

Evolving Contrast Equation: Clinical Performance and Supply Considerations in Modern Radiology

Joseph Jalkiewicz

The role of iodinated contrast media (ICM) in imaging has traditionally been defined by clinical performance—image quality, safety, and consistency across a range of applications. In recent years, however, supply reliability has emerged as a cornerstone of the decision-making tree, shaping how radiology departments evaluate and select contrast agents. This shift marks a transition from viewing contrast as a commodity to treating it as a strategic component of operational resilience.

The Imaging Legacy of COVID-19

The global iodinated contrast shortage of 2022 marked a significant

turning point for the imaging community. A COVID-19–related shutdown of a major manufacturing facility in Shanghai disrupted production of widely used contrast agents, including iohexol-based products and iodixanol-based products, leading to severe supply constraints.¹

Brad Schaming, Supply Chain Customer Business Partner for Radiology North America at Bayer, recalls the gravity of that period: “The supply shortage had a global impact, which disrupted procedures nationwide. It was unprecedented in our history to that scale.”

The effects were immediate; radiology departments were forced to implement

emergency conservation strategies, including reduced-dose protocols and prioritization of urgent studies.² While these measures maintained image quality, they exposed the fragility of high-volume, just-in-time supply chains.³ In the United States alone, approximately half of the tens of millions of annual CT examinations require iodinated contrast, underscoring the agent’s central role in modern healthcare.^{4,5}

Within this landscape, Ultravist® (iopromide), developed by Bayer Healthcare Pharmaceuticals, reflects how clinical performance and operational considerations are increasingly evaluated together in radiology practice.

About the author: Joseph Jalkiewicz is a paid medical writer for *Applied Radiology*.

INDICATIONS and IMPORTANT SAFETY INFORMATION

INDICATIONS

Intravenous Procedures*: Ultravist® is indicated for:

- Contrast Computed Tomography (CT) of the head and body (intrathoracic, intra-abdominal, and retroperitoneal regions) for the evaluation of neoplastic and non-neoplastic lesions in adults and pediatric patients aged 2 years and older
- Contrast mammography to visualize known or suspected lesions of the breast in adults, as an adjunct following mammography and/or ultrasound
- Excretory urography in adults and pediatric patients aged 2 years and older.

Intra-arterial Procedures*: Ultravist is indicated for:

- Cerebral arteriography and peripheral arteriography in adults
- Coronary arteriography and left ventriculography, visceral angiography, and aortography in adults
- Radiographic evaluation of cardiac chambers and related arteries in pediatric patients aged 2 years and older.

*Specific concentrations and presentations of Ultravist are recommended for each type of imaging procedure (see Dosage and Administration 2.2, 2.3, 2.4 in the Full Prescribing Information).

IMPORTANT SAFETY INFORMATION

WARNING: RISK ASSOCIATED WITH INTRATHECAL USE

Intrathecal administration, even if inadvertent, may cause death, convulsions, cerebral hemorrhage, coma, paralysis, arachnoiditis, acute renal failure, cardiac arrest, seizures, rhabdomyolysis, hyperthermia, and brain edema. Ultravist is not approved for intrathecal use.

Please see additional Important Safety Information below and full Prescribing Information, including Boxed Warning

Clinical Performance and Protocol Flexibility

Ultravist® is a nonionic, low-osmolar iodinated contrast agent indicated for a range of intravenous and intra-arterial imaging procedures. It is available in concentrations of 300 mg iodine/mL and 370 mg iodine/mL, providing flexibility.

As Jose Briceno, MD, senior medical director at Bayer and former chair of radiology at Valera University Hospital and professor of radiology in Andes University, explains, “The degree of contrast enhancement is related to the iodine concentration delivered to the tissue of interest. This is an important factor when developing protocols. The shortage highlighted the importance of having options for a back up supplier,” he explains.

The efficacy for Ultravist® is reflected in multiple studies. Regarding intra-arterial studies:

- In two randomized, double-blind clinical trials (n=80), visualization ratings in patients undergoing cerebral arteriography were rated good or excellent in 99% of patients with Ultravist 300 mg/mL.⁶
- In two randomized, double-blind clinical trials and one unblinded, unrandomized clinical trial (n=106), visualization ratings in patients undergoing coronary arteriography/left ventriculography were rated as good or excellent in 99% or more of patients with Ultravist 370-mg/mL.⁶
- In two randomized, double-blind clinical trials (n=78), visualization ratings in patients undergoing aortography/visceral angiography were rated as good or excellent in the majority of patients with Ultravist 370 mg/mL; a radiographic diagnosis was made in 99% of patients.⁶

Intravenous studies with Ultravist®, meanwhile, posted similar results:

- In three randomized, double-blind clinical trials of contrast CT of the head and body (n=95), visualization ratings were good or excellent in 99% of the patients with Ultravist®;

a radiologic diagnosis was made in the majority of the patients.⁶

- In a fourth, blinded reader trial for CT of the head and body (n=382), visualization ratings were good or excellent in approximately 97% of patients. Similar studies were completed with comparable findings noted in excretory urography.⁶

With respect to contrast mammography, a published prospective study was conducted of 216 women with BI-RADS 3, 4, or 5 findings on mammography and who were evaluated using ULTRA-VIST 300 mg Iodine per mL. Patients with breast implants, pregnancy or possible pregnancy, history of hypersensitivity reaction to iodinated contrast agents, and renal insufficiency were excluded from study.

All breast lesions were evaluated in a blinded manner. A total of 226 lesions was evaluated, including 98 (43%) malignant lesions. Visualization of lesion contrast was scored on a 4-point scale, with 4 (2%) lesions rated as below background (negative), 93 (41%) as none, 46 (20%) as moderate, and 83 (37%) as intense.⁶

Operational Efficiency and Device Compatibility

Modern radiology departments increasingly view contrast selection through the lens of workflow efficiency. Schaming stresses that Bayer's approach provides a suite of solutions for contrast enhanced CT imaging that bridges the gap between hardware and pharmaceuticals.

Bayer positions itself as an end-to-end partner by providing Ultravist and hardware solutions like the multi patient MEDRAD Centargo CT injection System.[†] The MEDRAD® Centargo is compatible for use with multiple agents, including Ultravist in Imaging Bulk Package and single-dose vial presentations, which may help streamline workflow and may reduce waste. Operationally, the Centargo system employs a “Day Set”

with a 24-hour or 25 bottles which-ever-comes-first limit once opened, allowing for high-throughput usage while maintaining strict safety standards, Schaming says, explaining the broadest range of compatible contrast agents and presentations is key to Bayer's product offering.

Lessons in Resilience: Beyond Just-in-Time

The 2022 shortage exposed the limitations of “lean” inventory models. Schaming observes that hospitals are now performing deeper “due diligence” on their suppliers, asking questions that were rarely heard five years ago.

“Hospitals are reacting and trying to build supply assurance or dual sourcing. They are asking, ‘Where is your product made? What happens if you have a supply disruption? Do you have redundant processes?’” he says.

A key factor in Bayer's ability to support the market during the 2022 crisis was its diversified manufacturing footprint. While other major production sites were halted by regional lockdowns, Bayer's centers of expertise in Germany remained operational.

“Our locations in Germany were not subject to the same restrictions as sites in China. We were still able to produce product,” says Schaming, emphasizing the importance of this geographic independence.

To further mitigate the U.S. shortage, Bayer collaborated with the FDA to import product with alternative labeling — specifically foreign-language translations. “We were able to work closely with the FDA and import some of the product that had different labeling on it,” Schaming says. “We were able to use that so patients could get the imaging procedure they really needed.”

This proactive regulatory engagement and the ability to leverage a global supply chain, he notes, are now viewed as critical components of a manufacturer's “reliability profile.”

[†] Centargo is not cleared for use in contrast-enhanced mammography (CEM).

The Integrated Value Equation

The convergence of clinical and operational considerations has led to a more integrated approach to contrast selection. While imaging performance remains the primary requirement, it is no longer the sole criterion. Modern departments now evaluate contrast agents across multiple dimensions: imaging performance, protocol flexibility, and supply continuity.

Dr. Briceno summarizes this shift: “Departments are now taking a more comprehensive approach to contrast selection, considering imaging performance, protocol flexibility, available concentrations and presentations, and the manufacturer’s ability to support consistent supply.”

This is a significant departure from the pre-2022 mindset, where contrast was often selected based solely on established habits or price points. Schaming adds that this reliability is a key systemic capability.

“Reliability is not just finished goods inventory,” he says. “It’s also looking all the way down to manufacturing and

your active ingredients and making sure that you have that robust supply chain to meet demand.”

“It’s a Collaboration”

As global demand for imaging continues to grow, driven by demographic trends and expanded clinical applications, the underlying structure of the supply chain will remain a key consideration in the decision tree of radiology department administrators.

Product portfolios that offer clinical performance, protocol flexibility, and steady supply are strongly positioned to support the needs of modern radiology. For the radiologist and the department leader, the ability to balance these priorities is central to delivering timely, effective, and uninterrupted patient care.

For his part, Schaming identifies the ultimate takeaway as the importance of the manufacturer-provider relationship.

“It’s a collaboration,” he concludes. “How can we make sure that we keep the patient in focus and provide everything the radiologist needs to get their

job done — not just from a material standpoint, but holistically with smart devices, technology, contrast media and resilient supply?”

References

- 1) Dargan S. Iodinated Contrast Shortage Challenges Radiologists. RSNA. May 16, 2022. <https://www.rsna.org/news/2022/may/contrast-shortage>. Accessed May 7, 2026.
- 2) Society for Cardiovascular Angiography & Interventions (SCAI). Navigating the contrast media shortage. SCAI website. scai.org. Published May 17, 2022. Accessed April 17, 2026.
- 3) Cavallo J J, Pahade J K. Practice Management Strategies for Imaging Facilities Facing an Acute Iodinated Contrast Media Shortage., Volume 219, Issue 4. <https://doi.org/10.2214/AJR.22.27969>
- 4) Yee KM. ISCT: 2022 ICM shortage was a ‘wake-up call.’ Did we listen? Published Sept. 4, 2025. <https://www.auntminnie.com/clinical-news/ct/article/15754564/isct-2022-icm-shortage-was-a-wakeup-call-did-we-listen>. Accessed May 7, 2026.
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- 6) Ultravist (iopromide) injection prescribing information. Whippany (NJ); 1995. Bayer Healthcare Pharmaceuticals Inc.

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Hypersensitivity Reactions: Ultravist can cause life-threatening or fatal hypersensitivity reactions including anaphylaxis. Manifestations include respiratory arrest, laryngospasm, bronchospasm, angioedema, and shock. Most severe reactions develop shortly after the start of injection (e.g., within 1 to 3 minutes), but delayed reactions can also occur. There is increased risk of hypersensitivity reactions in patients with a history of previous reaction to a contrast agent and known allergic disorders, or other hypersensitivities. Premedication with antihistamines or corticosteroids does not prevent serious life-threatening reactions but may reduce both their incidence and severity. Obtain a history of allergy, hypersensitivity, or hypersensitivity reactions to iodinated contrast agents and have emergency resuscitation equipment and trained personnel available prior to Ultravist® administration. Monitor all patients for hypersensitivity reactions.

Acute Kidney Injury: Acute kidney injury, including renal failure, may occur after administration. Risk factors include: pre-existing renal insufficiency, dehydration, diabetes mellitus, congestive heart failure, advanced vascular disease, elderly age, concomitant use of nephrotoxic or diuretic medications, multiple myeloma or other paraproteinemia, and repetitive and/or large doses of Ultravist. Use the lowest necessary dose of Ultravist in patients with renal impairment. Hydrate patients prior to and following Ultravist administration. Do not use laxatives, diuretics, or preparatory dehydration prior to Ultravist administration.

Cardiovascular Adverse Reactions: Acute or delayed hemodynamic disturbances may occur in patients with congestive heart failure (CHF), severe renal dysfunction, combined renal and hepatic disease, or combined renal and cardiac disease, particularly with repetitive and/or large doses. Fatal cardiovascular reactions have occurred mostly within 10 minutes of Ultravist injection. Hypotensive collapse and shock have occurred. Cardiac decompensation, serious arrhythmias, and myocardial ischemia or infarction can occur during coronary arteriography and ventriculography. Use the lowest necessary dose of Ultravist in patients with CHF. Always have emergency resuscitation equipment and trained personnel available. Monitor all patients for severe cardiovascular reactions.

Thromboembolic Events: Serious, in some cases fatal, thromboembolic events causing myocardial infarction and stroke can occur during angiography procedures. During these procedures, increased thrombosis and activation of the complement system can occur. Risk of thromboembolic events can be influenced by: length of procedure, catheter and syringe material, underlying disease state, and concomitant medications. To decrease thromboembolic events, use meticulous angiographic techniques and minimize the length of the procedure. Avoid blood remaining in contact with syringes containing iodinated contrast agents, which increases the risk of clotting. Avoid angiography in patients with homocystinuria because of the risk of inducing thrombosis and embolism.

Extravasation and Injection Site Reactions: Extravasation can occur, particularly in patients with severe arterial or venous disease. In addition, injection site reactions such as pain and swelling at the injection site can also occur. Ensure intravascular placement of catheters prior to injection. Monitor patients for extravasation and advise patients to seek medical care for progression of symptoms.

Thyroid Storm in Patients with Hyperthyroidism: Thyroid storm has occurred after the intravascular use of iodinated contrast agents in patients with hyperthyroidism or with an autonomously functioning thyroid nodule. Evaluate the risk in such patients before use of Ultravist.

Thyroid Dysfunction in Pediatric Patients 0 to 3 Years of Age: Thyroid dysfunction characterized by hypothyroidism or transient thyroid suppression has been reported after both single exposure and multiple exposures to iodinated contrast media (ICM) in pediatric patients 0 to 3 years of age. Younger age, very low birth weight, prematurity, underlying medical conditions affecting thyroid function, admission to neonatal or pediatric intensive care units, and congenital cardiac conditions are associated with an increased risk of hypothyroidism after ICM exposure. After exposure to ICM, individualize thyroid function monitoring based on underlying risk factors, especially in term and preterm neonates. The safety and effectiveness of Ultravist® in pediatric patients younger than 2 years of age have not been established, and Ultravist is not approved for use in pediatric patients younger than 2 years of age.

Hypertensive Crisis in Patients with Pheochromocytoma: Hypertensive crisis in patients with pheochromocytoma has occurred with iodinated contrast agents. Closely monitor patients when administering Ultravist if pheochromocytoma or catecholamine-secreting paragangliomas are suspected. Inject the minimum amount of Ultravist necessary and have measures for treatment of a hypertensive crisis readily available.

Sickle Cell Crisis in Patients with Sickle Cell Disease: Iodinated contrast agents may promote sickling in individuals who are homozygous for sickle cell disease. Hydrate patients prior to and following administration and use only if the necessary imaging information cannot be obtained with alternative imaging modalities.

Severe Cutaneous Adverse Reactions: Severe cutaneous adverse reactions (SCAR) may develop from 1 hour to several weeks after intravascular contrast agent administration. These reactions include Stevens-Johnson syndrome and toxic epidermal necrolysis (SJS/TEN), acute generalized exanthematous pustulosis (AGEP), and drug reaction with eosinophilia and systemic symptoms (DRESS). Reaction severity may increase and time to onset may decrease with repeat administration of contrast agent; prophylactic medications may not prevent or mitigate severe cutaneous adverse reactions. Avoid administering Ultravist to patients with a history of a severe cutaneous adverse reaction to Ultravist.

Interference with Laboratory Tests: Ultravist can interfere with protein-bound iodine test.

Common Adverse Reactions: Common adverse reactions (>1%) are headache, nausea, injection site and infusion site reactions, vasodilatation, vomiting, back pain, urinary urgency, chest pain, pain, dysgeusia, and abnormal vision.

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