

Current Status of R&D and Future Role of the Radioisotope Research Center

K.H Choi^{a*}, J.S Kim^a, K.M Lee^a, E.T Kim^a, D.E Lee^a

^aRadioisotope Research Division, Korea Atomic Energy Research Institute, Daejeon, Korea

*Corresponding author: khchoi@kaeri.re.kr

***Keywords** : Radioisotope, R&D center, Cold kit, ¹⁷⁷Lu, Gijang, Busan

1. Introduction

Under the '4th Nuclear Promotion Comprehensive Plan(2012~2016)', the government has been implementing the creation of new industries and the establishment of an international-level radiation infrastructure through radiation fusion technology to expand radiation use.

In particular, four major regional areas were established, and discussions on the development of the southeastern region centered on Busan. Busan Metropolitan City and Gijang-gun have established investment plans for creation of a science industrial complex('Radiopharmaceutical & Medical Science Industrial Complex' or 'Radiopharmaceutical & Medical Complex')

The Radiopharmaceutical & Medical Complex, organized by the local government, has set the goal of fostering high-tech industries with the vision of creating a radiomedical hub for the world's leading radiology and science convergence industries, and six strategic tasks has been announced by the local government.

Starting with 'Dongnam Institute of Radiological & Medical Sciences(DIRAMS)' in 2010, the construction project is underway with the Heavy Particle Accelerator Center, the Power Semiconductor Commercialization Center, and the Kijang Research Reactor.

Furthermore, with the goal of strengthening research infrastructure and creating new industries through radiation convergence, the importance of research on the development and commercialization of radioisotopes has been recognized, leading to the launch of a project to expand the radiation research infrastructure. Accordingly, construction of a research reactor began in Gijang-gun in May 2019, and construction of the 'Radioisotope Utilization Research Center' started in December of the same year.

The goal of this project is to promote the value of medical/industrial usage and to establish a basic infrastructure for commercialization of RIs. In addition, efforts are being made to establish the research function

of the Research Center and to derive the first research results

2. Radioisotope Utilization Research Center

The center is located at 286 Imrang-ri, Gijang-gun, Busan, and has a land area of 19,369m², a construction area of 16,361m², and a total floor area of 4,708m². Construction was completed in July 2024 with the start of construction in 2022, and internal infrastructure facilities are currently being built with the aim of official operation in the second half of 2026.

The composition of the center is as follows. The basement has a machine room and an electric room, and the first floor is a management area for handling radioactive materials, and is composed of an open laboratory and 10 research facilities for handling radioactive materials for various purposes. The second floor consists of an office with a capacity of 30 to 40 people, and about 10 laboratories for chemical, biological and mechanical studies. The third floor is composed of some offices, a space for seminars and education. Currently, various experimental tables and reagent cabinets have been installed, and Lab equipments also has been installed or is scheduled to be installed.



<Radioisotope Utilization Research Center>

3. The Research Function of the Research Center

Currently, the center has been built, and the construction of the Kijang Research Reactor is progressing with the goal of completion in 2027.

Accordingly, it is necessary to secure research functions for isotope industrialization.

Radioisotopes and related products are 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.

Cold kits, based on the Tc-99m isotope, are becoming the standard for radiopharmaceutical manufacturing due to their ease of preparation and efficient distribution. Recently, high-precision cancer treatment and patient-customized treatment technology have been in the spotlight, but the use of low-cost, high-efficiency cold kits has been the basis so far.

The research center selected the first research results for commercialization as a cold kit. And currently, research is underway on bone imaging diagnostic agents(MDP, DPD and HDP) with high domestic urgency.



< Open LAB in 2nd floor >

4. Results & Conclusions

Construction of the Radioisotope Utilization Research 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 isotopes(Lu-177) is being started, and research equipments(eg, ICP-oes, HPLC) are currently being installed.

The detailed schedule and plan will be discussed through an spring academic conference.

A thank-you NOTE

This project was carried out as one of the radiation research-based expansion projects organized by Ministry of Science and ICT.