



**Prof. B. Guiu**  
*Head of the Radiology Department*

# Infinix-i 4D CT

## Advanced Interventional Radiology Techniques for Treatment of Primary Liver Cancer in France

The University Hospital in Montpellier, France, is a unique regional health center specialized in the treatment of patients with liver cancers. The center contributes to developing new treatments of these cancers through advanced Interventional Radiology techniques. With a growing Radiology Department, the center has recently acquired an Infinix™-i 4D CT system from Toshiba Medical. Mr. Le Ludec, General Manager of the Hospital and Prof. B. Guiu, Head of the Radiology Department describe how the new system has enabled the hospital to bring innovative new Interventional Oncology techniques, such as tumor thermoablation, into daily practice.

**N**ew treatment options for liver conditions are emerging fast. Public health issues including rising levels of obesity and type 2 diabetes have created an increase prevalence of metabolic liver diseases, such as Non-Alcoholic Fatty Liver Disease (NAFLD). Research into treatment of these conditions has also enhanced our knowledge of other liver diseases including primary liver cancers, which are often complex. Interventional Radiology has an important role to play in effective treatment of liver disease. Minimally invasive techniques, such as liver ablation, are recommended for almost 50% of primary liver cancer cases.

The University Hospital in Montpellier has a strong, dynamic and diverse team of committed, specialized professionals, who strive to provide the best care for cancer patients in the region, including transplant surgeons, liver disease-, anesthesia- and resuscitation specialists, and Interventional Radiologists. The team of five senior radiologists, six interns and 28 technicians will be expanded with three additional physicians, who will join the team next year. All radiologists in the department are active in Interventional Radiology.

“Our expert team works continually towards improving patient care,” said Mr. Le Ludec. Direct recruitment of radiologists in hospitals can be difficult in France, as many

prefer to be self-employed, but the opportunity to practice Interventional Radiology has encouraged many of our specialists to stay within the hospital system.”

### Interventional Radiology - An Emerging Field

“Our use of Interventional Radiology has increased by 400% over the last three years,” said Prof. Guiu. “Our current priority is to develop techniques on thermoablation of tumors of the liver using multi-modality imaging, which combines CT scan, ultrasound and angiography. Nearly 40% of liver tumors are not detectable with ultrasound and 20% cannot be picked up with CT scanning. The combination of these imaging modalities, as well as the ability to mark the tumors endovascularly, has enabled us to perform three times more thermoablation treatments over the last three years with subsequent Interventional follow-up.

“We had been using a single dedicated scanner for diagnosis and treatment of these complex procedures. However, high demand for procedures created waiting times of more than six weeks for patients. This is not acceptable in oncology.” Mr. Le Ludec explained. “With a realistic assessment of the number of patients that our center could treat and by weighing up the costs and benefits, we decided that investment in an Infinix-i 4D CT system



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from Toshiba Medical and re-equipping the angiography room would be the way forward. The new Angio CT system is located in the operating room to facilitate access to anesthesiology and for patient security. Our team have been fully trained in using the new system."

**Superior Image Quality**

Prof. Guiu and his team find the image quality of the angio system excellent. The very low radiation exposure is a real bonus. They find the tools for reduction of radiation exposure with the Infinix-i 4D CT really efficient and easy-to-use in daily practice.

The team were also particularly impressed by the ease and speed of performing a CT acquisition during angio procedures, as compared to their previous system, which was a Cone Beam CT (CBCT) based system. They were convinced that image quality was better and the field of view size larger than CBCT.

"Image quality of CT-arteriography using only one rotation with 16cm spatial coverage is much better than any Cone Beam CT system," he said. "By comparison, the speed of acquisition in the workflow of angio procedures is also surprising."

### **Prof. B. Guiu**

Prof. Guiu studied Radiology at the University Hospital of Dijon, then in the Interventional Radiology departments of the Gustave Roussy Institute and the University Hospital of Lausanne in Switzerland. He was appointed Professor and Hospital Practitioner at the University Hospital in Montpellier in September 2014 and became Head of the Department of Diagnostic and Interventional Radiology of the St-Eloi Hospital. He is an expert in both percutaneous and endovascular hepatic Interventional Radiology and research into Interventional treatment of tumors of the liver, in which, he coordinates several Phase I and Phase II trials. The University of Montpellier has four Radiology departments that cover all sub-specialties. The Radiology Department is highly specialized in digestive imaging.

### **Mr. T. Le Ludec**

Mr. T. Le Ludec has been Managing Director of the University Hospital of Montpellier in France since 2016. He has worked in many medical facilities in France: at the University Hospital (CHU) in Lille, the public hospices (hospices civils) of Lyon, and also in management at the North Seine and Marne (Nord Seine et Marne) Hospitals. During his career, he has also been the Director for improvement of quality and safety of care at the French national health authority (HAS).



### **Minimal Training**

Even with such high-level technical capabilities, the team at the hospital find the Infinix-i 4D CT very easy to handle in daily practice. However, some training in combining the dual modalities offered by the Infinix-i 4D CT system was required.

“Using the new system is not simply a question of adding a new angio suite and a CT system. We had to learn how to extract the right information from the CT for the angio. However, ease of use of the system was surprising; most functions are very easy to use in daily practice, and we were already able to use the most advanced functions of the system after one month,” remarked Prof. Guiu. “We have created a group of intensively-trained radiographers that can work with the system’s full range of functions, including reconstructions. The group shares information on using the system - overnight and at weekends too - to continuously advance our knowledge of the system and ensure that users have a minimum competence level.”

### **A True Hybrid System**

The Infinix-i 4D CT is not only the consolidation of two modalities, but a true hybrid system with a permanent communication between these two modalities.

“With the new system installed, we are now able to perform a wider range of Interventional procedures, including liver ablations, chemoembolization, radioembolization, implantation of ports for hepatic arterial infusion of chemotherapy, biliary drainage and stenting, and portal- and hepatic vein embolizations,” said Prof. Guiu. “The 4D capabilities enabled by Toshiba Medical’s Aquilion™ ONE technology are fascinating and will change our treatment evaluation practices; pre-, during and post-therapy. The large spatial coverage (16cm) provided by the CT allows coverage of the full liver in only one rotation. It opens the gate to true 4D imaging through many applications. We are working to replace the classical workflow of angio procedures with two 4D acquisitions, providing information, such as liver vessel anatomy, tumor-feeding vessels, tumor perfusion and flow, with less

radiation exposure than classical techniques. Equally importantly, it has increased workflow and significantly reduces waiting times for patients.”

“Having the chance to acquire the first Infinix-i 4D CT system in Europe with Aquilion ONE has been very exciting, but was also a difficult choice to make in the absence of external advice or reference point with relevant activities similar to mine,” said Prof. Guiu.

### **Indisputable Reliability**

The Radiology team have found the support provided by the Toshiba Medical to be excellent from the beginning of the acquisition of the new system.

“The support and information provided by Toshiba Medical has been amazing, and in retrospect, I must say that everything that they promised has turned out to be true in practice,” added Prof. Guiu. “We benefited from a pre-training course and a very close multidisciplinary application follow-up in the early stages and were ready to start with full use of the system within two weeks.”



Mr. T. Le Ludec

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en," added Mr. Le Ludec. "We have formed a great collaboration with the company in the development of new tools and hardware upgrades. The reliability of this collaboration is indisputable and is a particularly strong indicator for success."

#### **A Unique Imaging System**

The new room that was installed in the operating room enabled the hospital to free up time that was dedicated to Interventional Radiology on the scanner of the Department of Radiology at St-Eloi. This enabled shortening of the waiting time for diagnostic scanners and also increases the profitability of this machine. With optimization of anesthetic resources in the operating room, more patients can be treated and waiting times before treatment reduced.

"Finally, it has been possible to increase our Interventional Radiology activities in compliance with the ISO Human Resources standards, with an imaging system that can do everything!" said Mr. Le Ludec. "The Infinix-i 4D CT technology allows development of innovative minimally invasive care for tumors of the liver and shorter durations of stay for the patient. Any medical center that wants to renew an angio-suite should at least consider the Infinix-i 4D CT as an option instead, given the additional possibilities offered by this technology."

"Having all imaging modalities in the same interventional suite located in the operating room allows the development of any percutaneous, endovascular or combined treatments within a secure context. The limitation is only that of your imagination." added Prof. Guiu. //

"Toshiba Medical has provided very efficient support in system acquisition and installation of the Infinix-i 4D CT, and the partnership continues to strength-

