixanol 320 in patients undergoing abdominal multidetector CT

Objectives
To compare Iomeron® 400 and iodixanol 320 for contrast enhancement and safety in patients undergoing liver MDCT.

Methods
183 patients received equi-iodine 40g/L and either Iomeron® 400 or iodixanol 320, administered intravenously at 4mL/s. Two readers determined contrast density in the abdominal aorta, portal vein, inferior vena cava and liver parenchyma.

Result

Findings
Iomeron® 400 produced significantly greater enhancement of the aorta during the arterial phase and the liver parenchyma during the portal-venous phase.
Renal Safety in At-Risk Patients

The ACTIVE Trial: comparison of the effects on renal function of iomeprol-400 and iodixanol-320 in patients with chronic kidney disease undergoing abdominal computed tomography

Objective

Patients with pre-existing chronic kidney disease (CKD) are at greater risk of experiencing contrast induced nephropathy (CIN) following injection of iodinated agents. This study compared the effects of lomeron® 400, and iodixanol 320 on the renal function of patients with pre-existing moderate-to-severe CKD undergoing contrast-enhanced multidetector CT (CE-MDCT).

Methods

This was a prospective, multicenter, double blind, randomized, parallel group comparison of lomeron® 400 and iodixanol 320 in renally impaired patients receiving relatively high intravenous doses (40gI) of the two contrast media.

Results

- The CIN analysis population consisted of 148 evaluable patients, of whom 76 received lomeron® 400 and 72 iodixanol 320.
- The two study groups were comparable at baseline with regard to age, gender, hydration status, baseline SCr and CrCl values. However, the lomeron® 400 group had a significantly higher proportion of patients with CKD and diabetes mellitus (p = 0.02).
- A total of 5 patients (6.9 %) receiving iodixanol 320 and none of the 76 patients (0%) receiving lomeron® 400 experienced an increase in SCr ≥0.5 mg/dl from baseline CIN (p = 0.025).
- Relative rises in SCr of ≥25% and relative CrCl decreases of ≥25% occurred with similar frequency in both groups (p >0.05).
- In the subset of patients with CrCl <40 mL/min and SCr >2.0 mg/dL, no cases of CIN (0/39) were detected after the administration of lomeron® 400, independently of the CIN endpoint used, while the rate of CIN after iodixanol 320 was 11.8% (4/34) using the primary endpoint (p = 0.04), and 5.9% (2/34) using the secondary CIN endpoints (p = 0.21).
- The difference in mean change in SCr between the two groups lomeron® 400 (–0.04 ± 0.19mg/dL) and iodixanol 320 (0.06 ± 0.19mg/dL) was statistically significant (p = 0.017).

Findings

The authors conclude that: “The incidence of CIN was significantly higher after IV administration of iodixanol-320 than iomeprol-400. The mean rise in SCr from baseline was also higher in patients receiving iodixanol.”
Radiation Safety

Low-dose multidetector-row CT-angiography of abdominal aortic aneurysm after endovascular repair

Objectives
To investigate the possibility of reducing radiation dose exposure while maintaining image quality using multidetector computed tomography angiography (MDCTA) with high-concentration contrast media in patients undergoing follow-up after endovascular aortic repair (EVAR) to treat abdominal aortic aneurysm.

Methods
- 30 patients.
- Prospective, single center, intra-individual study.
- Patients underwent two consecutive MDCTA scans 6 months apart:
  - one with a standard acquisition protocol (130 mAs/120 kV) and 120mL of iomeprol 300;
  - one using a low dose protocol (100 mAs/80 kV) and 90mL of iomeprol 400
- Images acquired during the arterial phase of contrast enhancement were evaluated both qualitatively and quantitatively for image noise and intraluminal contrast enhancement.

Results
- Statistically significantly higher attenuation values were measured in the low-dose acquisition protocol compared to the standard protocol, from the suprarenal abdominal aorta to the common femoral artery ($p < 0.0001$; all vascular segments).
- Qualitatively, image quality was judged significantly ($p = 0.0002$) better with the standard protocol than with the low-dose protocol.
- However, no significant differences were found between the two protocols in terms of contrast-to-noise ratio (CNR) ($13.63 \pm 6.97$ vs. $11.48 \pm 8.13$; $p = 0.1058$).
- An overall dose reduction of up to 74% was observed for the low-dose protocol compared with the standard protocol.

Findings
In repeated follow-up examinations of patients undergoing Endovascular Aortic Repair (EVAR) for abdominal aortic aneurysm, a low-dose radiation exposure acquisition protocol provides substantially reduced radiation exposure while maintaining a constant CNR and good image quality.
Key Points: Iomeron® 400

- Iomeron® is the contrast medium with the highest concentration available on the market.
- At the same concentration as other CM, Iomeron® has the lowest viscosity and the lowest osmolality.
- Iomeron® is readily available in a wide variety of iodine concentrations and volumes for clinical use.
- Iomeron® allows both the total volume of CM administered and the injection rate to be reduced.
- Iomeron® allows the same imaging quality at lower radiation doses.
- Iomeron® has shown optimal renal tolerability; in fact using HCCM does not lead to higher incidence of adverse events when compared to a lower concentration.
- Iomeron®: when highest iodine concentration matters.