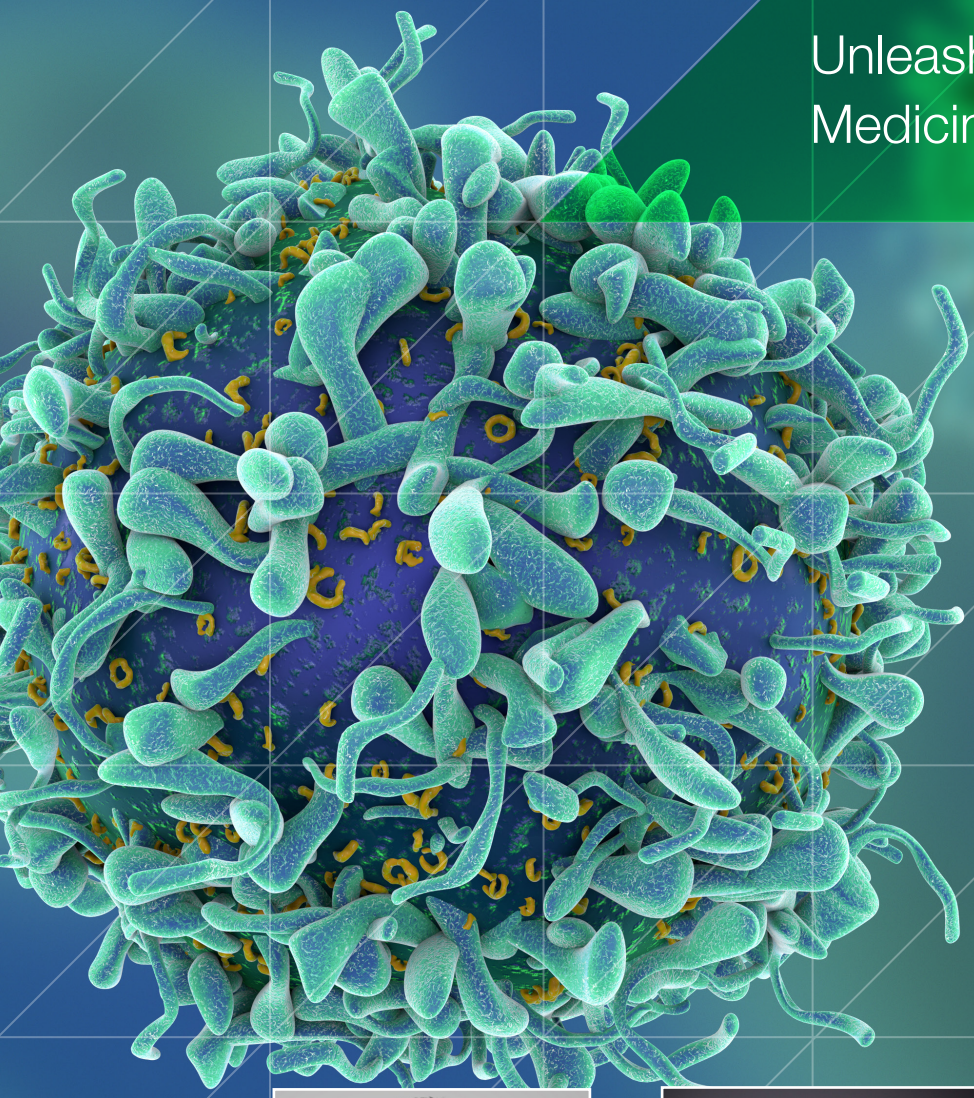
Unleashing the Power of Precision Medicine: Radioligand Therapy



Anshul Mangal

President
Project Farma and
Precision ADVANCE

Sumit Verma

Co-founder and Partner
Orchestra Life Sciences

PRECISION ADVANCE the cell & gene therapy collective™

PRECISION for medicine | PROJECT FARMA | PRECISION value & health

Unleashing the Power of Precision Medicine: Radioligand Therapy

This article was originally published on **This Month in Transformative Medicine** *on October 17, 2023.*

Anshul Mangal *President of* **Project Farma (PF)** *& Precision ADVANCE and* **Sumit Verma**, *Co-founder and Partner at Orchestra Life Sciences discuss the power and potential of radioligand therapies and its impact on the treatment of a number of cancers.*

The current standard of cancer care has saved many lives, but these methods often come with incredibly difficult side effects. Advancements in technology have brought new options to cancer care that hope to provide meaningful outcomes while minimizing the impact to the patient's quality of life. Radioligand Therapy (RLT) for example, a cutting-edge approach in precision nuclear medicine, holds the potential to revolutionize disease diagnosis and therapeutic treatment. At its core, RLT harnesses the power of radioactive atoms (ranging from gammas, beta and alpha particles) to tackle advanced cancers with unprecedented precision. It is RLT's unique ability to deliver radiation exclusively to targeted cancer cells, while minimizing damage to surrounding healthy tissues, that sets it apart from traditional oncology treatments, especially with newly discovered alpha emitters.

Advancements in technology have brought new options to cancer care...

This holistic approach encompasses both diagnostic imaging and therapeutic aspects, referred to as radioligand imaging and radioligand therapy, respectively. The diagnostic aspect employs radioactive atoms to unveil tumor locations, while the therapeutic component employs radioactive particles to target and potentially damage cancer cells. These techniques are administered through intravenous delivery and are particularly relevant for conditions like prostate cancer and neuroendocrine tumors. While diagnostic imaging has been around for over 50 years or so, radioligand therapies including Lutathera™ and Pluvicto™ are very recently approved FDA approved and marketed radioligand therapies.

Development of Radioligand Therapies: Precision in Action

Radioligand Therapies (RLTs) operate on a sophisticated dual-component mechanism, harnessing the power of a radioactive atom in combination with specific molecular puzzle pieces that lock onto tumor sites. This unique pairing allows the treatment to selectively circumvent healthy cells to find its molecular match. Once identified, the radioactive atoms cluster around the cancer cells to deliver targeted damage to the tumor. This precision allows the treatment to be delivered anywhere in the body and because the reach is limited, the impact to surrounding healthy cells and tissues is limited.

The therapeutic radioisotopes used in RLTs are generated in specialized nuclear reactors, cyclotrons or generators before being transported to production facilities. Here, the radioisotope is meticulously bonded to the cell-targeting compound. The final product is then packaged, quality-tested, and shipped in specially designed lead-shielded containers directly to medical facilities, ready for individual patient administration.

The inherent characteristics of the radioisotope and rapid decay mean that RLTs expire shortly after production. This creates a challenge as manufacturers and clinicians race against the clock to create, deliver, and administer the treatments to patients within a matter of days. Due to the time-sensitive nature of these treatments the therapies are administered in a single dose to ensure effectiveness. This limitation has implications for widespread access and adoption, creating logistical hurdles that manufacturers must navigate. Despite these challenges, industry leaders believe that the substantial returns in terms of patient outcomes will justify addressing these complexities.

The potential benefits of RLTs are substantial, offering a revolutionary alternative to conventional cancer treatments that often impact healthy tissues due to their focus on rapidly dividing cells. Although RLTs still come with side effects, they are typically better tolerated than traditional treatments like chemotherapy. The development of RLTs comes with a notable cost, primarily due to the intricate process and logistics involved. Patients often require multiple doses, typically ranging from 4 to 6, further contributing to the overall expense. Yet, the potential for precise and effective cancer treatment has driven the pursuit of RLTs, offering hope for improved therapeutic options for patients facing challenging diagnoses.

Shaping the Future: Radioligand Therapy's Growth Trajectory

One of the most promising aspects of radioligand therapy lies in the potential to create unique combinations of radioactive atoms and targeting molecules tailored to specific tumor types. While the current indication list is limited, industry pioneers like Novartis are boldly experimenting with these interchangeable building blocks, envisioning novel radioligand therapies capable of addressing a diverse spectrum of cancers and diseases.

The radioligand therapy market is already showing remarkable potential, as evident from its 2021 valuation of $7.78 billion. Forecasts believe the industry is poised to undergo substantial growth with a projected value of $13.07 billion by 2030. Several key factors are driving this rapid progress. A rise in incidence of various cancer types, particularly prostate cancer, and neuroendocrine tumors, plays a role in the adoption of RLTs. Another significant catalyst influencing the landscape is the rise in awareness around alpha radioimmunotherapy. This innovative approach is gaining recognition not only among medical professionals but also among patients thanks to advocacy work. Pioneering methods like the use of prostate-specific membrane antigen (PSMA) are revolutionizing the sector, opening avenues for more effective and precise treatment strategies. This is especially significant for cancer patients with limited alternatives, offering them a potentially life-changing therapeutic option with reduced side effects.

> This offers cancer patients a life-changing therapeutic option **with reduced side effects**

As the adoption of radioligand therapy increases, it continues to show profound potential to transform the landscape of cancer care. The convergence of innovative strategies, expanding awareness, and increasing demand for more targeted therapies are steering the industry toward a future where personalized and effective cancer treatments are not just a possibility, but a reality.

Leading the Way: Novartis' Transformative Radioligand Therapies

At the forefront of the radioligand therapy revolution, Novartis offers two FDA approved groundbreaking treatments that are changing the landscape of cancer care. Lutathera, a trailblazing therapy tailored to address neuroendocrine tumors, a rare yet formidable form of cancer that takes root in the digestive tract. This innovative solution gained approval in 2020, marking a significant advancement in the field. Their second offering Pluvicto targets a specific type of prostate cancer. This therapy secured approval in March 2022, offering new hope for patients grappling with this difficult diagnosis.

Thousands of patients have already received these treatments and some have witnessed profoundly positive outcomes, with one patient telling his Lutathera survival story 15 years later. His journey has inspired him to champion patient advocacy for neuroendocrine tumors, igniting a mission to spread awareness about this life changing therapy.

Notably, both Lutathera and Pluvicto have outperformed other available treatments, highlighting the strides that Novartis has taken in reshaping the future of cancer treatment. The head of radioligand therapy at Novartis, Jeevan Virk, estimates as many as 60,000 patients in the US could benefit from these pioneering medicines, the impact of Novartis' radioligand therapies extends beyond individual patients, promising to make a substantial contribution to the larger healthcare landscape.

Advancing Oncology Breakthroughs: POINT Biopharma's Radiopharmaceutical Focus

Dedicated to pioneering advancements in precision oncology, POINT Biopharma Global Inc. is a contender in the field of radiopharmaceuticals. Their focus on this specialized domain is evident by the clinical pipeline dedicated to redefining cancer treatment. Their clinical trials have gained momentum with PNT2003 poised to revolutionize the management of neuroendocrine tumors (NETs), progressing into the critical phase III stage. However, their vision extends beyond NETs, with an ambitious pipeline of candidates designed to combat solid tumors, prostate cancer, and the challenge of Metastatic Castration Resistant Prostate Cancer (mCRPC). Among their promising candidates, the Prostate Specific Membrane Antigen (PSMA) holds potential, offering new hope to those battling this condition.

As we witness these innovative breakthroughs, it becomes clear that the future of cancer care is brighter than ever, offering hope and improved therapeutic options to patients facing challenging diagnoses. The continued dedication of industry leaders and innovative approaches like RLT are shaping a future where cancer and other diseases can be treated with greater precision and fewer side effects, ultimately saving more lives and improving the quality of life for those affected by devastating diseases.

About the Authors

Anshul Mangal

Anshul Mangal is President of Project Farma & Precision ADVANCE. Anshul founded and grew PF into a leading global biologics and advanced therapy engineering consulting firm. Under Anshul's leadership, PF pioneered the industrialization of advanced therapies including two notable, commercially approved cell and gene therapies. PF was acquired by Precision Medicine Group in 2020 to be the cornerstone of Precision ADVANCE. ADVANCE is a collection of Precision's services uniquely focused on the complexities of research and clinical development, regulatory, manufacturing, and commercial needs to successfully bring an advanced therapy to market.

Sumit Verma

Sumit Verma, Co-founder and Partner at Orchestra Life Sciences, also currently serves as Senior Vice President Global Strategy and Manufacturing for Iovance Biotherapeutics – A San Francisco based Immuno-Oncology company dedicated to providing advanced novel therapy products for curing cancer.

He has executive responsibilities for building a one-of-a-kind cell therapy manufacturing facility and organization that will be involved in providing life-saving cancer therapies across North America and Europe. Prior to Iovance, he has held multiple leadership roles at Merck, Covidien, Mallinckrodt and notably served as the Chief Operating Officer for Curium Pharmaceuticals' nuclear medicine business. He has successfully led his respective teams in four new FDA-approved drug launches and five new FDA approved facilities in his career that have created over 1000+ new high paying biotech jobs. His experience in nuclear medicine includes establishing a $75 million new facility in Maryland Heights that developed cutting edge nuclear diagnostic medicine, launching Low enriched Uranium Molybdenum isotope and holds several patents in design and delivery of nuclear medicine products.

PRECISION
ADVANCE the cell & gene therapy collective™

PRECISION for medicine | PROJECT FARMA | PRECISION value & health®

ADVANCE, a collection of interconnected services and complementary teams, uniquely focuses on the complexities of clinical, regulatory, manufacturing, and commercial needs to successfully bring cell or gene therapies to market.

Connect with one of our experts. Contact us at **precisionadvance@precisionmedicinegrp.com**.
To learn more about Precision ADVANCE, visit **precisionmedicinegrp.com/advance**.

2 Bethesda Metro Center
Suite 850
Bethesda, MD 20814

Rev. 01