JUBILANT RADIOPHARMA
RADIOPHARMACIES DIVISION

5 Trends in Radiopharmaceuticals: What's Changing and Why It Matters

Radiopharmaceuticals are advancing rapidly, transforming precision medicine and redefining how we diagnose and treat disease. What was once a niche field primarily focused on oncology is now expanding into neurology, cardiology, and beyond, with groundbreaking therapies and diagnostic tools emerging at an unprecedented pace. Yet these advancements aren't just scientific milestones—they're reshaping clinical practice, reimbursement landscapes, and patient care. Are you ready for what's next? Here are the five trends that every healthcare provider should know.

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From Radium to Radiopharma: The Journey of Discovery

In the early 20th century, in a Parisian laboratory, Marie and Pierre Curie uncovered something astonishing—radioactivity.[1] They had no idea that their groundbreaking discovery of radium and polonium would evolve into one of the most powerful tools in modern healthcare: radiopharmaceuticals.

Over the next century, radiopharmaceuticals advanced from early experiments with radioactivity into groundbreaking medical practice. The journey began in the 1940s when radioactive isotopes were first used in medicine, with iodine-131 revolutionizing thyroid disease treatment.[2] By the 1970s, technetium-99m transformed diagnostics, enabling real-time imaging for heart disease, bone disorders, and cancer with unprecedented accuracy. [3]

Then, with the rise of theranostics, a fusion of therapy and diagnostics, scientists realized that the same radiopharmaceuticals used to detect cancer could also be used to destroy it. This ushered in treatments like Lutetium-177 for neuroendocrine tumors and PSMA-targeted therapies for prostate cancer—precision treatments designed to attack malignant cells while sparing healthy tissue.[4] The era of personalized, radiopharmaceutical-driven medicine had arrived.

Today, radiopharmaceuticals are at the forefront of medicine. Once a niche application in nuclear medicine, this field is changing how we diagnose and treat disease, offering a level of precision that was once unimaginable. Nuclear medicine physicians and technologists, radiopharmacists, biotech innovators, and healthcare policymakers all have a stake in shaping this future. Here are five key trends defining the next chapter of radiopharmaceuticals—advancements that will not only influence the industry but redefine the very nature of precision medicine.

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Trend 1: A Dual Approach: Theranostics in Precision Medicine

Theranostics is revolutionizing modern medicine by combining therapy and diagnostics into a single approach that utilizes radiolabeled molecules—often radioactive isotopes—targeted to specific biomarkers associated with disease.[5] These agents can be used both for imaging, to detect the disease, and for therapy, to deliver targeted radiation or drug delivery directly to the disease site. In oncology, theranostics is transforming cancer care by providing more precise diagnostic tools and targeted treatments that are customized to each patient's unique tumor biology.

Revolutionizing prostate cancer treatment with PSMA theranostics

One of the most compelling examples of theranostics in action is in prostate cancer. Prostate-Specific Membrane Antigen (PSMA) is a biomarker found on the surface of most prostate cancer cells.[7] Radiolabeled PSMA-targeted diagnostic radiopharmaceuticals, such as PYLARIFY®, LOCAMETZ®, and ILLUCCIX®, use this biomarker to deliver targeted imaging and radiation treatment directly to the cancer cells.[8] By binding to PSMA-expressing cells, these agents can allow clinicians to locate and target tumors, improving diagnostic accuracy and enabling more effective treatment.[8]

Lutetium-177 for neuroendocrine tumor therapy

Similarly, theranostics has made tremendous strides in the treatment of neuroendocrine tumors (NETs), a rare and often difficult-to-treat cancer that originates in neuroendocrine cells.[9] The development of Lutetium-177 (177Lu) labeled somatostatin analogs has transformed the landscape of NET treatment.[10] Targeting somatostatin receptors abundant on NET cells, this radiolabeled therapy delivers precise radiation while sparing healthy tissue. Beyond treatment, it also enables real-time monitoring of efficacy, helping to improve patient care and patient outcomes.[10]

Trend 2: The Cost of Innovation: How Changes in Reimbursement Are Breaking Down Barriers and Expanding Access

As nuclear medicine advances, the question of accessibility looms large—especially when it comes to high-cost agents like radiopharmaceuticals. For years, complex reimbursement structures have hindered patient access, but evolving policies are increasing adoption. The balance between costs, insurance, and reimbursement now plays a crucial role in ensuring these innovative treatments reach patients.

New policy changes for CMS and private insurers

At the end of 2024, the Centers for Medicare & Medicaid Services (CMS) announced a significant adjustment to the Hospital Outpatient Prospective Payment System (HOPPS). Under the new policy, which took effect on January 1, 2025, CMS will unbundle and pay separately for diagnostic radiopharmaceuticals with per-day costs exceeding $630, removing financial barriers that have long hindered patient access to essential nuclear medicine diagnostic procedures.[11]

For patients: The new policy helps increase access to life-changing diagnostic tools for a broader range of patients, particularly those on Medicare.

For providers: Healthcare systems will benefit from a more streamlined reimbursement process, enabling them to offer these innovative therapies with greater confidence.

For manufacturers: This change will expand radiopharmaceutical use by integrating them into more treatments and driving demand and investment in research and development.

Simultaneously, private insurers are adapting reimbursement policies to mirror the growing body of evidence supporting radiopharmaceuticals. Insurers like Blue Cross Blue Shield and UnitedHealthcare have expanded coverage for novel radiopharmaceutical therapies, particularly in oncology, where the potential for precise, targeted treatments has become increasingly clear.[12-13]

Overcoming the complexities and standardization of reimbursement

Despite these forward strides, there is a need for greater standardization in reimbursement processes.[14] Despite expanded coverage for PSMA-targeted therapies and Lutetium-177, reimbursement policies for many novel radiopharmaceuticals vary by insurer, by state, and by clinical indication, creating uncertainty for healthcare providers and patients alike.[14]

In response, organizations like the American Society of Nuclear Cardiology are advocating for the inclusion of newer therapies and diagnostic agents, such as Flurpiridaz, a radiolabeled PET diagnostic agent for heart disease detection, in reimbursement schedules.[15] As more insurers recognize the value of precision treatments, radiopharmaceuticals will become integral to patient care across multiple specialties.

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Trend 3: Beyond Traditional Oncology Use: The Expanding Horizons of Radiopharmaceuticals

Radiopharmaceuticals have long been synonymous with the treatment and diagnosis of cancer, particularly in the realm of prostate cancer and neuroendocrine tumors (NETs). However, the scope of radiopharmaceuticals extends far beyond the boundaries of traditional oncology, reaching into new and exciting areas of neurology, cardiology, and even brain cancer.

Glioblastoma treatment

For years, glioblastoma, one of the most aggressive brain cancers, has responded poorly to conventional therapies and has a low survival rate. [16] However, radiolabeled monoclonal antibodies are changing this.

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➤ **Example:** The experimental agent 131I-BC8 shows promise in precisely targeting glioblastoma tumors. Tagged with a radioactive isotope, these antibodies bind to tumor antigens, delivering destructive radiation directly to cancer cells.[17]

Cardiovascular disease detection

Radiotracers are vital for early cardiovascular disease detection, helping visualize heart tissue and assess damage from conditions like coronary artery disease or heart failure.[18]

➤ **Example:** Technetium Tc-99m sestamibi, widely used in nuclear cardiology, enables myocardial perfusion imaging via SPECT. It helps detect blockages, assess disease severity, and guide treatment by identifying areas with reduced blood flow.[19]

PSMA-targeted diagnostic agents

For prostate cancer, radiopharmaceuticals remain one of the most powerful tools in diagnosis and treatment. Over the last decade, the use of PSMA-targeted radiopharmaceuticals has dramatically improved the detection and management of this prevalent cancer.

Example: PSMA-targeted diagnostic agents like PYLARIFY, LOCAMETZ, and ILLUCCIX, can enable precise prostate cancer detection and monitoring via high-resolution positron emission tomography (PET) scans, and can help identify recurrent prostate cancer earlier than traditional imaging.[20]

GEP-NET management

Gastroenteropancreatic neuroendocrine tumors (GEP-NETs) are rare, slow-growing tumors that can develop in the pancreas or gastrointestinal tract. Arising from hormone-producing cells, they are challenging to diagnose and treat, but radiopharmaceutical advancements are transforming their management.[22]

Example: PET agents like Detectnet™ (Cu-64 dotatate) and NETSPOT® (Ga-68 dotatate), have been shown to significantly enhance detection accuracy and assist in planning treatment strategies.[23-24] The development of Lutetium-177-labeled somatostatin analogs has also been a breakthrough in therapy, allowing for targeted radiation that can help minimize or eliminate tumors with minimal impact on surrounding healthy tissue.[25]

Amyloid imaging

Radiopharmaceuticals play a key role in early Alzheimer's Disease detection, using amyloid-targeting agents to visualize beta-amyloid plaques via PET imaging.[26] These radiolabeled compounds help identify plaques early in the course of the disease.[26]

Example: Neuraceq® uses Fluorine-18 to provide highly sensitive detection of amyloid plaques in the brain.[27] This early detection can allow for earlier intervention.[27]

Trend 4:
Combining Radiopharmaceuticals with Immunotherapy and Targeted Treatments

A new treatment strategy is emerging—one where radiopharmaceuticals, traditionally relegated to diagnostic roles, are now being integrated with chemotherapy, immunotherapy, and targeted therapies.[28] This fusion represents a fundamental shift in how we understand and approach cancer treatment, one that maximizes therapeutic potential while minimizing collateral damage to healthy tissues.

CAR-T with radiopharmaceuticals

Chimeric Antigen Receptor T-cell (CAR-T) therapy is a recent development in immunotherapy that involves genetically modifying T-cells to express a receptor that targets specific cancer antigens.[29] The addition of radiopharmaceuticals to this treatment strategy, such as radiolabeled CAR-T cells, enhances the precision and potency of the therapy. These radiolabeled T-cells can effectively target and irradiate cancer cells, particularly in hematologic malignancies like B-cell lymphomas and leukemias, where tumor cells express specific antigens such as CD19.[30] The radiolabels provide the T-cells with a dual function—both as a targeted weapon for cell killing and as a beacon that enhances immune recognition and response.

Example: A promising approach combines Yttrium-90-labeled antibodies with CAR-T cell therapies to boost tumor eradication and deliver targeted radiation. This local irradiation enhances the immune response, potentially increasing CAR-T therapy efficacy and prolonging patient remissions. [31]

Radiopharmaceuticals and resistance in cancer treatment

Combination therapies in oncology offer enhanced cancer cell killing and the potential to overcome resistance, a major challenge in cancer treatment. Tumor mutations, immune escape, and microenvironmental changes often lead to resistance, causing treatment failure. However, integrating radiopharmaceuticals adds precision, delivering targeted radiation that disrupts the tumor's ability to repair and evade immune detection.[35]

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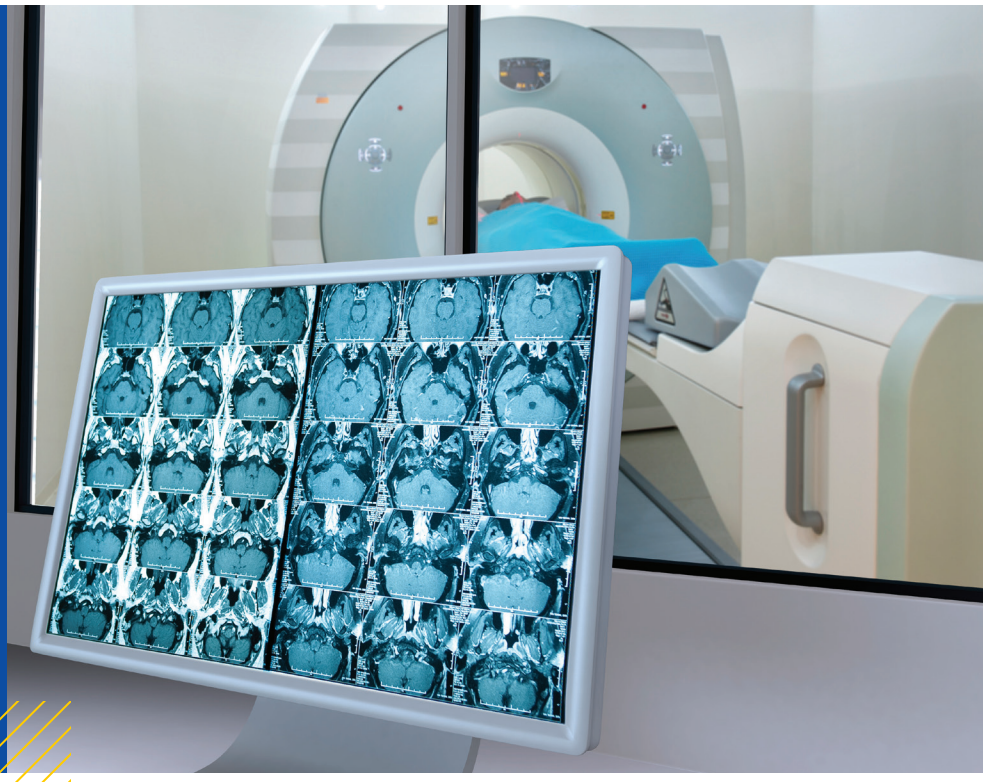
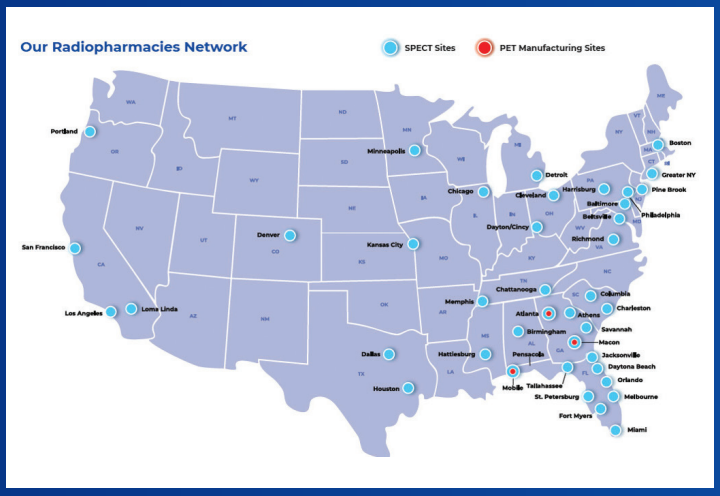


Trend 5:
Decentralization and Novel Isotope Development in Radiopharmaceutical Manufacturing

The United States radiopharmaceutical industry is poised to grow from $5 billion in 2023 to $20 billion in 2030 due to the increasing demand of PET imaging and advanced radiopharmaceutical therapies.[36] The transformative impact of radiopharmaceuticals has brought nuclear medicine to the foreground with landmark investments in 2024 exemplifying this trend.



Jubilant Radiopharma's Radiopharmacies Divison announced an investment of $60 million to expand its PET radiopharmaceutical manufacturing facilities by adding six sites in strategic locations throughout the United States. The new PET radiopharmaceutical manufacturing facilities are expected to be operational within 24 months. This investment will expand the company's PET radiopharmaceutical manufacturing sites to nine and the overall radiopharmacy (PET/SPECT) network to 52 sites, solidly positioning Jubilant's radiopharmacy network as the second largest in the United States.[36]

Yet, within the wave of radiopharmaceutical manufacturing expansion, there are two powerful currents guiding the direction of growth: decentralization and a focus on developing a robust pipeline of novel isotopes for a burgeoning list of new indications and applications.

Decentralization: Overcoming supply chain challenges

The rapid expansion of radiopharmaceuticals presents a significant challenge: ensuring that these highly specialized, short-lived compounds reach patients efficiently and reliably. This makes supply chain reliability a critical factor in their accessibility and effectiveness.

Decentralizing radiopharmaceutical manufacturing and distribution helps overcome logistical hurdles while ensuring more providers and patients have access to these therapies. Instead of relying on a few large-scale production sites, the shift toward regional manufacturing hubs and pharmacy networks allows for faster delivery, improved product availability, and increased flexibility in meeting patient and provider needs.

Jubilant Radiopharmacies: A model for decentralized radiopharmaceutical distribution

Jubilant Radiopharmacies combines the reach of a national network with the personalized service of a local pharmacy. This hybrid model allows healthcare providers to benefit from both scale and flexibility, ensuring that critical radiopharmaceuticals are available exactly when and where they are needed. The company's extensive distribution network ensures:

- **A 99.29% on-time delivery rate:** Jubilant Radiopharmacies sets the standard for reliability in radiopharmaceutical distribution.
- **Access to a full spectrum of radiopharmaceuticals:** Jubilant Radiopharmacies' open-formulary model offers access to a wide array of SPECT and PET radiopharmaceuticals, including essential products like Tc-99m generators, Sodium Iodide I 131 solutions, and Indium In 111 oxine through multi-source partnerships.
- **Flexibility in meeting provider needs:** Whether hospitals require routine deliveries or urgent, on-demand access to radiopharmaceuticals, Jubilant Radiopharmacies' decentralized approach ensures unparalleled responsiveness and reliability.

Advancing robust pipelines of novel isotopes

The future of radiopharmaceutical manufacturing will depend on developing a robust pipeline of novel isotopes tailored for an expanding range of indications. While traditional isotopes like Lutetium-177 (Lu-177) and Actinium-225 (Ac-225) have demonstrated remarkable success in targeted radiotherapies, the next phase of innovation will focus on emerging isotopes that can address unmet clinical needs, enhance treatment precision, and expand therapeutic applications beyond oncology.[37]

Several promising isotopes beyond Lu-177 and Ac-225 are emerging as game-changers in targeted radiopharmaceutical therapy:

- **Lead-212 (Pb-212):** A powerful alpha-emitting isotope that delivers high-energy, short-range radiation, ideal for treating micrometastatic disease while minimizing off-target effects. Pb-212 is particularly promising for targeted alpha therapy (TAT) in aggressive cancers.[38]
- **Terbium-161 (Tb-161):** A beta-emitting isotope with similar characteristics to Lu-177 but with added Auger electron emission, enhancing DNA damage within cancer cells for greater therapeutic potency. This makes Tb-161 an exciting candidate for next-generation radiopharmaceuticals in solid tumors.[39]
- **Copper-67 (Cu-67):** An emerging therapeutic isotope with a balance of beta and Auger electron emissions, potentially useful in lymphoma, breast cancer, and neuroendocrine tumors.[40]
- **Actinium-227 (Ac-227):** A longer-lived alpha emitter with potential applications in bone-targeting radiotherapies for metastatic cancers.[41]

From Innovation to Impact: The Future of Radiopharmaceuticals

The landscape of radiopharmaceuticals is evolving rapidly, and these five trends represent just the beginning of what will likely be a transformative era in healthcare.

From revolutionizing cancer treatment with theranostics to unlocking new frontiers in neurodegenerative and cardiovascular diseases, these precision-targeted agents are reshaping the medical landscape at an astonishing pace.

But this revolution isn't just about the science—it's about access, reliability, and delivering these life-changing treatments to the patients who need them most. As the demand for radiopharmaceuticals accelerates, so too must the infrastructure that supports them. This is where Jubilant Radiopharmacies stands apart.

With its expansive radiopharmacy network, commitment to innovation, and unwavering dedication to timely, high-quality delivery, Jubilant Radiopharmacies is not just keeping pace with this new era of medicine—it's helping to define it.

A key advantage of Jubilant Radiopharmacies service is a dedicated in-house delivery team. While many rely on on third-party drivers, Jubilant Radiopharmacies has 300+ trained drivers on staff, ensuring every delivery is handled with care, precision, and a personal commitment to excellence.

This model provides Jubilant Radiopharmacies with unmatched reliability and consistency, making us a trusted extension of our customers' patient care teams.

As radiopharmaceuticals continue to push the boundaries of what's possible, Jubilant Radiopharmacies remains the trusted partner, ensuring that the future of precision medicine isn't just imagined—it's delivered.

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