With every woman, with you

www.oncovision.es

MAMMI

dedicated breast PET

prone position · true 3D · no breast compression

ONCO VISION
GEM-IMAGING SA

MAMMI
dedicated breast PET

You are not alone

Breast cancer is affecting the lives of millions of women and their families. Its personal and community impacts are very important, and major efforts are being devoted worldwide to its early detection and effective treatment. Breast cancer is better known today than ever before, far beyond its earlier classification in “lobular” or “ductal” or purely by size.

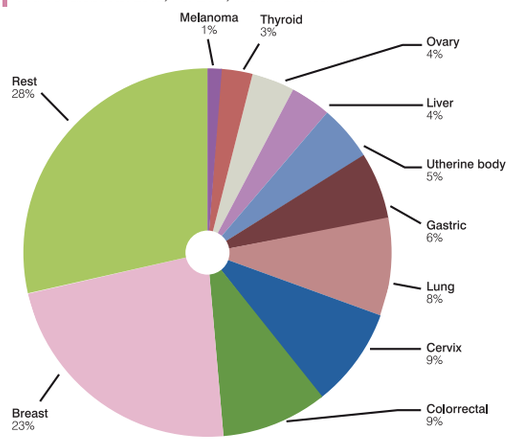
Every woman can now have the better opportunity each one of them deserves, by clearly differentiating benign from malignant lesions, avoiding overdiagnosis and unnecessary treatments, accurately identifying tumor types, from luminal A or B to (among others) ER+/- , HER2+/- or triple negative, personalizing treatments and measuring their effectiveness. Revolutionary medical imaging options are making possible seeing and accurately tracking breast cancer progress from disease to restored health.

Defeating breast cancer with Personal Care and Technology

Every 2,5 minutes a woman is diagnosed with breast cancer. Every 7,5 minutes a woman dies from the disease. Complete cure is a reality for more and more women, with earlier diagnosis and improved, less aggressive treatments.

Cross Specialty teams, with oncologists, surgeons, gynecologists, radiologists, nuclear medicine physicians, pathologists, nurses and researchers are making it possible. Molecular vision and technology can help the professionals who are taking care of every woman at screening, diagnosis or treatment.

New Cancer cases worldwide, women, 2013
Source: Globocan 2012, FCAECC, internal assessment



With every woman, with you

Imaging to the rescue

Being able to SEE breast cancer with ever increasing accuracy is a cornerstone of its effective diagnosis and treatment. A host of clinical ways and technologies are being applied today, from the basic self-exploration or x-ray screening, improved by digital or tomosynthesis options, to sophisticated stereotactic prone tables or the advanced MRI programs for high risk groups and staging. Each one of them has clinical and economic pros and cons. Dedicated breast PET is fast emerging as a solid, proven, reliable and cost- effective multistage imaging alternative.

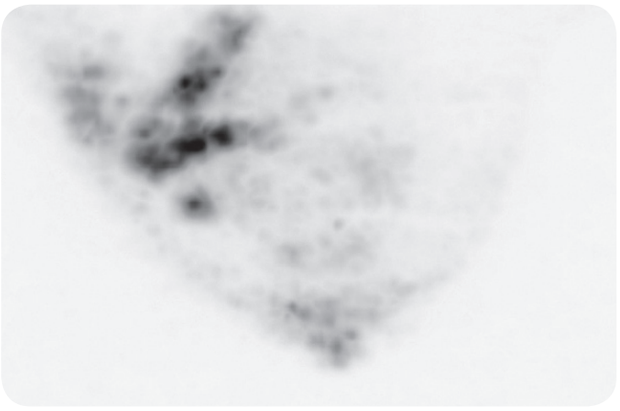
Primary detection	Diagnosis	Staging	Asessing treatment	Characterization
x-ray Mammography and screening	x-ray, digital Mammography, tomosynthesis	Sentinel node biopsy. ROLL		Hystopathology H& E, IHQ...
Breast MRI screening in high risk women	Breast ultrasound	Axillary ultrasound	Breast ultrasound	PET
Dedicated breast PET?	MRI	PET CT	MRI, CT	Tumoral markers
	Breast Molecular Imaging BSGI	Bone scintigraphy	PET CT	**Dedicated breast PET new tracers**
	Dedicated breast PET	**Dedicated breast PET local**	**Dedicated breast PET primary systemic therapy** **Dedicated breast PET local recurrence**	

Breast imaging options.

Old challenges, new Opportunities

Today, unfortunately, not every diagnosis or treatment is successful. From X ray mammography, recognizing up to 25% false negatives (undetected tumors) to MRI, reporting 27%+ false positives (non-tumors reported as cancer) and other imaging techniques showing low sensitivity or reliability, there is important room for improvement.

Detecting breast cancer in the breast can often be like “detecting a polar bear in the snow” and two important emerging issues are daily challenging successful diagnosis and treatment:



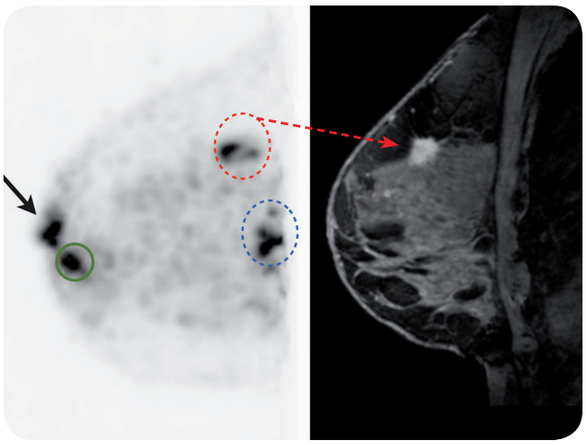
A new view of heterogeneous tumors with Mammi.

- **Dense breasts**, occurring in 20%+ of all, 50%+ of Asian women, 70%+ in younger women are a major limitation to successful mammography (1)
- **Tumor heterogeneity**, with very different activity, or even distinct tumor types in the same breast, is challenging both diagnosis and biopsy accuracy.

(1) Very active advocacy groups, such as “Areyoudense” are helping thousands of women, even gaining Legislative changes in the US.

Molecular Vision: A View to Cure

Standard breast imaging alternatives (X ray mammography, tomosynthesis, ultrasound...) and even CT or MRI are, providing often high resolution ANATOMICAL information. Important challenges are that changes detected (microcalcifications, shapes and shadows...) are compared with images of “normal” anatomy, and that these changes evolve at a different rate than the tumor itself.



Mammi MRI

While anatomical imaging is indeed very valuable, FUNCTIONAL (MOLECULAR) imaging is providing a DECISIVE view: what the tumor does, its metabolism, areas of biggest and lowest activity and QUANTIFICATION of tumor aggressiveness. Breast gamma imaging can give useful information, but only **PET** (positron emission tomography) can truly characterize tumors and their evolution with high resolution, true quantification, multitracer options, low dose and unprecedented ease of use.

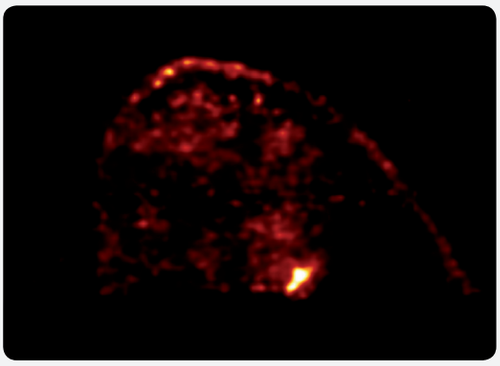
From whole body (WB) PET to DEDICATED breast PET

PET (WB PET) is, when in prone position, an excellent molecular (functional) option, complementary to anatomical imaging, at many stages in breast disease diagnosis. However, the case for dedicated breast PET is very strong, both in centers with WB PET and sufficient patient volume and when maximum accuracy is paramount. DbPET fully complies with every single one of the critical conditions for a sound long term clinical and cost-effectiveness decision:

Key requirements for cost effective **dedicated imaging technology**:

- Proven **increased performance** vs WB PET: superior resolution, more accurate quantification, higher specificity, true 3D, faster explorations, quicker assessment of treatment´s local results, simplified dynamic explorations and radiotheraphy guidance, significantly lower radiation dose (patient benefits, savings).

- **Faster workflow** (imaging, reconstruction and interpretation), freeing WB PET, time increased productivity and return on a much smaller investment, increased capacity / flexibility / exploring more patients, REAL ease of use, limited facility requirements, easy installation, a new standard in patient comfort and personal care new options.



Courtesy of Dr. Valdés Olmos, Netherlands Cancer Institute, Amsterdam.



Mammi: top SEVEN clinical advantages

1 Whole breast **TRUE 3D images**, with very **precise quantification** of tumor activity

- Decisive for assessing the real size and shape of the tumor and its possible heterogeneous or multicentric character.
- Accurate and VERY early visual confirmation and measurement of efficacy of QT/ HT / RT.
- Crystal clear guidance for surgery, even in dense breasts.

2 Natural **prone position**, **no breast compression** for improved sensitivity and optimum patient comfort

- Improved detection of “difficult” lesions: near thoracic wall, small breasts, multicentric, heterogeneous, near nipple, breasts with prosthesis.
- Direct correlation with MRI images.
- Unprecedented patient convenience.

3 Revolutionary, **very high clinical resolution**: better than 1,6 mm: seeing -and measuring- the real shape and activity of tumors

- Detection of early tumors, never seen before definition of active areas of heterogeneous tumors and tumor limits, even in dense breasts.
- Breakthrough quantification accuracy, by greatly reducing partial volume effect, critical for early assessment of therapy (QT/HT/RT) results.

4 Really **MINIMUM dose**, up to 1/4th of whole body PET

- Safer repeated explorations with optimum accuracy, independent from breast density or hormonal status.
- Opening the option for safe, cost effective explorations in patients with suspicious mammography.

5 **Unequaled specificity** with clear lesion characterization: benign vs malignant, tumor profiling

- Safer for patients, faster interpretation for Doctors.
- New tracers opening the future option for virtual biopsy.

6 **Very FAST explorations**, with TOTAL time (per breast) from 5 to 15 minutes

- Optimizing productivity, system profitability and patient flow.
- Reducing patient downtime, maximizing comfort.

7 Remarkably **easy to use** and **fully reliable**, even with intensive work

- User friendly software, very fast reconstruction times, multiple options, built-in multiuser interface.
- Powerful PC -based and Osirix visualization, with a dedicated Macintosh® station.
- Exclusive mechanical simplicity and modular ring architecture.

ever had of breast cancer

Mammi´s top five clinical indications.

1 Fast, accurate assessment of primary systemic (neoadjuvant) therapy chemotherapy, hormonotherapy, radiotheraphy

Keys are high resolution and very accurate quantification of tumor activity
- Proven, actionable results in three weeks vs three+ cycles (three+ months).

BEFORE surgery -also even after partial excisions- diverse therapies are contributing to improve healing for more and more women with breast cancer. These treatments are targeting different tumor fenotypes, and assessing their success as early as possible is critical for optimizing personalized treatments, avoiding unnecessary side effects and controlling HC costs. Db PET Mammi is an extraordinary, best in class technology for measuring with unprecedented accuracy and speed if and how much these treatments are working.

2 INMEDIATE and clear tumor characterization and differentiation benign-malignant lesions

Keys are resolution, sensitivity, quantification, true 3D vision
- Confirmation of occult tumors, MRI or ecographically suspicious lesions

Normal breasts have very wide variations in size, shape, density and hormonally-related or even benign inflammatory changes. Some or many of them can generate “suspicious” images in current inaging techniques. Db PET Mammi has proven specificity, and has become a very valuable tool for clearly differentiating cancer from benign pathologies. Its true 3D vision, with simplified options for selecting as many layers / cuts as needed significantly help in accurate lesion characterization.

Courtesy of Dr. Suzana Teixeira, ICRIDI / NKI Amsterdam, The Netherlands.

The Long and the Short of it.

Very early diagnosis of breast cancer in women from complex or high risk groups

3

In spite of improved therapies, early diagnosis and accurate tumor identification are the keystones for defeating breast cancer. Women´s physiology and evolution and limitations in sensitivity and specificity in existing clinical ways are not a barrier for dbPET Mammi, with its unique capacity for individualizing tumor types by true shape and dynamic metabolic activity. Often complementary of other techniques, its unprecedented accuracy can often make a difference for faster, more reliable diagnosis.

Reliable follow up post surgery, differentiating scar tissue vs local recurrence

4

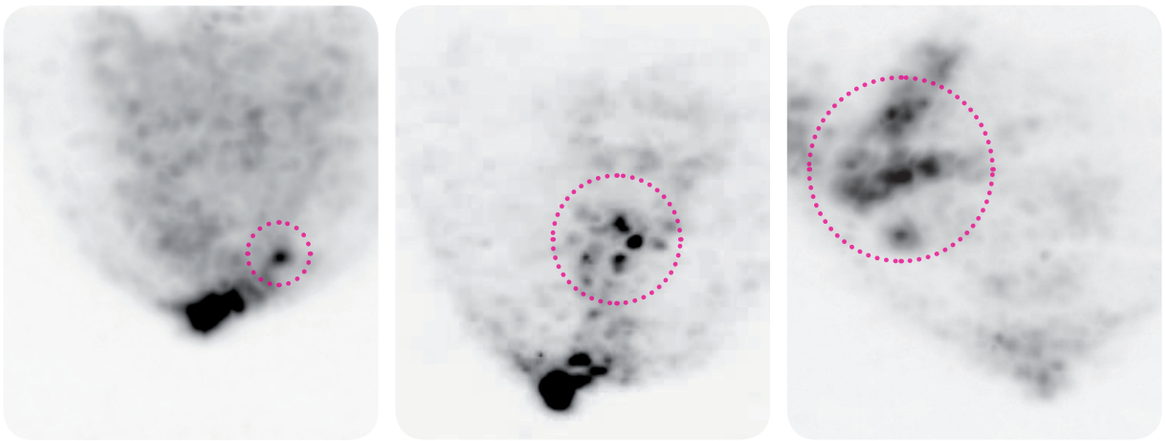
PET´s exclusive quantification and metabolic assessment capabilities are optimum to detect cancer as completely different from scar tissue after partial surgery, chemotherapy, hormonotherapy or radiotherapy, when anatomy possibly has changed. Its capacity to guide and assess with optimum accuracy postoperative radiotheraphy is an added value.

...and

Patient stratification in suspicious lesions identified in screening and non-conclusive mammograms

5

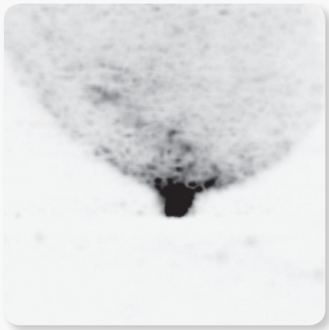
Together with direct clinical identification of suspicious lesions, diverse forms of screening are bringing many women for a deeper study of possible breast pathologies. As a SECONDARY simple, fast and cost-effective confirmation / clarification technology, Mammi is adding a clear option for accelerating diagnosis and avoiding unnecessary explorations. Future multitracer options will allow for faster, even more accurate diagnosis.



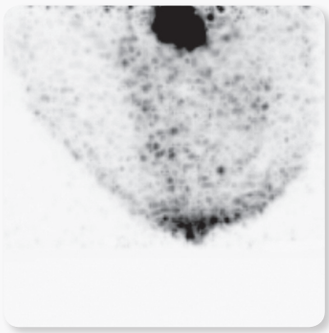
Courtesy of Dr. Valdés Olmos, Netherlands Cancer Institute, Amsterdam.

Early breast cancer and non-malignant lesions diagnosis

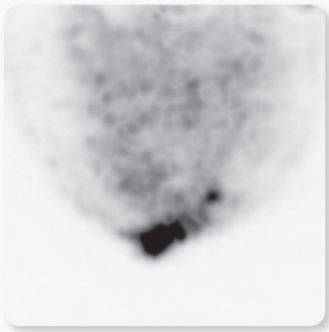
Normal breast



Normal breast

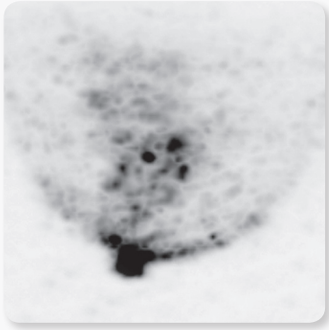


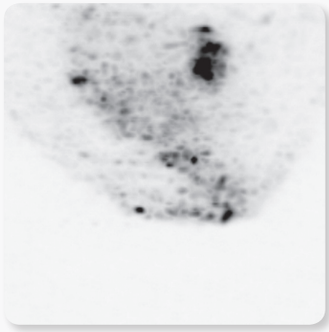
Basal tumor. Ring architecure, bed design and no compression of the breast are permitting visualization of tumors very close to the chest wall

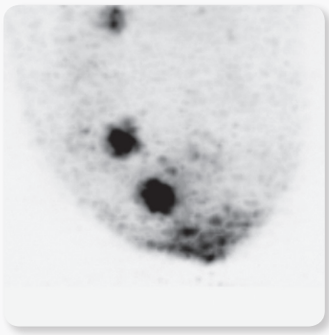


High clinical resolution. Detection of tumors half a grain of rice in size.

Precise stratification of **multifocal** tumors

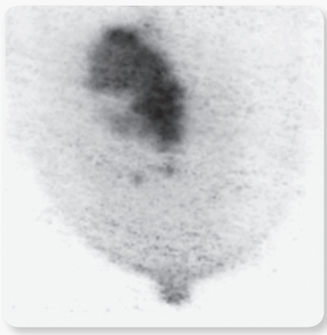


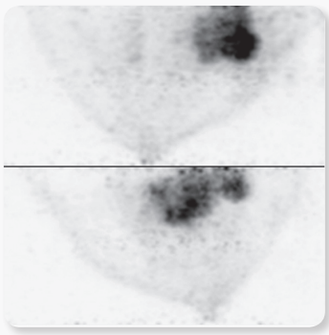




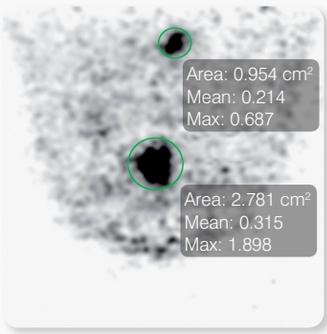
Designed with

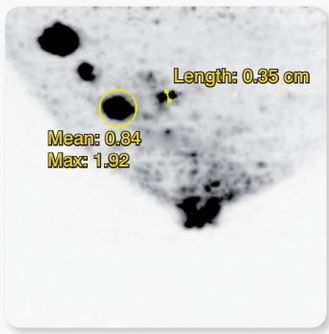
The REAL shape of heterogeneous tumors





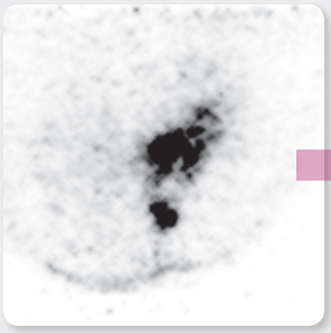
Accurate **quantification** of tumor activity and SuV



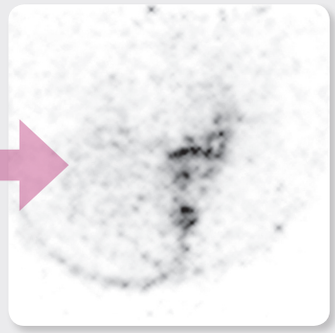


FDG dbPET excels at measuring the real metabolic activity of (even every region in) a tumor, assessing its agressiveness with unprecedented precision, high sensitivity, 1,4 mm clinical resolution. Advanced, easy to use software tools optimize tumor characterization and treatment efficacy assessment.

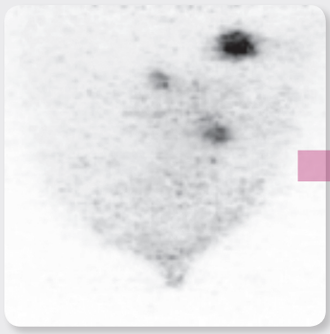
Revolutionary: measuring results of primary systemic (neoadjuvant) theraphy



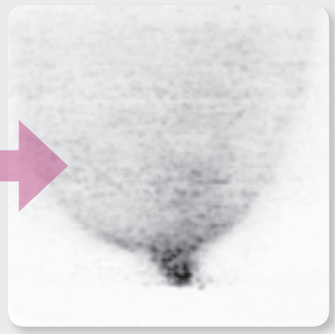
Pre-therapy



Post-therapy, 1 cycle



Pre-therapy



Post-therapy, 1 cycle

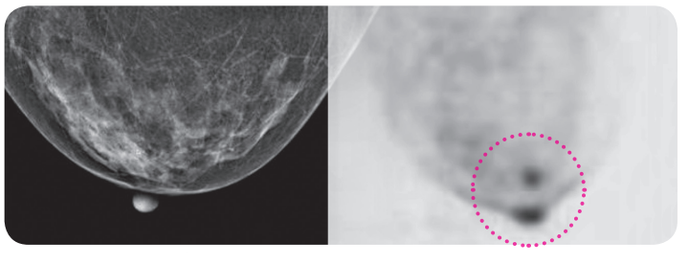
Very fast and accurate evaluation of the results of therapies in 95%+ of tumors.
A true breaktrough for patients, oncologists and HC managers.

Mammi, the best clinical

New technology has to prove its clinical and economic advantages, as well as fitting in the latest algorithms of care. Mammi is adding a qualitative, significantly different, cost effective type of information to previous options, of which is often complementary. Repeated experience is showing that, after a secondary exploration with Mammi, previously undetected lesions in the primary modality can now be confirmed. The true shape and activity of even the different regions of each tumor is now, at last, visible, and can accurately be measured, before and after therapies.

dbPET Mammi and X ray mammography, tomosynthesis or stereotactic prone tables

Mammography has been the standard imaging exploration of the breast for the last 30 years. Its many contributions to improved cancer outcomes are proven, as well as its limitations, based in technology (limited use in young women, dense breasts, conditioned by tumor size and shape, microcalcifications vs tumor evolution...), position (breast compression vs lesions near thoracic wall, small breasts, breasts with prosthesis...) or operator (breast size and shape vs parallel compression pads, patient comfort...).



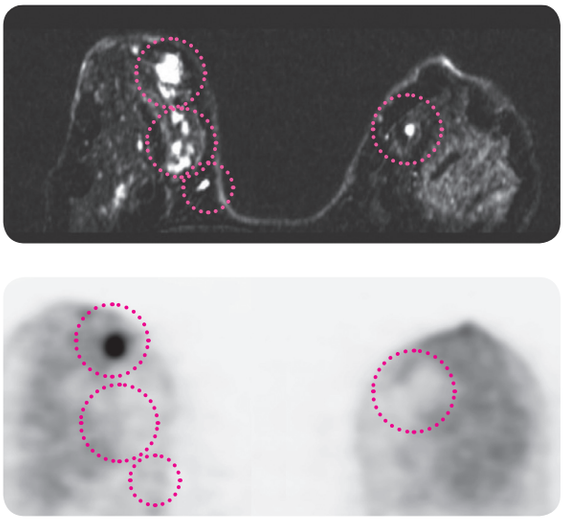
Courtesy of Dr. José Ferrer, ERESA, HGU of Valencia, Spain.

Mammi is adding a **whole new diagnostic perspective**, with functional / metabolic vision assessing tumor aggressiveness and true extension. Optimum for women of every age and breast size or shape, dense breasts, lesions near thoracic wall, safe, with minimum dose, and comfortable, Mammi is adding the completely new dimension of fast and reliably measuring the results of breast treatments. Beyond its basic indication in younger women or women with dense breasts, Mammi can truly become a powerful tool for suspicious mammographies / tomosynthesis / stereotactic explorations.

dbPET Mammi and MRI: complementary

MRI is the diamond standard in breast imaging, and is usually performed in the optimum prone postition. MRI is an excellent anatomical exploration. It has proven high sensitivity and excellent resolution, and it is being used today in “difficult” patients and younger women from groups at risk. MRI is a complex exploration, requiring significant interpretation time from highly skilled experts. MRI has well known limitations, both related to technique (implants, metal prosthesis, obesity, other patient restrictions...) and to hormonal status. MRI is generating a very significant % of false positives, with related potentially unnecessary and costly tests or treatments.

Mammi has comparable sensitivity and significantly higher specificity (above 94%). Its unique quantification of tumor activity, very few patient restrictions, very fast explorations, short interpretation time, reproducibility, flexibility and lower cost are factors to consider. Mammi is a strong complementary option to MRI.



Courtesy of Dr. José Ferrer, ERESA, HGU of Valencia, Spain.

and economic decision

dbPET Mammi and whole body (WB) PET

Whole Body PET is an excellent functional exploration, specially valuable for assessing distant extensions of the original tumor. In spite of recent progress, its resolution (often nearing 7 mm) is still not adequate for primary detection or quick assessment of therapy local breast results. The significantly improved resolution, precision quantification, **very low dose** (1/3 to 1/4) allowing safer repeated explorations in younger women, **very fast explorations** and interpretation and the flexibility added by liberating WB PET for other pathologies are factors to consider. db PET Mammi is complementary to WB PET in high patient volume centers, and is adding definitive differential advantages for dedicated breast units

dbPET Mammi and breast ultrasound

The very relevant value of ecography for qualification of lesions with liquid content and guiding biopsy of previously identified lesions are positioning this technique as valuable in breast assessment. Its many clinical limitations for primary diagnosis, limited resolution and depth of detection, very high skill level requirement and major inter-operator variability are conditioning its acceptance.

dbPET Mammi´s superior resolution, sensitivity, reproducibility, convenience, detection of lesions near thoracic wall, true 3D, patient comfort and, specially, quantification, are putting it in a completely different level for both primary, diagnostic, lesion asessment anf follow up of treatments and after partial breast surgery.

dbPET Mammi vs BMI

Breast gammagraphy, in its different types, is also a valuable breast exploration, with good resolution, used as complementary to X Ray mammography in some centers. db PET Mammi´s exclusive accurate quantification, excellent resolution and sensitivity, prone position with no compression and true 3D, access and assessment of difficult lesions and in smaller breasts or breasts with prosthesis, very fast explorations and very significantly reduced radiation dosage (with near future multitracer options) are strong differential points.

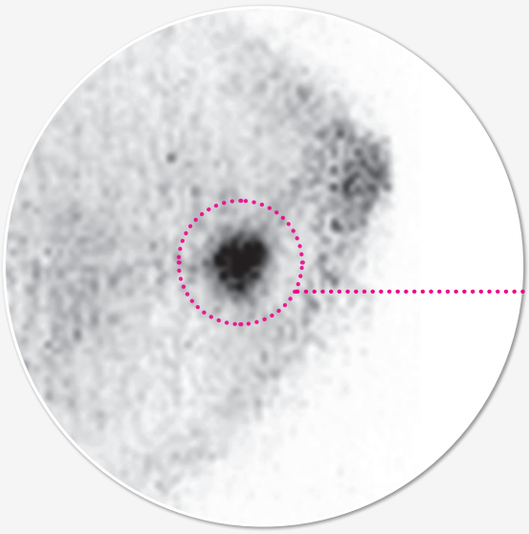
dbPET Mammi vs PEM

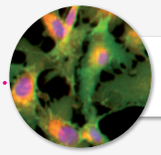
First generation PEM (positron emission mammography) is using a mammography-like approach. Its advantages and limitations, with significant false negatives (undetected tumors) conditioned their clinical acceptance.

dbPET Mammi is bringing completely new advantages: from its exclusive continuous crystal technology and ring architecture, with related substantial improvement in resolution and sensitivity, VERY fast explorations and reconstructions (up to 2 times faster), prone position / no breast compression for a true 3D with crystal clear 3D rotating images and as many layers/cuts as needed, remarkable ease of use, detection of lesions near thoracic wall, smaller breasts, breasts with prosthesis and high patient comfort, together with much reduced (1/3 to 1/2) lower dose, it is representing a more effective, more profitable, safer and more reliable option

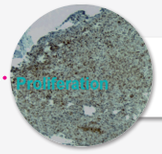
MAMMI
dedicated breast PET

With every woman, with You



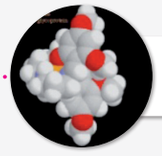


METABOLISM ^{18}F-FDG

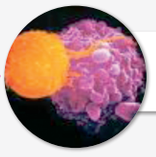


PROLIFERATION ^{18}F-FLT

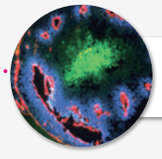
HER-2 EXPRESSION ^{68}Ga/^{18}F-AFFYBODY



ER-EXPRESSION ^{18}F-FES



APOPTOSIS ^{18}F-Annexin V



HIPOXIA ^{18}F-FMN

Beyond FDG

New tracers, revolutionary options for PERSONALIZED breast diagnosis and integral assessment

Courtesy of Dr. Valdés Olmos, ICRIDI, NKI Amsterdam

ONCO VISION
GEM-IMAGING SA

Spain address:
Centro de Investigación
Príncipe Felipe (CIPF)
Eduardo Primo Yúfera, 3
46013 Valencia SPAIN
Phone: +34 963 722 472

USA address:
Oncovision Inc.
44 School Street – Suite 250
Boston, MA 02108
USA
Phone: (617) 505-1464

www.oncovision.es