

A thriving women's health radiology practice at the technological top

The "CSE Imagerie Médicale Numérique" center located in the heart of Paris is one of the most successful and dynamic private women's health radiology practices in France. Ever since its creation 28 years ago, the center has adopted a policy of always using the most technologically advanced and up-to-date equipment not just for the imaging equipment itself but also for the, just as important, accessory equipment.

The latest addition to the center's impressive arsenal of systems is a new Computer-Aided-Detection (CAD) software package for use in the detection of suspicious lesions in mammography and in digital breast tomosynthesis.

We wanted to find out more about the center in general and their experience with the new CAD system in particular, so we spoke to Dr Philippe Benillouche, co-founder, CEO, and practising radiologist.



Dr Philippe Benillouche, co-founder and current CEO of CSE Imagerie Médicale

Q *Let's start with your center in general. How many patients do you see annually?*

In our center as a whole we see more than 100 000 patients a year for a complete range of indications and radiological examinations, but since we are principally focussed on women's health we actually carry out more than 40 000 mammograms per year, a total which is constantly increasing from year to year.

Our center is located right in the center of Paris, not far from the famous Place de la République so most of our patients come from the city of Paris itself, but we're proud to say that, thanks to the reputation that our center has built up since its creation, a substantial proportion of our patients come from further afield, such as the outer suburbs of Paris and even from other regions in France,

The patients are mostly referred to

us by specialists such as gynecologists, surgeons, etc. from private practices and hospitals.

At the foundation of our practice in 1989, CSE was exclusively focussed on women's health imaging, and this still remains one of our principal activities even though over the years we have developed other imaging indications and introduced appropriate new imaging modalities as new radiologists specialised in fields other than that of women's health have joined the group. However, as

I said breast cancer screening and diagnostic mammography remain our principal activity.

We are an independent private practice but we are very well aware that while radiology plays a vital role in the diagnosis and follow-up of patients receiving treatment, the discipline should not be a stand-alone, isolated activity.

It is for this reason that we are an active participant in one of the biggest multi-disciplinary network in France, focused on breast cancer



Thanks to its high reputation, the CSE Imagerie Médicale deals with 100 000 patients per year. Although the center itself is located in the heart of Paris, the patients come not only from Paris itself, but also from the suburbs and further afield.

and connecting private practice specialists with hospital-based specialists.

Known as the SLRS (*Saint Louis Réseau Sein* or *Saint Louis Breast Network*) the network is based on the Saint Louis Hospital in Paris and is particularly active in the management of breast cancer patients.

I am currently vice-president of the SLRS, whose mission can be simply stated as being to “improve the care of breast cancer patients and their family through care, prevention, screening and support”.

The Saint Louis hospital is one of the largest hospitals in the Paris-wide group of hospitals (the AP-HP) which itself is the biggest association of hospitals in Europe.

In addition to our close contacts with Saint Louis, we also have close working relationships with the breast cancer departments in other Parisian hospitals.

Q *Now, what about the equipment you have in order to deal with all your patients?*

When in 1989 we started our small women’s health imaging centre in the same street as we are now, we only had one analogic mammography system and 2 ultrasounds.

We moved to our current location— which has a total floor space of 2000 m² — in 1999 because the original premises were too small. We are now well equipped — we have four Pristina digital mammography systems from GE Healthcare. In addition to mammography, these systems are capable of carrying out digital breast tomosynthesis (DBT), contrast enhanced spectral mammography (CESM). We also have the computer-aided detection (CAD) system from the US company iCAD.

Other equipment we have include:

- 1 Invenia Automated Breast Ultrasound system (ABUS).
- 1 breast biopsy stereotactic unit.
- 2 general and bone radiology units,
- 12 ultrasounds units
- 1 bone densitometry equipment.
- 1 dental radiology unit with cone beam 1 CT Scanner and a 1.5T MRI system

Q *And the personnel to run all this?*

There are a total of 60 people in our team and that includes 15 radiologists, of whom ten are specialized in breast imaging; We also have one obstetrician for pregnancy ultrasound; 15 X ray technicians one executive secretary; 24 secretaries; 4 Management and accounting staff

Q *Let’s turn more specifically to breast imaging and tomosynthesis*

We carry out Digital Breast Tomosynthesis (DBT) on all of our breast examinations including screening.

The advantage of DBT is of course that the number of lesions that can be detected is increased compared to standard mammography. DBT is also useful in the examination of dense breasts, where some lesions can be occluded in standard mammography.

“... The results...showed that the combination of 3D CAD with DBT resulted in a reduction of reading time by 28%...”

However before we started to use DBT in routine we had to consider the fact that it would significantly increase our reading time. Which is where we became interested in the role that Computer-Aided Detection (CAD) could play. I have to say that we have been using CAD in one form or another for a long time now (our first CAD system

dates from the year 2000) so we have had time to be able to appreciate the potential of the approach.

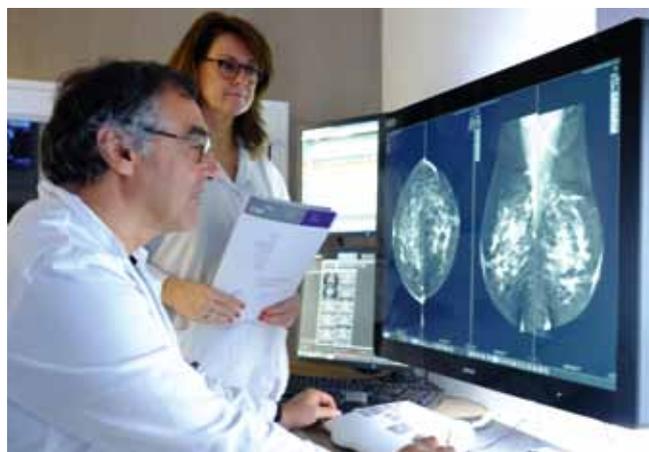
However regarding the exact contribution of the use of CAD to the problem of the increased reading time associated with DBT, last year we carried out a study initiated by iCAD on exactly this question. The results were presented at RSNA and showed that the combination of 3D CAD with DBT resulted in a reduction of reading time by 29.2%, so increasing our efficiency significantly.

Q *So what CAD system do you use now?*

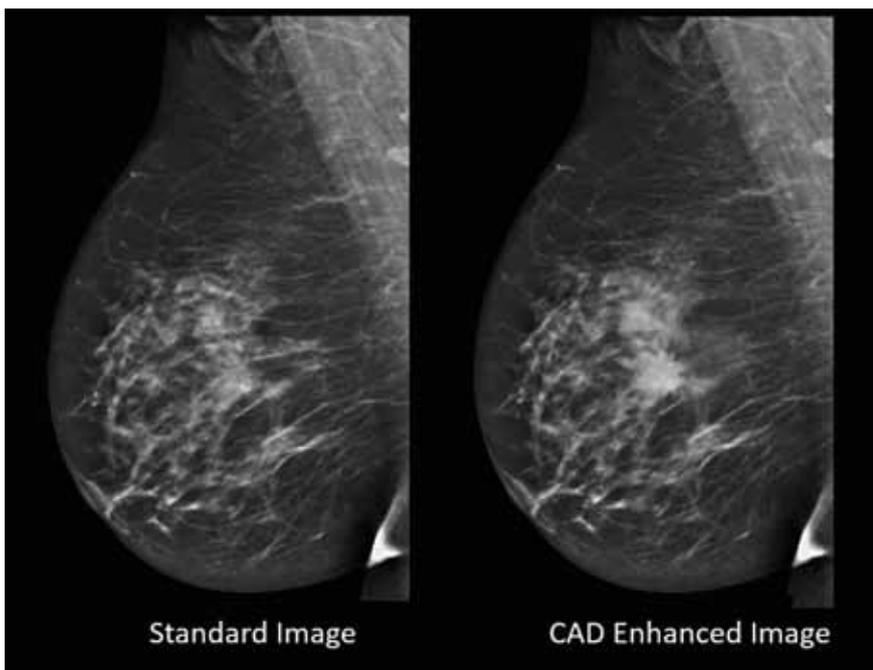
We have been using the new iCAD Powerlook Tomo Detection for the last two years and in fact we now collaborate in the deep learning development process run by iCAD by flagging and sending our images every day to iCAD’s development team. Given the significant increase of the reading time involved in reading all the projections of a DBT examination, we knew we needed a solution to improve our clinical workflow.

It was totally natural for us to choose the use of a 3D CAD system to provide a solution to this issue.

Once the software was installed the learning curve for



The center has a policy of investing in up-to-date technology, which, with a staff of 60 personnel, including 16 radiologists, enables the center to handle an ever-increasing number of patients.



iCAD's PowerLook Tomo Detection, built on the latest deep learning technology, is being used at CSE Imagerie Médicale to improve the digital breast tomosynthesis reading workflow and assist radiologists in finding cancers quickly. The advanced Tomo Detection deep learning algorithm detects potential cancers by scanning each DBT plane and blending those regions onto GE's V-Preview 2D synthetic image, so creating an Enhanced V-Preview image. The detected regions visible in the Enhanced V-Preview 2D synthetic image are linked back to the DBT planes where they were detected creating an efficient and effective navigation tool for radiologists when reading tomosynthesis exams. iCAD's PowerLook Tomo Detection is CE marked and being used by several mammography facilities throughout Europe.

our radiologists to be able to get up to speed and to use the software to its full capacity was not difficult at all, but as with any change in work routine involving reporting of clinical results we had to go through a validation period, which however didn't take a long time.

Our radiologists were not resistant to this change or at all sceptical of the potential benefits perhaps because over several years our team had already been used to, and trained in, the reading of mammograms using 2D CAD.

The Power Look Tomo detection is now used routinely by all our team of radiologists in since, as I said, we carry out tomosynthesis on every patient for each of whom we also carry out a 3D CAD reading.

The impact on our work flow since we added CAD to our DBT examinations has been significantly positive, as we can read more mammograms with the help of 3D CAD.

The Enhanced V-Preview images are additional V-Preview images (2D synthetic views) provided to the radiologist, in which the V-Preview images

are blended with regions from their corresponding DBT projections. In these Enhanced V-Preview images, regions of interest detected by the CAD system are overlaid on to the corresponding segment of a DBT

“... The impact on our work flow since we added CAD to our DBT examinations has been significantly positive...”

image containing the structure of the detection.

The system also provides new tools that leads directly to the CAD marks and allows to navigate in the adjacent planes.

As for the second reading you may be surprised to learn that this is carried out using film prints in a separate independent second reading center elsewhere in Paris that unfortunately is not equipped for reading digital images on work stations and has no access to the DBT images. I hope this set-up will change.

I am sure that our screening programs

will in the future benefit greatly from the use of 3D CAD.

So to sum up, we are very satisfied with our 3D CAD. We are looking forward to the next software release that will include a risk score indicating the certainty of the findings.

Q *And the future? How do you see technology or other developments?*

Recently there has been a debate about the impact of technological advances, such as Artificial Intelligence on the profession of radiology. However, right from the setting up of our center, we have always been open to innovation and have never considered technology developments as a threat, so long of course as there are advantages for the patients and that the developments help us by increasing confidence in our diagnoses. We are all already using AI in our everyday lives, sometimes without knowing it, and today, image recognition by computers trained using deep learning is getting better than humans. If we accept the idea of driverless cars we should be at ease with the use of neural networks that simulate the radiologist's decision making, which would be particularly useful in an automated breast cancer screening program with the aim of improving preventive healthcare.

Likewise in breast imaging there is the ongoing debate about overdiagnosis/ overtreatment. It is a fact that we now detect small lesions more frequently, which we would not have been able to detect without using DBT. I firmly believe that such a scenario is a direct consequence of the essential goal of the radiologist, which of course is to make diagnoses. So the problem is not one of over-diagnosis but rather the subsequent over-treatment, where some developmental advances are needed.

In the future, the breast screening program in France should be adapted to accommodate all the technologic developments of mammography. By offering more widespread access to recent technologies such as DBT and 3DCAD we should be able to optimize diagnoses and increase the number of women participating in the screening program.