



# BIOEMTECH

*Embracing scientists translate ideas into outcomes*



## $\beta$ -eye

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A high resolution, benchtop, *in vivo* imaging system for real time PET isotopes screening

## General

BIOEMTECH's vision is to accelerate preclinical research, towards clinical translation for promising drugs, through high quality services and products.

We are a strong research partner who guides, consults, and supports all preclinical research studies of our collaborators.

- As a manufacturing company of novel breakthrough imaging systems (*eyes*), we offer simplicity, speed, and efficiency on a daily workflow, during the first steps of testing novel compounds.
- As a preclinical CRO, we offer a one-stop-shop at our state-of-the-art Laboratories that covers a full chain of preclinical studies, following a Good Laboratory Practice approach in the daily routine.

BIOEMTECH's ultimate goal is to aid scientists innovate, at every step of their research.



  
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## Introduction

BIOEMTECH's  $\beta$ -eye™ is a unique benchtop imaging scanner for real-time *in-vivo* screening of PET isotopes. Equipped with state-of-the-art technology,  $\beta$ -eye™ can depict the temporal and spatial physiological distribution of PET radioisotopes. It also quantifies, competently, the activity of organs and tissues in mice with high precision and for a wide dynamic range of activity. Designed based to the end-user's needs and integrated in an easy-to-use and intuitive environment,  $\beta$ -eye™ is a unique screening tool for fast and efficient whole body mouse imaging.

With a footprint of just 44 cm × 46 cm x 40 cm and a weight lower than 40 kg,  $\beta$ -eye™ is a truly desktop device that can turn any space into an imaging lab.  $\beta$ -eye™ comes with a laptop, which serves for data acquisition and processing. Standard licenses of the complete software suite Visual | eyes, are included.

## Technology- Specifications



## A. General Information

$\beta$ -eye™ is the first and only PET scanner for real-time, *in vivo* screening of all PET isotopes. Inferring high-end detector technology, small footprint and field of view that provides whole body mouse images,  $\beta$ -eye™ is a complete solution for all laboratories at any research stage.

<b>Modality</b>	PET
<b>Anatomical mapping</b>	Artificial X-ray
<b>Active FOV</b>	50 mm × 100 mm
<b>Photodetectors</b>	Silicon Photomultipliers
<b>Scintillators</b>	LYSO:Ce
<b>Read-out channels</b>	256

## B. Performance

$\beta$ -eye™ infers unique technical characteristics that enable efficient and high-resolution, whole-body, mouse imaging. With a sensitivity that reaches 5%, spatial resolution near 1.2 mm and TOF capabilities,  $\beta$ -eye™ offers high precision real-time imaging without the cost of time-consuming post-processing routines.

<b>Time frames</b>	Down to 10 sec*
<b>Sensitivity</b>	5 % @ CFOV
<b>Spatial resolution</b>	1.2 mm @ CFOV
<b>Energy resolution</b>	11.8 % @ 511 keV
<b>Time resolution</b>	350 ps FWHM   TOF
<b>Dynamic range</b>	0.1 up to 10 MBq

## C. Artificial X-ray mouse images

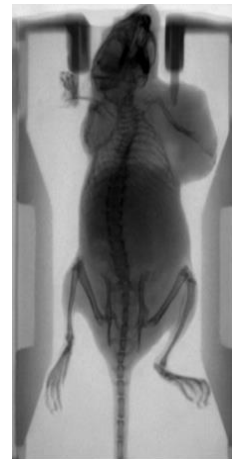
$\beta$ -eye™ integrates an advanced Artificial Intelligence Algorithm designed to synthesize morphological X-ray images by translating standard photographic images of mice. Artificially produced mouse's X-ray images are superimposed with the functional radioisotope 2D images to enhance overall anatomical information.



Optical Photo



Real X-ray

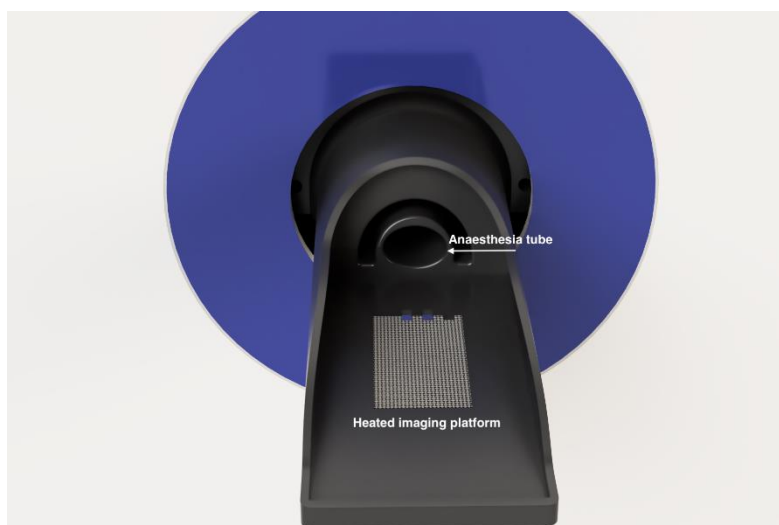


Artificial X-ray

#### D. Animal handling

To preserve animal's welfare and health,  $\beta$ -eye™ employs standard inputs for gas anaesthesia - fully compatible with third party systems. Anaesthesia then is provided into the mask of the animals, all throughout the imaging study. In addition, the system infers a heated imaging stage, thus maintaining the temperature of the animal at the desired level. Upon request, vital signs of the animal can be monitored including heart and respiratory rate, body temperature and oxygen saturation.

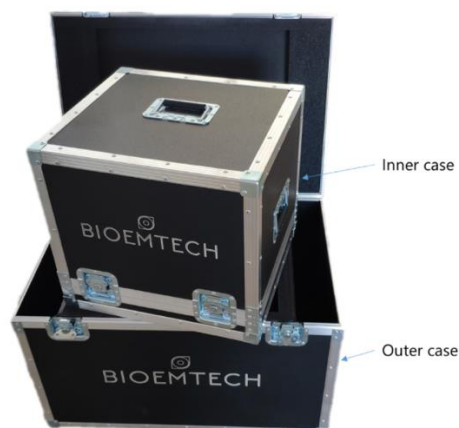
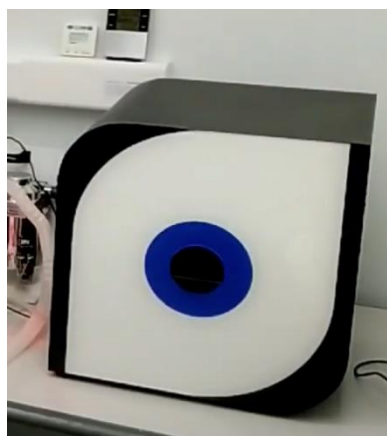
<b>Anaesthesia</b>	Standard inputs for gas anaesthesia; compatible with third party systems
<b>Heating</b>	Heated stage for optimum body temperature
<b>Vital signs monitoring</b>	Upon request



## E. Footprint and connectivity

$\beta$ -eye™'s footprint and standard digital interface connectivity can turn any space into an imaging lab. In addition,  $\beta$ -eye™ is characterized by simple power requirements and anaesthesia connections, allowing real time imaging and quantification inside a clean room, overcoming limitations, and facilitating scientists get great results under challenging conditions.

<b>Outer dimensions</b>	44 cm (L) × 46 cm (W) × 40 cm (H)
<b>Weight</b>	40 kg
<b>AC input range</b>	100-240 VAC
<b>PC Connectivity</b>	USB 2.0 Type A and Gb Ethernet
<b>Outer shielding</b>	Sheet metal and acrylic

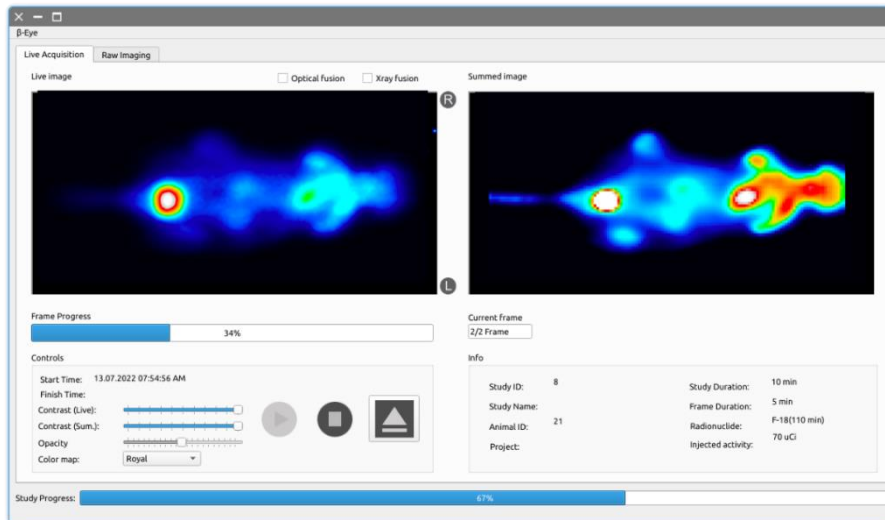


## F. Visual | eyes Software

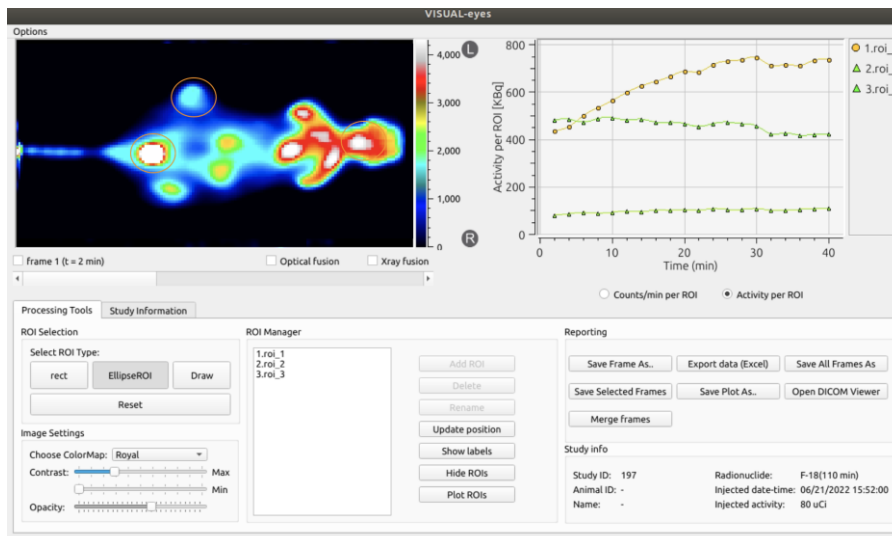
VISUAL | eyes is a complete software suite that serves for imaging, system control and analytical post-processing routines. Among other possibilities, users through Visual | eyes software, can generate imaging studies using custom and/or pre-defined protocols, obtain quantitative information in user's defined Region of Interests and export images to DICOM format.

<b>Fast acquisition</b>	Simplified procedure in a robust environment-
	Real time image visualization during the scan
<b>Database</b>	Raw data, DICOM storage, Compatibility with third party software
<b>Anatomical mapping</b>	Fusion with X-ray images artificially generated based on the mouse structural characteristics
<b>Imaging protocols</b>	Pre-defined and user's defined imaging protocols
<b>Post processing</b>	Integrated ROI manager for detailed post processing image analysis
<b>License</b>	Standard license for Mac and Windows

### Live imaging console



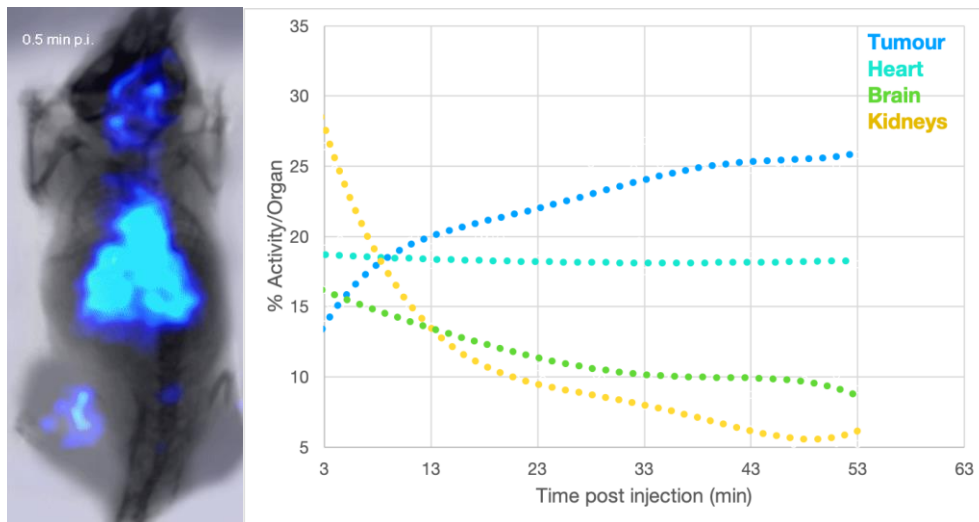
### Post Processing suite



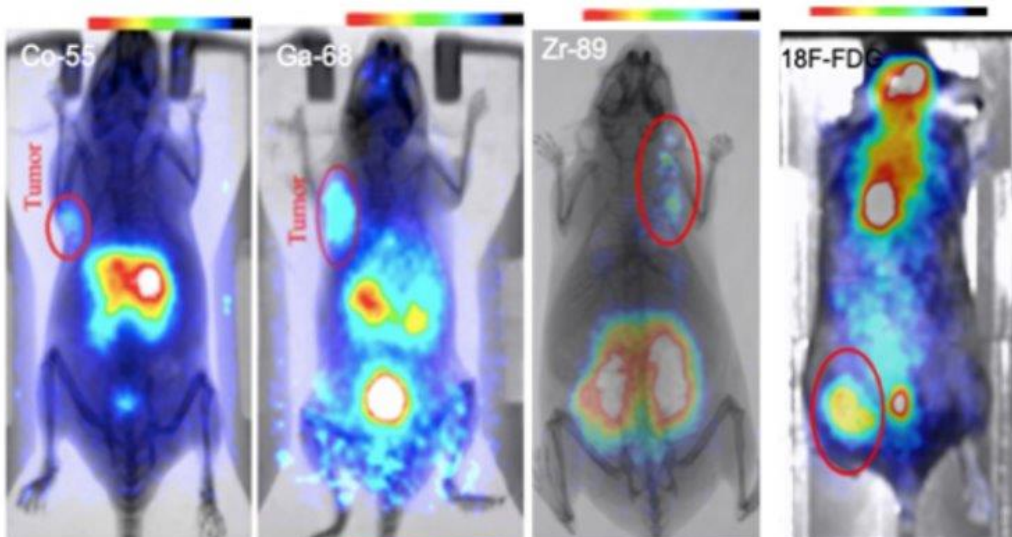
# Indicative Studies

- **Tumour Perfusion**

Live frames of 30sec for the first 50 minutes post administration



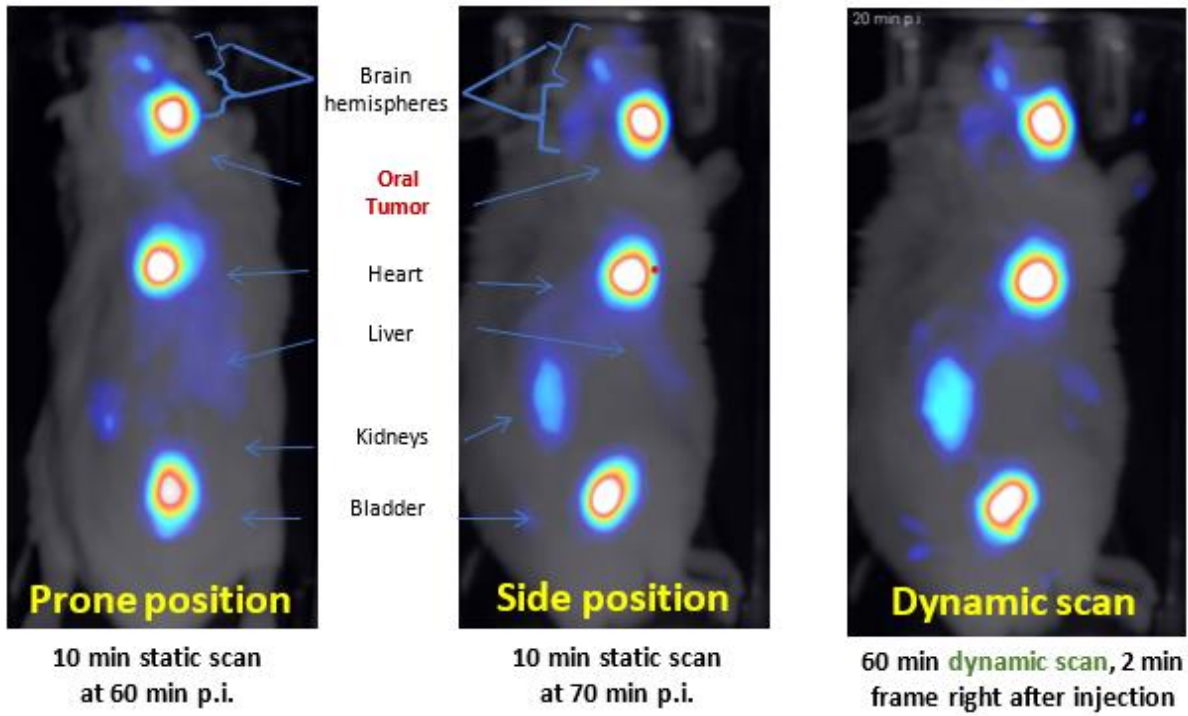
- **PET imaging with different isotopes**





- **Mimicking 2D-PET imaging of oral tumors with  $\beta$ -eye™**

20 uCi  $^{18}\text{F}$ -FDG i.v. injected in a healthy mouse with an oral tumor-mimicking structure of 10 % ID uptake





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