

TAIWAN



Realising the potential of radioligand therapy: a national call to action

January 2025

This project is led by The Health Policy Partnership (HPP) with guidance from a multidisciplinary group of experts. HPP has full editorial control of all outputs and is guided by experts with the aim of reflecting a consensus position. The project is supported with funding by Novartis.

The
**Health Policy
Partnership**
[research, people, action]

About this report

This policy narrative has been developed following consultation with national experts in the delivery of radioligand therapy, and seeks to provide an evidence-based overview of the key challenges that must be addressed to enhance radioligand therapy readiness at a national level. In addition, it provides policymakers and health system leaders with recommendations to improve effective implementation of radioligand therapy and, ultimately, support delivering the best-quality care for people with cancer.

To assess the current implementation of radioligand therapy in Taiwan, the authors of this report engaged with national experts in nuclear medicine, oncology, regulation and policy to guide the development of the policy narrative. Insights were gathered through a series of interviews and combined with desk-based research to identify the following policy and system barriers and associated recommendations.

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Executive summary

Radioligand therapy is a precision medicine that, if effectively implemented, has the potential to significantly improve cancer care and outcomes. Cancer is a substantial global burden; it was the third leading cause of death in 2021, resulting in almost 10 million deaths.¹ The incidence of cancer is growing, but new, targeted precision approaches – such as radioligand therapy – have the potential to provide more effective treatment options with fewer side effects.¹⁻³ A considerable level

of investment and research into radioligand therapy is ongoing, with more than more than 320 clinical trials around the world exploring the therapeutic

application of radiopharmaceuticals in a range of cancers.⁴ This momentum is paving the way for demand to increase significantly in the next 20 years. It is therefore vital that health systems have the ability to rapidly and sustainably adapt to integrate this innovative technology into care.

There are more than
320
ongoing clinical trials
around the world

Radioligand therapy can play a key role in tackling the burden of cancer in Taiwan. In 2021, cancer was the leading cause of death in the country, causing more than 55,000 deaths.¹ In light of this, the government made a series of national commitments that are expected to provide NT \$10 billion (USD \$306.9 million) over the next few years to advance innovative cancer treatments, such as radioligand therapy.⁵

The incidence of cancer is growing

In 2021, the disease caused almost
10 million deaths

In 2021, **cancer was the leading cause of death** in Taiwan, resulting in over

55,000 deaths



This report has identified the key barriers to implementing radioligand therapy effectively in Taiwan. Addressing these barriers will require policymakers to:

- **develop national regulatory frameworks and policies to create a more supportive healthcare environment for innovative technologies.**
These policies should facilitate the set-up of new radioligand therapy services by helping to offset the initial hospital-led investment. Such policies would also enable the expansion of clinical trials, to create greater understanding of the potential pharmacoeconomic and clinical impacts of the treatment for a Taiwanese population.
- **collect enhanced real-world data on the clinical effectiveness of innovative medicines,** such as radioligand therapy, and establish clear rules to determine the processes for long-term reimbursement in Taiwan.
- **promote the development of guidelines for disease management** that support physicians to select the most appropriate treatment modality for their patients and refer them to nuclear medicine services so patients can access radioligand therapy when indicated.
- **support the establishment of nuclear medicine and imaging services across Taiwan to increase equitable access** and reduce the financial and time burden on patients and their families who must travel long distances to access these services.
- **develop national guidance for patient engagement to ensure information on radioligand therapy services uses accessible language,** is patient-friendly and can be understood by non-specialists.
- **include nuclear medicine in medical education and hospital training programmes** to ensure all physicians are aware of it as a therapeutic option, and there is capacity to deliver radioligand therapy to all who are eligible.

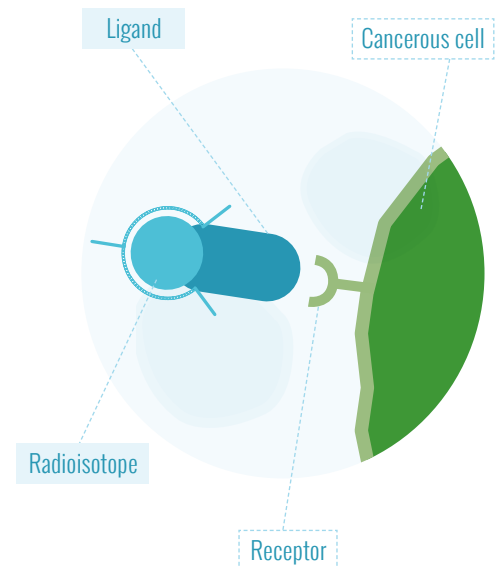
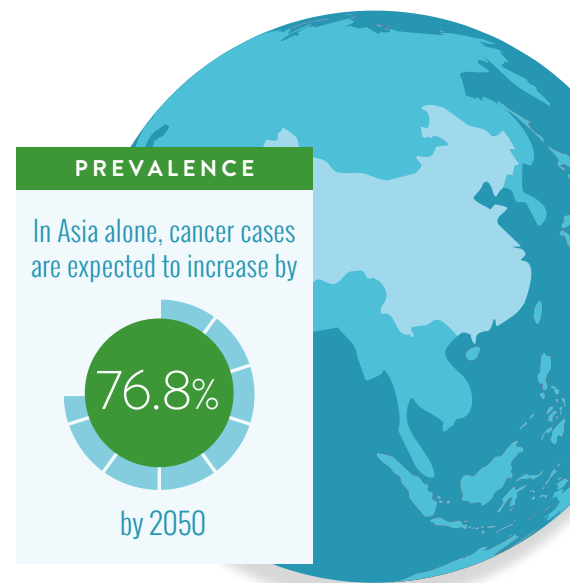
An introduction to radioligand therapy

The global prevalence and cost of cancer is immense, and continues to grow, but our ability to tackle it is improving.

Cancer was the third leading cause of death in 2021, when it led to almost 10 million deaths globally.¹ In Asia alone – the continent with the highest prevalence of cancer – it is estimated that there will be 7.5 million additional new cases of cancer by 2050, an increase of 76.8% from 2022.⁶ However, while the incidence of cancer continues to grow, so does the number of available treatments and innovations.

Radioligand therapy is a targeted treatment with huge potential to improve cancer care. The therapy is made up of two parts: a ligand that identifies cancer cells, and a radioisotope that delivers radiation.⁷ The process allows radiation to target cells anywhere in the body.^{2,3} Because the radiation works over short distances and can be directed specifically to cancer cells, the treatment is generally well tolerated and has less impact on healthy cells than other treatments, such as chemotherapy.³ Additionally, radioligand therapy has been proven to improve survival rates and quality of life, as well as slow disease progression, meaning that the treatment can have a significant positive impact on people's lives.⁸⁻¹⁰ Radioligand therapy is currently licensed in several countries for use in certain types of neuroendocrine neoplasms (NENs) and prostate cancer.¹¹⁻¹⁵

The mechanism by which the therapy works is not specific to any particular tumour type, meaning it could be applied to many other cancers. Investment and research are paving the way for a large increase in demand for radioligand therapy in the next 20 years. Recognition of its potential has led to significant investment; there are more than 320 ongoing clinical trials around the world exploring the therapeutic application of radiopharmaceuticals in a range of cancers.⁴ Given the potential of this research to identify new applications for radioligand therapy, demand is expected to surge.



As demand increases, so too will the need to build readiness for the implementation of radioligand therapy to ensure equitable access.

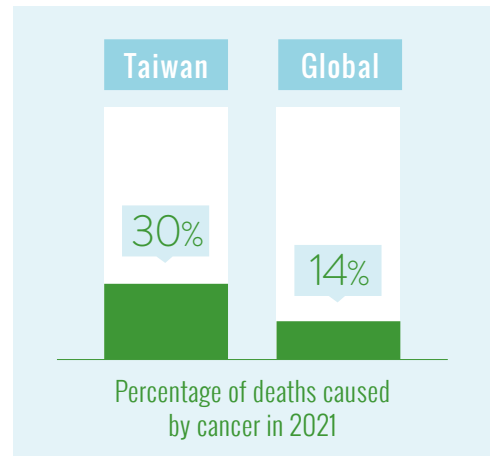
Readiness is the ability of a health system to rapidly and sustainably adapt policies, processes and infrastructure to support the integration of new therapies, as outlined in the Radioligand Therapy Readiness Assessment Framework (see *Appendix*).¹⁶ Identifying the policy and health system barriers to the implementation of radioligand therapy allows for more effective long-term planning and resource allocation to build readiness and provide equitable access to radioligand therapy services.

BOX 1. Defining radioligand therapy

This document uses the term radioligand therapy, but there are various terms used for the approach, including molecular radiotherapy, peptide-receptor radionuclide therapy (PRRT), systemic radiation therapy, targeted radionuclide therapy and targeted radiotherapy. If the ligand used is an antibody, the approach is known as radioimmunotherapy.

The potential of radioligand therapy in Taiwan

Cancer is the leading cause of death in Taiwan, prompting the government to make significant commitments to improve care. In 2021, cancers caused more than 55,000 deaths in Taiwan – around 30% of all deaths in the country.¹ In comparison, cancers caused around 14% of deaths globally in the same year.¹ Prostate was the third most prevalent cancer in the country, while NENs – the most common form of pancreatic cancer – were the sixth most prevalent.¹ Because both types of cancer can be treated with radioligand therapy, there is potential for this treatment



to make a significant difference in Taiwan. The President and the Ministry of Health and Welfare announced national commitments in 2024 to reduce cancer deaths by one third by 2030 by improving prevention and treatment.⁵ As part of these commitments, the government is expected to establish a Cancer Drugs Fund of NT \$10 billion (USD \$306.9 million) for new medicines over the next few years. The fund is part of a three-pronged approach to national improvements in cancer care, focusing on:^{5 17-19}

1. early-stage cancer screening
2. genetic testing
3. precision medicine.

Centralised commitments such as these, which advance precision medicine, could bolster the integration of radioligand therapy in Taiwan and, in doing so, improve survival rates for people with cancer.

Radioligand therapy is delivered in a limited number of facilities in Taiwan, with different approaches to service and delivery organisation depending on the type of therapy being administered. There are 23 hospitals or cancer centres (out of 476) that have the appropriate facilities to deliver nuclear medicine therapies.^{18 20} For radioligand therapy, both outpatient and inpatient services are used; inpatient services are designated for therapies with higher risk of radiation exposure to the public, or for patients who require ongoing monitoring.^{18 21}

A range of specialist healthcare professionals are involved in the delivery of radioligand therapy in Taiwan, but there may be capacity challenges in the future.

Delivery of care may require a multidisciplinary team that includes general surgeons, surgical oncologists, medical oncologists, gastroenterologists, urologists, radiotherapists, nuclear medicine physicians, technicians, pharmacists, specialist nurses and endocrinologists.^{18 21-23}

However, due to an anticipated increase in demand for the therapy, there are concerns that it will be challenging to retain and train a workforce to provide sufficient capacity.²¹

Radioligand therapy is currently approved for use in one type of cancer in Taiwan, but it is not yet reimbursed.

It is approved for the treatment for neuroendocrine tumours,²⁴ and is being reviewed for use in prostate cancer.^{22 25} But the therapy is not reimbursed by National Health Insurance (NHI) (Box 2) for either indication.^{18 19 21 23 26 27}

BOX 2. The health system in Taiwan²⁸

- National Health Insurance (NHI), implemented in 1995, is a single-payer system that provides universal, mandatory health coverage.
- Private health insurance is available, and offers disease-specific cash indemnity provisions that can be used for medicines or devices not covered by NHI.
- Out-of-pocket costs for citizens include contributions for outpatient care, prescription drugs and hospital stays, subject to limits and exemptions, and there are full subsidies for low-income households.

Where radioligand therapy is available, the approach to care varies due to differences in clinical guidelines between hospitals.

The therapy is included in the Taiwan Urological Association guidelines for the treatment of prostate cancer.²⁹ As part of government regulation, however, every cancer centre should have its own guidelines for managing care; this may be leading to disparities in care for people receiving radioligand therapy. Most physicians still follow international guidelines or use them as a point of reference,^{19 21 23} and care is generally consistent with the National Comprehensive Cancer Network guidelines used in the US.³⁰ Inconsistency between guidelines may also generate difficulties in assessing effectiveness when considering wider implementation.

Opportunities to advance the implementation of radioligand therapy in Taiwan



Improved data collection and new funding models may provide increased accessibility



Promoting investment in radioprotective infrastructure and embracing an innovative policy environment can broaden access to radioligand therapy services



Investing in imaging infrastructure may help address bottlenecks in the delivery of care



Encouraging information-sharing and collaborating with clinical societies and patient advocacy networks may help increase awareness and access



Workforce planning and specialist training can help meet future demand for innovative therapies



Bridging the knowledge gap among regulators across different regions may support more equitable access

Improved data collection and new funding models may provide increased accessibility



WHAT IS THE CURRENT CONTEXT?

Reimbursement for cancer medicines is restricted and does not always cover approved therapies. The government sets an annually reviewed cap on reimbursement spending for cancer treatments. While the cap appears to increase year on year, with the current cost of radioligand therapy, a greater proportion of the health budget may need to be allocated to cancer treatments for the therapy to be reimbursed.^{21 23 27} Other high-cost cancer medicines (such as CAR-T therapy) have previously been reimbursed, so there is scope for radioligand therapy to be included at some stage.¹⁷

The lack of reimbursement for radioligand therapy may be resulting in limited access, as some people are unable to cover the cost of the treatment.

The reimbursement criteria for some cancer medicines is limited to approved indications, and also depends on the line of treatment, the number of treatment cycles and treatment combinations.²⁶ This can lead to people with cancer choosing treatments that are reimbursed by NHI rather than newer, more innovative medicines.³⁰ It also means that access to the latest therapies could be limited to people who have sufficient private health insurance, are in a clinical trial or can pay out of pocket.^{19 21 23 27}

WHAT CAN BE DONE?

Increasing the number of radioligand therapy clinical trials in Taiwan could support greater access to reimbursement by building a robust evidence base that is relevant to the population. Multiple elements – including environmental factors, which vary around the world – can affect cancer development.³¹ So it is vital that country-level research is undertaken. With trials that solely take place in Europe or the US, it may be difficult to evaluate whether the same outcomes could be reproduced in Asia; this may result in lower confidence from the authorities in reimbursing innovative therapies.²⁷ Research also suggests that the inclusion of local clinical studies or pharmacoeconomic data in reimbursement applications for medicines improves the likelihood of reimbursement being granted.³² Therefore, trials that produce data specific to the Taiwanese population could provide the evidence that regulatory authorities need to inform their decision about whether radioligand therapy is approved for reimbursement.²⁷

Utilising the new Cancer Drugs Fund could support access and

reimbursement for radioligand therapy. The fund was set up to help reduce cancer deaths by a third by 2030 – a national commitment that includes advancing the role of innovative precision medicines in cancer care.⁵ The fund also aims to reduce the financial burden placed on people who need innovative cancer medicines that are not covered by NHI. It will also collect real-world data over two to three years; these data will be used by the National Health Insurance Administration (NHIA) in the final reimbursement assessment.³³ Consequently, the fund creates an opportunity for the Taiwanese government to embrace new technologies, such as radioligand therapy, and achieve wider access and reimbursement. However, under the NHI global budget system, the Cancer Drugs Fund may only serve as a temporary solution for introducing new technologies with uncertain efficacy. It is therefore crucial to carefully evaluate and develop strategies to incorporate these technologies into regular reimbursement schemes to ensure sustainable access for people living with cancer in Taiwan.

CASE STUDY 1. Advancing health technology assessment in Taiwan³⁴



The national body for health technology assessment in England, The National Institute for Health and Care Excellence (NICE), has been working alongside Taiwan's Center for Drug Evaluation (CDE) and the NHIA to improve the evaluation and inclusion of new medicines into Taiwan's health system.

Because cancer care is a particular area of focus for improvement in Taiwan, NICE is providing advice and support – including data collection to address clinical uncertainty – for projects that enable access to innovative treatments. NICE is also providing insights into England's Cancer Drugs Fund, Innovative Medicines Fund and managed access agreements.

The collaboration between NICE, CDE and NHIA has led to the establishment of the Center for Health Policy and Technology Assessment in Taiwan, alongside the provision of funding for Taiwan's own Innovative Medicines Fund and Cancer Drugs Fund.

Promoting investment in radioprotective infrastructure and embracing an innovative policy environment can broaden access to radioligand therapy services



WHAT IS THE CURRENT CONTEXT?

A lack of government support for the development of facilities to deliver radioligand therapy has resulted in limited expansion. Hospitals seeking to set up a radioligand therapy service are required to invest their own capital or seek additional funding from private donors.¹⁷⁻²³ The implementation of the therapy may therefore be limited to hospitals with greater financial resources, subsequently exacerbating inequalities.

Limited investment in infrastructure for radioligand therapy is hampering its expansion. The patient pool for radioligand therapy is small compared with that of other cancer therapies due to the limited number of indications it is approved for in Taiwan. This pool may be further limited by the lack of government reimbursement for the treatment, as some people may be unable to pay for radioligand therapy out of pocket. Hospitals are therefore less inclined to invest in the costly radioprotective infrastructure required to support the delivery of this therapy,²³ which includes lead-protected rooms, radioisotope storage and waste disposal systems, up-to-date imaging equipment, and protective equipment for the workforce.³⁵ However, should this infrastructure investment not occur, it may not only limit access for people who wish to receive radioligand therapy now, but further restrict access if demand increases in the future.

The locations of hospitals and cancer centres with the facilities to deliver radioligand therapy exacerbates inequitable access to care. Many of the 23 hospitals that are fully equipped to deliver radioligand therapy are in northern Taiwan, concentrated around the urban centre of Taipei.^{20-21,36} Hospitals with these facilities are less common in rural areas, so people must travel to city hospitals to receive treatment.²⁶ This can create a time-consuming and burdensome process for patients and their families or loved ones who must travel long distances to access these services, particularly as they do not receive financial support for travelling to access the most appropriate care.²⁶

WHAT CAN BE DONE?

Developing a holistic implementation strategy for radioligand therapy may broaden access and future-proof services. Such a strategy would entail a review of the current nuclear protective infrastructure and facility locations to identify underserved areas. This would help future-proof these services and

ensure more equitable access to innovative medicines, while recognising the high cost of developing these facilities.

Promoting investment in hospital infrastructure may attract people with cancer from overseas; in turn, this may help create greater demand for radioligand therapy.

Experts report that Taiwan appears to have more limitations than other countries in implementing radioligand therapy services; these limitations include a lack of centralised financial investment and lower numbers of people who can afford to pay for the treatment out of pocket.¹⁸ These factors may contribute to hesitancy from hospitals to invest in the infrastructure required to deliver radioligand therapy services, given the uncertainty of receiving a return on their investment. However, if hospitals and cancer centres were to invest, it would enable the system to manage future increased demand, and potentially encourage people from other countries to receive radioligand therapy at these facilities. This could mitigate current access barriers for people in Taiwan, increase the likelihood of a more immediate return on investment, and step up the pace for achieving economic scale.²³

A policy environment that promotes innovation and embraces new technologies would support implementing more radioligand therapy services.

With the advent of the Cancer Drugs Fund,³³ there is an opportunity to provide more certainty to hospitals about the longevity of innovative medicines such as radioligand therapy, and improve accessibility in Taiwan. More hospitals may be encouraged to establish services and broaden access if the government develops policies and strategies that make it more financially viable – particularly in rural regions – to set up wards with the infrastructure needed to deliver radioligand therapy.

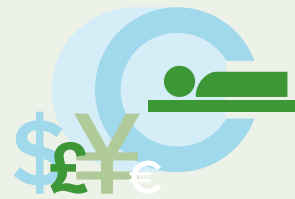
CASE STUDY 2. Supporting the development of a radioligand policy framework in Europe³⁷

The Stakeholder Political Alliance for Radioligand Cancer Therapies (SPARC-Europe), a policy initiative launched in 2020, aims to build a comprehensive policy environment for radioligand therapy. It does this by providing expert knowledge and guidance to support policymakers in implementing radioligand therapy and increase access to this treatment for patients.

The goal of SPARC-Europe is to:

- provide input about the need to integrate innovative medicines into health systems
- support the development of guidance for implementing radioligand therapy
- overcome geographical inequalities in access to these medicines
- guide the development of education and training programmes for healthcare professionals in the field of radioligand therapy.

Investing in imaging infrastructure may help address bottlenecks in the delivery of care



WHAT IS THE CURRENT CONTEXT?

Limited access to imaging creates delays in initiating radioligand therapy. People with cancer must undergo positron emission tomography (PET) scans so tumours and malignancy can be assessed, and to monitor the impact of treatment such as radioligand therapy.^{22 38 39} However, the scans used for radioligand-therapy imaging are only available in few hospitals in Taiwan, which is causing delays to treatment.²² This bottleneck partly stems from a scarcity of the Gallium-68 (Ga-68) radioisotope, which is used in these scans.^{22 40 41} The production capacity of this radioisotope is limited due to complex and stringent regulatory requirements, as well as the need for supportive infrastructure that often necessitates significant investment.⁴²

Currently, only four hospitals in Taiwan have the generators that can produce this radioisotope and therefore provide the scans needed for radioligand therapy.²² This has resulted in long waiting lists for people with cancer, which has the potential to negatively affect clinical outcomes.²²

There are also regional disparities in access to imaging, disproportionately affecting people living with cancer in southern Taiwan. The few Ga-68 generators that exist in Taiwan are located in the north, so people living in the south are often required to travel long distances to receive the PET scans needed for radioligand therapy.²² Similarly, experts report that access to alternative radiotracers, such as Fluorine-18 (F-18), is also limited in southern Taiwan.²²

WHAT CAN BE DONE?

Investing in supportive imaging infrastructure may help eliminate the bottlenecks that are restricting access to the scans needed for radioligand therapy. The government could support procuring additional Ga-68 generators and F-18 cyclotrons to address the challenges affecting regional



production and equitable access to the PET and single-photon emission computed tomography (SPECT) scans required for radioligand therapy.^{43 44} This investment could help reduce wait times for scans as well as alleviate the financial and logistical burden placed on people who would have had to travel long distances for imaging.

CASE STUDY 3. **Increasing imaging infrastructure in Spain⁴⁵**

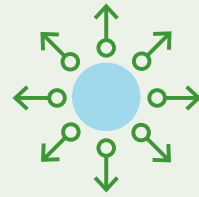


In 2013, the diagnostic infrastructure for radioligand therapy in Spain was limited, which had a negative impact on care. Some regions had as many as 3.11 PET scanners per 1 million inhabitants, while others had as few as 0.48. This regional discrepancy meant that people in some areas of the country did not have access to appropriate care.

To address this discrepancy and improve care, a review looked at the age of existing medical equipment. The review resulted in a report calling for improved infrastructure across the health system, and highlighted the need to prepare for increased radioligand therapy. At the same time, the Spanish government was granted EU funding for new, high-tech equipment that would help address the recommendations in the report.

The government consulted with medical societies and gathered regional needs from local governments to inform equipment distribution. From 2020 to 2022, the number of PET scanners in Spain grew from 88 to 115 (a 30.6% increase).⁴⁶ This led to a rise in the number of scans; 58,039 more scans took place in 2022 than in 2020 (a 26.0% increase).⁴⁷

Encouraging information-sharing and collaborating with clinical societies and patient advocacy networks may help increase awareness and access



WHAT IS THE CURRENT CONTEXT?

Awareness of radioligand therapy among physicians is largely limited to those in, or closely associated with, nuclear medicine. Many physicians and surgeons in larger general hospitals are familiar with established treatment modalities, but may lack awareness of newer options such as radioligand therapy. Consequently, they may be less likely to refer their patients for more innovative treatments – meaning radioligand therapy may not be considered as an option for first-line treatment. This could cause people with cancer to miss the opportunity to benefit from the treatment.²¹⁻²³ Other barriers that could be limiting referral to radioligand therapy services include concerns about radiation exposure; physicians may be worried about their and other healthcare professionals' exposure after a patient receives radioligand therapy treatment.²¹ In some cases, people have been asked to delay follow-up appointments with their physician to minimise this perceived risk.²¹ However, radiation exposure from patients during follow-up visits after discharge is negligible and unlikely to pose any risk due to the design of radiation protection infrastructure and processes in nuclear medicine.²¹

Awareness of radioligand therapy among people with cancer is also low, which may limit its consideration as a treatment option. Many people living with cancer in Taiwan rely on their physicians for information about treatments options; they may not independently seek out information on alternative therapies or treatments.^{21,27} Additionally, people with cancer are often not aware of the costs associated with innovative medicines such as radioligand therapy (which may include time and money spent on accessing treatment as well as the need to pay out of pocket for the therapy).²² However, it has been noted that people with neuroendocrine tumours (NETs) are more aware of these alternative treatments.²² This is possibly a result of the disease awareness programmes established by medical societies and patient groups, which may have encouraged people to actively seek more information from their physician.

An infrastructure gap may be restricting the capacity to conduct clinical trials for radioligand therapy in Taiwan, which in turn may be contributing to limited awareness of such treatments. With only a small number of clinical trials conducted in the country, there are few opportunities for healthcare professionals and patients to become more familiar with radioligand therapy; this may limit their understanding of the therapy as an effective treatment option.²³ Hospitals are required to have good radiation protection infrastructure in place before they can conduct these trials, but this standard is met by only 23 centres in Taiwan.^{18,20}

WHAT CAN BE DONE?

Encouraging the dissemination of information about radioligand therapy may foster a broader understanding of the therapy among healthcare professionals. Collaboration among international societies, clinicians and the general public can improve awareness and understanding of the types of cancer that can be treated with radioligand therapy, and opportunities to participate in clinical trials. Bringing together relevant societies – such as the Taiwan Neuroendocrine Tumour Society and the Society of Nuclear Medicine, Taiwan – can provide oncologists with best-practice guidance for the therapy.^{21 22 24} These societies also play a role in developing clinical guidelines, and can broaden understanding of radioligand therapy by including it as a treatment option, as seen in prostate cancer guidelines by the Taiwan Urological Association.²⁹ Unfortunately, education efforts are often limited to specialists who are already familiar with the therapy as a treatment modality. Expanding outreach to family physicians may help increase awareness and referrals to radioligand therapy services.²¹

Improving awareness of radioligand therapy among people living with cancer is also essential to broadening access. Efforts could include conversations between patients and their physicians to discuss radioligand therapy as a treatment option; or accessible educational materials, such as videos, that provide information about types of cancer and available therapies.^{22 48} Patient groups in Taiwan already share information on treatment options and clinical trials, and use websites and social media to spread awareness. These groups have been influential in advocating for the reimbursement of radioligand therapy for NETs.^{18 21} This highlights an opportunity for patient groups and healthcare professionals to collaborate, sharing knowledge and jointly advocating for increased awareness of and improved access to the therapy.

CASE STUDY 4. NET awareness programme⁴⁸

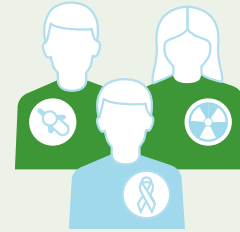


NETs can be difficult to detect because the symptoms are often non-specific. To help raise awareness of the condition and its symptoms, the International Neuroendocrine Cancer Alliance developed World NET Cancer Day and undertook targeted information-sharing across Taiwan.

The group placed themed decorations in 11 hospitals, hosted parades and shows in public places, developed a promotional animation, online marketing and outdoor advertising, and launched the world's first NET website in Mandarin.

Their work led to increased information-sharing with the public as well as oncologists. There were particularly good results from the animation, which was viewed 208,427 times in two months on YouTube.

Workforce planning and specialist training can help meet future demand for innovative therapies



WHAT IS THE CURRENT CONTEXT?

Overall workforce capacity and retention in Taiwan is a challenge, and could limit the country's ability to meet future demand for radioligand therapy.

Low salaries and high workloads have led to healthcare professionals leaving the workforce, prompting a nationwide push to increase salaries across the sector.^{17 26} Workforce shortages have reduced hospital capacity, resulting in fewer available beds and longer waits for hospital admissions.²⁶ The scarcity of radioligand therapy expertise is particularly concerning, with increasing demand for radiopharmacists and specialist nurses who are trained to deliver and care for people receiving the therapy.²¹

Multidisciplinary teams (MDTs) are not commonly involved in radioligand therapy, which can affect quality of care. Research demonstrates that MDT involvement in cancer care can prolong survival, reduce the risk of recurrence and improve quality of life; it should therefore be central to the management of all cancer types.^{49 50} One of the main cancer types that can be treated with radioligand therapy is NETs, a rare but increasingly prevalent cancer⁵¹ that requires extensive coordination with a specialist MDT to ensure effective therapy delivery.⁵² However, few hospitals in Taiwan have dedicated MDTs to support people with NETs due to the rarity and limited awareness of the disease. Instead, those receiving radioligand therapy are often covered by MDTs from other departments, such as gastric or thyroid teams.²² Healthcare professionals from these departments may be less familiar with newer treatment modalities for NETs such as radioligand therapy, which could result in care that is not joined up or tailored to the needs of people with this type of cancer.²²

Training programmes need to adapt to improve education around treatment and care as the role of nuclear medicine physicians evolves in light of advances in radioligand therapy. Traditionally, education for nuclear medicine physicians focuses primarily on diagnosis and less on treatment.²² However, as innovative treatments such as radioligand therapy become available, nuclear medicine physicians should become increasingly involved in treating cancer and caring for patients more directly.²² Currently, only a few hospitals in Taiwan maintain training programmes within nuclear medicine departments that include overall treatment and care of a patient.²² Unless education in this area expands, the low number of nuclear physicians with this expertise may pose a risk to meeting future increases in demand

for radioligand therapy.²² The lack of national programmes or incentives to recruit and train these specialists exacerbates the issue, potentially leading to bottlenecks in accessing care.^{21,27}

WHAT CAN BE DONE?

With demand for radioligand therapy likely to increase, it is imperative that the specialists needed to deliver this care are factored into workforce planning and training. Priority training programmes – targeting nuclear physicians, specialist nurses, radiopharmacists and radiation technicians – should be established as there are currently no programmes in Taiwan for the specialist workforce required for the delivery of radioligand therapy.^{21, 22, 27} There is a risk that, as demand for this therapy grows, workforce capacity will not expand to meet it; this could result in significant delays for patients in accessing the treatment, and a lack of appropriate MDTs to manage their care. Without proactive workforce planning, the national target to reduce cancer deaths by a third by 2030 may be unattainable.

CASE STUDY 5. **An expansion programme for specialist nurses in Poland⁵³**



Nurses play a key role in delivering radioligand therapy, working with nuclear medicine technologists and physicians to provide effective care. In Poland, there were no specialist training programmes for nuclear medicine that were specific or appropriate for nurses; instead, nurses were required to obtain additional certification and receive training in their hospitals.

To address the problem, a national-level course was created in 2019 to provide formal qualifications for nurses so they can work in nuclear medicine centres. The training involves theoretical classes and 35 hours of practical sessions at the Department of Nuclear Medicine of the Military Institute of Medicine. The course raised awareness of radioligand therapy among nurses; the trained nurses have also gone on to provide peer-to-peer learning, further raising the profile of the therapy.

Expanding specialist training programmes to include a broader range of healthcare professionals could significantly enhance the workforce's capacity to deliver radioligand therapy. Such programmes would not only increase the nursing workforce but could extend to radiopharmacists, who are also vital to ensuring the effective and safe delivery of these therapies.

Bridging the knowledge gap among regulators across different regions may support more equitable access



WHAT IS THE CURRENT CONTEXT?

Regional disparities in the regulation and availability of radioligand therapy may be contributing to health inequalities. Because many of the major facilities capable of delivering radioligand therapy are concentrated in northern or central Taiwan,²⁰ regulators in these regions appear to be more knowledgeable about these therapies and have implemented effective regulatory processes.²² In contrast, southern Taiwan faces limited regulatory knowledge, particularly around accurately assessing the treatment fee charged to patients and regulating use of the therapy.²² Coupled with the variable access to imaging and specialist cancer facilities, these disparities risk widening the gap in access to effective cancer therapies, including radioligand therapy, and disadvantaging people in southern Taiwan.

Responsibility for regulating radioligand therapy is split between two bodies, and this separation may be creating bureaucratic barriers to implementing clinical trials using the treatment, consequently hindering wider access to the therapy. Nuclear medicines, including radioligand therapy, are regulated by the Taiwan Food and Drug Administration (TFDA) and the Nuclear Safety Commission. The TFDA is responsible for the safety of medicines, while the Nuclear Safety Commission oversees professional training and the radioprotective infrastructure.^{18,27} While the parallel regulatory activity has not been reported as significantly hindering established cancer centres and hospitals with experience in delivering other radioactive medicines,²⁷ it has posed challenges to setting up clinical trials. To initiate or participate in a clinical trial for radioligand therapy in Taiwan, centres must submit a research proposal to both bodies for review. However, the experts from either institution who review the proposal may not have a clear understanding of radioligand therapy, potentially delaying trial initiation.¹⁸ Because clinical trials are a key access route to radioligand therapy for people who are unable to afford the treatment otherwise, such delays could hinder access for those who need it most.

WHAT CAN BE DONE?

A nationwide strategy to standardise the regulation of radioligand therapy could help to bridge the knowledge gap among regulators and contribute to more equitable access to effective treatments. Establishing clear guidelines on how radioligand therapy should be regulated, with consistent expectations from both regulatory bodies, could ensure understanding of the treatment is consistent among regulators across Taiwan, as well as streamline processes and broaden access to these medicines. The strategy should be developed with input from healthcare professionals who are involved in the delivery of radioligand therapy, as well as regional regulators to ensure continuity and uniformity across regions.

CASE STUDY 6. **A guide to setting up a theranostics centre**⁵⁴



The European Association of Nuclear Medicine (EANM), the Society for Nuclear Medicine and Molecular Imaging (SNMMI) and the International Atomic Energy Agency (IAEA) have created a framework to facilitate establishing a theranostics centre.

The guide provides details of the requirements that must be considered – including radiation safety, regulation, radiopharmaceutical administration, storage, waste, patient release and multidisciplinary care. The framework and guidance recognise that there are regional differences in the regulation of radiation safety, but provides information on the licenses that must be sought and the prerequisite compliance procedures that must be undertaken for a theranostics service to be implemented.

This helpful guide could support the development of a nationwide strategy for the regulation of radioligand therapy in Taiwan and provide a blueprint for establishing new services in the future.

Recommendations for action

Radioligand therapy is an innovative, potentially life-changing therapy for people with cancer. In Taiwan, innovative treatments will be a crucial tool for reaching the national target of reducing cancer deaths by 30% by 2030,⁵ and there are clear opportunities to support improved implementation of radioligand therapy. While many of the recommendations made in this report will require cross-sector collaboration to enable a smooth transition to a more supportive environment for innovative medicines, the role of the government as a leader in advancing these recommendations cannot be understated. By taking decisive action, the government can drive improvements in cancer treatment that benefit the entire Taiwanese population. Other countries are already proactively adapting their health sectors to embrace these new technologies, which enhance cancer survival and quality of life. It is vital for Taiwan to join this global momentum, prioritising high-quality cancer care and implementing policies that foster innovation and accessibility.

The authors of this report, guided by a multidisciplinary group of experts, have developed a series of recommendations to support Taiwan in its efforts to establish itself as an innovation hub through the successful implementation of radioligand therapy.

WE CALL FOR POLICYMAKERS IN TAIWAN TO:

- ↓ **develop national regulatory frameworks and policies to create a more supportive healthcare environment for innovative technologies.** These policies should facilitate the set-up of new radioligand therapy services by helping to offset the initial hospital-led investment. Such policies would also enable the expansion of clinical trials, to create greater understanding of the potential pharmacoeconomic and clinical impacts of the treatment for a Taiwanese population.
- ↓ **collect enhanced real-world data on the clinical effectiveness of innovative medicines,** such as radioligand therapy, and establish clear rules to determine the processes for long-term reimbursement in Taiwan.
- ↓ **promote the development of guidelines for disease management** that support physicians to select the most appropriate treatment modality for their patients and refer them to nuclear medicine services so patients can access radioligand therapy when indicated.
- ↓ **support the establishment of nuclear medicine and imaging services across Taiwan to increase equitable access** and reduce the financial and time burden on patients and their families who must travel long distances to access these services.
- ↓ **develop national guidance for patient engagement to ensure information on radioligand therapy services uses accessible language,** is patient-friendly and can be understood by non-specialists.
- ↓ **include nuclear medicine in medical education and hospital training programmes** to ensure all physicians are aware of it as a therapeutic option, and there is capacity to deliver radioligand therapy to all who are eligible.

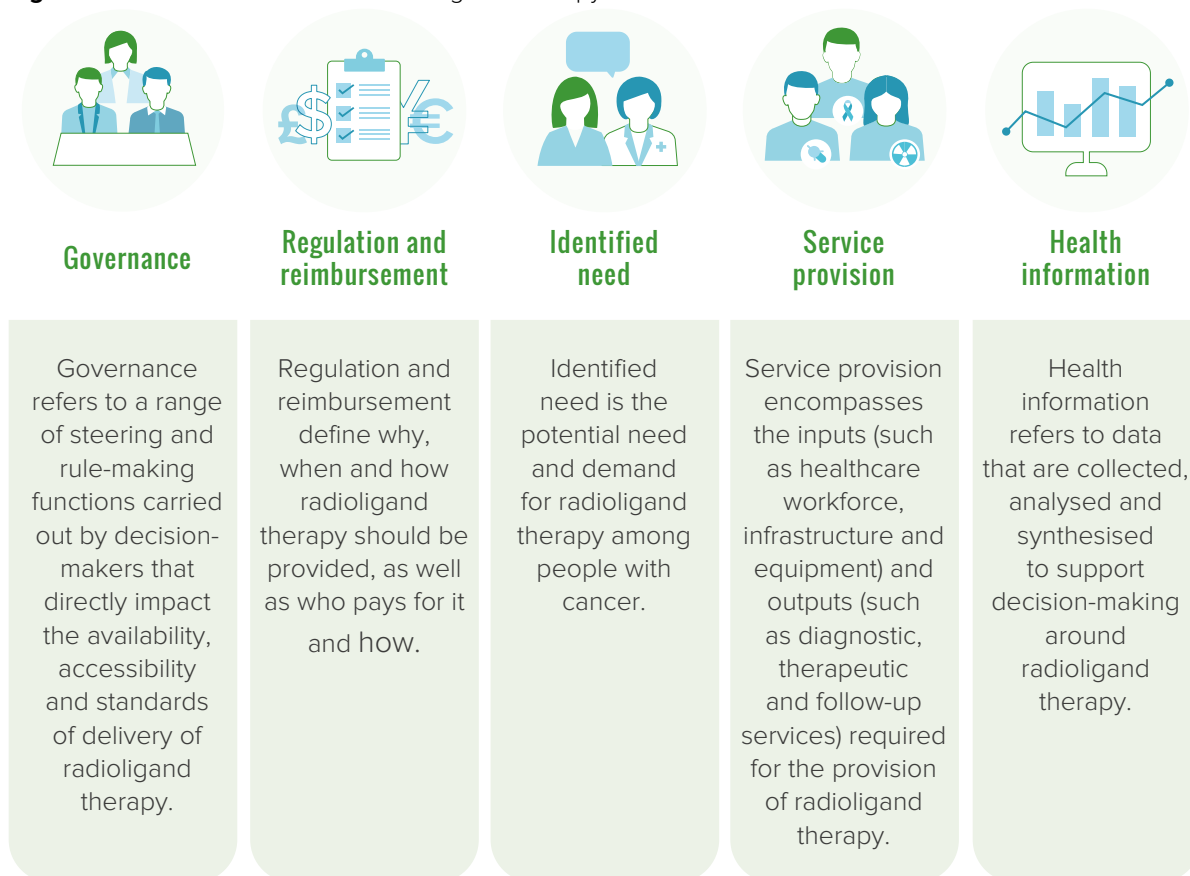
Appendix

The Radioligand Therapy Readiness Assessment Framework used to guide the research for this policy narrative was developed by HPP to evaluate national health systems' progress in integrating radioligand therapy.¹⁶ The framework allows those using it to take a systems-based approach to assessing the level of readiness in their country across five key domains (*Figure 1*), with the aim of identifying gaps in capacity and supporting more effective long-term planning and resource allocation.

The framework's development was guided by a multi-stakeholder international advisory group made up of nuclear medicine specialists, oncologists, urologists and patient representatives, and has been endorsed by the European Association of Urology, the European Neuroendocrine Tumor Society and the Oncidium Foundation.

Previous applications of the framework have been carried out in the US, the UK and South Korea.

Figure 1. The five domains of the Radioligand Therapy Readiness Assessment Framework



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**Realising the potential
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TAIWAN

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