Introduction to the RI Utilization Research Center and Current Research Status

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1. Introduction

Within the total value chain of the Southeast Radiation Medicine & Science Complex in Gijang, Busan, the Radioisotope Utilization Research Center(RI center) serves as the core hub for translational research and industrial validation, bridging isotope production with final clinical application.

While the Kijang Research Reactor fulfills the upstream function of producing high-value raw radioisotopes such as Mo-99, I-131, and Lu-177 and the Heavy Ion Therapy Center along with the Dongnam Institute of Radiological & Medical Sciences (DIRAMS) manages the downstream clinical trials and patient treatments, the RI Center anchors the indispensable midstream segment. Produced radioisotopes cannot be directly utilized as therapeutics or industrial agents without high-purity isolation, stable formulation, conjugation (labeling) with disease targeting vectors, and non-clinical pharmacokinetic (PK) and safety profiling.

Accordingly, the Center focuses on establishing highpurity separation and purification protocols, optimizing radiolabeling processes with target peptides and antibodies, and standardizing radiochemical quality control (QC) systems. By providing open-access laboratories and pre-clinical testing platforms equipped with heavy shielding and hot cells, these infrastructures typically cost-prohibitive for private bio-ventures and pharmaceutical firms, the RI center facilitates the seamless studies of candidate molecules.

Ultimately, the RI Center serves as R&D Infrastructure capable of overcoming the physical limitations of short- lived nuclides. It also aims to provide the creation of technological value by transforming radioisotopes into a high valued industry.

2. Radioisotope Utilization Research Center

The RI Center was established under national 4th Nuclear Promotion Comprehensive Plan to expand medical and industrial radioisotope (RI) applications and establish infrastructure for commercialization. Located in Gijanggun, Busan, the facility spans a gross floor area of 4,708 m² (site: 19,369 m²). Construction was completed in July 2024, with full scale operations scheduled for the second half of 2027.

The RI center's facilities are strictly separated into a radiation-controlled area and a general area, and are composed of four floors. The basement is composed of central mechanical and electrical utility rooms. The first floor serves as a radiation controlled area with an open laboratory and 10 dedicated isotope-handling facilities. The second floor contains ~10 multidisciplinary laboratories for chemical, biological, and mechanical studies alongside office space for 30–40 researchers. The third floor provides administrative offices, seminar rooms, and educational spaces. Following structural completion, internal laboratory fixtures including experimental benches and reagent cabinets have been installed. Specialized analytical instrumentation is currently being deployed to secure operational readiness by 2H 2027.



<Radioisotope Utilization Research Center>

3. The Research Function of the RI Utilization Research Center

The construction of the RI Utilization research center has been completed, and the construction of Kijang Research Reactor is underway, with completion targeted for 2027. Therefore, it is necessary to first secure the research capabilities for the industrialization of RIs and related products, highly dependent on foreign imports, so it is necessary to diversify supply and demand, and prepare a domestic production system. In particular, cold kit (Lyophilized drug vials) for co-growth with Tc-99m are not being produced in Korea due to economic problems such as production cost. therefore domestic development is urgent. Especially, cold kits, based on the Tc-99m isotope, are easy to

prepare and distribution efficiently, making them the standard for radiopharmaceutical preparation. Although high precision cancer treatment and patient-specific therapy techniques have recently attracted attention, so far their foundation has been the use of low cost, high efficiency Cold kits. currently, research in RI center is underway on bone imaging diagnostic agents(MDP, DPD and HDP) with high domestic urgency.

In addition research on mass production technique for the production of Lu-177 is being conducted at the Radioisotope Utilization Research Center.



< Open LAB in 1st floor>



< Open LAB in 2st floor>



< Cold kits and isotope generator>

4. Results & Conclusions

Construction of the RI Center was completed in July 2024, and various permits were completed in June 2025. However, delays in the construction of the Kijang Research Reactor and political issues prevented the center from fully functioning. From 2026, research on developing cold kits and new therapeutic radioisotopes(Lu-177) is being started, and research equipments(eg, ICP-OES, iTLC HPLC) are currently being installed. The details of the RI Utilization Research Center and doing researches will be discussed in the 2026 fall meeting.

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