

IHI Call Days | Call 12

● **INTERACT: Accurate Tissue Characterization with Deep-silicon Photon-Counting CT (PCCT) for Precision Cardiac and Oncology Diagnostics**

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Link to the [IHI brokerage platform](#): [IHI Call 12- Brokerage Event and Platform](#)

- Proposal sharing tool
- [Participant profile](#)

Clinical challenges in Conventional CT imaging.

Challenges

- **Limited accuracy in tissue characterization**
Traditional CT struggles to precisely characterize soft tissues, often requiring additional tests.
- **Unnecessary repeat testing**
Initial scans may be inconclusive, leading to multiple follow-up procedures that increase cost and delay care.
- **Overuse of invasive procedures**
Many patients undergo invasive diagnostics that could be avoided with more precise imaging.
- **Complex and hard-to-use systems**
Advanced CT technologies are difficult to implement in everyday clinical settings due to complicated workflows.
- **Slow diagnosis timelines**
Sequential testing and interpretation delays treatment decisions and impacts patient outcomes.
- **Strain on healthcare resources**
High reliance on advanced imaging like MRI burdens healthcare systems, especially in less-equipped facilities.
- **Poor patient communication**
Imaging reports are often too technical, making it hard for patients to understand their condition or participate in decisions.

Opportunities with Si-PCCT

- **Improved tissue clarity**
New Si detectors offer better spectral resolution, enabling more precise diagnosis in a single scan.
- **Fewer motion-related issues**
Advanced motion correction reduces image distortion from cardiac and respiratory motion.
- **High-quality imaging with lower radiation**
Efficient reconstruction algorithms allow clearer images with less exposure to radiation.
- **Reduced need for extra tests**
More definitive initial scans can eliminate the need for additional imaging.
- **Fewer invasive procedures**
Better anatomical detail helps avoid unnecessary interventions.
- **Faster clinical decisions**
AI tools support quicker interpretation and help guide treatment earlier.

Clinical Innovation - solution

Silicon-based PCCT offers ultra-high spatial resolution and spectral fidelity, enabling:

Cardiac Imaging Advancements

- **Enables detailed visualization of coronary plaques**, including non-calcified and lipid-rich components.
- **Identifies high-risk features** such as large lipid-rich necrotic cores with thin fibrous caps, which are critical for assessing vulnerability to rupture.
- **Provides quantitative plaque burden and composition analysis** for risk stratification and monitoring of therapeutic response.
- **Offers accurate quantification of coronary stenosis and detailed plaque characterization** using spectral data, including visualization of non-calcified and lipid-rich plaques.
- Goes beyond anatomical assessment by **facilitating functional evaluation** through flow measurement and myocardial perfusion imaging, enabling assessment of ischemia and myocardial viability.
- **Supports 4D imaging** capabilities for dynamic evaluation of cardiac wall motion, ejection fraction, and valvular function, enhancing diagnostic accuracy

Oncology Imaging Advancements

- **Enhanced visualization of soft tissue lesions**, including small or ambiguous nodules in the lungs, liver, pancreas, and lymph nodes.
- **Improved differentiation between benign and malignant tissue** through precise material decomposition and contrast enhancement.
- Quantitative assessment of tumour composition and vascularity, **supporting early detection, staging, and monitoring of treatment response**.
- **Reduced reliance on follow-up MRI or PET scans**, streamlining diagnostic workflows and improving access in resource-limited settings.

Main focuses of the project

- **Deliver more definitive cardiology and oncology insights beyond that of today's clinically available technology** by developing and validating advanced deep silicon PCCT acquisition, reconstruction, and AI-driven interpretation software. The goal is for the innovations to **reduce follow-up tests**.
 - Cardiology will focus on functional and anatomical assessment of Coronary Artery Disease
 - Oncology will span from diagnostic to Radiation Therapy planning
- **Design and test workflow solutions** that democratize access to advanced imaging, including deviceless ECG gating and automated metrics for non-elite healthcare centers.
- **Create patient-friendly reports** that support shared decision-making and improve health literacy.
- **Make PCCT available to more communities** by reducing the cost of manufacturing and servicing of PCCT through innovation.

Technology Development Needs

- **Cardiac-dedicated acquisition and reconstruction innovation and interpretation software:**
 - capture the fast-moving heart anatomy at high detail
 - improve the ease of cardiac PCCT acquisition for non-elite centers (e.g., deviceless ECG gating)
 - take advantage of the intrinsic spatial and spectral resolution of the system to visualize functional and anatomical detail of Coronary Artery Disease (CAD)
 - Simple to use plaque characterization and myocardial perfusion with disease correlation (AI-based) and patient-friendly report structure
- **Oncology acquisition, reconstruction, and interpretation software:**
 - High spectral fidelity imaging with simple workflow - taking advantage of spectral separation of deep Si PCCT for advanced lesion/tumor differentiation and radiation oncology planning
 - Develop tools for automated characterization of lesions in CT with simple workflow to increase accessibility to non-academic imaging facilities with patient-friendly report structure
 - Rad Onc – expand dSi PCCT benefits to RT Simulation and understand how always on spectral imaging can improve OAR identification, removal of artifacts, improve target definition, etc.
- Reduce cost of manufacturing and servicing of PCCT

Impact & Outcomes



For patients

Faster Access to Diagnosis and Treatment: Shortened diagnostic timelines lead to earlier interventions

Reduced Diagnostic Burden: Fewer procedures and lower radiation exposure enhance safety and comfort.

Empowered Engagement: Clearer and quicker results help patients participate more actively in their care decisions.

Reduction in unnecessary follow-up procedures, lowering patient burden.

Better Prognosis: Early and accurate diagnosis improves the likelihood of successful treatment and recovery.

For clinicians

Enhanced Diagnostic Accuracy
Context-rich imaging reduces uncertainty and improves tissue characterization.

Improved Risk Stratification
Quantitative tissue data supports personalized treatment planning.

Support for Personalized Medicine
High-resolution imaging and AI insights enable individualized care in oncology and cardiology.

Faster Clinical Decisions
Deep learning-driven triage systems support earlier, better-informed decisions.

Longitudinal Monitoring
Enables tracking of disease progression and therapeutic response, enhancing continuity of care.

Streamlined Workflows
Minimizes repeat scans and inconclusive results, boosting operational efficiency.

For radiology institutions

Safer Imaging Practices
Minimizes radiation exposure for patient & staff.

Reduced Follow-Up Procedures
Lowers reliance on invasive or costly tests

Operational Efficiency
Improves throughput and reduces scan redundancy, lowering costs and increasing capacity.

Technological Leadership
Advances institutions in precision imaging with AI-integrated PCCT.

Scalable Infrastructure
Supports future expansion and integration of advanced diagnostic models.

Enhanced Research Capabilities
Enables studies in tissue characterization, AI diagnostics, and imaging biomarkers.

For healthcare systems

Expanded Access
Simplified workflows and automation enable advanced diagnostics in resource-limited settings.

Cost Reduction
Cuts hospital expenses by improving first-scan accuracy and reducing unnecessary procedures.

Affordable Technology
Advances in PCCT design help reduce the cost of high-performance CT scanners.

Improved Care Coordination
Rich imaging data supports multidisciplinary collaboration and integrated care pathways.

Strategic Alignment
Supports hospital goals in digital transformation, quality improvement, and value-based care.

For EU

Clinical Readiness
Strong evidence base supports integration into routine care for cancer and cardiovascular diseases.

Public Health Impact
Early, accurate diagnosis improves outcomes and reduces long-term healthcare burden.

Sustainable Care Minimizes unnecessary procedures and hospital stays, aligning with cost-effective healthcare goals.

Innovation Leadership
Reinforces Europe's role in AI-driven medical imaging and precision diagnostics.

Policy Alignment
Supports EU strategies in digital health, personalized medicine

Expertise and resources

- **We have:**

- Diagnostic: Medical Devices
Digital: AI-tools, AI boosted healthcare application

- **We are looking for:**

- **Clinical institutions** with established expertise in diagnostic oncology and in cardiac imaging.
- **Pharmaceutical partners** developing lipid-lowering therapies to support longitudinal studies on plaque evolution and treatment efficacy.
- **Medical technology companies** specializing in **lung biopsy systems** and **minimally invasive diagnostics** to support tissue confirmation and downstream care pathways.
- **Computing and data infrastructure** expertise in HPC, cloud imaging, and AI-driven data processing to handle and analyze large-scale PCCT datasets for longitudinal and diagnostic applications
- Patient organizations