

# BioSpec<sup>®</sup> 3T

- Superior cryogen-free magnet technology

Innovation with Integrity

Preclinical Imaging

## Extending the Range of Multi-Purpose MRI and MRS Systems

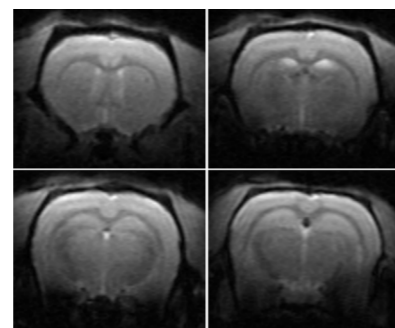
At a translational field of 3 Tesla, the BioSpec 3T extends the range of multi-purpose, preclinical MRI and MRS systems in a compact, easy to site footprint. With its versatile design, it supports a broad spectrum of preclinical application fields, such as oncology, structural and functional neuroimaging, contrast agent development, stem cell research, ischemia, cardiology, and metabolic research. Superior cryogen-free magnet design eliminates the need for liquid Helium and completely overcomes reliability limitations of previous cryogen-free magnets that quench within minutes after a cooling disruption.

Designed for study of mice and rats, the BioSpec 3T comprises the latest Bruker MRI technology, software application packages and multimodal options. To augment the range of research options in your laboratory the BioSpec 3T is fully compatible with other imaging modalities such as PET.

### Key Benefits

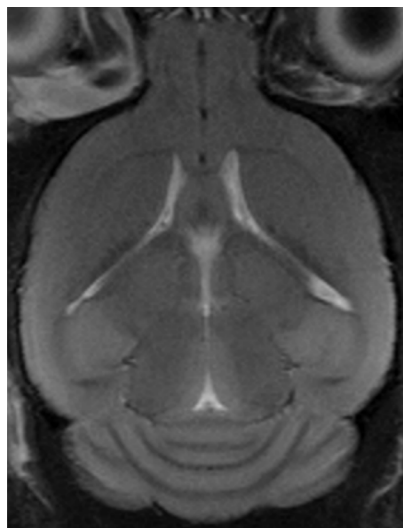
- Superior cryogen-free magnet that stays on field during power outages of 4 hours
- No liquid Helium or Nitrogen filling required
- Ensure peace of mind with comprehensive services, hotlines, training courses (application and programming) and onsite training
- Over 100 validated and ready to use *in vivo* protocols and scan programs for mice and rats
- Accurate animal positioning with the motorized animal handling system, including touchscreen operation for a simplified, precise workflow
- Automated multi-stage, whole body imaging
- Compact footprint can even fit in small labs
- Self-shielded system, no Faraday cage necessary
- No quench line required

Figure 2



Fast Single-Shot EPI in-vivo rat brain imaging at 3T. Acquisition details: Single shot FID EPI, resolution 195x195  $\mu\text{m}^2$ , slice thickness 1.25 mm, FOV Saturation: Coronal. Coil setup: Circularly polarized 82 mm coil for signal transmission & 20 mm surface coil for signal reception

Figure 1



High resolved in-vivo mouse brain imaging at 3T. Acquisition details:  $T_2$ -weighted TurboRARE, resolution 78x78  $\mu\text{m}^2$ , slice thickness 0.8 mm. Coil setup: Circularly polarized 82 mm coil for signal transmission & 2x2 mouse brain array for signal reception

## Superior Design for Unmatched Convenience and Flexibility

### Key Features

- Maximum freedom for your animal experiments with a magnet bore of 180 mm
- Support for very large rats with best-in-class free RF-coil access of 82 mm
- Significant signal-to-noise boost *in vivo* of at least a factor of 3 with the MRI CryoProbe™
- Complete RF coil portfolio for mice and rats available, including coils for head, brain, cardiac, body, x-nuclei and multi-purpose applications
- Fully-featured ParaVision® preclinical user interface integrates other modalities for streamlined workflow
- Upgradable with state-of-the-art PET module
- MRI sequence portfolio of more than 1000 sequence variations, including wireless cardiac imaging using navigator based IntraGate methods with a choice of cartesian or radial readout, as well as short echo time imaging, such as UTE and ZTE
- Best in class homogeneity of  $\pm 0.1$  ppm for a 50 mm DSV due to solid magnet design
- Crisp and highly resolved images with a gradient strength of up to 900 mT/m at high gradient linearity of  $\pm 3.5\%$  (DSV 50 mm)
- Up to 6 higher order, high power shim channels (e.g. 3750 Hz/cm<sup>2</sup> for XZ,YZ) guarantee optimal performance for spectroscopy and MRI
- In-house development and production of all key components (software, magnet, gradient, spectrometer, RF-coils) ensures the best performance and short repair times

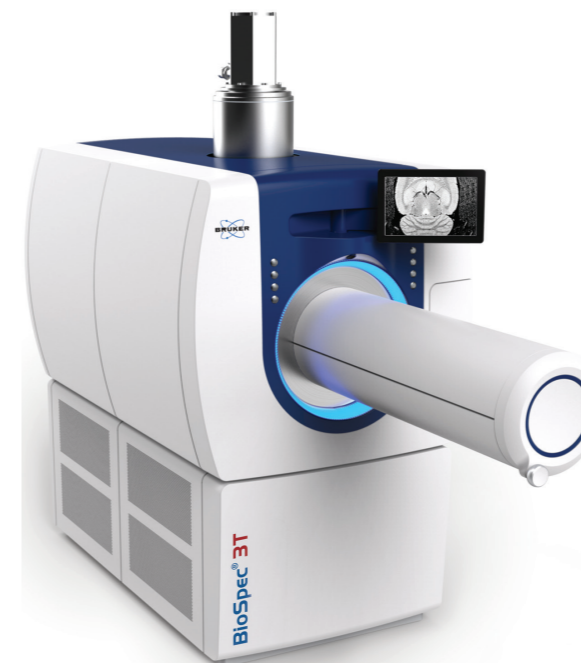


Figure 3



High quality in-vivo mouse abdomen imaging at 3T. Acquisition details: Left, T1 weighted, flow compensated FLASH, respiratory gating, resolution 156x156  $\mu\text{m}^2$ , slice thickness 1 mm. Right, T2 weighted, RARE, respiratory gating, resolution 208x208  $\mu\text{m}^2$ , slice thickness 1 mm. Coil setup: Circularly polarized 40 mm coil for signal transmission & reception

## Specifications (Typical configuration: <sup>1</sup>H and Broadband Channel, 4 Channel Parallel Receive)

### Magnet Specifications

Field strength	3 Tesla (rampable)*
Bore diameter	18 cm
Homogeneity (35 mm DSV)	± 0.05 ppm
Homogeneity (50 mm DSV)	± 0.1 ppm
Stray field (center to 0.5 mT)	0.53 / 0.94 m (radial / axial)
Magnet hold-time during power outage or cold water failure	4 hours

### Gradient Specifications

Gradient inner diameter	105 mm
Gradient strength	450 mT/m (900 mT/m with high power option)
Slew rate	4200 T/m/s
Max. DC gradient strength, @ 15 °C, 8 l/min	335 mT/m

\*Ramping the magnetic field from 0 to 3 Tesla is possible, but requires additional hardware (e.g. preamplifiers and frequency specific RF Coils) and services.

## RF Coil Portfolio

CryoProbe™	Mouse	Rat
<sup>1</sup> H MRI CryoProbe™ 2 Element Array	✓	
<sup>1</sup> H MRI CryoProbe™ 4 Element Array	✓	✓
Transmit and Receive Volume Coils For <sup>1</sup> H	Mouse	Rat
Rat Body Volume RF Coils – 82 mm / 72 mm / 60 mm		✓
Rat Head / Mouse Body Volume RF Coil – 40 mm	✓	✓
Mouse Head and Body Volume RF Coils – 30 mm / 23 mm	✓	
Receive-only Surface Coils for <sup>1</sup> H	Mouse	Rat
Circularly Polarized Brain Surface Coil	✓	✓
Brain Array Coil – 4 Channels	✓	✓
Cardiac Array Coil – 4 Channels	✓	✓
Body Array Coil – 8 Channels	✓	✓
Multi-Purpose Planar Surface Coil – 10/20/30 mm	✓	✓
Transmit and Receive Volume Coils for X-Nuclei ( <sup>13</sup> C/ <sup>19</sup> F/ <sup>31</sup> P/ <sup>23</sup> Na)	Mouse	Rat
<sup>1</sup> H/X-nuclei Rat Head / Mouse Body Volume Coil - 40 mm	✓	✓
Transmit / Receive Surface Coils for X-Nuclei ( <sup>13</sup> C/ <sup>19</sup> F/ <sup>31</sup> P/ <sup>23</sup> Na)	Mouse	Rat
<sup>1</sup> H/X-nuclei Transmit/Receive Surface Coil - 20 mm	✓	✓

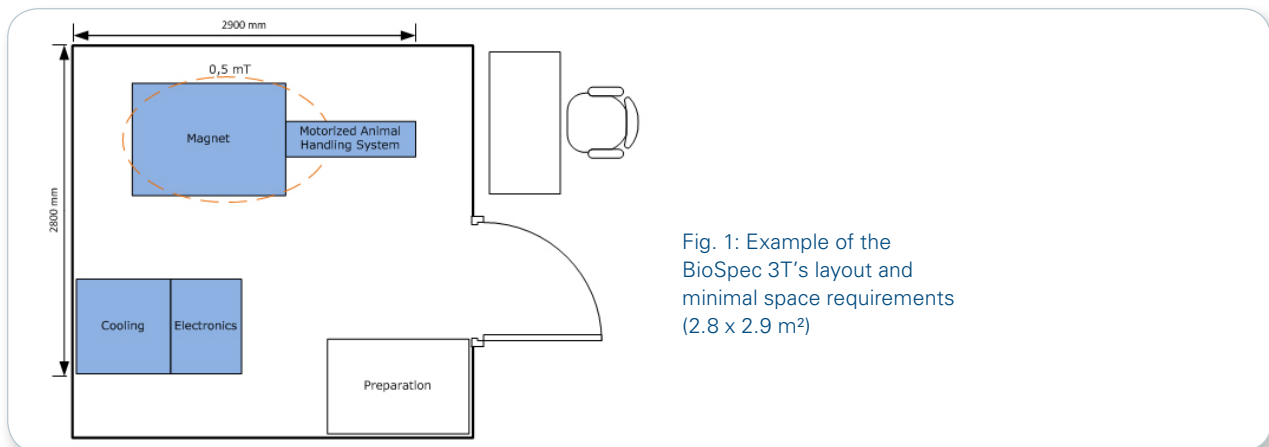


Fig. 1: Example of the BioSpec 3T's layout and minimal space requirements (2.8 x 2.9 m²)

● **Bruker BioSpin**

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www.bruker.com/3T