DELab Micro Computed Tomography

For in vivo small laboratory animals and ex vivo samples / µCT-100

High-resolution desktop CT / µCT-100X

- Maximum resolution up to 1µm, fast scan in 2 seconds
- Patented carrier for automatic recognition, one-touch parameter setting
- 3D reconstruction for comprehensive insight into the structure of study objects

Life Science

Geological Science

Materials Science

Food Science

Restoring accurate details with

3D Micro Computed Tomography system

Delta's 3D Micro Computed Tomography system is a non-destructive testing instrument designed specifically for small target objects, including in vivo small laboratory animals, fossil specimens, biological samples, drugs, electronic components, metals, and plastics, and more. With computed tomography technology, the system can extract and reconstruct 3D images, and accurately capture the internal physical structure of a tested object. It helps shorten testing and verification times, identify problems faster, and improve the efficiency of product development, academic research, and quality management .

Application fields

Life science

- In vivo and ex vivo scan
- Whole-body scanning of in vivo small laboratory animals
- Micro structure of the spine
- Body fat distribution analysis
- Respiratory, cardiac, and cardiopulmonary gated imaging

Food science

- New product development
- Reformulation experiments
- Changes in food over time
- Structure and texture
- Structural effects of ingredients and additives

Bone and teeth research

- Bone disease models
- Fossil samples
- Endodontic research and root canals
- Bone morphology analysis
- Density measurement, volume analysis

Geological science

- Structural geology
- Building materials
- Geochemistry
- Paleontology
- 3D mineral distribution

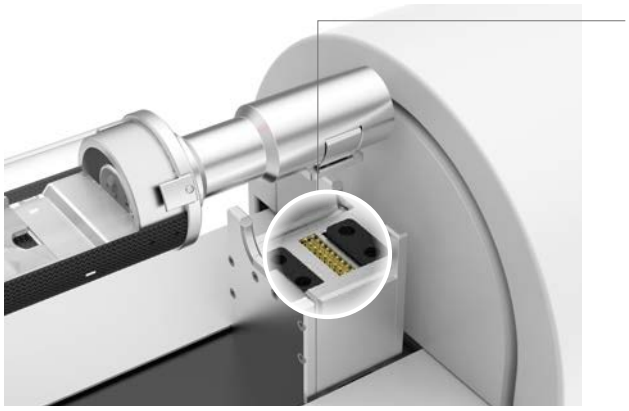
DELab µCT-100

Micro Computed Tomography

For in vivo small laboratory animals and ex vivo samples

- 1 (One) Touch : Automatic recognizable animal bed for FOV selection.
- 2 Seconds : Fast scan mode
- 2 µm : High-resolution image
- Independent heated airflow and anesthesia system help to maintain the stable vital signs of the animal
- Equipped with tube voltage range :40-90 kVp , 50W

One touch auto-setting



- **Automatic recognizable animal bed**

Rat-size bed:
80(ϕ) mm x 200(L) mm

Mouse-size bed:
40(ϕ) mm x 200(L) mm

Ex vivo bed:
10(ϕ) mm x 200(L) mm

- **Automatic multi-filter and**

FOV modes selection:

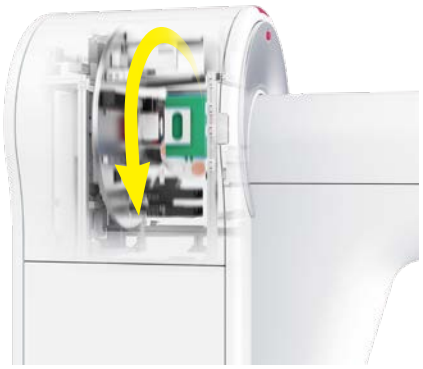
Rat

Mouse

Ex vivo

Ultra-High Resolution

2 sec. Fast-scan



Cube-shielding

Self-shielding:

Cube radiation protection

Syringe Pump*

The built-in syringe pump can automatically inject a contrast agent during scanning, and it also offers manual injection mode for different experimental requirements. This significantly increases the diversity of experimental operations .

*Estimated to be launched in 2022Q4

Capsule-style Multifunctional Chamber System

The chamber features an easy-to-remove replaceable bed support, a top cover design for escape prevention, an embedded surveillance camera, body temperature measurement, and smart recognition functions. It also includes an independent anesthesia gas and heating system to stabilize the animal's vital signs while providing physiological monitoring to monitor the animal's status in real time.

Controllable warming chamber

Anesthesia gas absorption system

Anti-Escape Cover: This design prevents small animals that are not completely anaesthetized from escaping during the experiment.

Embedded LED Camera: The camera enables real-time observation of small animals during imaging. Respiratory signals can be detected using camera images and displayed on the interface.

台灣精品
2020

DELab µCT-100X

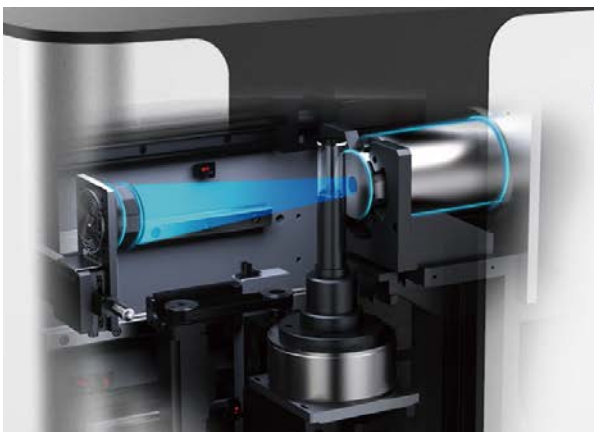
Micro Computed Tomography

High-resolution desktop CT

- Accurately capture detailed internal structures
- Transmission X-ray tube for 1-µm high-quality images
- Efficient image reconstruction for 3D modeling
- Designed for safety, stability, and availability
- Non-destructive inspection

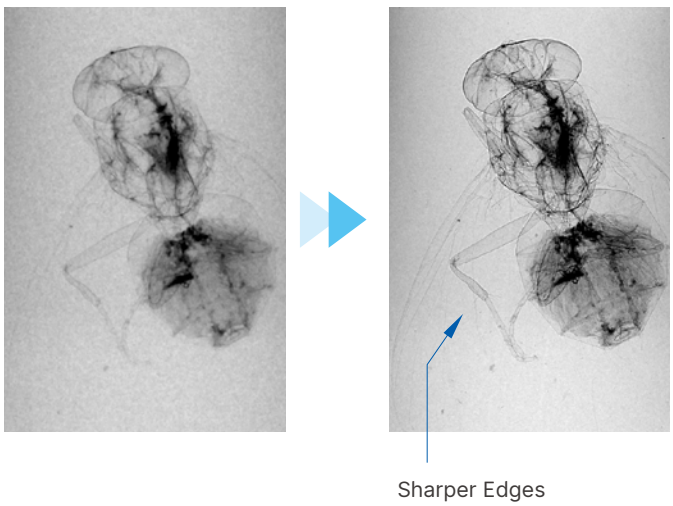
Sealed Transmission Tube and CCD X-Ray Detector

The sealed transmission tube and CCD X-ray detector produce 1-µm high-resolution images through characteristics of high power output, small focal spot, and less focal spot drift.



Phase Contrast Technology for Sharper Image Edges

The µCT-100X uses in-line phase contrast imaging technology to strengthen image edge in low-Z or low attenuation materials, without the need to purchase expensive optical accessories.



Patented Carrier Ensures Stable Image Acquisition

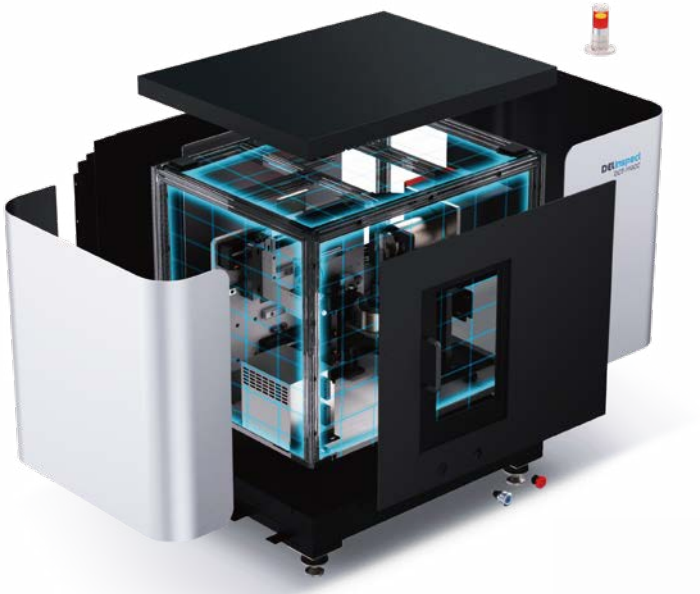
360° Degree Rotation Carrier

Patented anti-twist and anti-vibration design ensure stable carrier 360-degree rotation during image acquisition.

Control the Rotate Angle and Speed

Motor optimization allows accurate control over the rotation speed and angle, further ensuring stable image quality.

Radiation Shield.
No Need for an Additional Shielding Room or Control Area



Features Comprehensive Self-Shielding

The lead and lead glass design ensure that radiation stays inside the machine, with a reading of <1 μSv/h detectable within 10 cm of the X-ray system.

This frees up space by not needing an extra lead room or designated X-ray area. Moreover, the lead glass allows users to monitor internal operations in a radiation-protected environment.

Interlock

To prevent radiation leakage, the X-ray system is fitted with a sensor that prevents operation while the door is not closed perfectly. Furthermore, the X-ray will turn off immediately if the door is opened during operation.

Automatic Internal Temperature Regulation

The internal temperature is automatically regulated to maintain consistent conditions. This protects the object under inspection from being affected by temperature variations that would influence image quality.

Efficient Image Reconstruction for 3D Modeling

Rapid Scanning Parameter Setup 1

Multi-Size Carrier for a Wide Range of Applications

Different carrier options are provided to accommodate the resolution requirements and size of the tested object. Carrier size is identified using a patented technology to achieve collision prevention.

Default Application Mode, Complete Parameter Settings in One Click

Default detection mode can be configured according to carrier size, and carrier recognition and positioning are automatically completed in one click, thus simplifying a complex process.

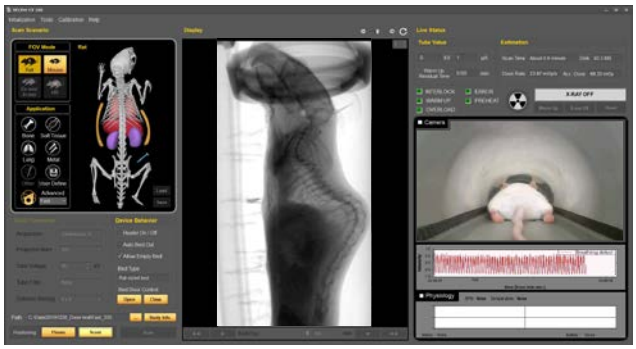
Instant 2D/3D Image Capture 2

Easy Calibration

Image calibration is easily performed using commonly used parameters to obtain the best image quality.

Image Capture and Real-Time Monitoring System

The graphic operating system is integrated with real-time monitoring, enabling easy system configuration and 2D/3D image acquisition to monitor the status of the tested object in real time during the scanning process.



Optimal 3D Reconstruction 3

3D Image Batch Reconstruction

A batch of images can be loaded for batch reconstruction after setting parameters individually or collectively , thereby simplifying the testing process.

Local 3D Image Reconstruction

An area of interest can be selected for 3D reconstruction to reduce the overall file size, thus accelerating the reconstruction process .

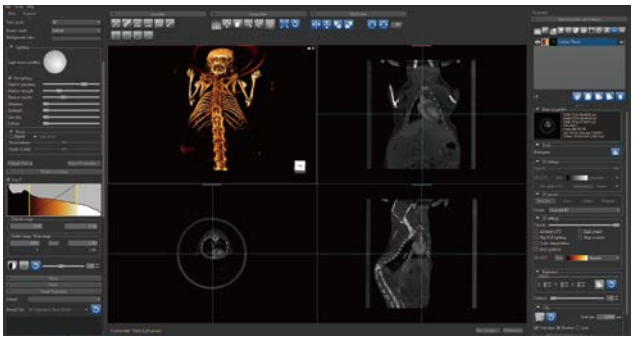
Multi-Section Display

Problems can be quickly identified by cropping 3D images in any direction to simultaneously display multiple images at the required angle and section view.

Inspection Completed

3D Imaging and Measurement

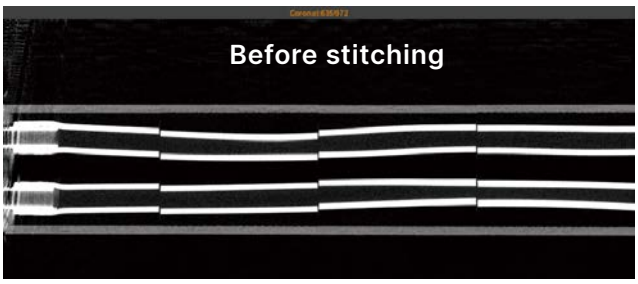
Image interpretation is assisted by built-in image flip/rotation, measurement labeling, grayscale adjustment, coordinate probe, and rendering/visual setting tools.

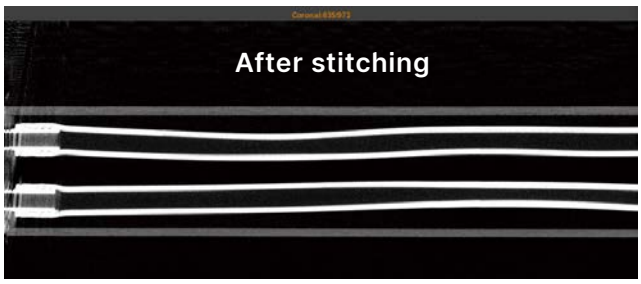


Imaging Technology

Image stitching

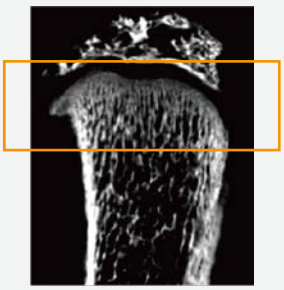
Image stitching technology uses Delta-developed algorithms to seamlessly stitch segments of circular cone beam CT images.



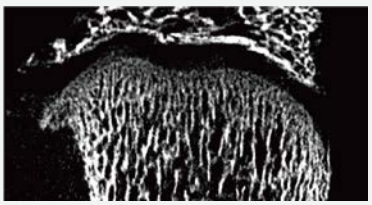


Sub-volume reconstruction

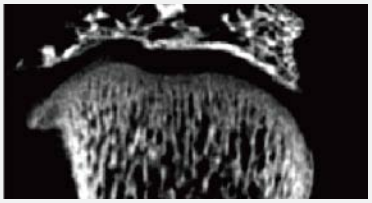
A reconstruction algorithm reconstructs local high-resolution images to optimize the original image.



15 µm Ex vivo mode



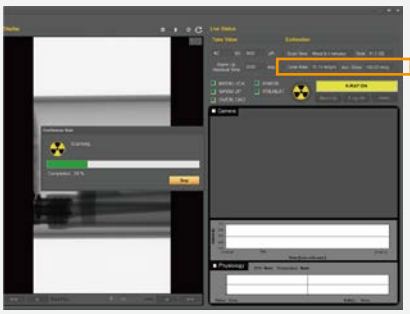
2 µm voxel size
(Delta)



Zoom in by interpolation
(Others)

Dose estimation

Signals received by the image detector are used to estimate the radiation dose exposed to the imaged object.



Dose Rate
Acc. Dose

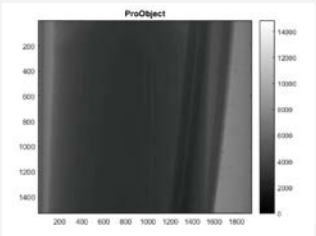
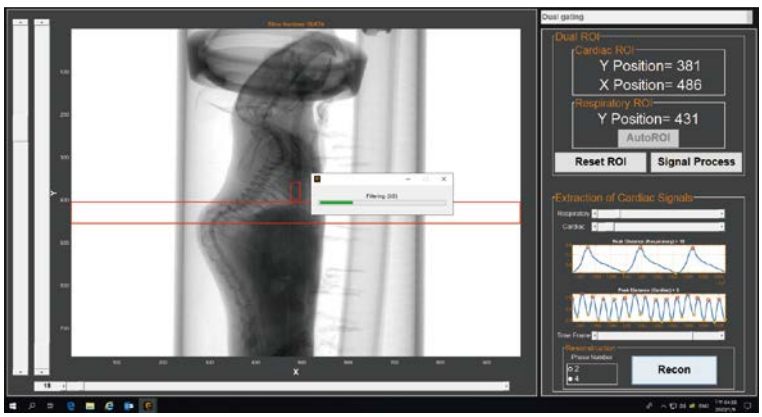


Image-based gating

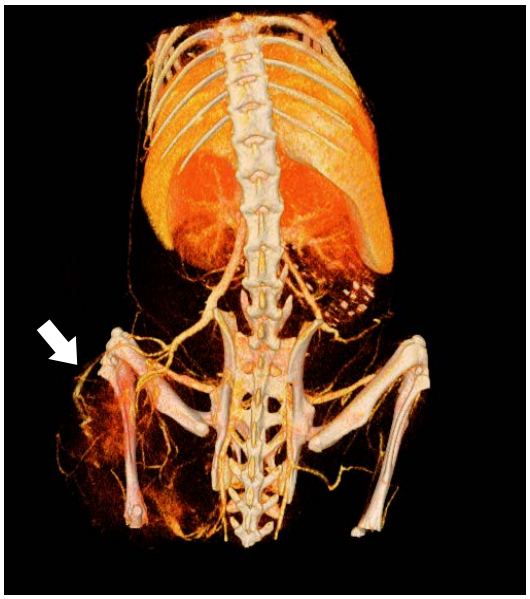
Signal analysis can be performed on captured images without additional sensors or ECGs. Image data are used to reconstruct pulmonary and two-phase/four-phase cardiac and cardiopulmonary gated images.



Result of image-based gating

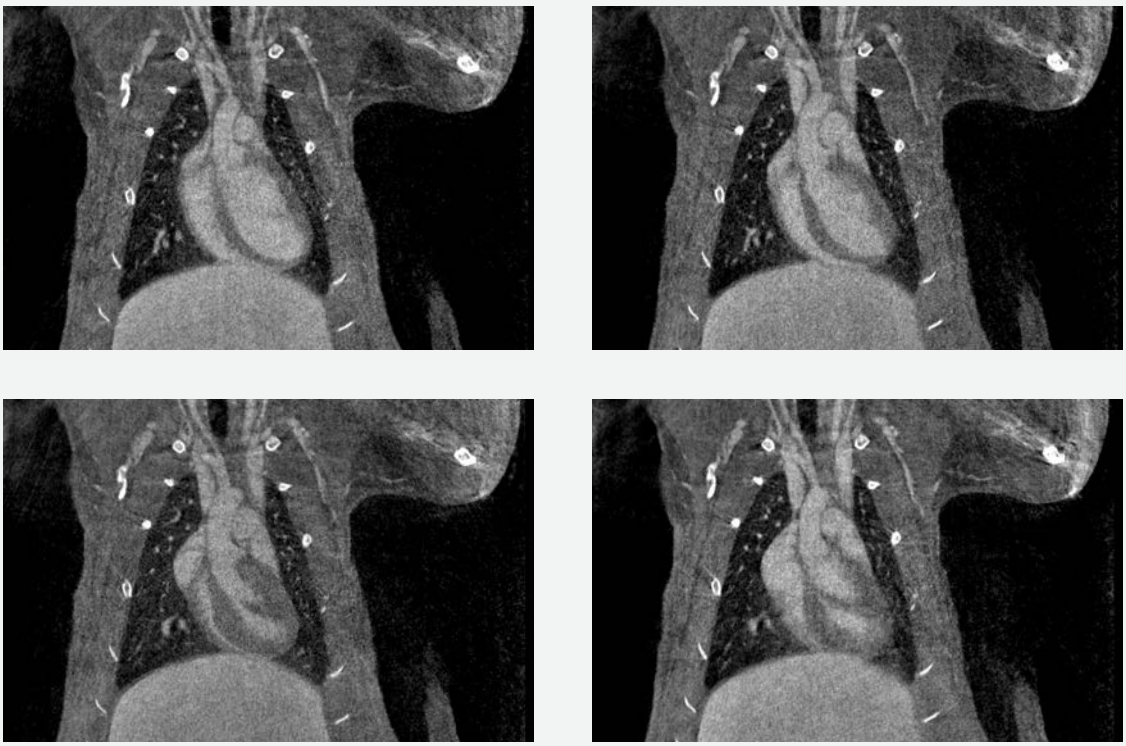
Result of general imaging

In Vivo Imaging



▲ **DELab μCT-100**
NU/NU Nude mouse
Cell line: CT26 colorectal cancer cell
Resolution: 22.5 μm, Scan time: 20 seconds

▲ **DELab μCT-100**
Complete presentation of an embryo's skeletal development in a pregnant female mouse
Resolution: 22.5 μm



▲ **DELab μCT-100 four-phase cardiopulmonary gated images**
Image-based gating algorithm is used to capture heart and lung images at different times for reconstruction without needing to place sensors or ECGs on the small animal.

General imaging mode

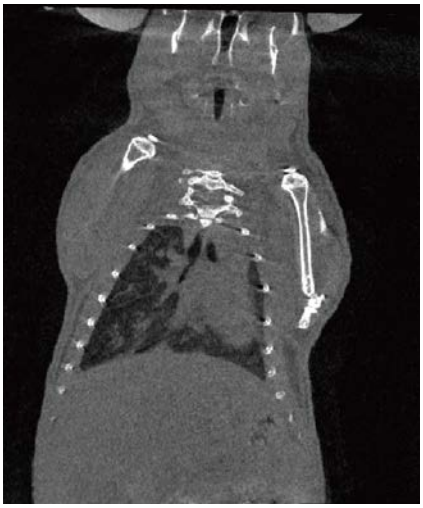
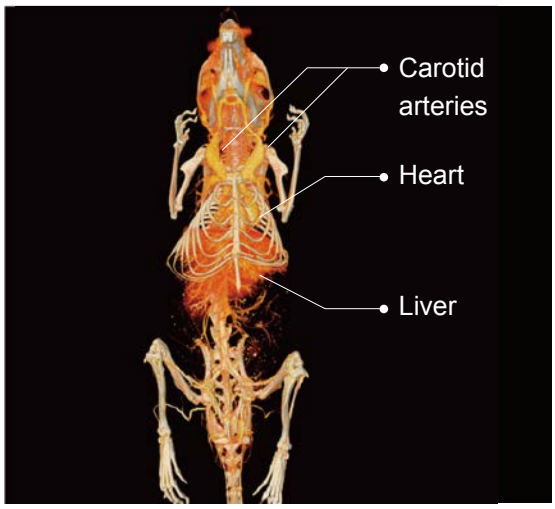
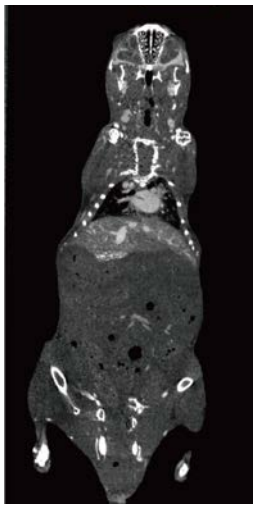


Image-based gating mode

◀ DELab μCT-100

Image-based gating captures images of the lung in a static state, and prevents blurred images due to breathing movement, thus providing a more accurate interpretation of the disease area and state of the lung.





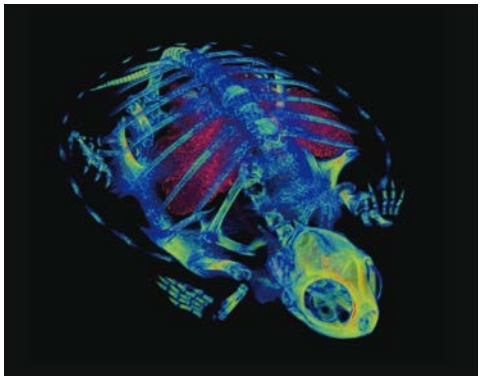
◀ DELab μCT-100 Whole-body angiography

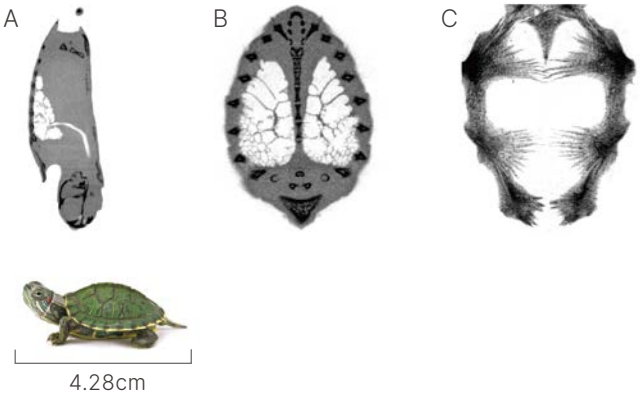
Whole-body angiography is performed using a contrast agent made specifically for small animals. Whole-body images can be obtained with two-step scanning.
Resolution: 44.9 μm
Scan time: 20 seconds
Number of scan steps: 2

6.5cm

▼ DELab μCT-100 Turtle

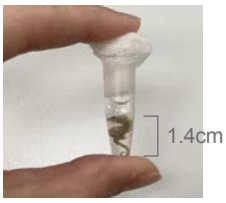
Surface rendering is combined with volume rendering.
Images A and B show the sagittal and coronal planes of the chest and trachea, respectively.
Image C shows the pattern on the turtle's plastron.
Resolution: 22.5 μm, Scan time: 20 seconds



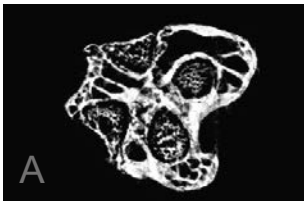


4.28cm

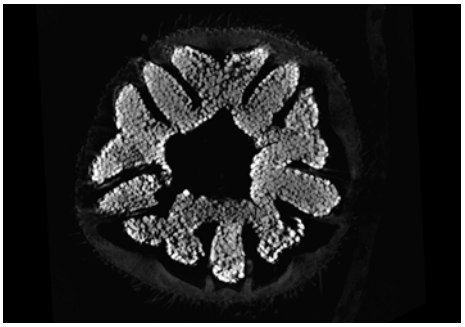
High-Resolution CT Image



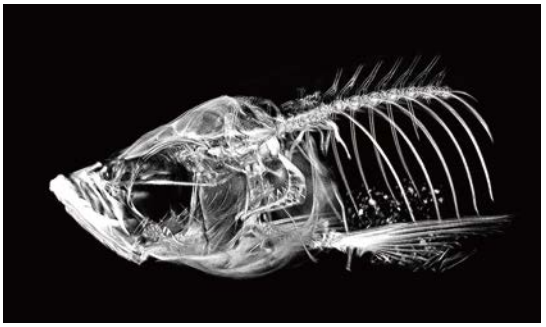
▲ **DELab μCT-100X Dwarf seahorse**, 40 kVp,resolution: 7.5μm
A combination of 2D and 3D images shows the characteristics of the seahorse, including the interior and exterior, biological features, structure, and number of bones.



▲ **DELab μCT-100 Mouse femur**
9 μm pixel ultra-high resolution
Image A: Transverse and 3D sections show details of the femur.



▲ **DELab μCT-100X**
Sand dollars
40 kVp, 0.3 mmAl
Resolution: 3 μm

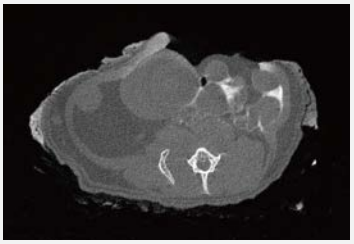


▲ **DELab μCT-100X**
Zebrafish
60 kVp, 0.3 mmAl
Resolution: 5 μm

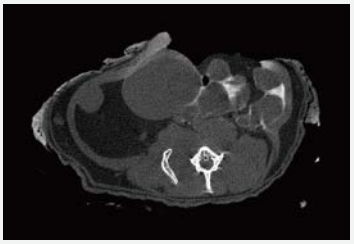
▲ **DELab μCT-100X**
Trilobite fossil
40 kVp, 0.5 mmAl
Resolution: 3 μm

Analysis

Dual-Energy Image Analysis

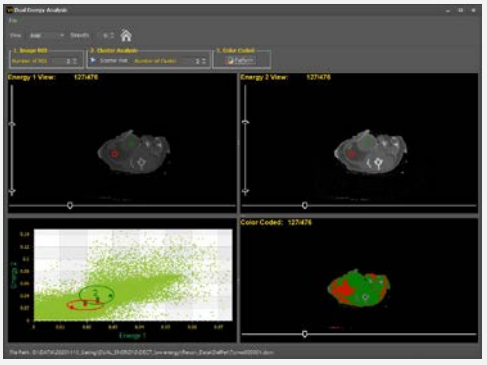


High Energy



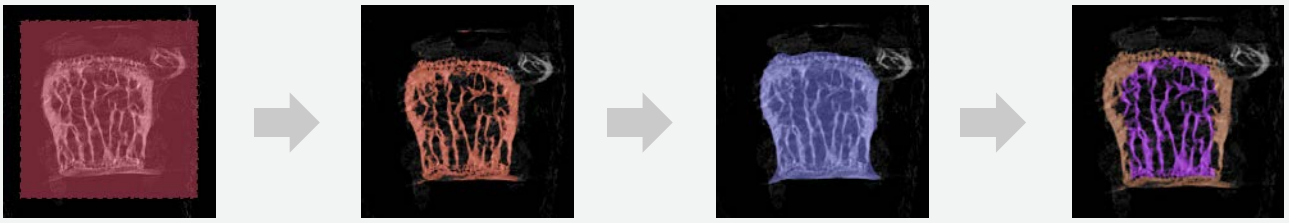
Low Energy

The dual-energy imaging program on the interface can be used to automatically capture two sets of images with different energy levels. Users can select the default dual-energy parameter setting for optimal fat and muscle comparisons. Alternatively, imaging parameters can be adjusted as required for experiments.

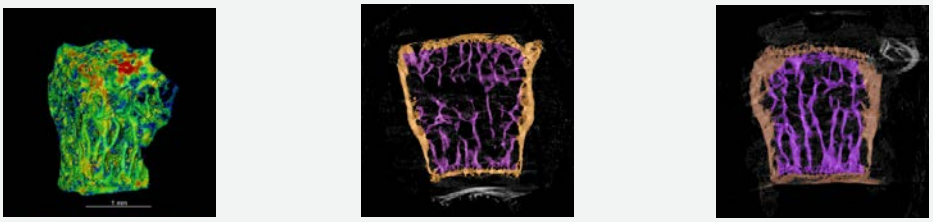


With the dual-energy image analysis software, the tissue of interest can be selected and distinguished using different colors.

Bone Morphology



Select ROI | Segment bone image | Confirm bone cavity range | Distinguish cortical bone and trabecula area

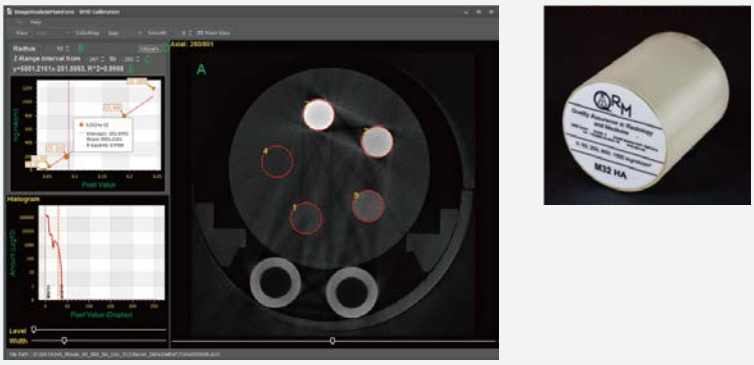


Thickness of trabecula | Osteoporotic bone | Normal bone

Bone morphology analysis calculates total volume (TV), bone volume (BV), ratio of bone and tissue volume (BV/TV), trabecula thickness (Tb.Th), and number of trabecula bones (Tb.N), etc.

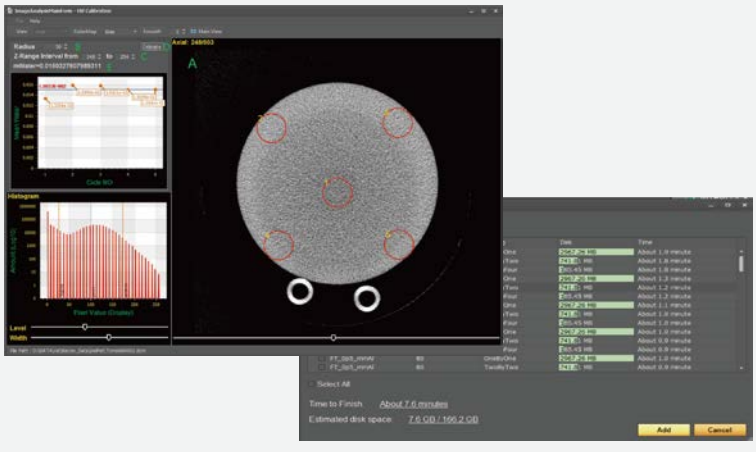
Bone Density Calculation

QRM's HA Phantom and the intuitive interface are used to analyze the scanned bone image and calculate bone density.



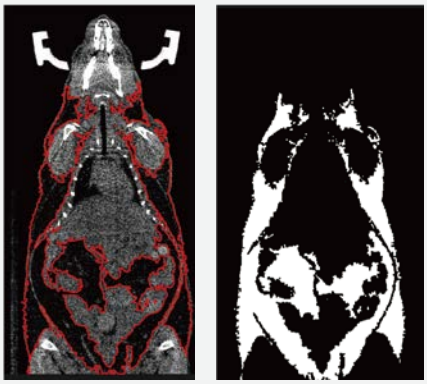
Batch Scanning and HU Calculation

The complex calibration process is simplified, allowing users to easily complete routine calibration works during non-working hours or when time permits during experiments .

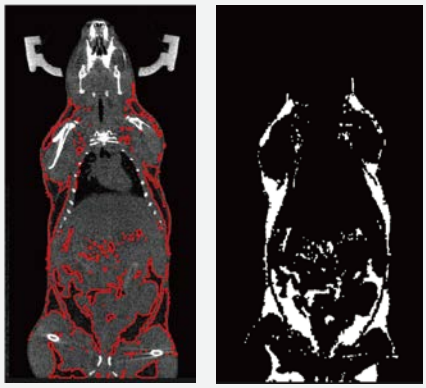


Body Fat Analysis

Using optimal scanning parameters, users can capture enhanced images for body fat analysis. The analysis software then calculates the volume of body fat as a percentage of the section image.



Body fat ratio: 0.36 (Obese mouse)



Body fat ratio: 0.16 (Normal mouse)

Specifications

DELab µCT-100

Micro Computed Tomography

For in vivo small laboratory animals and ex vivo samples

Model	MCL-090AF75P0 X
X-Ray System	
X-Ray Tube	40-90 kV, 50 W
X-Ray Detector	1536 × 1944, 14-bits, CMOS detector
Filter	0.5 mmAl, 1.0 mmAl, 1.5 mmAl, 0.2 mmCu and no filter, total 5 types
Inspection Performance	
Scan Mode	3D
Resolution	9 µm, 15 µm, 22.5 µm, 44.9 µm
Field of View	10 mm, 23 mm, 40 mm, 80 mm
Reconstruction Size	1944 × 1944 × 1536 pixel (Single scan)
Image Output Format	Raw, DICOM
Mechanical Design	
Sample carriers	3 carriers
Acceptable Sample Size (Diameter × Height)	Rat-size bed: 80 (ϕ) x 200(L) mm, Mouse-size bed: 40(ϕ)x 200(L) mm, Ex vivo bed: 10(ϕ) x 200(L) mm
Acceptable Sample Weight	< 5 kg
Dimension, Weight	88 × 150 × 150 cm, < 950 kg
Power	100-240V~/50-60Hz/5.85 A
Radiation Safety	< 1 µSv/h within 10 cm of the X-ray system (while scanning)
Accessories	
Software (Standard)	• System operation and image acquisition software • Image reconstruction software • 3D image analysis software
Equipment (Standard)	• Image acquisition and processing computer • Camera
Others (Optional)	• Anesthesia system • Uninterrupted power system (UPS)

DELab µCT-100X

Micro Computed Tomography

High-resolution desktop CT

Model	MCI-110	MCI-100
X-Ray System		
X-Ray Tube	40-110 kV, 16 W, 2 µm focal spot size at 2W	40-100 kV, 20W, 5 µmv focal spot size at 2W
X-Ray Detector	4032 × 2688, 14-bits, CCD detector	2944 × 2352, 14-bits, CMOS flat panel detector
Filter	0.3 mmAl, 0.5 mmAl, 1.0 mmAl, 0.1 mmCu+0.3 mmAl, 0.2 mmCu+1.0 mmAl and no filter, total 6 types	0.3 mmAl, 0.5 mmAl, 1.0 mmAl, 0.1 mmCu+0.3 mmAl, 0.2 mmCu+1.0 mmAl and no filter, total 6 types
Inspection Performance		
Scan Mode	2D, 3D	2D, 3D
Resolution	1 µm, 3 µm, 5 µm, 7.5 µm	5 µm, 15 µm, 33 µm
Field of View (ϕ x L)	**1 µm:** 4(ϕ) x 2.5(L), **3 µm:** 12(ϕ) x 7.5(L), **5 µm:** 20(ϕ) x 12.5(L), **7.5 µm:** 30(ϕ) x 18.5 (L) mm	**5 µm:** 14.5(ϕ) x 11(L), **15 µm:** 44(ϕ) x 33(L), **33 µm:** 97(ϕ) x 72.5(L) mm
Reconstruction Size	4032 × 4032 × 2688 pixel (Single scan)	2944 × 2944 × 2352 pixel (Single scan)
Image Output Format	• 2D: JPG, BMP, TIF, PNG, RAW • 3D: TIF, RAW, DICOM	• 2D: JPG, BMP, TIF, PNG, RAW • 3D: TIF, RAW, DICOM
Mechanical Design		
Sample carriers	4 carriers	3 carriers
Acceptable Sample Size (Diameter × Height)	**1 µm:** 11(ϕ) x 19(L), **3 µm**: 19(ϕ) x 35(L), **5 µm:** 24(ϕ) x 43(L), **7.5 µm:** 39(ϕ) x 44(L) mm	**5 µm:** 19(ϕ) x 35(L), **15 µm:** 39(ϕ) x 44(L), **33 µm:** 83(ϕ) x 146(L) mm
Acceptable Sample Weight	< 1 kg	< 5 kg
Dimension, Weight	96 × 95.5 × 67.5 cm (W × H × D), 430 kg	96 × 95.5 × 67.5 cm (W × H × D), 433 kg
Power	AC 110/220 V ± 10%, 50/60 Hz, 15A	AC 110/220 V ± 10%, 50/60 Hz, 15A
Radiation Safety	< 1 µSv/h within 10 cm of the X-ray system (while scanning)	
Accessories		
Software (Standard)	• System operation and image acquisition software • Image reconstruction software • 3D image analysis software	
Equipment (Standard)	• Image acquisition and processing computer • Camera	
Others (Optional)	• Loadable over 1000 kg, anti-vibration table • Uninterrupted power system (UPS)	

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