



Welcome to the
Revolution in
Real-Time Imaging

Magnetic Particle Imaging

- MPI - Bruker's Revolutionary Modality for Preclinical Imaging

● From Concept to Lab Reality



MPI is a tomographic imaging technique that detects the magnetic properties of injected iron-oxide nanoparticles.

The new technology, invented by Philips, and first introduced in a 2005 Nature paper, gave rise to high aspirations for a new era in biological imaging.

Now Bruker has combined its expertise in technological innovation with its passion for pushing the boundaries of understanding, and launched the previously only envisioned possibilities to the imaging community.

Unimagined Speed and Sensitivity

1,000 Times Faster Than PET

With Bruker's MPI imaging of up to 46 volumes per second can be performed, allowing real time imaging of biological processes at an equal or higher spatial resolution than with PET.

Total Animal Visualization Flexibility

MPI measures the 3D distribution of injected iron oxide nanoparticles using a 25 kHz RF signal. This signal can easily be recorded from any depth within the animal allowing complete flexibility in choosing areas of interest.

Pure Sensitivity

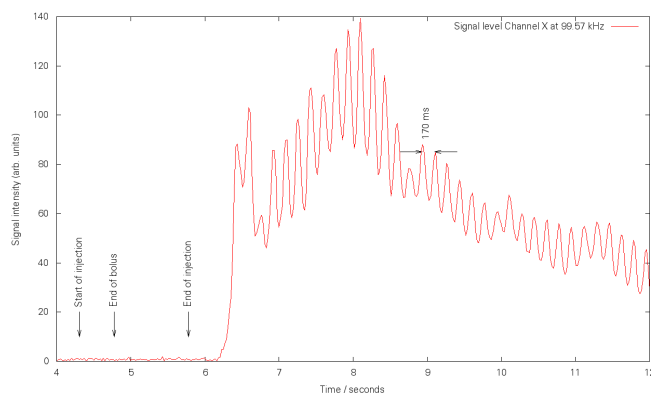
MPI images only injected iron-oxide nanoparticles, so there is no background signal.

100% User-Friendly

Bruker's MPI System incorporates ParaVision® 6 and accommodates Bruker's multi-modal bed, providing a seamless transition of your animal to and from your Bruker MRI system.

Novel Applications Come to Life

The ability to acquire high time-resolution images within a single second allows for novel applications in medical and industrial research and ultimately patient care in which temporal resolution is key.



Temporal Evolution of MPI Signal Intensity - See a Rat's Heart Beat

Temporal evolution of the MPI signal within the field of view during a rat heart bolus injection measurement. The inflow of the contrast agent into the field of view around the heart is seen approximately 2 seconds after the start of injection. The signal modulation corresponds to the rat's heart beat rate of 350 bpm under anesthesia.

● A World of New Possibilities

Cardio-Vascular

- Cardiac ejection fraction, wall motion, flow dynamics
- Coronary blood supply
- Quantitative myocardial perfusion
- Vulnerable plaque detection

Interventional Radiology (3D)

- Stent placement
- Catheter navigation

Oncology

- Micro-vascularization (blood volume)
- Inflow-outflow kinetics (Pharmacokinetics)
- Interventional oncology
- Ablation monitoring
- Highly localized heating for therapy and thermal triggering of local drug release

Neuro-Vascular

- Bleeding detection
- Functional brain imaging

Cell Tracking

- White blood cell tracking – inflammation detection
- Therapeutic (stem) cell tracking

Breast Imaging

- Sentinel lymph node detection
- Screening

Organ Perfusion Imaging

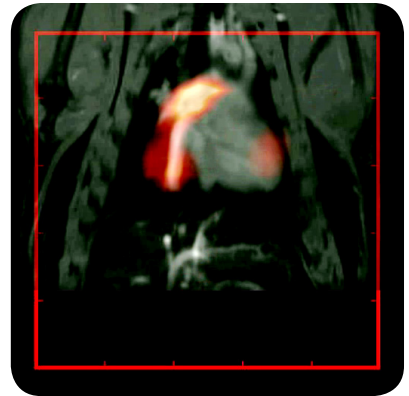
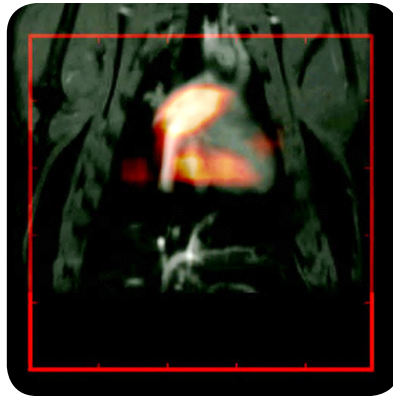
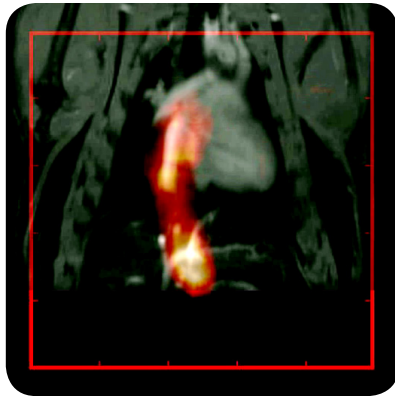
- Liver perfusion
- Lung perfusion (incl. therapy response assessment)
- Lung ventilation

Imaging of Mouse Heart

Images show the inflow of a Resovist bolus in a mouse after tail vein injection. The axial view shows a cross section through the vena cava, the coronal view shows the flow in the vena cava, and the sagittal view shows the contrast agent reaching the heart from the vena cava.

Real-Time Imaging of the Rat Heart

Contrast agent is seen approaching the heart via the *vena cava*, entering the right atrium, the right ventricle and finally the left ventricle.

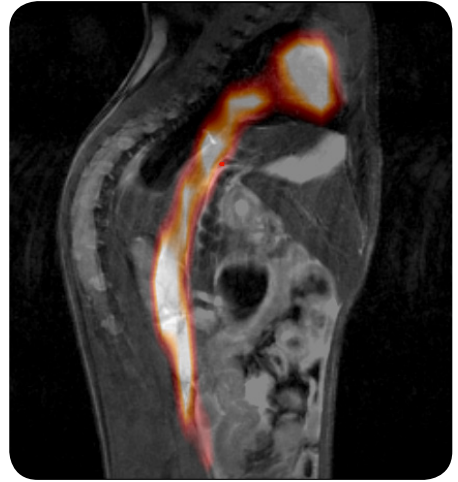
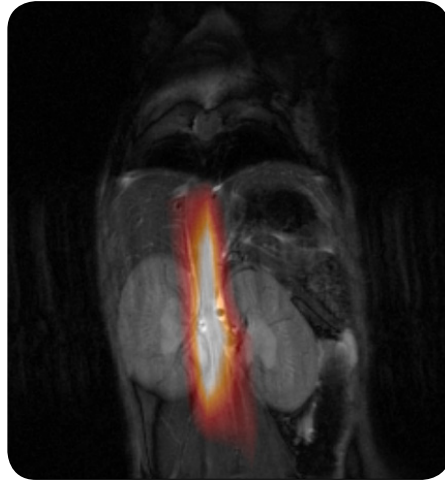
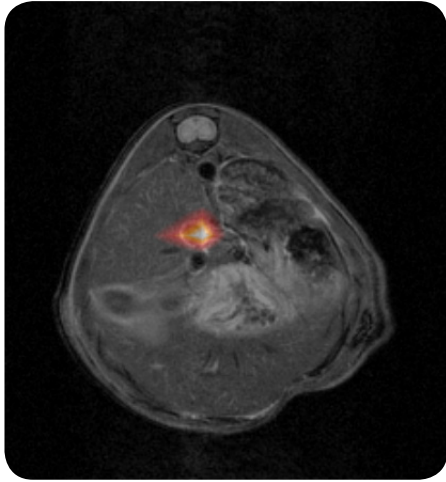


The ParaVision® 6 Interface for MPI Measurements

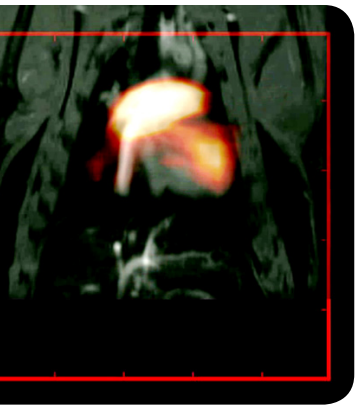
4,000 repetitions in less than 90 seconds.

General settings		Magnetic fields	
Scan Time	0h1m26s169ms	Dimension	<input type="radio"/> 1D <input type="radio"/> 2D <input checked="" type="radio"/> 3D
Averages	1	Drive field strength	20.0000 20.0000 20.0000 mT
Repetitions	4000	Gradient strength	2.50000 T/m
Band width	0.588235 MHz	Drive field FOV	8.000 8.000 16.000 mm
Contrast Agent		System function	
Name of Tracer	Resovist	Selected System Function: No system function selected	
Batch of Tracer	0		
Volume of Tracer	25.0 µl		
Concentration of Tracer	0.50 mol/l		

Routine | Tracer | Setup | Systemfunction | Reconstruction | Info | Single Parameter | Instruction



Courtesy of M.G. Kaul/G. Adam, Department of Diagnostic and Interventional Radiology, University Hospital Hamburg Eppendorf



MPI Workflow

Bruker offers a complete imaging solution for MPI imaging, including the ICON™ Desktop MRI System, which runs on the same ParaVision®6 platform as the MPI, a multimodal animal bed for easy animal transfer, and even a programmable syringe pump for bolus injection.



● Innovation You Can Trust

Offering the largest range of preclinical imaging systems, with an unmatched 9 *in-vivo* modalities, Bruker is committed to supporting the scientific community with high-end instruments dedicated to disease research, translational science, and molecular imaging.

Benefiting from more than 5 decades of passionate innovation, Bruker's customers profit from the vast portfolio of modalities from a single source, providing endless opportunities to combine multiple modalities for seamless workflows and higher productivity. These non-invasive *in-vivo* imaging modalities are based on animal-centric solutions to deliver the greatest scientific insight.



Your Personal Partner

Bruker provides customized support and service designed to make your instrumentation choice and subsequent installation of cutting edge technology a smooth and welcoming experience.

You can expect the highest quality of support starting with the acquisition process and continuing throughout the lifetime of your chosen solution.

From the initial site evaluation, through the system installation, and for the entire lifetime of your instrument, Bruker's service program is dedicated to providing personalized support.

Welcome to the Community

Bruker's commitment to the imaging community means that we play an active role in supporting, strengthening, and innovating.

You can rely on Bruker to deliver informative user support programs, from a regular presence at international events, to users' meetings, symposiums and workshops, and expanded interaction at social and networking opportunities.

● Bruker BioSpin

imaging@bruker.com
www.bruker.com/mp

● The World's First Preclinical MPI System

A Revolution in Preclinical Imaging

Magnetic Particle Imaging (MPI) has been heralded as a future preclinical imaging technique with the potential to revolutionize disease studies, translational research, and drug discovery. For some, that potential is a pipe-dream; to Bruker and its partner and MPI-inventor Royal Philips, that dream has arrived.

Meet the world's first commercial MPI system, now available to order for your own imaging lab.

Partnering in Innovation

The result of an exclusive collaboration, the MPI system combines Bruker's leading expertise in analytical magnetic resonance instruments and preclinical Magnetic Resonance Imaging (MRI) with Philips' unique strengths in medical imaging.

MPI is a completely new preclinical imaging technique with enormous potential to deliver new insights into disease processes at the organ, cellular, and molecular level.

With the new MPI system, Bruker further complements its extensive preclinical imaging product portfolio that includes MRI, PET, SPECT, micro-CT, optical molecular imaging, and X-ray.

Features

- Powerful drive, selection, and focus field technologies
- ParaVision® acquisition and processing platform with DICOM export and import
- Full 3D imaging and segmented acquisition capability
- Bolus injection triggering via ParaVision®
- Bruker's multi-modality animal handling system
- 12 cm free access for imaging of mice, rats, guinea pigs, and rabbits
- Bruker AVANCE III / MPI technology
- Recommended morphology reference: Desktop MRI ICON™



PHILIPS

Component	Specifications
Scalable Selection Field	0...2.5 T/m
Drive Field X/Y/Z	0...≥ 12 mT @ 25 kHz
Focus Field X/Y/Z	0...±18/0...±18/0...± 42 mT
Max. FOV	∅ 10 cm × 10 cm
Detection Bandwidth	Up to 1.25 MHz
Speed	46 volumes/second
Bore size	119 mm