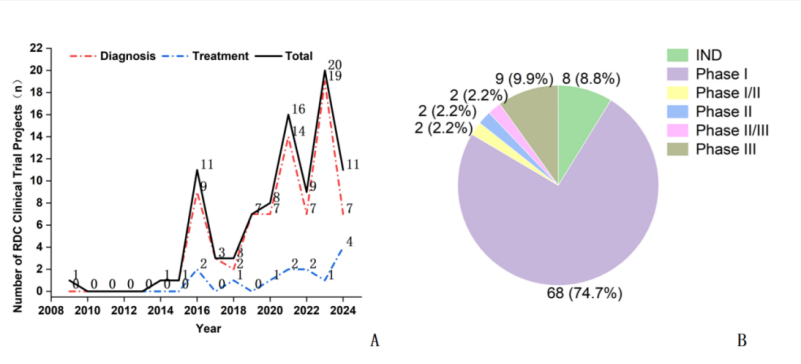
Bridging diagnosis and therapy: advances in radionuclide conjugate drugs

FAYETTEVILLE, GA, UNITED STATES, December 25, 2025 / EINPresswire.com/ -- Radionuclide drug conjugates (RDCs) have emerged as transformative agents that integrate diagnosis and therapy into a single clinical workflow. By coupling radioactive isotopes with antibodies, peptides, or small molecules, RDCs enable precise tumor targeting, high diagnostic sensitivity, and effective localized radiotherapy.



Overall situation of RDC R&D in China from 2009 to 2024. A: annual development situation of clinical trials; B: staging of RDC clinical trials under research in China.

A new review published (DOI: 10.12290/xhyxzz.2024-0577) in Medical Journal of Peking Union Medical College Hospital in July 2025 provides an in-depth analysis of 15 years of progress in RDC research. Conducted by a team from Peking Union Medical College Hospital, the study summarizes current RDC classifications, clinical development trends, and supportive policy frameworks. It highlights the expanding number of clinical trials, new therapeutic targets, and national-level guidance that are shaping the next generation of precision radiopharmaceuticals.

Structurally, RDCs are categorized into antibody-, peptide-, and small-molecule–based conjugates, each offering unique pharmacological advantages. The review emphasizes the rise of cyclic peptide conjugates, which exhibit low toxicity and high tumor selectivity. Policy reforms—including technical guidelines issued by regulatory agencies since 2020—have standardized clinical evaluation, non-clinical research, and radiochemical quality control, creating a more predictable environment for innovation. Collectively, these developments position RDCs as a cornerstone technology for achieving precision oncology through theranostic integration.

“RDCs represent the only class of therapeutics capable of achieving true integration of diagnosis and treatment,” said Prof. Hongyun Wang, senior author of the review. “Despite challenges in radiochemical synthesis, stability, and regulatory alignment, we are witnessing unprecedented enthusiasm and cross-disciplinary collaboration in this field. With continued innovation in targeting ligands and isotope design, RDCs will redefine how we approach tumor detection,

treatment monitoring, and personalized therapy."

RDCs hold vast potential to transform cancer management by enabling simultaneous imaging, treatment, and response monitoring within a single platform. As aging populations and cancer incidence continue to rise, demand for next-generation radiopharmaceuticals will grow. The review underscores the need for stronger innovation capacity, improved isotope supply chains, and streamlined approval processes to support RDC translation from laboratory to clinic. Through coordinated scientific, industrial, and regulatory efforts, RDCs are expected to become a central component of future oncology care, offering patients more accurate diagnoses and safer, more effective treatment pathways.

References

DOI
10.12290/xhyxzz.2024-0577

Original Source URL
https://xhyxzz.pumch.cn/article/doi/10.12290/xhyxzz.2024-0577

Funding Information
Capital's Funds for Health Improvement and Research (2022-2Z-4018); National High-Level Hospital Clinical Research Funding (2022-PUMCH-B-118).

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