molecular
Magnetic Resonance Imaging

Biograph mMR

Two exams at the same time

Two
patient-friendly imaging methods
in one

MRI or PET?
Which technology provides higher diagnostic accuracy?
Both, at best.

Magnetic resonance imaging (MRI) is a long-established and ever-improving technique for imaging structures in the body. Position emission tomography (PET) is used to show metabolic processes in the body.

In the past, the two techniques were used sequentially if MRI alone was not sufficient for a diagnosis.

But now, for the first time, both MRI and PET are united in a single scanner – the molecular magnetic resonance (mMR) system.

Advantages
of the Biograph mMR system

- **simultaneous acquisition of morphology, function, and metabolism of the human body**
- **high diagnostic confidence**
- **patient-friendly exams, reduced radiation exposure compared to other modalities**
- **shorter exam times**
- **suitable for children[1]**

What exactly does that mean?

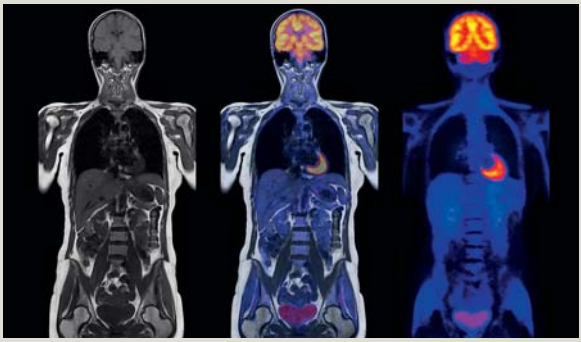
By developing Biograph mMR, Siemens succeeded in fully integrating two modalities, with different functional methodologies that provide complementary information for the diagnosis and understanding of disease, such as cancers. While MRI delivers precise structural images of the body's internal organs, PET shows metabolic activity in the human body. Now, with Biograph mMR, it is possible to scan once and acquire both MRI and PET images simultaneously. Whole-body exams as well as exams of specific body regions are possible.

Half the examination time

The acquisition time for a simultaneous whole-body scan with the integrated mMR system is 20 – 60 min depending on the medical issue. Sequential MRI and PET exams would take about twice as long.

Diagnostic certainty – two images in one

Sequential MRI and PET scans require manual comparison of the images. Biograph mMR delivers a combined image for a much more complete picture.



An MRI (left) shows even the smallest changes to tissue and organs, while a PET scan (right) shows the activity in specific parts of body. A combined molecular MR image (middle) gives additional information for a more comprehensive assessment of the disease.

How does Biograph mMR work?

Biograph mMR is an innovative hybrid imaging system: a magnetic resonance imaging scanner combined with a PET imaging system that captures metabolic and functional processes at the same time.

This new hybrid imaging technique makes a single reference image by combining both techniques. This is a tremendous advancement in diagnostic accuracy and precision.

MRI – Magnetic Resonance Imaging

Magnetic resonance imaging is based on the physical principle of nuclear resonance. It does not involve radiation, but instead uses strong magnetic fields and alternating electromagnetic fields to excite the hydrogen nuclei in the body.

As the nuclei return to a rest state they give off electrical signals, which the MRI scanner detects and uses to construct medical images.

The results are precise 3-dimensional images of tissue structures.

PET – Positron Emission Tomography (Molecular Imaging)

While MRI exams show the structural and functional detail of the human body, a PET scan shows the body's metabolic processes – its functions.

The images are acquired by injecting a very small dose of a radioactive substance that travels through the body and is absorbed by the organs and tissues. The PET imaging device detects and records the energy given off by the tracer substance, thus making metabolic and biochemical processes in the human body visible.

The results are usually 3-dimensional color-coded images of biological processes.

The Biograph mMR exam process

The process of an mMR exam is similar to a regular PET (positron emission tomography) exam.

1) Registration
Usually you will be referred for an mMR exam by your physician who deems it necessary based on his findings.

2) Pre-scan consultation
Before the scan, you will be thoroughly informed about the procedure, and can get answers to any questions you may have.

3) Preparation
You should not eat in the 8 hours before the scan and should also stop taking certain medications if your physician so directs. When you arrive for the exam, you will first get an overall check-up. This may include a blood-sugar measurement, and you

may be asked to lie down for a few minutes so the metabolic processes in your muscles can normalize.

4) Tracer injection and rest

You will now be injected with the radiotracer fluid necessary for the mMR examination. During the rest period that follows, the fluid will go to various parts of your body through normal metabolic process. You should drink plenty of fluids during this time.

5) Examination

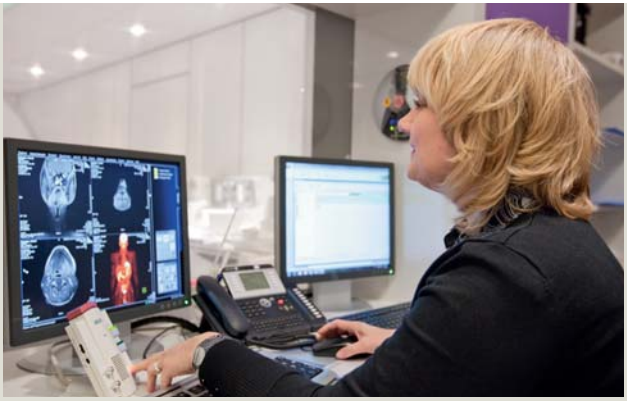
During the scan, you will lay comfortably on a table. The body areas to be scanned are covered by so-called “coils,” and the table slides into the tunnel where the images are acquired. An intercom will allow you to remain in constant contact with the technologist operating the scanner.

6) After the scan

The slightly radioactive tracer fluid will soon decay into non-radioactive elements. In order to ensure this process happens quickly and does not put further strain on your body, a period of rest is also called for after the scan. You should also drink plenty of water during this time.

7) Evaluation of the images

The images will be evaluated in consultation with your physician by an experienced radiologist.



Biograph mMR

Two exams in one

For the first time, two patient-friendly imaging procedures are together in a single scanner: magnetic resonance imaging (MRI) to visualize the structural and functional detail of organs, and positron emission tomography (PET) to capture the metabolic activities in the human body.

Where sequential imaging procedures were required in the past, Biograph mMR now has the power to perform a single, simultaneous scan and to obtain a comprehensive diagnostic picture.

Not only does this result in shorter scan times, it can also lead to faster diagnoses and improved diagnostic confidence.

This information was provided by:

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[1] MR scanning has not been established as safe for imaging fetuses and infants under two years of age. The responsible physician has to decide about the benefit of the MRI examination in comparison to other imaging procedures.

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