



*VISIONS spoke with
Prof. Franco Orsi, from the
European Institute of
Oncology (IEO), Milan, Italy*

Expanding Interventional Radiology with the Highest Image Quality

The Alphenix 4D CT helps considerably improve minimally invasive treatments, by facilitating workflow, reducing surgery time and improving image quality, according to a leading interventional radiologist at a prestigious cancer centre in Italy.

The European Institute of Oncology (IEO) in Milan is the fastest growing comprehensive cancer centre in Europe. The team at IEO tackles cancer on all fronts, from prevention, diagnosis, and treatment to training and basic and translational research.

At the institute, Interventional Radiology (IR) is truly the fourth pillar of oncology, next to clinical oncology,

surgical oncology and radiation therapy. In 2010, IR became a clinical department of its own, completely separated from the rest of radiology.

Prof. Franco Orsi has been involved with the IEO ever since its iconic founder Prof. Umberto Veronesi was hiring young specialists to build a new concept of clinical oncology management, mainly based on minimally invasive therapy.



The Radiology Team at IEO, Milan, Italy

Prof. Orsi is Chairman of the Interventional Radiology department, with a team of seven interventional radiologists, two or three residents, six anaesthesiologists, seven nurses and eight technicians.

The team performs a wide range of activities from invasive diagnosis, with around 1,500 CT and Ultrasound guided biopsies per year, to highly sophisticated interventions, such as liver chemoperfusion during Extra Corporeal Circulation (ECC) and percutaneous ablation during single lung ventilation.

"The huge experience we've accumulated within the last twenty-five years and our close collaboration with other specialists enable us to constantly update our approaches, with the aim to increase the indications for IR, always within the boundaries of minimal invasiveness," Prof. Orsi said.

To match the growing demand for less invasive procedures, the IEO decided to add Canon Medical's Angio CT Suite, the Alphenix 4D CT in 2018.

Canon's experience with the technology is a specific guarantee for the functionality of the system, according to Prof. Orsi. "It is of the utmost importance when reliability and efficiency of this technology are the basis of an adequate and safe daily clinical activity. Regarding the specific features of the system, of course the connection between Fluoro and CT provided by the system is unique on the market," he said.

The IR team uses the Angio CT Suite routinely, and with Canon Medical's help, has learned how to use the system to the best of its abilities.

Boosting workflow

The core business of IR clinical activity is mainly represented by those interventions that are performed under general anaesthesia. Since 2008, the IEO had been equipped with a CT room, with a mobile digital C-arm fully dedicated to IR procedures performed under general anaesthesia.

This combination of CT and fluoroscopy in one room enhanced the safety, precision and efficacy of these inter-

ventions. But many important issues were affecting the workflow. Due to the indirect interaction between acquired fluoro and CT images the procedure times were long.

"The procedures took longer because of the time needed for post processing the imaging data sets. This challenge has been completely overcome thanks to the Alphenix 4D CT system. CT, Fluoro and Ultrasound images are integrated and sent to a large screen directly in the room, for faster and more efficient imaging interpretation. Reducing the length of the intervention is of critical importance, especially since patients are under general anaesthesia," he explained.

Imaging data sets coming from different sources can be processed in real time by the system and fused, if needed, to improve the visibility of the area where the intervention is being carried out.

Having the patient lying on an angio table rather than on a CT couch, has also improved patient accessibility.

Thanks to the rails on which it is mounted, the CT scanner can be positioned close to the patient and in parking position, positioned far from the patient. "That's a great feature, allowing the IR room to host the many indispensable technologies for modern IR activity," Prof. Orsi said.

A wide variety of procedures made possible

The Alphenix 4D CT is of great support to perform intra-arterial embolisation (TAE), chemo-embolisation (TACE) and radio-embolisation (TARE) procedures of liver tumours. These procedures particularly benefit from a technology like the Alphenix 4D CT because of the integration of vascular images and CT.

Intra-arterial liver chemosaturation during Extra Corporeal Circulation (ECC) is safer and faster with the system, which also enables us to increase the number of percutaneous ablations to around 500 ablations per year at the IEO.

Renal and lung liver are routinely performed with fusion imaging software integrating Ultrasound and CT imaging. The Alphenix 4D CT also enables us to treat emergencies, for example, when bleeding is suspected. "The patient is usually sent to the the Alphenix 4D CT instead of the CT room for initial diagnosis, in order to save time and start the embolisation immediately after bleeding is detected," he said.



The Alphenix 4D CT also offers plenty of new unexplored possibilities, and as the technology improves, intra-arterial procedures for treating tumours will increase indication and efficacy, he believes. "The concept of treating tumours through their vascular feeders is winning, but the main limitation is the detection of all the right feeders, and it is a matter of imaging quality," he said.

The IEO changed their clinical pathways thanks to the new system. For instance, during hepatic angiography performed as simulation for TARE, the volume CT acquisition during the selective intra-arterial injection allows us to precisely define volumetric assessment of the involved liver parenchyma, facilitating the process of treatment planning.

Collaboration with Canon Medical Systems has been fruitful from day one and the team is looking forward to more exchange to improve an already amazing system.

"After a few months of IR activity with the new Alphenix 4D CT, I cannot think how to treat my patients without it. The system is really addictive and once you start to use it for clinical practice, you will never want to stop to use it."

The new Alphenix 4D CT means being able to "navigate" virtually within the volumes of the organs. It means targeting quickly and accurately the tumour lesions to be eliminated. To feel confident to have eliminated the pathological tissue without complications, immediately at the end of the treatment and without other instrumental checks." Prof. Orsi concluded.



"The system is really addictive. I cannot think how to treat my patients without the Alphenix 4D CT."

Prof. Franco Orsi, Head of the Interventional Radiology department, IEO, Milan, Italy.



Prof. Franco Orsi (right) and Dr. Della Vigna (left).

The added value of the Embolisation Planning Software

Imaging is the backbone of Interventional Oncology and its quality and precision will affect the outcome of any image-guided interventions. In the field of intra-arterial therapy, such as liver chemo-embolisation and radio-embolisation, the quality and the amount of imaging information regarding the target, are directly affecting the whole procedure itself: precision, complexity, safety, length and results, are essential values, depending by the quality of the facilities used for treating the patient.

The fact that we have both real CT images and angiography images in the same room is obviously a great advantage if compared with a regular angiography system or C-arm for maintaining a high level of precision in targeting a liver tumour during the embolisation. Acquiring CT images during selective arterial contrast injections allows us to confirm the correct position of the catheter tip prior to the treatment. Moreover, by changing the position of the catheter, according to the vascular anatomy (provided by DSA) and the CT imaging, it will be possible to save unaffected liver parenchyma or to find more feeders for the same tumour, to be targeted for a more effective treatment. Unfortunately, when the imaging information is

coming from different sources, such as CT, DSA and US, the management of this huge amount of information is usually up to the Interventional Radiologist.

That's the real benefit provided by the Alphenix 4D CT: images are integrated by the system, because the sources are connected, to each other. One of the helpful features provided by this unique integration, is the Embolisation Plan software package. It is a dedicated software tool for quickly finding the correct feeders to be targeted for a super selective embolisation of (liver) tumours or arterial bleedings.

It usually reduces procedure time and also x ray dose because it helps to avoid unnecessary catheterization of arteries which are not feeders of the tumour.

The Flexibility

The amount of Interventional procedures are rapidly increasing and are also becoming more and more complex. The strength of an Angio CT concept is bringing the best of 3 worlds together in one room to optimize flexibility, minimise risks and improve patient outcome.

The system allows to give flexible space for collaborating with colleagues such as Anesthesiologists or Surgeons who are present in the room during some interventions. The Alphenix 4D CT

positioning is very flexible to avoid interference with those people and their equipment.

Moreover, an advanced IO activity cannot avoid to use different devices for treating different tumours in different organs. There is more often the need to change the position of the many devices around the patient and it can be done only when the system has flexibility, which allows the C-arm and the CT scanner to move out from the patient very fast and easily, by only pushing couple of buttons. And using its auto-positioning possibility where pre-defined positions of CT and C-arm can be programmed and recalled.

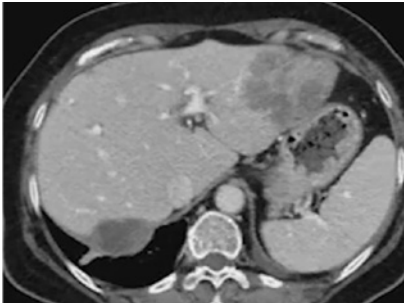
A one room solution

The availability of all of the most useful imaging sources into the same room, as previously mentioned, allows for better disease definition and target identification. Moreover, all these facilities will also provide a better and earlier feedback of the treatment. It is of crucial value, certainly when the patient is under general anesthesia during an IO intervention.

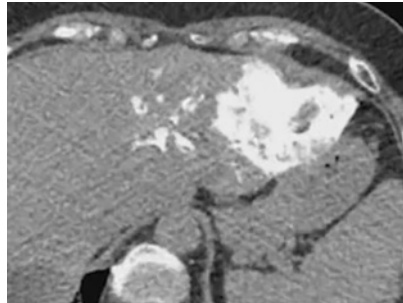
Before waking up the patient, the success of the treatment can be verified directly and it can be decided right away if the treatment needs to be continued instead of assessing the outcome a day after when the procedure is already finished. //

Clinical case 1:

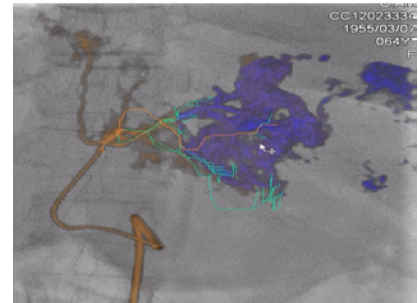
Liver metastasis from CRC progressed after to 2 lines of chemo:
indication for Irinotecan-DEB-TACE.



CT scan shows the huge liver metastasis in the left lobe.



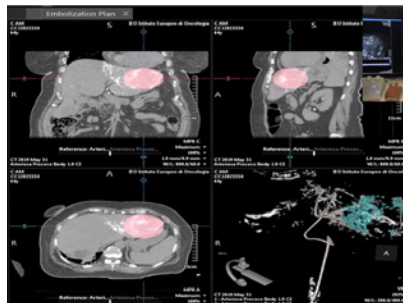
CT during arterial selective injection of c.m., shows the enhancement of the tumor.



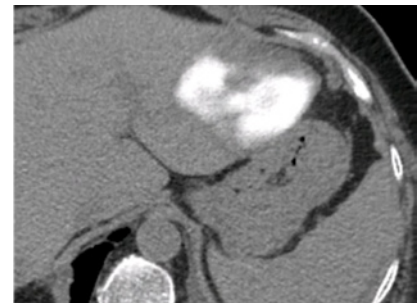
3D roadmap is used to overlay the CT volume to fluoroscopy for guiding the treatment.



DSA of the left hepatic artery shows the possible feeders to be used for chemoembolisation.



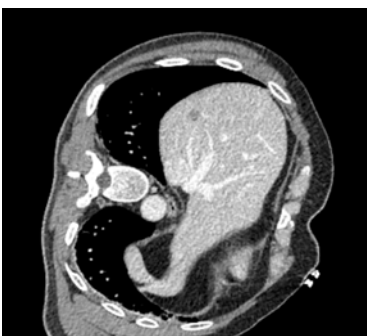
DSA and CT imaging are integrated by the system, which will provide a 3D Roadmap and the routes for treating selectively the mass.



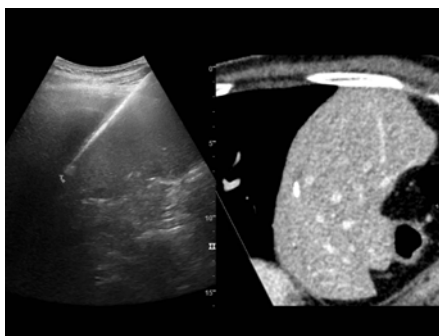
Native CT after the procedure, shows the embolic material concentrated within the tumour.

Clinical case 2:

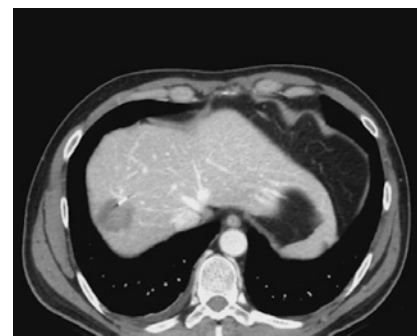
Post-surgical relapse of a liver metastasis from CRC:
indication for percutaneous ablation.



CT performed with the patient in lateral position, ready for the ablation, shows the small liver relapse after liver resection.



Fusion imaging (Ultrasound and CT) was used to target the liver lesion and guiding the MWA needle to the target.



CT scan shows the large ablation zone after the procedure. The surgical clip of previous resection is also visible.
