SIEMENS

www.siemens.com/mMR

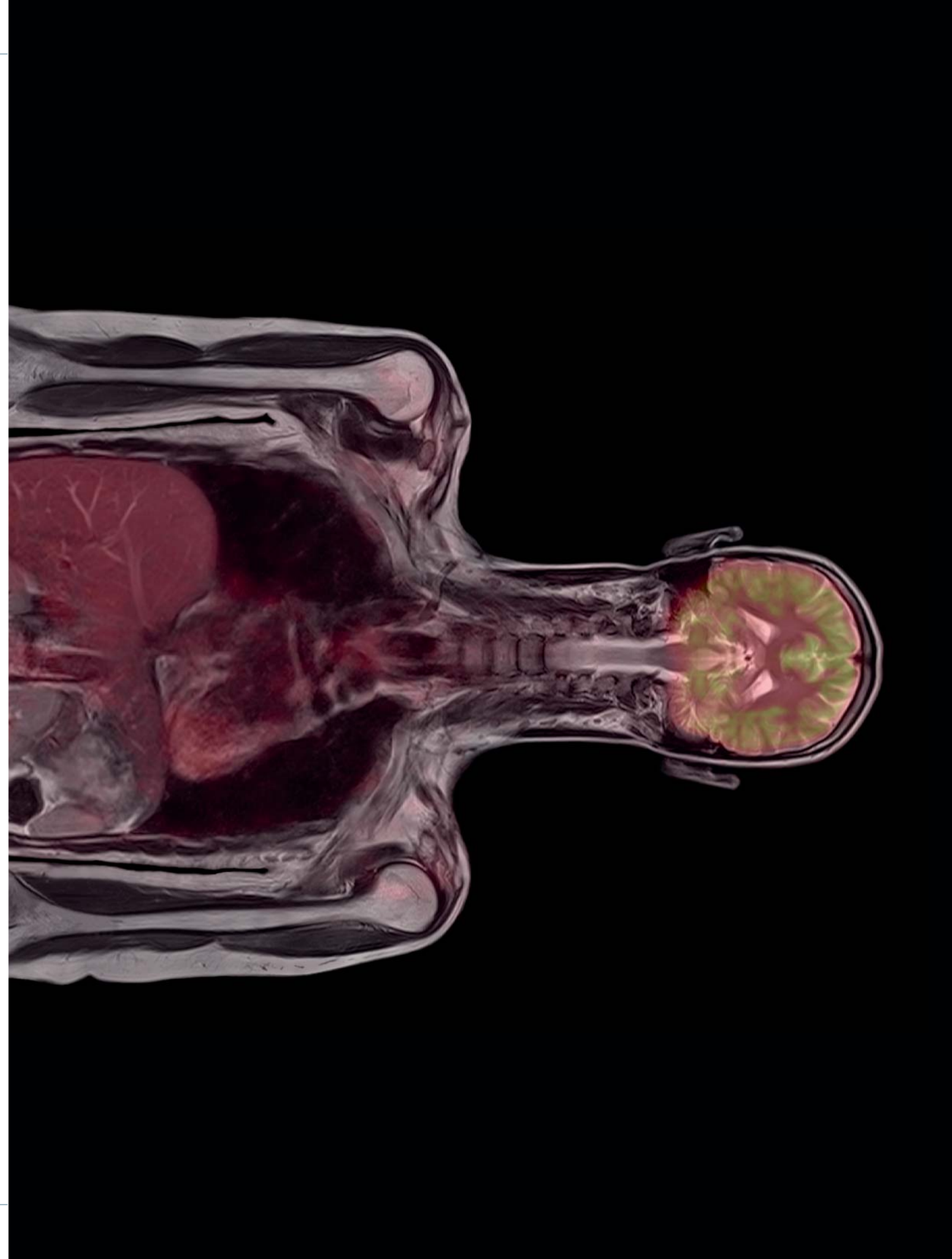
Biograph mMR

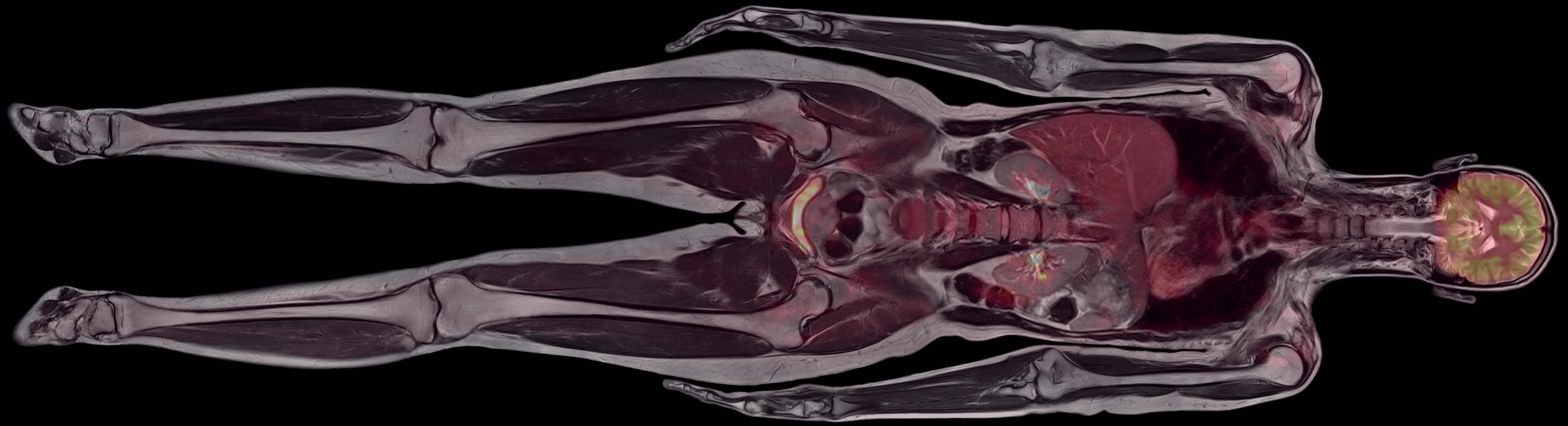
For the first time, MR and PET are one.

Answers for life.

It’s the firsts that define the world.

Biograph mMR brings a revolution in diagnostic imaging to life. For the first time, state-of-the-art 3T MRI and cutting-edge molecular imaging are fully integrated as one. Siemens makes the simultaneous acquisition of morphology, function, and metabolism possible. Now, whole-body MR and PET fully integrated. Precisely aligned. For breathtaking images. Enabling new insights into the progress of disease. Unlocking new paths to treatment. Opening new areas of research. And ultimately, expanding the understanding of life.





The world’s only simultaneous, whole-body molecular MR.

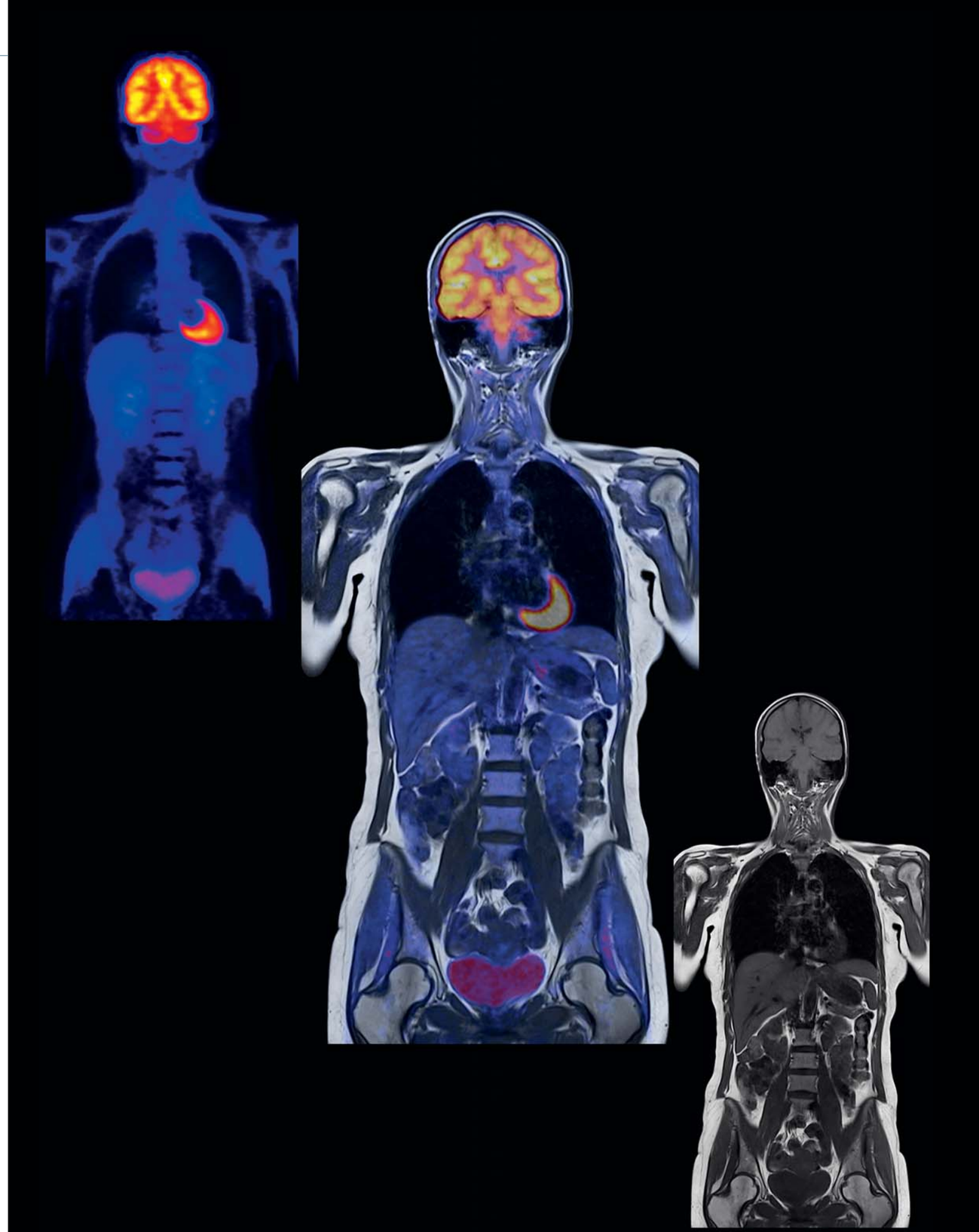
Sequential
is now simultaneous.

Biograph mMR sets a new standard. As the only system that can simultaneously acquire MR and PET data across the whole body, it is a tremendous leap forward in imaging capabilities. Opening new doors in the diagnosis and understanding of disease. Fully supporting you from detection and planning through monitoring and follow-up.

In the brain, the structural and functional detail of MR combines with PET metabolic activity to support early detection of disease, precise planning of intervention, and enhanced follow-up after treatment.

In the musculo-skeletal system, MR and PET combine to provide a thorough assessment of soft-tissues and bone marrow.

And in the oncological applications in the body, PET provides metabolic details in the chest, heart, abdominal and pelvic structures while MR brings structural and additional functional information to the image.



The benefits of simultaneous imaging.

With only one scan you can now obtain a comprehensive diagnostic picture. One that shows MR and PET data in virtually seamless spatial alignment. In addition, the MR acquisition can be used to correct for motion-related effects in PET, greatly improving image quality.

Spatial alignment.

With Biograph mMR, you no longer have to perform image registration of MR and PET visually or through an alternative fusion software. It enables the precise alignment of MR and PET by performing both scans at the same time. For one frame of reference. Minimal motion artifacts. And exact spatial registration.

Temporal co-registration.

The human body is in a constant state of change. Minimizing the time between imaging techniques helps ensure a better understanding of the true nature of physiologic processes. By acquiring MR and PET data simultaneously, Biograph mMR captures metabolic and functional processes at the exact same time for a precise and accurate assessment of disease.

Minimizing the effects of motion.

Biograph mMR technology helps to eliminate the motion effects that may degrade PET results. Delivering brilliant MR images through gating tools that freeze motion, while at the same time providing information about the gated exam to improve the overall quality of the PET images. This is essential when structures like the liver or other moving organs must be imaged.

A: Arterial phase of a dynamic VIBE sequence visualized as a thin MIP and fused with PET for a bronchial carcinoma case.

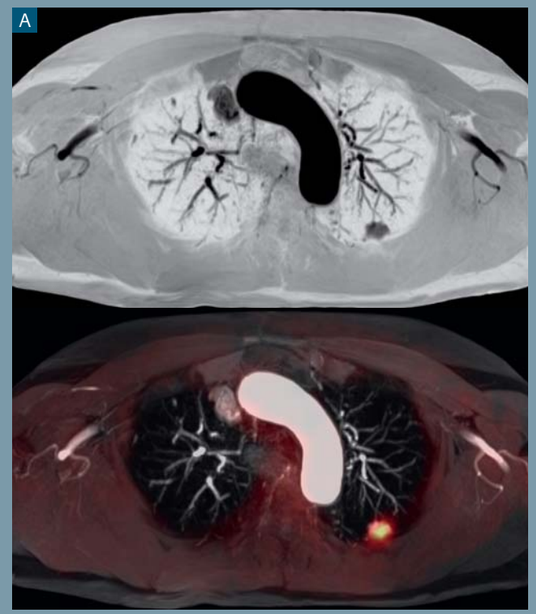
B: Biograph mMR scan of a breast cancer patient with osseous metastatic spread.

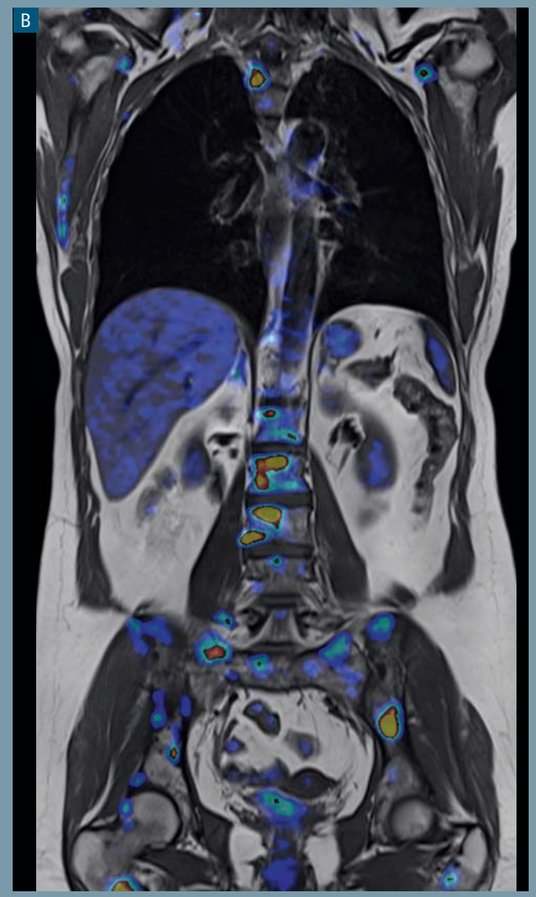
C: MR-based PET gating: Simultaneous imaging of PET and MRI in a CHD patient.

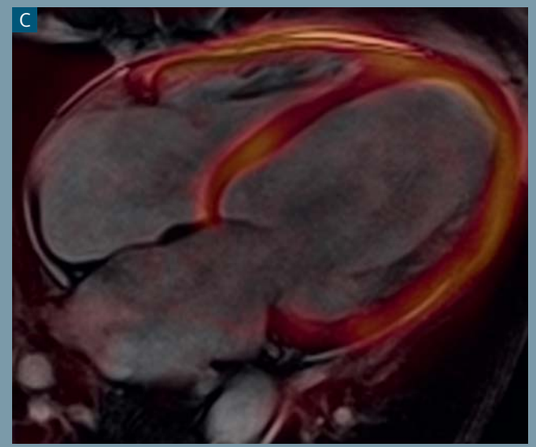
D: Simultaneous acquisition of PET and MRI resulting in outstanding spatial registration, being of special importance in hybrid MR and PET imaging of moving organs, e.g. the liver.

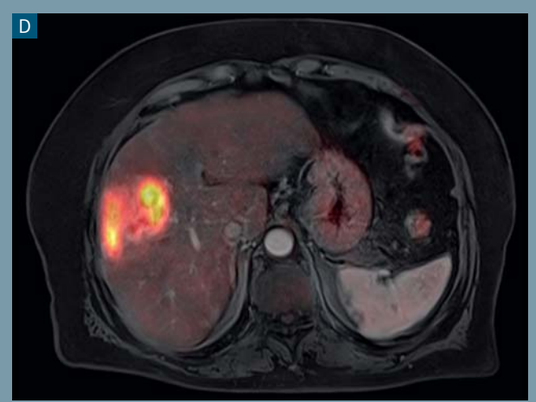
E: Biograph mMR for evaluation of lung pathologies – motion freezing.

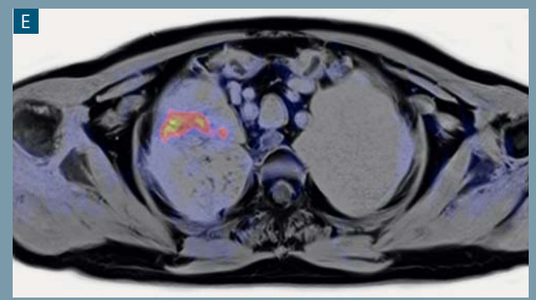
F: Reducing the effects of misregistration due to physiological processes – simultaneous MR and PET for exact spatial registration in the pelvic region (bladder filling, bowel motion).

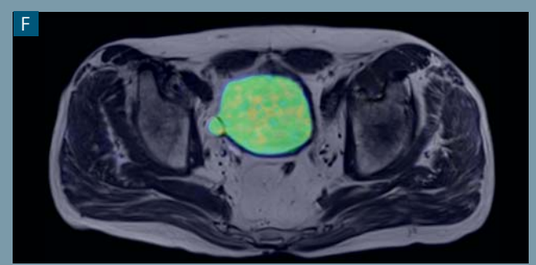












Two
is now one.

For the first time, MR and PET are fully integrated into a single scanner. Empowering you to redefine the way you visualize, diagnose, treat and manage disease. One scan instead of two, results in shorter exams, easier scheduling, and faster results.

One exam. One room. One whole-body solution.

Two is now one.

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One exam. One room. One whole-body solution.

60 cm system opening

Integrated state-of-the-art PET detector and detector cooling channels

Integrated MR gradient coil (45 mT/m and 200 T/m/s)

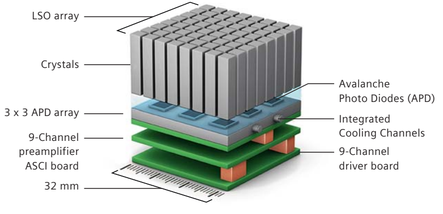
3T magnet with TrueForm magnet design

The inside story on mMR technology.

As the world leader in both MR and PET, Siemens possesses the engineering expertise to fully integrate the two. It's our deep understanding of both modalities that has enabled us to bring Biograph mMR to life.

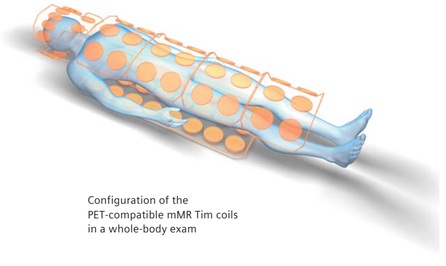
The first MR-compatible PET detectors.

We've designed the first PET detectors that allow the full integration of whole-body MR and PET while maintaining the performance of each modality. Our unique Biograph mMR PET detector architecture includes integrated cooling features to assure optimal PET performance, as well as specialized shielding to eliminate magnetic field interference in the PET data processing chain.



Optimized for a strong signal.

Attenuation correction of the human body is an essential part of a PET exam. It improves the consistency of PET data results across varying tissue densities. With Biograph mMR, attenuation information is collected from MR data during the simultaneous exam. In addition, we've re-engineered the relevant components – from our new, PET-compatible Tim® (Total imaging matrix) coils to the mMR Tim Table designed with low-attenuation materials – to further ensure high-quality simultaneous exams. Remaining attenuation is automatically taken into account in the hardware attenuation correction.



Configuration of the PET-compatible mMR Tim coils in a whole-body exam

The advantages of one integrated system.

It's not just about clinical efficiencies. Siting one system instead of two presents significant business benefits. Allowing you to significantly reduce costs while making the most of the precious space in your facility. Patients and staff alike enjoy the benefits of shorter, more comprehensive exams.

One streamlined exam boosts productivity.

No more sequential exams. No more switching systems. No more transporting patients between exam rooms. Biograph mMR simultaneously captures all of the MR and PET data you need to produce exceptional clinical images.

By performing two exams at once – rather than sequential MR and PET exams – you can shorten acquisition times by up to 50%. Not only does this boost workflow, productivity and efficiency. It can reduce costs, may lead to faster diagnoses and ensure patient and staff satisfaction. Not to mention faster results for referring physicians.

A single exam means happier patients.

Now, there's no need for patients to schedule multiple visits in different departments or to get on and off the table between exams. Patients and technologists alike are more comfortable with Biograph mMR:

- Position once for both MR and PET exams
- No coil changing or repositioning, thanks to Tim technology
- Reduced radiation exposure to technologist
- And, significantly lower ionizing radiation dose for all patients, including pediatric*, compared to other imaging modalities.

One system that reduces costs.

The Biograph mMR requires an installation space similar to a conventional 3T MRI system. The ability to perform MR and PET with a single scanner virtually eliminates the siting and operational costs of a second system, while offering the potential for more patients per day.

- One room for MR and PET
- One cooling system
- One operator

In addition to combined MR and PET imaging, Biograph mMR can also be used as a regular 3T MR scanner in combination with Tim coils.

* 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.

syngo.via
Images, my way.

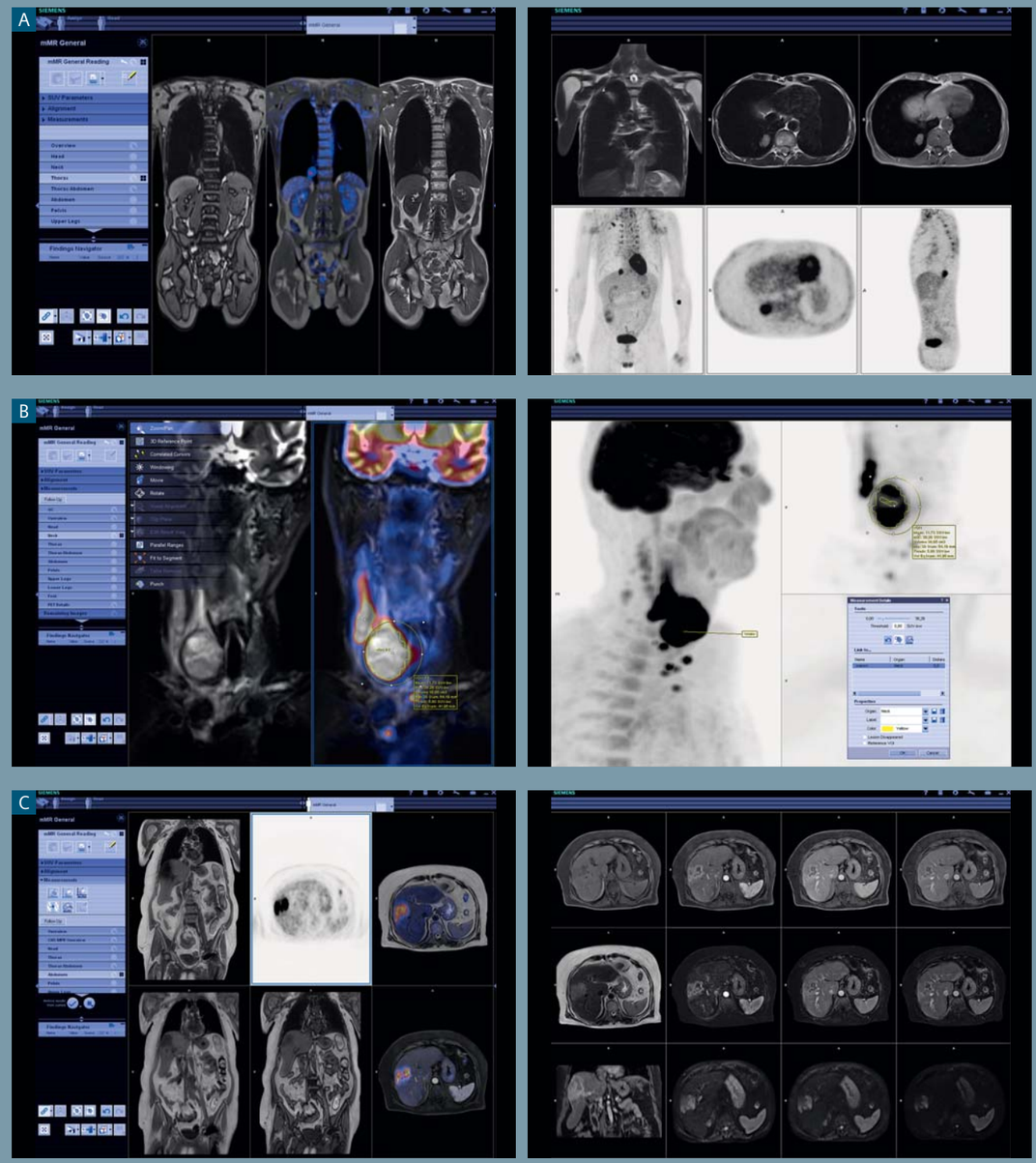
Biograph mMR and *syngo*®.via* are one. Enabling you to view, share and manage your molecular MR images with ease. Take full advantage of indentical Frames of Reference. And see what you need, where you need it, how you need it.**

Biograph mMR provides MR and PET data as one dataset – molecular MR acquisition data. Every Biograph mMR includes *syngo*.mMR General, the advanced visualization software application tool based on *syngo*.via. This allows you to fully utilize this one dataset in your clinical environment.

With *syngo*.mMR General you benefit at all steps of your reading and reporting workflow. While mMR data is automatically loaded and visualized in precise registration, all MR and PET markings are correlated automatically. The software also supports multiple time-point analysis and your final result is summarized in one integrated report. With the collaboration function two experts can even diagnose the same case at the same time from different locations within the hospital**.

* *syngo*.via can be used as a standalone device or together with a variety of *syngo*.via-based software options, which are medical devices in their own rights.

** Prerequisites include: Internet connection to clinical network, DICOM compliance, meeting of minimum hardware requirements and adherence to local data security regulations.



A: Overview workstep to get a first impression of a loaded mMR exam. The following worksteps are dedicated to specific body regions and allow the mMR data to be read in more detail.
Left screen: Diagnostic MR and hybrid MR and PET fusion.
Right screen: Attenuation-corrected PET in overview and in comparison with non-attenuation-corrected PET (lung cancer).

B: Semi-automatic, threshold-based ROI definition for SUV evaluation in this Biograph mMR scan.
Left screen: The diagnostic MR and the fusion between MR and PET is displayed.
Right screen: Different orientation of the attenuation-corrected PET are displayed for ROI definition (anaplastic thyroid carcinoma).

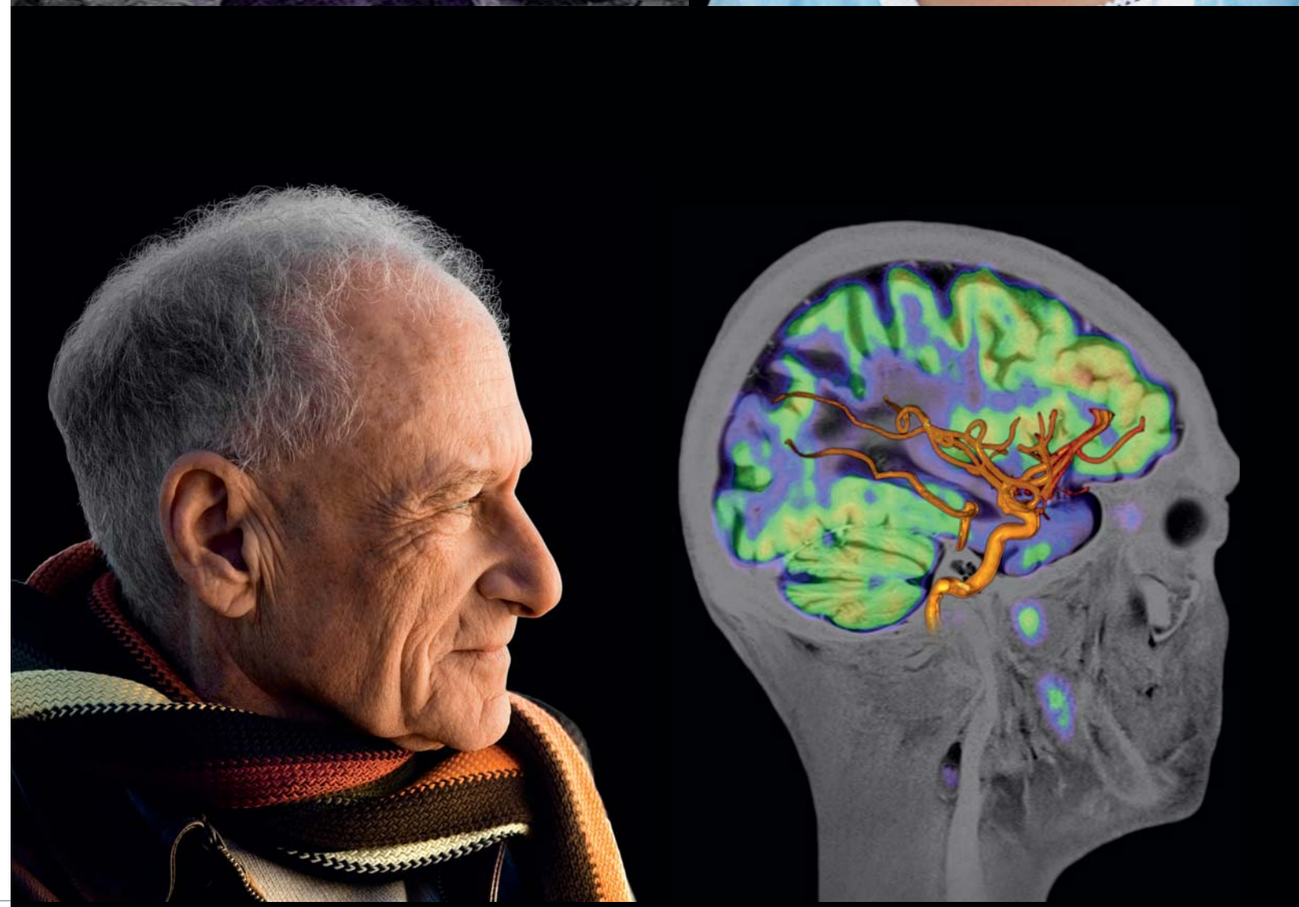
C: Example of an individualized window layout for efficient reading and comprehensive evaluation of the liver in a HCC case. Right screen: A dynamic contrast-enhanced MRI study is visualized.

Potential is now reality.

The arrival of simultaneous, whole-body MR and PET creates a synergy far beyond the capabilities of each. One that will unlock new medical applications now, and advance new areas of research in the future.

Biograph mMR gives you the ability to meet the needs of demanding high-end research. While exploring the boundaries of exciting – and important – clinical applications. Biograph mMR is designed to support you in all aspects of MR and PET development, including simultaneous acquisition of PET and the additional morphologic and physiologic understanding provided by MR.

Ultimately, the advent of true simultaneous molecular MR puts you at the very frontier of medical diagnostics and research. Offering new opportunities in the areas of funding, grants, donations, and publishing. Attracting the attention of referring physicians as well as the most highly talented staff. Differentiating your facility in a powerful way.



A: Exquisite definition of anatomical structures not only in regards to the relation of the right apical lung cancer to sensitive mediastinal structures but also for further understanding of variations of metabolic activity as a consequence of e.g. necrotic tissue is made possible by combining MR and PET in one mMR examination.

B: Extensive metastatic spread into the spinal canal from an unknown primary tumor. This exam impressively shows the added information of MRI to understand the extent of disease but also how simultaneous MR and PET can be used for a fast and patient-adopted evaluation of disease even for patients in unfavorable conditions.

mMR Oncology Imaging.

In oncology imaging you can make full use of the unique features offered by simultaneous MR and PET imaging. Biograph mMR does not only deliver important information during early detection and staging. It can be a decisive factor for treatment planning, therapy selection and monitoring, and follow-up.

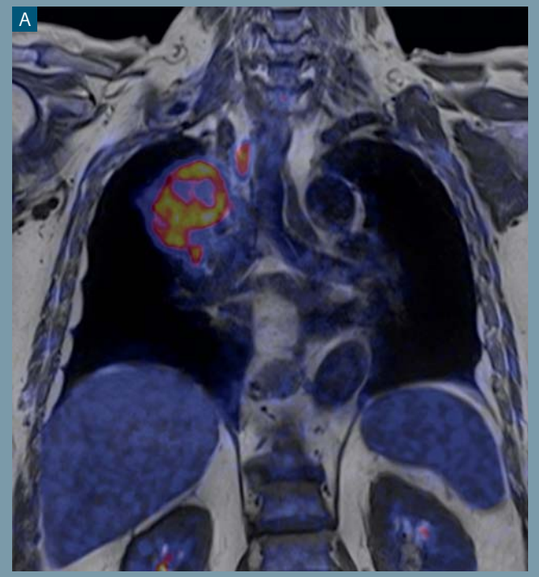
Abdominal and Pelvic Oncology.

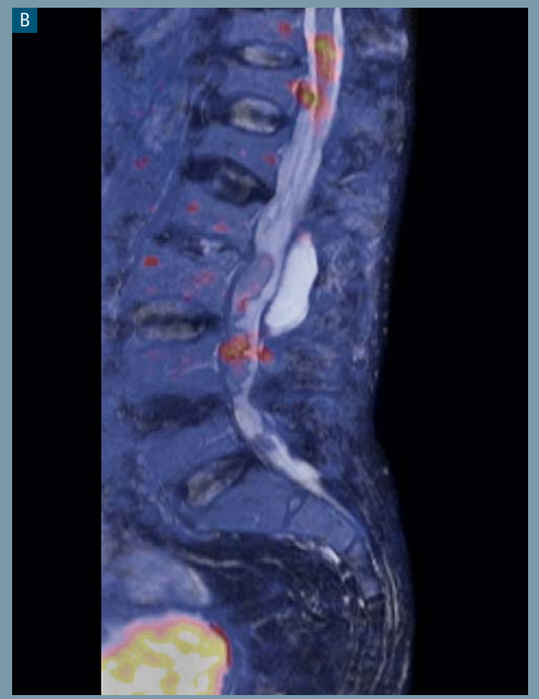
Abdominal structures are always in motion. Simultaneous acquisition inherently reduces the mismatch between MR and PET due to peristalsis, for example. Furthermore motion information collected by MR can help to minimize motion effects in both MR and PET. The precise alignment plays an important role for the evaluation of smaller lesions, but is also beneficial for further applications – staging, liver metastasis, prostate cancer, and bone and soft tissue lesions to name a few.

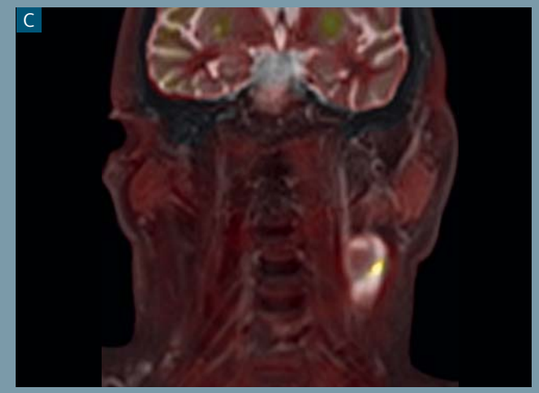
Pediatric* Oncology.

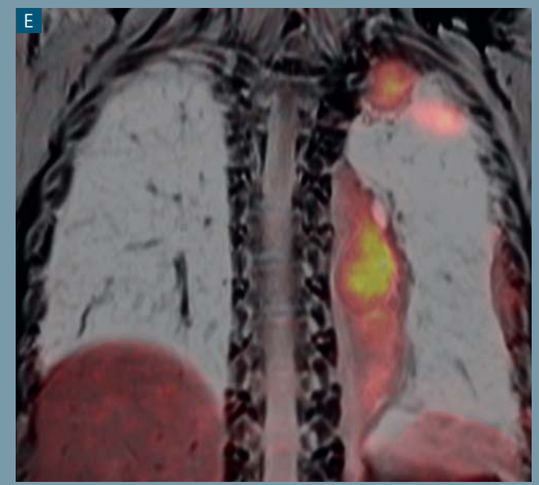
Minimizing radiation dose is especially critical for pediatric patients. Since MR works without ionizing radiation, the overall dose of a Biograph mMR exam is much lower than with other imaging modalities. This is especially important in young patients where repeated scans for therapy response monitoring and follow-up are needed.

* 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.









C: Oropharynx carcinoma characterized in this Biograph mMR image of PET and an opposed-phased Dixon VIBE sequence acquired for MR-based PET attenuation correction and suitable for lesion localization.

D: Understanding function, metabolism and their relationship at a single point in time. This image shows the glucose metabolism of a liver tumor and its three-dimensional relationship to blood supply, which was measured for the arterial phase using a dynamic MRI liver scan.

E: Assessment of pleural infiltration and mediastinal affection of a thymoma. The Biograph mMR technology allows large areas of interest based on one workflow-optimized examination to be assessed.

mMR Neurology Imaging.

The benefits of MR and PET in the study of neurologic diseases are widely implemented. Bringing them together offers the potential for a more complete imaging picture and better understanding of neurologic pathologies. In addition, the current research and development of new tracers offers great promise.

Neurodegenerative diseases.

Early diagnosis of neurodegenerative diseases is of special interest for simultaneous MR and PET imaging. With new tracers being developed in this field, Biograph mMR could be of increasing importance.

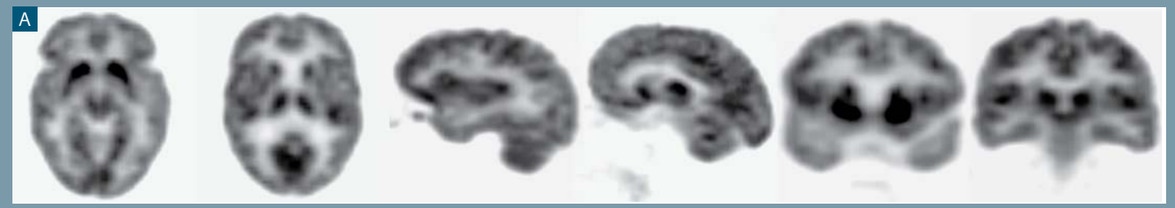
Brain tumors.

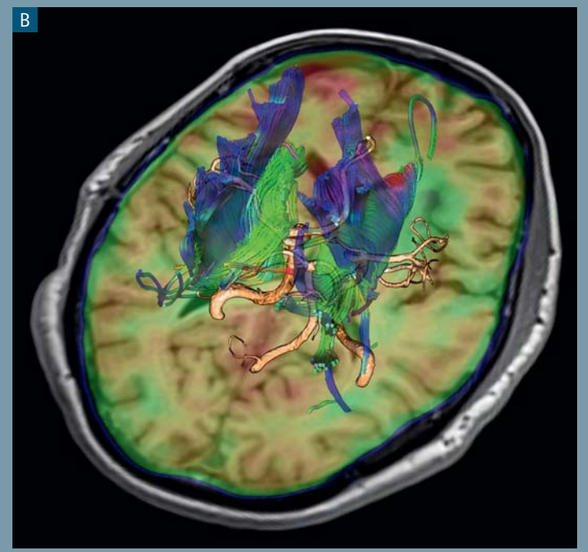
Therapy planning in brain tumors by combining the metabolic information from PET with BOLD (blood-oxygen-level dependance), fibertracking and diffusion-weighted imaging is a very promising application with potential to enter the clinical routine in the near future.

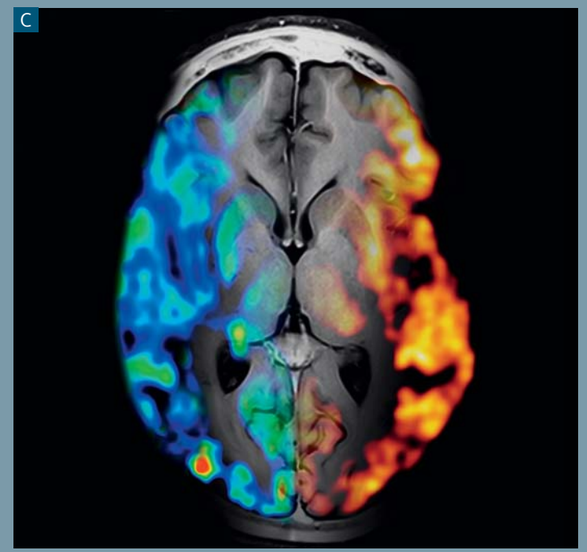
A: Series A shows the PET portion of a Biograph mMR scan for evaluation of the brain in a patient with thyroid cancer.

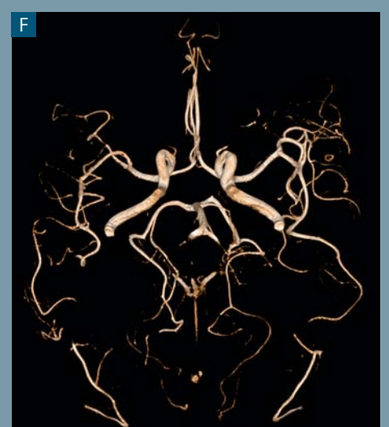
B: Simultaneously with series A, a diffusion tensor MRI scan was acquired for fiber tracking and time-of-flight MR angiography sequence to assess the brain vasculature. The complete information needed for comprehensive therapy planning is acquired in one single exam.

C: Only Biograph mMR imaging allows the simultaneous acquisition of anatomy and function from MRI together with the metabolic information from PET revealing the complete picture of disease.







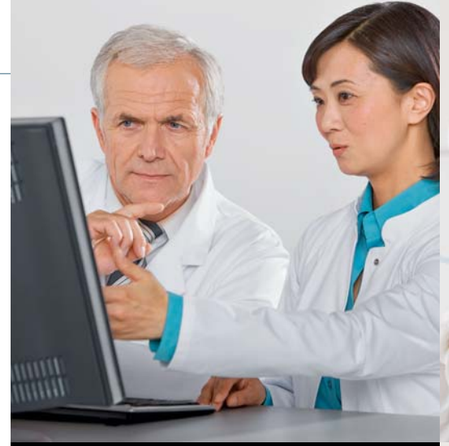


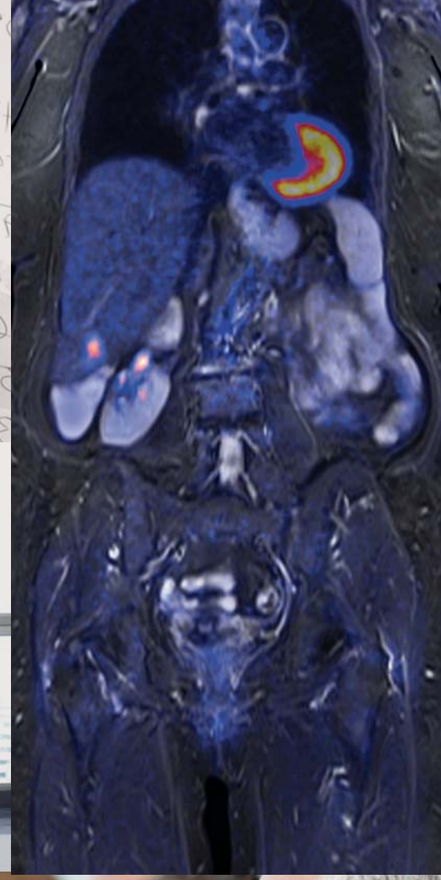
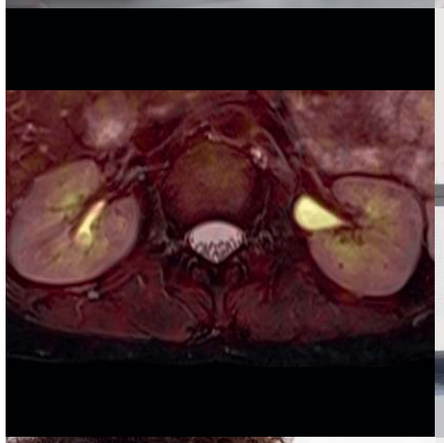
D + E: T2 and dark-fluid weighted diagnostic MRI scan. MR imaging provides high soft-tissue contrast, which is especially beneficial in the complex anatomy of the brain and head/neck region.

F: Time-of-flight angiography without MR contrast agent. This functional information from MRI can help to get a better and deeper understanding of the brain vasculature.

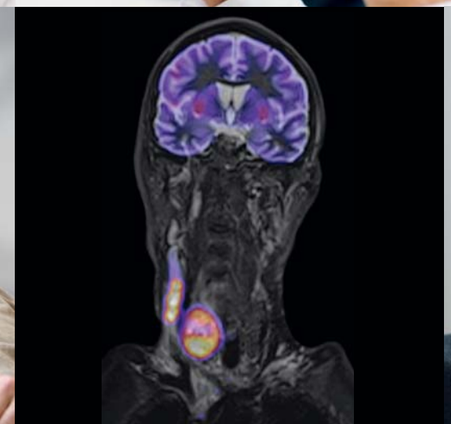
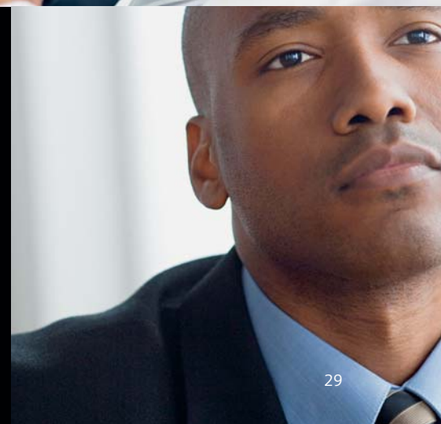
Molecular MR supports our joint vision for healthcare – to advance the management of disease and improve care for all patients. Biograph mMR represents a large step forward in making this vision a reality. The future is now truly wide open. At this singular point in time, there's only one question to ask:

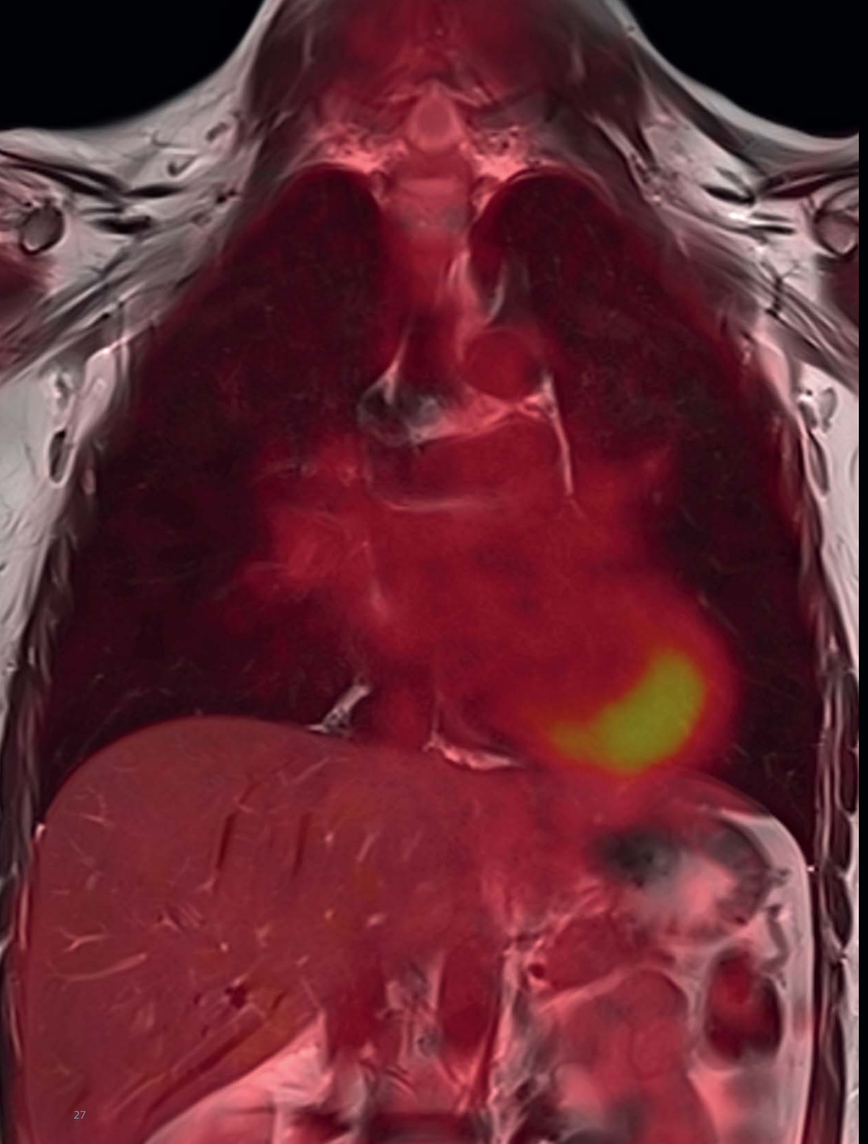
What will you do first?

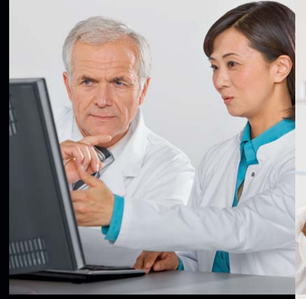


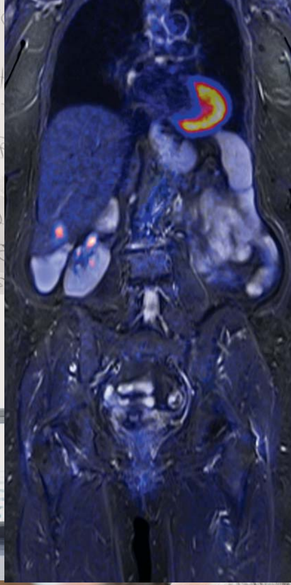



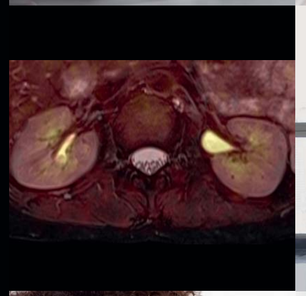


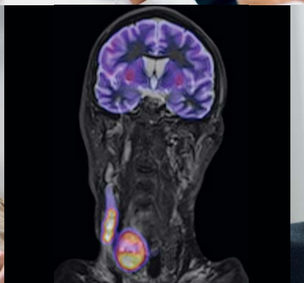




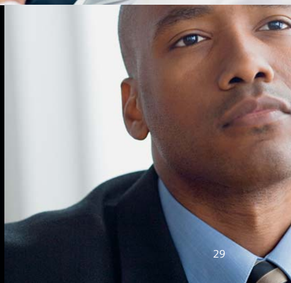












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