



# Growing theranostics program is now everyday clinical practice in Finland

As a true pioneer in the frontier in cancer treatment, The Comprehensive Cancer Center in Helsinki offers precision therapy personalized to the needs of each individual patient.

By Claudette Lew | Photography by Matti Immonen



The new facilities at The Comprehensive Cancer Center were opened in early 2023, equipped with the latest molecular imaging equipment accessible to the multidisciplinary staff who provide theranostics to patients.



Most theranostics programs are housed within the Molecular Radiotherapy Unit at the center, and the unit has seen a significant increase in theranostics patients in recent years.

Cancer treatment has made tremendous progress in recent years, and the latest advancement in precision therapy is theranostics. Theranostics is the combination of therapy and diagnostics, pairing diagnostic biomarkers with therapeutic agents that share a specific target present in diseased cells or tissues. This new frontier in cancer treatment offers highly specific therapies that are revolutionizing how clinicians treat cancer.

“There’s a lot of excitement around theranostics right now,” said Veera Ahtiainen, MD, oncologist in the Molecular Radiotherapy Unit at The Comprehensive Cancer Center in Helsinki, Finland. Part of HUS Helsinki University Hospital, The Comprehensive Cancer Center is a world-renowned center for the treatment of cancer

patients, using theranostics to treat many of them. “There’s a clear advantage in its possibilities to be used in prediction, for personalization in treatment, and to provide precision medicine for cancer patients. We can diagnose and treat cancer, evaluate and measure the effectiveness of a given treatment, and carry out a treatment in a more targeted manner. We can better influence the care path of cancer patients and improve the patient’s quality of life.”

### **An established theranostics program**

The unit is an integral part of The Comprehensive Cancer Center and uses a combination of molecular imaging and targeted radiotherapy to diagnose and treat cancer patients. As the country’s largest and most versatile cancer center, it continues to

be a critical resource for patients throughout Finland, reaching those living as far north as Lapland. The Comprehensive Cancer Center recently designed and built new state-of-the-art facilities to continue serving Finland’s patient communities. The new center opened in early 2023, equipped with the latest molecular imaging equipment directly accessible to the multidisciplinary staff who provide theranostics and other cancer treatment to patients.

The team has seen the number of theranostics patients double in the last seven years, especially with the approval of prostate-specific membrane antigen (PSMA) labeled with lutetium 177 ( $^{177}\text{Lu}$ -PSMA) as a treatment for prostate cancer. At present, roughly 60 percent of their theranostics treatments are for prostate cancer, and 40 percent are



for treating neuroendocrine tumors, thyroid cancers, and other malignancies to minor extent.

"Most theranostics programs are housed within The Comprehensive Cancer Center," explained Dr. Ahtiainen. "As an oncologist, I work directly with Vappu Reijonen, our physicist, on planning radiotherapies for all of our cancer patients."

## PET/CT for patient selection

The Molecular Radiotherapy Unit uses a combination of imaging techniques, including PET/CT, to determine the location and extent of the cancer in the patient's body. Patient selection is the first step in theranostics. "We use image-guided patient selection," explained Dr. Ahtiainen. "Usually, we need to see an uptake in the tumor volume in a patient's diagnostic PET/CT. Patient selection for theranostics treatment is then determined in multidisciplinary meetings with our clinicians." Utilizing the available diagnostic information, the team can design a personalized treatment plan that is tailored to the patient's individual needs.

## SPECT/CT for imaging-enabled treatment evaluation

Another benefit of the theranostics approach is the potential, through quantitative SPECT/CT imaging, to measure treatment effectiveness.



Oncologist Veera Ahtiainen and medical physicist Vappu Reijonen collaborate closely to plan radiotherapies for all cancer patients, as the Molecular Radiotherapy Unit is a part of the radiotherapy department of The Comprehensive Cancer Center in Helsinki.

The team uses quantitative SPECT/CT, for example, to monitor the patient's response throughout the treatment and adjusts the treatment plan as necessary. The Molecular Radiotherapy Unit also performs SPECT/CT-based dosimetry to ensure the patient receives the most effective treatment possible while minimizing any potential side effects.

"Once patients begin treatment, we perform post-therapy imaging with our SPECT/CT. To individualize the treatment, molecular imaging is extremely valuable from a clinical perspective," explained Vappu Reijonen, medical physicist, "because molecular imaging not only allows us to determine patients

who benefit from the treatment, but it also allows us to see exactly what we treat. I believe that all around the world, people are beginning to realize the importance of imaging and its role in making treatments like theranostics optimal."

At The Comprehensive Cancer Center, patients are evaluated with Siemens Healthineers Symbia Pro. spectra™ SPECT/CT after each cycle of theranostics treatment. "Post-treatment scanning is a very important part of the process here," noted Dr. Ahtiainen. "From the post-treatment scans, we assess, together with laboratory results and the patient's clinical condition, the safety and tolerability of the



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**Veera Ahtiainen, MD**, oncologist in the Molecular Radiotherapy Unit at The Comprehensive Cancer Center in Helsinki University Hospital, Finland

treatment, and that we are seeing uptake in the tumor tissue, in comparison to normal tissue uptake. Cycle by cycle, we can observe the changes in the uptake in the tumor tissue and how the organs at risk are getting the accumulated dose. It's important for us to approach theranostics treatments from the perspective of using quantification and dosimetry for safety, as well as tracking effectiveness."

## Facilitating the theranostics workflow

Considering the high volume of patients The Comprehensive Cancer Center sees for post-treatment scanning, the team routinely uses Symbia Pro.specta SPECT/CT system to facilitate their theranostics workflow. "We've designed our workflow to accommodate our patient volume so that it's feasible for us, but also for our patients. During scans, patients need to breathe freely and sometimes move. It's really important that the patient is comfortable during imaging, and with respiratory motion correction, we can minimize those artifacts," explained Reijonen.

The team relies on the system's intuitive interface and features that

automate steps across the workflow to support them from patient setup through final imaging, resulting in consistent, reproducible studies. "The system is well-designed," noted Dr. Ahtiainen, "and has features that save time and are more practical, which can have a huge impact. Using the features on our Symbia Pro.specta, we can now implement treatment assessment and dosimetry more efficiently. We also utilize the system to perform diagnostic studies as well when needed."

## Evolving theranostics into routine clinical practice

Although theranostics treatment is part of the everyday clinical practice at The Comprehensive Cancer Center, many more patients around the world can benefit from more precise and targeted cancer treatments, which can impact clinical outcomes. The Molecular Radiotherapy Unit at The Comprehensive Cancer Center is constantly evaluating the effectiveness of its treatments through ongoing research and clinical trials. This ensures that the unit's treatment protocols are based on the latest scientific evidence and are optimized for the best possible outcomes for patients.

"Theranostics has a long history, starting with radioactive iodine to treat thyroid cancer. Considering the imaging resources we have and the different software that has been developed for quantification and dosimetry, new treatments can quickly become part of the clinical routine," explained Dr. Ahtiainen. "But before we can apply theranostics treatments, it requires functioning facilities, expertise, and of course, the staff. It's important for us to spread awareness about using radiopharmaceuticals in cancer treatment. We have had a lot of visitors here in our new facility, and we're happy to share our best practices. We can show them how we implement treatments and what it requires from us or the patients."

"We've seen many successful, significant, and long-lasting positive treatment responses," added Reijonen. "It's nice to see that in heavily pre-treated patients, we have been able to deliver these treatments without difficulties with the tolerability, encouraging us to continue and develop further treatments."

The team is working on publishing data to support the effectiveness of theranostics treatments and highlighting some of their work.



The Symbia Pro.specta in Helsinki was installed in 2022 as the second in Europe for clinical use. "I think it was exciting for us all," said Reijonen.



"Our nuclear medicine technologists have given a lot of positive feedback about the everyday user-experience when imaging with Pro.specta," noted Reijonen.



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**Vappu Reijonen**, medical physicist, PhD, Molecular Radiotherapy Unit  
at The Comprehensive Cancer Center in Helsinki University Hospital, Finland

This research even includes optimizing existing treatments, such as radioactive iodine for thyroid cancer, and working on clinical trials with alpha-emitting nuclides.

## Pioneers in theranostics

The team at The Comprehensive Cancer Center are true pioneers in a new frontier in cancer treatment, offering precision therapy that is personalized to the needs of each individual patient. Expanding the role of molecular imaging from detection to tissue characterization, treatment efficacy prediction, and treatment response measurement, clinicians can deliver highly targeted theranostics therapies that are more effective than traditional

treatments. With the potential to revolutionize the way cancer is treated, theranostics is an exciting development that continues to hold great promise for the future of personalized medicine and precision healthcare. ●

**Claudette Lew** is a freelance medical writer and editor.

Symbia Pro.specta™ SPECT/CT is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed.

The statements by Siemens Healthineers customers described herein are based on results that were achieved in the customer's unique setting. Since there is no “typical” hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.

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At the Molecular Radiotherapy Unit, Pro.specta is used for quantitative post-therapy imaging as well as for diagnostic nuclear imaging. “It is, of course, important to take good care of the regular quality assurance,” says Reijonen.



Reijonen and Ahtiainen collaborate on planning molecular radiotherapy, exemplifying the essential teamwork in cancer treatment.