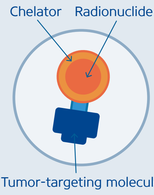
What is Radiopharmaceutical Therapy?

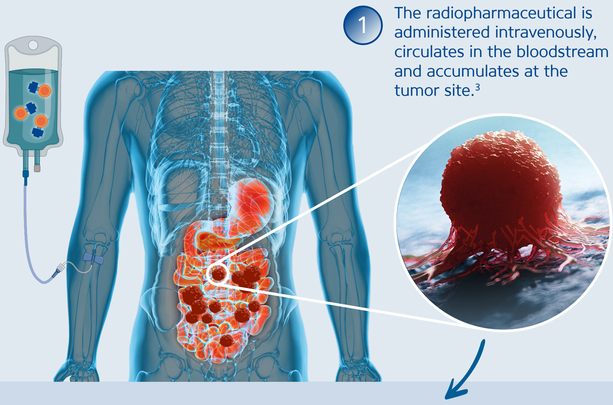


Radiopharmaceutical Therapy (RPT) or Peptide Receptor Radionuclide Therapy (PRRT) is a medical specialty in nuclear medicine. With RPT, innovative theranostics pairs allow non-invasive visualization of diseases and targeted treatments, especially in cancers.[1]

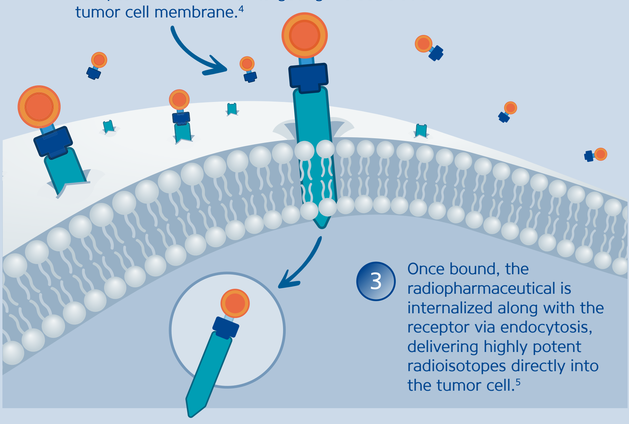
RPT uses radiopharmaceuticals, which are novel, high-quality radioactive drugs containing a targeting molecule (e.g., peptide or antibody) and a medical-grade radioisotope conjugated by a chelating agent.[2]

Mechanism of Action

1 The radiopharmaceutical is administered intravenously, circulates in the bloodstream and accumulates at the tumor site.[3]

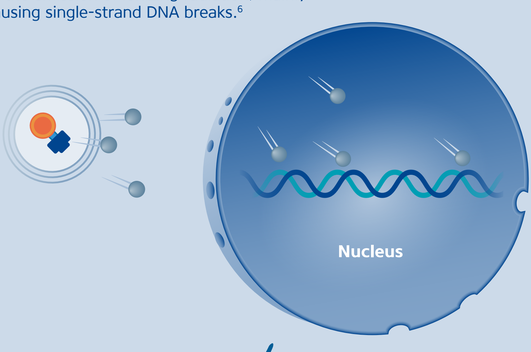


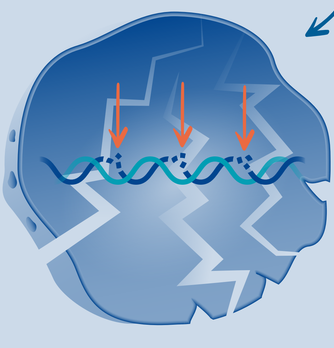
2 The radiopharmaceuticals are designed to bind with high affinity and specificity to the overexpressed tumor receptors via the tumor-targeting molecule at the tumor cell membrane.[4]



3 Once bound, the radiopharmaceutical is internalized along with the receptor via endocytosis, delivering highly potent radioisotopes directly into the tumor cell.[5]

4 The decay of the radioactive isotope leads to the emission of ionizing radiation, mainly causing single-strand DNA breaks.[6]





5 This can result in the arrest of tumor growth – stable disease or tumor shrinkage with a partial or complete response.[7]

Future Perspectives

Diagnostic and therapeutic radionuclides offer an excellent platform for developing innovative drugs.

An increasing demand for high-quality radionuclides and radiopharmaceuticals has triggered the development of a new radiotheranostics industry.

Advances in RPT are revolutionizing the personalized treatment landscape and improving clinical outcomes and the quality of life of patients with cancer.

References

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