



**PHILIPS**

Partnership

Managed Service

# Collaborative success

**Building a world-leading imaging offer** supported by a ground-breaking SPCCT research collaboration and the development of an AI-based CT COVID-19 assessment

**Hospices Civils de Lyon (HCL)** is a world-renowned university hospital center, comprising 13 French governmental hospitals and over 23,000 professionals. As France's second largest university hospital, it has a prized reputation for research and innovation and a now longstanding relationship with Philips that affords it access to innovative equipment and the ability to co-develop new clinical applications that can accelerate research.

Operating from a strong CT installed base, the hospital hosts the first of its kind new Philips Spectral CT 7500 scanner and the latest Intellispace Portal versions and is supporting the clinical trials on the unique Photon Counting Prototype installed in CERMEP.



## Challenges:

Committed to continually optimizing its health system, Hospices Civils de Lyon wanted to find new ways of providing better care (with a focus on its imaging provision), enhancing its attractiveness and abilities in staff retention, while managing its expenditure in order to finance its groundbreaking innovation and research projects.

To achieve this, the hospital center set about finding a strategic long term partner that would help it deliver on its Quadruple Aim goals with a focus on taking care of its imaging equipment, by offering a flexible and simplified procurement process and a planned renewal program, while also giving access to cutting-edge technology.

In addition to this, the partner would also need to support its research and innovation ambitions and help facilitate its breakthrough achievements. In this unique partnership, the innovation and research focus was of key importance to the hospital, with the clinical operational support acting as a foundational basis.

Improved patient experience



Better health outcomes



Improved staff experience



Lower costs of care





# About Hospices Civils de Lyon\*

**1.3 million**  
patient journeys

**77,684**  
surgical  
interventions

**280,979**  
emergency visits

**356 organ**  
transplants

**570,000**  
imaging  
exams/year

**the leading**  
cancer treatment  
center in the region

**+950,000**  
consultations

**3 maternity**  
sites accommodating complicated  
pregnancies and premature deliveries

**11,414**  
births, with 1 birth  
every 50 minutes

\* 2021 annual numbers

## Philips: a proven partner

A twelve year long term strategic partnership to modernize Lyon's imaging services and reinforce research activity while enhancing customer experience.

In December 2015, Hospices Civils de Lyon entered into a twelve-year partnership with Philips to optimally manage its pool of existing and future imaging equipment. This ambitious partnership – the extent of which had never been seen before in France – would enable the university hospital to embed a world leading imaging offer, thanks to equipment even more innovative, to benefit the patient.

As well as helping to improve operational efficiencies, a key element to the partnership was the support from Philips to further this hospital's world renowned research activity.

This support would include access to latest medical equipment as well as innovative services and research support in imaging, as well as mutually identified themes, from Philips' own clinical and academic experts. Philips experts to join the team included scientists from Paris, Haifa, Hamburg, Bangalore, Bothell, Best, Cleveland and Eindhoven who all worked in close collaboration with the Hospices Civils de Lyon team. They were also further supported by the Philips Clinical Research Board, which provided input into the best practice collaboration framework and project execution structure.



*"With this unprecedented industrial partnership in the French university hospital world, the Hospices Civils de Lyon is asserting itself as a leading site in medical imaging. Since 2015, we have the most advanced imaging technologies, allowing us to offer our patients high-level diagnostic and interventional care pathways; this requirement for quality of care is accompanied by a strong scientific commitment in terms of research and innovations, contributing to the attractiveness of professional practice in Lyon."*

Mr. Raymond Le Moign, General Manager, Hospices Civils de Lyon.

# The Managed Services Strategic Partnership includes:

Enhanced operational performance via:

**Vendor-neutral equipment purchase and replacement program** including procurement, enabling works, installation, program management and commissioning

**Service Improvement** program including analysis and optimization of systems to improve quality and productivity

**Maintenance and upgrading** services, to ensure equipment is up to date

Uptime guarantee on **system availability** to enhance predictability and patient throughput

**Customized training** programs to equip the staff with the capabilities and tools to improve their service delivery process

Research and innovation support via:

**Exclusive access** to Philips innovations

Research and innovation **support**

**Financial** support for research projects

**Advanced collaboration**

# Two key pillars of collaborative success

## Partnership pillar 1: Foundational **Enhanced operational performance**

Working together with Hospices Civils de Lyon, Philips analyzed existing procedures and developed standardized clinical journeys for radiology workflows to reduce all repetitive or unnecessary steps along the way.

The strategic technology management plan optimized the equipment investment yet ensured an operational lifecycle of less than 7 years for most of the machines installed, which is unprecedented for a university hospital where most equipment has a longer usage age on average.

The partnership also enabled excellence in performance and care delivery, thanks to solutions and services of cutting-edge imaging technology all with important cost savings. Patients at Hospices Civils de Lyon could benefit from higher quality treatment, faster diagnosis, shorter waiting time and fewer follow-up examinations. The management of breakdowns was simplified and objectified thanks to a centralized call center which allows technicians and radiology handlers to obtain a rapid response and thus accelerate the resumption of the equipment's activity.

The partnership also resulted in a boost of Hospices Civils de Lyon's financial performance by increasing cash flow. Better control of expenditure and optimization of revenue was enabled through the creation of financial models.

According to a Hospices Civils de Lyon customer survey, "Philips proved to be a reliable medical technology supplier by striving for quality and efficiency and cost savings, which ultimately drives added value for patients through a better overall experience."

### Results

**71%**  
of the imaging  
fleet was  
renewed

High average  
availability rate  
**> 98%**

On-site team  
with  
**95%**  
fast response  
time

## Partnership pillar 2: Advanced Access to innovation and cutting-edge research and innovation support

A unique element of this partnership is the commitment to collaborating on ground-breaking clinical imaging research. The partnership went beyond the simple provision of equipment, to instead become an accelerator partner, supporting medical imaging research projects in various clinical fields such as oncology, neurological (stroke) and cardiovascular (acute myocardial infraction), with artificial Intelligence (to facilitate diagnosis) being a main component of those projects.

To determine the focus of the collaboration, representatives from across Philips initially met with the heads of the hospital's radiology departments in 2016 for an intensive three-day collaborative workshop to mutually share the company's innovation roadmap and the hospital's research pipeline and determine the first stage research and innovation focuses.

The workshop resulted in the identification of two core strategic axis in the domain of Stroke-Acute MI and Oncology and provided the basis for ongoing and deepening research collaboration. Since that first workshop, several other activities in various domains have been started in Neurology (Multiple Sclerosis), Cardiology (myocardium assessment), Oncology (liver and prostate cancer) and trauma and lung assessment as the partnership is evolving.



*"This partnership creates added value for both Hospices Civils de Lyon and Philips in terms of both imaging management and research. Through this project, Philips is putting its intelligence and power of innovation at the service of patients, healthcare professionals and the entire French healthcare system for more efficient, more effective and more personalized healthcare."*

**David Corcos, President, Philips France.**



*"A very close and productive collaboration for the CT BIU. We will have to pay attention to the valorisation of data while we move to the next phase of collaboration with the HCL."*

**Philippe Coulon, Clinical Science Director CT, CT BiU, Philips**

# The two key strategic axis research and innovation projects initiated by Hospices Civils de Lyon and Philips are:

The rich CT installed base of Hospices Civils de Lyon makes it one of the only hospitals in the world to have multiple Spectral CT scanners. Recently the latest and first of its kind Spectral CT scanner was installed. The fact that the ongoing European SPCCT project is based out of the hospital as well as CERMEP hosting the world's first Photon counting prototype, reinforce the importance of the joint CT cardiac collaboration and has resulted in two key projects to date: **Prototyping the future of Spectral CT and Pioneering Spectral Photon Counting CT.**

To carry out those projects, Hospices Civils de Lyon is using the latest IntelliSpace artificial intelligence platform developed by Philips, which allows for algorithms to be shared and tested easily. Philips is also providing support with a team of artificial intelligence experts from Philips research, and an experienced on-site team, eager to accelerate ongoing projects and publications.

## Prototyping the future of Spectral CT

*"The good interaction with Philips Business Units and the presence of a local Philips research manager are pivotal for the success of our ambitious research projects ""*

**Professor Loic Bousset, MD - Head of Radiology department, Hôpital de la Croix Rousse, Hospices Civils de Lyon**

Spectral Photon Counting CT is a new imaging modality based on the usual CT concept with the key difference of energy resolving detector technology. The additional spectral information can be used for material separation and can deliver additional contrast with clinically relevant new information. The most important novel capability of Spectral CT is K-Edge imaging for selective and quantitative detection of specific elements including among others iodine, gold, bismuth, gadolinium or ytterbium. The full potential of Spectral CT can be exploited in combination with targeted contrast materials carrying a payload with a compatible K-edge.

**Philips is already supporting clinicians in several care settings, such as cardiology, oncology and trauma to improve diagnostic confidence with its Spectral Detector CT (SDCT) systems, the IQon and 7500 Spectral CTs. Able to improve tissue characterization, these systems offer benefits over conventional CT systems and represent a step towards SPCCT-like functionality. SPCCT itself, however, will bring further improvements in spatial resolutions for better assessment of coronary arteries, lung and bone pathologies.**

SPCCT is at the interface between medicine, biology, and high-end technology. In the first phase of the project, development of new acquisition protocols and reconstructions methods with new contrast agents dedicated to a large spectrum of applications were already performed in small animals, including vascular, heart, brain, kidney, liver lung and bone imaging. The first results with a preclinical spectral photon counting CT prototype defined the actual sensitivity threshold of Gold, Gadolinium, Holmium, and iodine.

As part of the SPCCT research team, Professor Douek and Bousset from Hospices Civils de Lyon ran a series of experiments in Hamburg which secured the joint call for €1.7M funding and enabled the first prototype to be installed in Lyon in 2015.



# Pioneering Photon Counting (SPCCT)

After a first project phase of three years, the new clinical prototype is now used for human research purposes.

This innovative scanner is composed of a new generation of CZT detectors allowing Ultra high resolution up to ~160um, radiation dose reduction, better energy separation and adjustable energy bins for K-edge imaging.

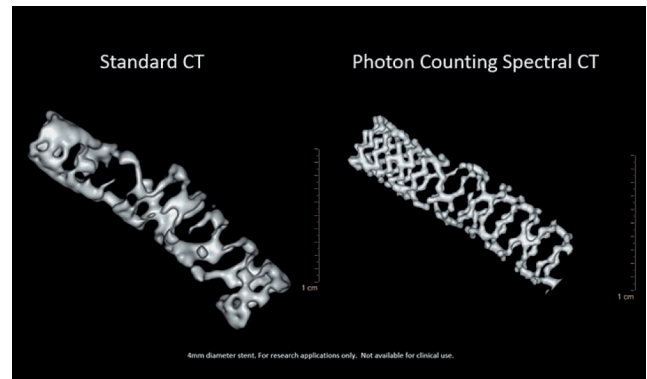
Since the start of 2020, human testing has been included in clinical studies using the SPCCT scanner. Currently there are two ongoing clinical protocols taking place at the Hospices de Lyon:

The primary objective of the first clinical protocol is to compare the overall image quality of SPCCT and standard DECT globally across several body regions.

The primary objective of the second protocol is to compare the characterization of atherosclerotic plaque components between contrast enhanced SPCCT and DECT in subjects diagnosed with a carotid stenosis of at least 50 % by US examination, using pathology from CEA samples as the Standard Of Reference (SOR).

## Demonstrations:

Coronary CTA with SPCCT demonstrated in human an improved image quality and diagnostic confidence compared to DECT while x-ray dose was reduced by 21% Abstract RSNA 2021

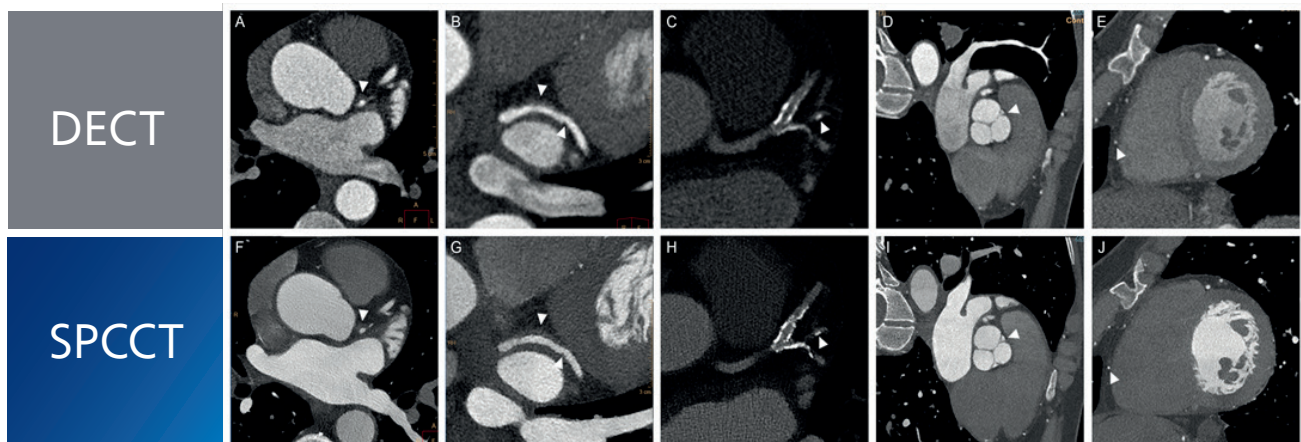


## Conclusions from the protocols to date are:

SPCCT outperformed standard CT and DualEnergy CT (DECT) for preclinical and clinical cardiovascular applications in terms of:

- Spatial resolution
- Spectral imaging with specific molecular imaging (new contrast agents and K-edge)

Coronary CTA with SPCCT demonstrated in human an improved stent image quality compared to DECT. Abstract RSNA 2021







## Results

Just five years into the partnership, research and innovation collaboration has resulted in:

- **30 research projects** underway at the Hospices Civils de Lyon
- **Multiple publications**
- A variety of potential **new software applications** to be integrated in the Philips IntelliSpace Portal platform
- 1 new developed piece of Philips software (**CT Auto Pulmo Results**) in 2020.

**During the partnership, Hospices Civils de Lyon has a privileged access to imaging innovation, either from Philips or another vendor:**

- In 2018, HCL had the 1st photon counting clinical prototype scanner worldwide
- First of its kind Philips Double Energy 7500 Spectral CT scanner
- First of a kind Philips iQon Spectral CT scanner
- First of a kind Philips IntelliSpace Portal (image post processing platform)
- In 2016, first GE CZT gamma camera in Europe
- In 2019, a new medium range GE gamma camera was installed at Hospices Civils de Lyon.

**And the partnership continues to push the collaboration to new heights, including:**

- Expansion of the fleet managed by Philips: From 119 pieces of equipment at the beginning of the partnership (2016) to 124 items of equipment in 2021. (+5)
- Increased financial support on research, with Philips is investing more in research projects in Spectral CT algorithms.
- Co-creation workshops between Hospices Civils de Lyon and Philips to brainstorm on the next steps of the partnership
- New research collaborations including workflow optimization in the imaging department

*“ After the required preparation of the proper working frameworks, we can now say that we are satisfied of the research partnership with Philips and willing to push it even beyond the original scope.”*

**Mr Jean-François Cros, Imaging Platform Director, Hospices Civils de Lyon**



# Development of breakthrough COVID-19 detection technology for CT chest scan images

In addition to the two research projects, the teams also came together in extraordinarily complex and critical circumstances to create breakthrough COVID-19 detection technology for CT scan images. The technology, developed with Philips research harnessed Artificial Intelligence software for fast analysis of pulmonary lesions. Using this software they could also identify the degree of severity of the lesions, adding more precision and rapidity in COVID-19 CT detection.

The solution CT Pulmo Auto results for the COVID-19 assessment initiated with Hospices Civils de Lyon, after regulatory approval was obtained, is now introduced in 9 additional sites, both in clinical practice or under a research setting.

*“Our longstanding partnership with HCL has resulted in outstanding joint deliverables for a multitude of our imaging businesses, most prominently in CT. The collaboration on our new generation CT scanner will surely create another wave of exciting innovations. Many of us truly value the dedication of the HCL Lyon team and the partnership over the many years.”*

**Richard Kemkers, Innovation Program Manager, CTO, Philips**





\* The products, services and solutions may not be available in all markets, please check with your local Philips representative.

\*\* Results from case studies are not predictive of results in other cases. Results in other cases may vary.

\*\*\* All pictures shown are for illustration purpose only. Actual product may vary due to product enhancement.

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