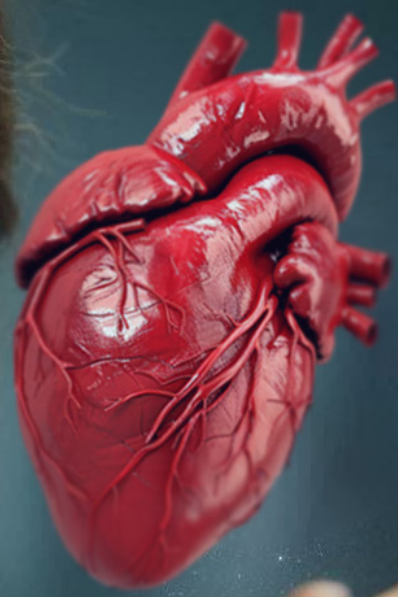


MEDICAL

ADVACAM

Imaging the Unseen

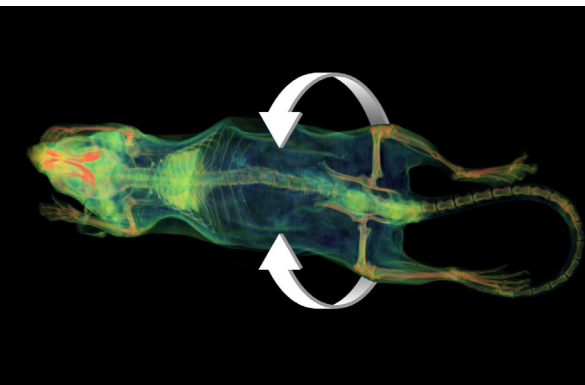


WELCOME PHOTON-COUNTING TO MEDICINE

Look into Every Heartbeat. Track Every Particle of your radiotherapy.

PRINCIPLES OF PHOTON-COUNTING BIOIMAGING

OUR PATENTED SOLUTIONS

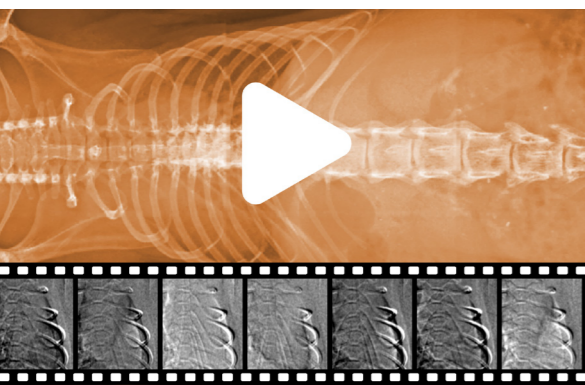
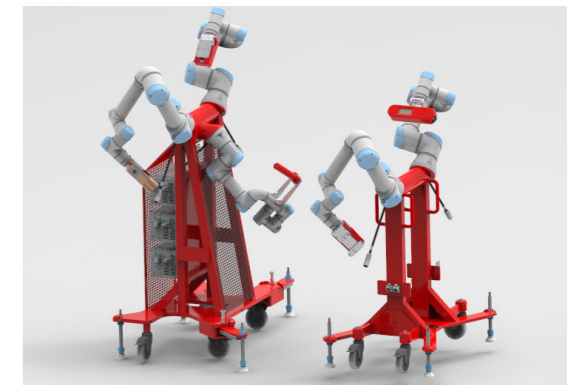


X-RAY OF SOFT TISSUES? IN COLOR AND 3D!

The high sensitivity of photon-counting detectors makes them ideal for imaging light objects, such as tissues. Every type of tissue can be distinguished thanks to the spectral sensitivity and high dynamic range of our cameras. Spectral radiography can also be extended to 3D using computed tomography.

IRRADION: THE FLEXIBLE X-RAY IMAGING

Unlike conventional systems with limited movement, the IRRADION portable robotic system offers greater flexibility, enabling 3D and spectral (color X-ray) imaging from almost any angle. With direct conversion photon-counting detectors, it provides high-resolution, real-time imaging and adaptable scanning for various sample types.



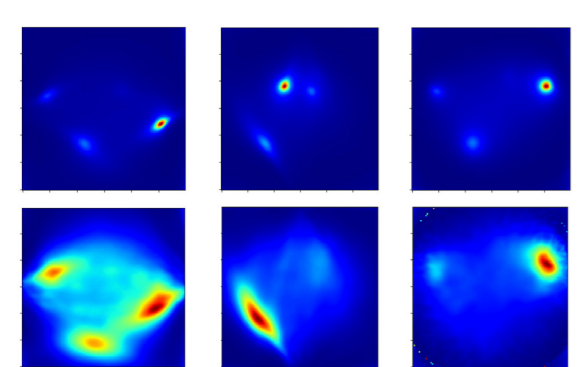
WATCH THE MOTION WITH REAL-TIME IMAGING

We can create X-ray videos. Our cameras capture up to thousands of X-ray images per second, producing high-speed X-ray footage of live organs and tissues. Watch real-time visualizations of dynamic processes, such as a rodent's heartbeat at a rate of 670 beats per minute, and see even the blood flowing inside.



DON'T MISS A BEAT

Utilizing a Medipix-3-based camera with ultrafast readout, we've successfully recorded the mouse's heartbeat at 700 bpm along with detailed views of its bones and muscles. With our detector and software the recording can be made at a rate of 1000 frames per second. Bone tissue can be suppressed using post-processing to make the heart visible even behind the rib cage.

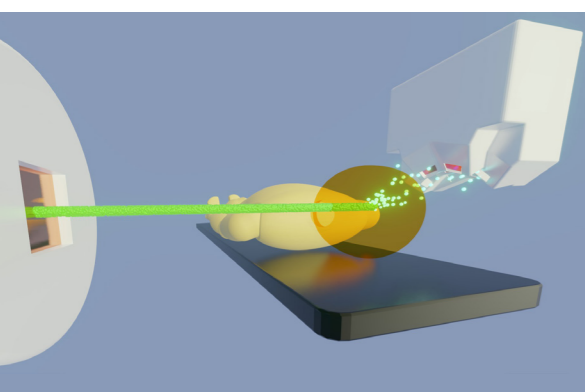


NAVIGATION TO RADIATION

Radioactive sources, such as radiopharmaceuticals inside the body, can cure cancer. However, it's important to be able to keep an eye on them. ADVACAM cameras can precisely locate radiation using patented Compton camera methods, improving SPECT and enabling us to determine the direction of every particle emitted from the therapeutic source.

THYROPIX: MONITOR THE EFFECT OF RADIOACTIVE DRUGS

The iodine-131 radionuclide is used to reduce the remains of thyroid gland tumors after surgery. ThyroPIX, a newly developed robot with a gamma camera, can help map its effects using Compton scattering for imaging. The detailed distribution of the radioactive source in the body can be monitored over time. The prototype was developed with the support of the Technology Agency of the Czech Republic.



NEED TO AIM THE THERAPEUTIC BEAM?

ADVACAM offers a new method to improve ion beam irradiation for head cancer. By collecting information on every particle, the detector can determine the direction of scattered particles and inform doctors whether the beam is accurately targeting the tumor. Our cameras can improve methods such as FLASH.



THERAPIX: REDUCE SIDE EFFECTS OF RADIOTHERAPY

Ion beams are used to irradiate tumors near the base of the skull. With ADVACAM's system for monitoring secondary radiation emitted during the treatment, the beam can be navigated more precisely to the tumor, enabling higher doses while avoiding side effects such as memory loss.



“COMPACT”

MiniPIX TPX3

Speed Parameters:	2.35 Million hits/s
Pixel Pitch:	55 μm
Number of Pixels:	65 536
Dimensions:	80 x 21 x 14 mm
Weight:	40 g



“FAST”

AdvaPIX TPX3

Speed Parameters:	38 Million hits/s
Pixel Pitch:	55 μm
Number of Pixels:	65 536
Dimensions:	210 x 94 x 38 mm
Weight:	905 g



“SPECTRAL”

WidePIX 2x5 MPX3

Speed Parameters:	up to 80 frames/s
Pixel Pitch:	55 μm
Number of Pixels:	655 360
Dimensions:	170 x 140 x 42 mm
Weight:	2000 g

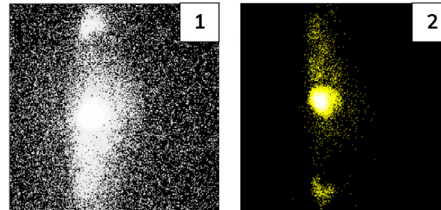
Lower noise, improved SBR

In vivo mouse measurement

A $^{99\text{m}}\text{Tc}$ solution with activity of 34MBq was injected via tail vein in a mouse body and then measured using ADVACAM's Timepix3 camera. The main advantage of using our detector is better separation or even reconstruction of usefull signals. Therefore, the background signals do not contribute to the final picture and do not degrade its contrast.

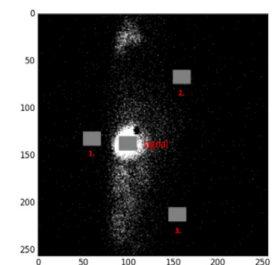
• **Signal to background ratio improved 8x**

• **Parasitic background signal suppressed**



- 1 All events without any energy criteria
- 2 Events of $^{99\text{m}}\text{Tc}$ photo peak 125–150keV

Spectrum filtering steps	Regions		
	P_1	P_2	P_3
whole measured spectrum	125,8	60,8	99,3
$^{99\text{m}}\text{Tc}$ Photo peak separation (135–150 keV)	453,4	453,3	1020,25
CdTe autofluorescence elimination	121,2	59,26	106,67
autofluorescence elimination + $^{99\text{m}}\text{Tc}$ Photo peak separation (135–150 keV)	450,6	579,3	1013,7
SBR improvement for individual regions	4	10	10
SBR improvement factor		8x	



SBR analysis for in vivo mouse measurement. The image on the right hand side shows events of whole spectrum.

