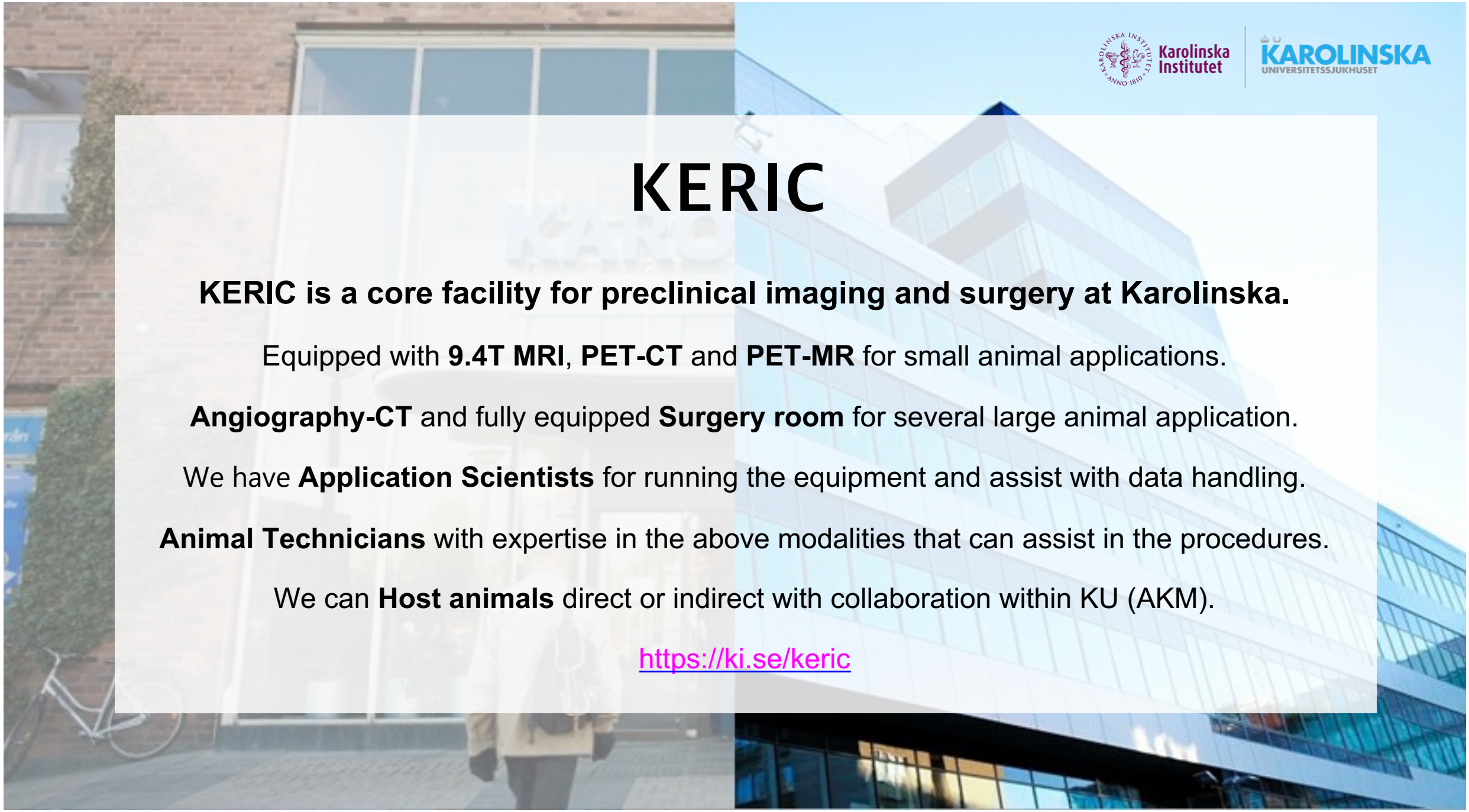

KAROLINSKA INSTITUTET ANNO 1810
Karolinska Institutet
KAROLINSKA UNIVERSITETSSJUKHUSET
KERIC
Experimental Research and Imaging



KERIC

KERIC is a core facility for preclinical imaging and surgery at Karolinska.

Equipped with **9.4T MRI**, **PET-CT** and **PET-MR** for small animal applications.

Angiography-CT and fully equipped **Surgery room** for several large animal application.

We have **Application Scientists** for running the equipment and assist with data handling.

Animal Technicians with expertise in the above modalities that can assist in the procedures.

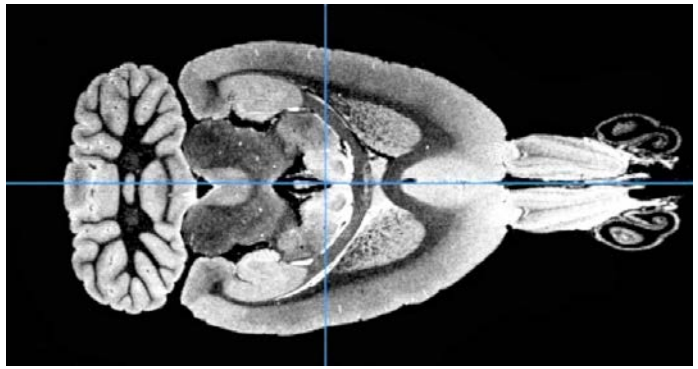
We can **Host animals** direct or indirect with collaboration within KU (AKM).

https://ki.se/keric

	MRI	CT	PET
Name:	Magnetic Resonance Imaging	X-ray, gamma	Radioactivity
Source:	MR, magnetic gradients and RF 22.6MHz @ 1T , 400MHz @ 9.4T	Computed Tomography CT (x-ray)	Position Emission Tomography PET (radioactive substances)
Targets:	Soft tissue: brain, organs, fat, blood. Other nuclei (19F)	Hard tissue: bone, vague organ images	Only radioactive source. Requires a reference images.
Cannot detect:	Bone, metal, regions close to material with different magnetic properties.	Water, not best for soft tissue	Only detects radioactive sources
Other benefits:	Can show diffusion and flow, anatomical, paramagnetic, functional MRI (fMRI)	Relatively fast, can be used with contrast to view veins and organs, good contrast for hard matters, good with metals.	Can view uptake and distribution. Can follow over time. Wide range of ligands.

MRI 9.4T

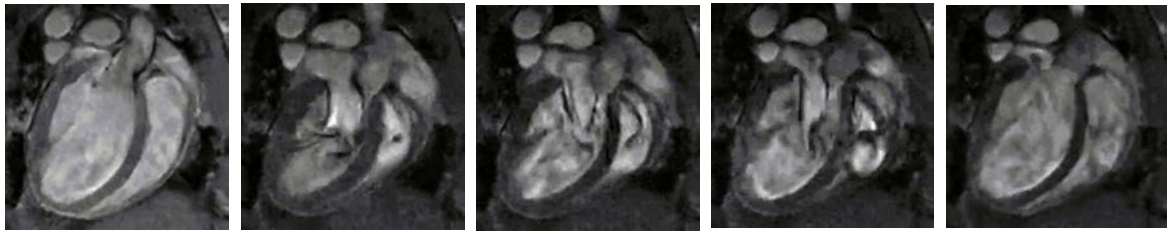
Preclinical 9.4T MRI equipped with three gradients with different bore sizes.
20 cm bore size for large larger animals such as rabbits and small piglets.
12 cm bore size for medium size animals such as rats.
6 cm bore size for smaller animals such as mice.



Rat brain (cordinal view)

We can do anatomical imaging of brain, spine, heart, legs or whole body in various animal models.
Arterial Spin Labelling, (ASL) in rabbit brain applications, fMRI, pharmacological MRI and cardiac imaging are established applications.

With monitoring system to follow biological data allow us triggering scanning to allow images with minimal motion artefacts for breathing or heart beat.

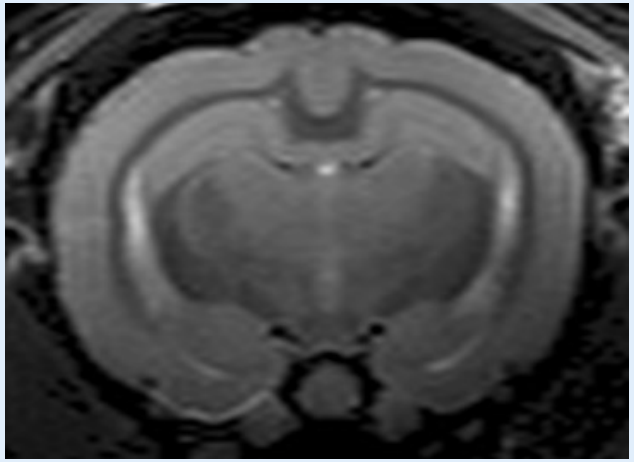


Rat heart. (reduced framerate)

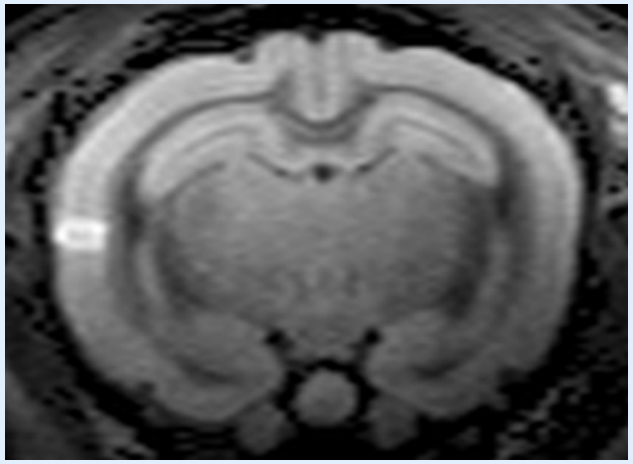
We are installing a new 9.4T MRI system (Q4 2022)
The system will have a cryo-coil for mouse brain applications and keep us updated with that latest experiments and features with preclinical MRI

MRI 9.4T

Rabbit brain. Induces stroke model

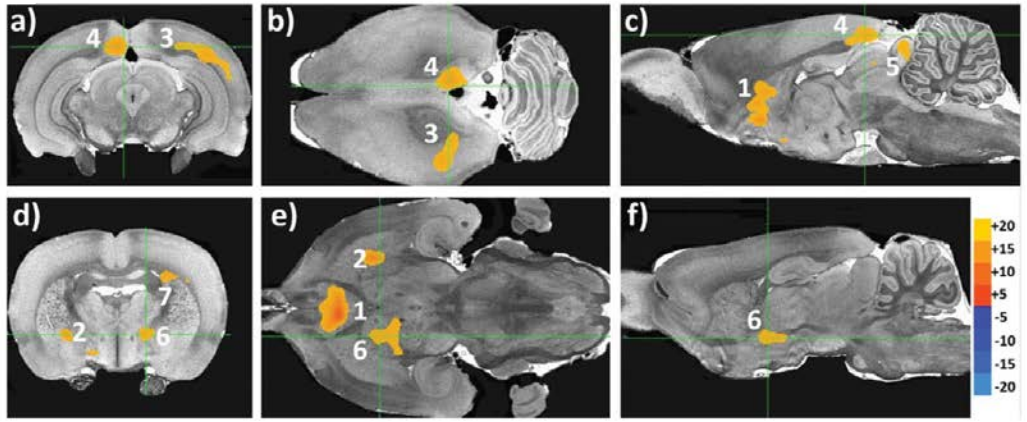


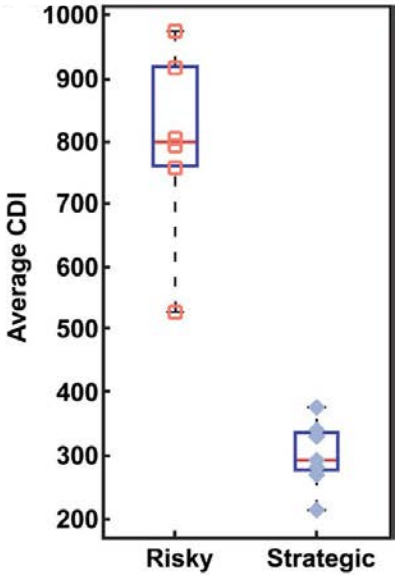
S0, T2 image (Standad MR image)



Difusion Weighted MR image

Gambling behaviour in rat model studied with fMRI





Tjernström N, Tie-Qiang L, Holst S, Roman E. ***Functional connectivity in reward-related networks is associated with individual differences in gambling strategies*** **in male Lister hooded rats**. Addiction Biology. 2022 Jan 17;27(2):e13131 link

Parkinson study in rat model with treatment of L-DOPA investigated with fMRI and dwMRI

Monnot, C., Zhang, X., & Svenningsson, P. et. Al. (2017). ***Asymmetric dopaminergic degeneration and levodopa alter functional corticostriatal connectivity bilaterally in experimental parkinsonism.*** Exp Neurol, 292, 11-20. link

Comparing rat model to human model with fMRI

Sierakowiak, A., Monnot, & Brené, S. et. Al. (2015). ***Default mode network, motor network, dorsal and ventral basal ganglia networks in the rat brain: comparison to human networks using resting state-fMRI.*** PLoS One, 10(3), e0120345. link

PET-CT / PET-MR 2x PET-CT and 1 PET-MR (1T)

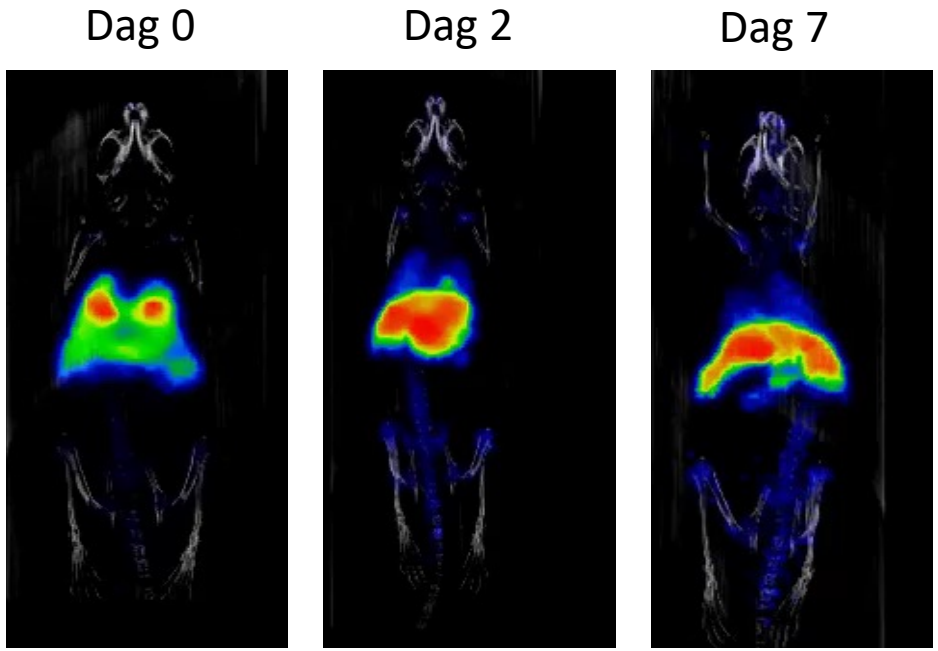
Collaboration with Radio pharmacy Core Facility (RCF) at KI

We can do PET with tracers containing:

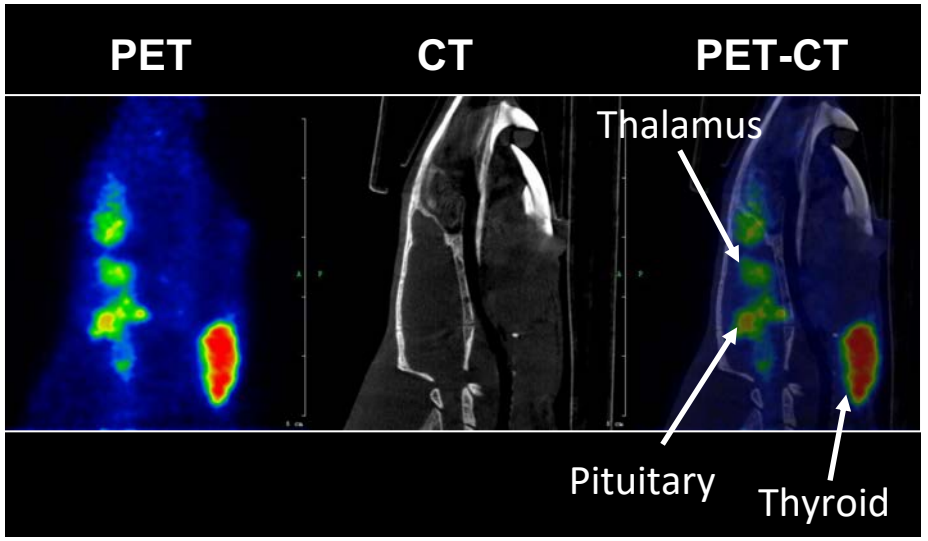
Short half time such as ^{18}F, ^{11}C or ^{123}I

Long half time such as ^{89}Zr, ^{68}Ga or ^{125}I

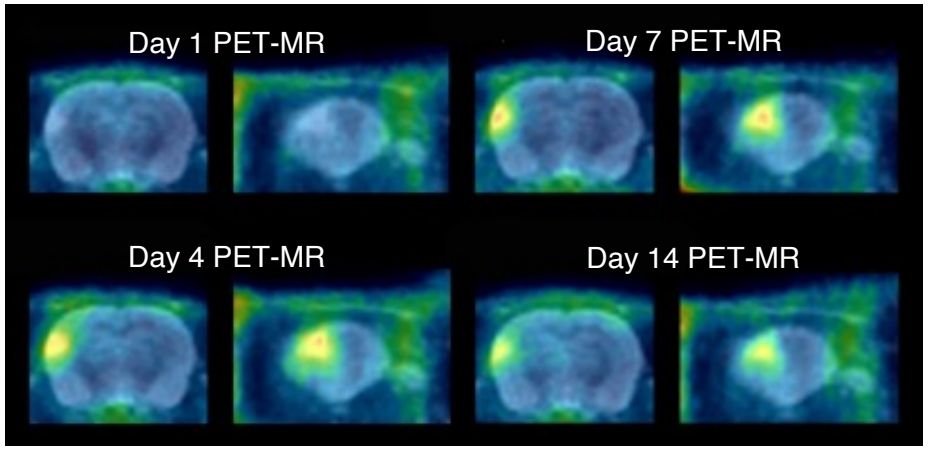
More complicated ligands that can be activated in-vivo



[^{89}Zr]Zr-oxine MOLM-14 Mus #38: 600 kBq, 0.8 x 10^6 cells



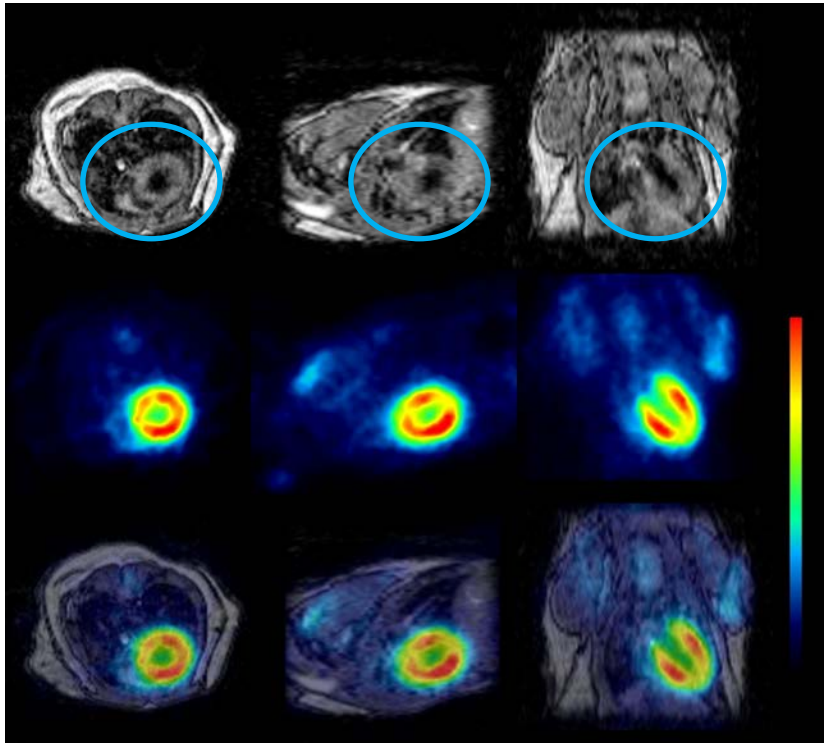
PET-CT tracer [^{11}C] in rat



PET-MR of uptake from day 1 to day 14 of using [^{11}C]PBR28 tracer in M2CAO animal.

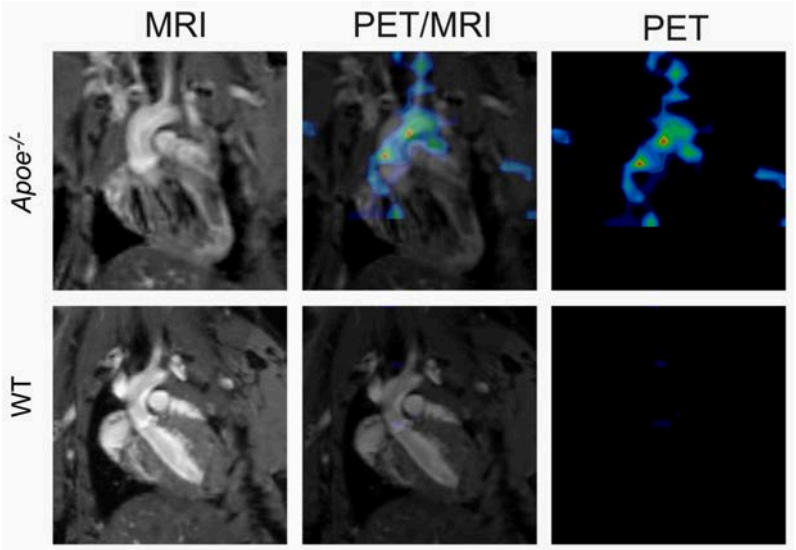
PET-CT / PET-MR 2x PET-CT and 1 PET-MR (1T)

PET-MR mouse heart (FTG)



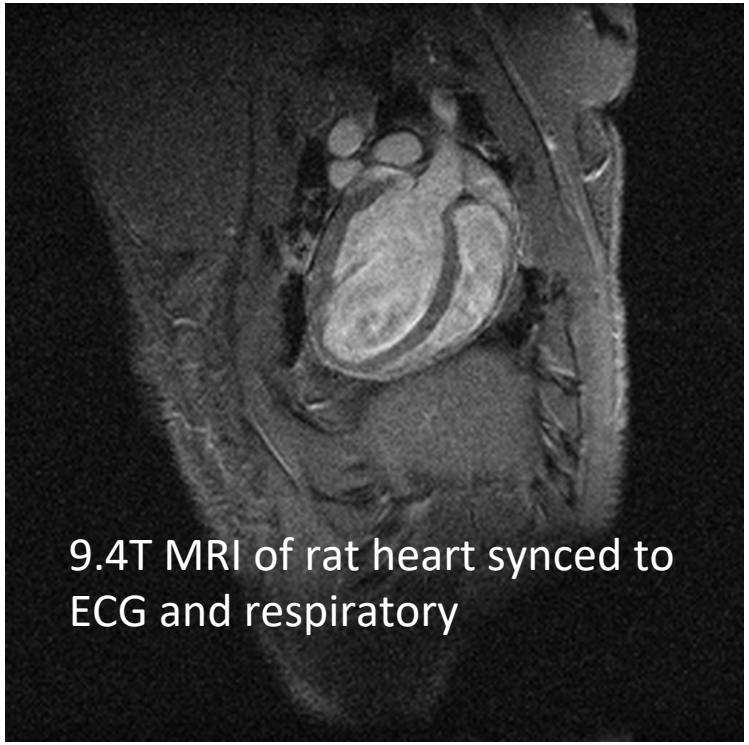
Strong PET signal from 18F (FTG),
but an avranged image of the heart

PET + 9.4T MRI mouse heart (89Zr)

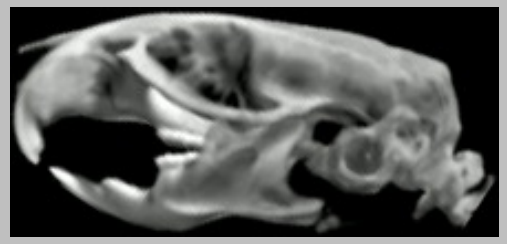


Rather weak signal from PET, but clear
MR signal from synchronized ECG + resp

2x PET-CT and 1 PET-MR (1T)



9.4T MRI of rat heart synced to
ECG and respiratory



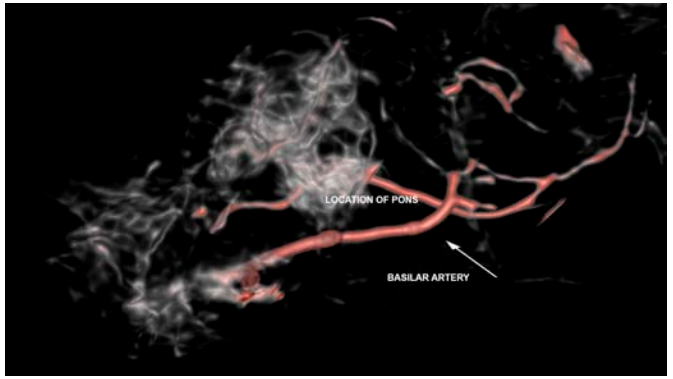
CT rat skull (reconstructed 3D)

Angiography CT

Angio-CT room

The equipment is continuously upgraded and used in activities like:

- Research in endovascular devices.
- Experimental stroke research, combined.
- Courses e.g. endovascular stroke treatment.
- Development of direct puncture devices.
- Super selective stem cell installation.
- Radiation reduction in angiography.



Angio-CT using contrast to visualize vessels in pig brain

Angio-CT using contrast to visualize vessels in brain, heart and kidney

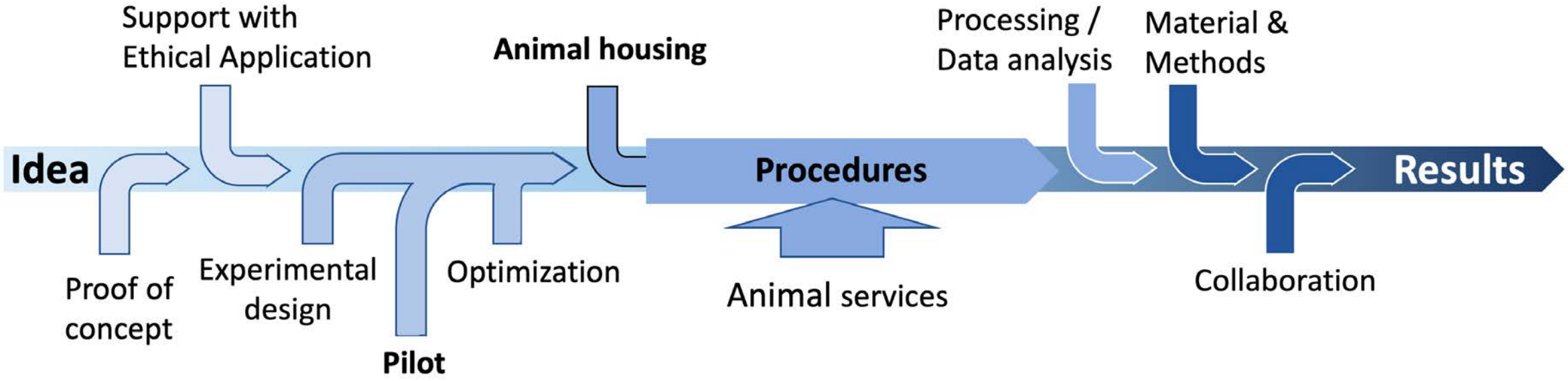
Experimental Surgery

Four fully equipped operating units for surgical training, courses, and research projects.

- Operating table (x4)
- Anesthesia equipment (Dräger Primus Infinity)
- Monitoring equipment (Datex / Philips MX800)
- Surgical diathermy (Valleylab, ForceTriad)
- Surgical light (Maquet Volista)
- Patient warming units (Mistral Air)
- Surgical suction
- Standard surgical instruments

Our operating units are regularly used for surgical training in areas such as transplantation, neuro/stroke, specialist trauma expertise, otorhinolaryngology, gynecology, pediatric surgery and more. We also have ongoing research projects for new and refined medical equipment and methods.

From Idea to Results



We can support preclinical projects from the initial **Idea** with a **Proof of concept** and setup of a **Pilot**.

Assist with the **Ethical Application** and take **care of the Animals** before, during and after the **Procedures**.

In imaging projects we also can assist with **data analysis** and **data processing**.

It is our mission that you reach your goal with the work performed at **KERIC**.

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Karolinska Institutet Research

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Research areas | Researchers | Research funding | Infrastructure

/ Research / Infrastructure / Core facilities for research / Karolinska Experimental Research and Imaging Centre (KERIC)

Karolinska Experimental Research and Imaging Centre (KERIC)

KERIC is a core facility offering different imaging analyses in experimental systems in combination with experimental surgery in large animals like swine as well as in rodents.
We offer a fully equipped facility for experimental surgery with four full size operation units equipped with ventilator.

Booking is done via iLab or in communication with staff.

about KERIC | book via iLab

Contact | Collaborations

Units at KERIC

Preclinical MRI 9.4T

PET-CT/MR

Angio CT

Experimental Surgery

Selected Research at KERIC

Some of our most successful customers that uses KERIC for their research.

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Idea → KERIC → Results

We can help you get your ideas to scientific results

Example of Workflow

How we can help in different stages of a research project. Not just images.

News for KERIC

https://ki.se/keric webpage update 2022-04-12

https://ki.se/keric

Selected projects and publications (scroll right)

Publications list from projects that have used KERIC facilities or collaborated direct with KERIC. List is in chronological order. Starting with the latest at top.

Please include KERIC in the acknowledgement, in publications based on results obtained from the any of our modalities or collaburated direct with us.

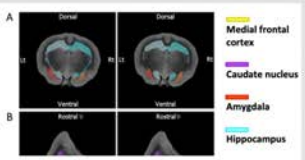
*"The ***** was performed at the Department of Comparative Medicine/Karolinska Experimental Research and Imaging Centre at Karolinska University Hospital, Solna, Sweden."*

/Thank you

nature COMMUNICATIONS

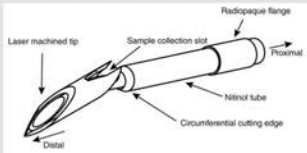
COVID-19 pathophysiology may be driven by an imbalance in the renin-angiotensin-aldosterone system

SARS-CoV-2 uses ACE2, an inhibitor of the Renin-Angiotensin-Aldosterone System (RAAS), for cellular entry. Studies indicate that RAAS imbalance worsens the prognosis in COVID-19. We present a consecutive retrospective COVID-19 cohort with findings of frequent pul- monary thromboembolism (17%), high pulmonary artery pressure (60%) and lung MRI perfusion disturbances. We demonstrate, in swine, that infusing angiotensin II or blocking ACE2 induces increased pulmonary artery pressure, reduces blood oxygenation, increases coagulation, disturbs lung perfusion, induces diffuse alveolar damage, and acute tubular necrosis compared to control animals. ...



Changes in brain architecture are consistent with altered fear processing in domestic rabbits

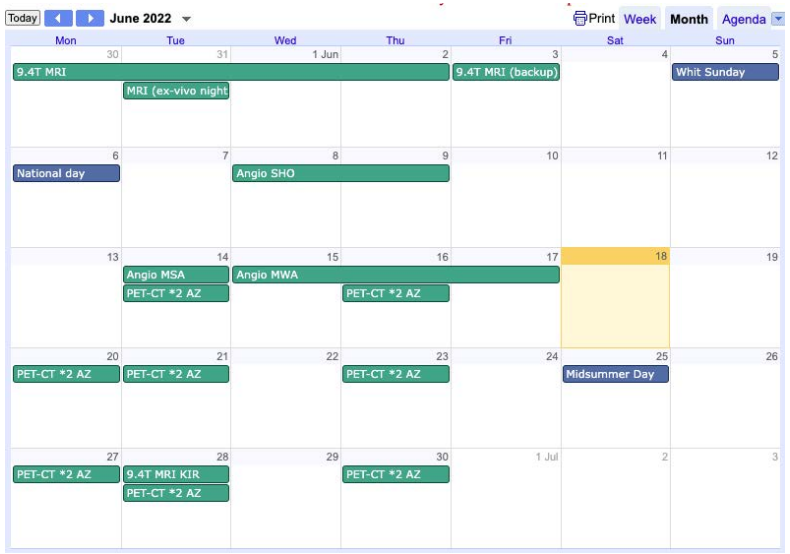
The most characteristic feature of domestic animals is their change in behavior associated with selection for tameness. Here we show, using high-resolution brain magnetic resonance imaging in wild and domestic rabbits, that domestication reduced amygdala volume and enlarged medial prefrontal cortex volume, supporting that areas driving fear have lost volume while areas modulating negative affect have gained volume during domestication. ...



Myocardial micro-biopsy procedure for molecular characterization with increased precision and reduced trauma

Endomyocardial biopsy is a valuable tool in cardiac diagnostics but is limited by low diagnostic yield and significant complication risks. Meanwhile, recent developments in transcriptomic and proteomic technologies promise a wealth of biological data from minimal tissue samples. To take advantage of the minimal tissue amount needed for molecular analyses, we have developed a sub-millimeter endovascular biopsy device, considerably smaller than current clinical equipment, and devised a low-input RNA-sequencing protocol for analyzing small tissue samples. ...

KERIC Calendar



Publications KERIC

Publications list from projects that have used KERIC facilities or collaborated direct with KERIC in reverse chronological order. Starting with the latest at top. (60 Publications)

Tjernström N, Tie-Qiang L, Holst S, Roman E. Functional connectivity in reward-related networks is associated with individual differences in gambling strategies in male Lister hooded rats. Addiction Biology. 2022 Jan 17;27(2):e13131https://doi.org/10.1111/adb.13131

Rysz, S. Al-Saadi J., Sjöström A., Farm M., Jalde F. C., Plattén M., Eriksson H., Klein M., Vargas-Paris R., Nyrén S., Abdula G., Ouellette R., Granberg T., Jonsson Fagerlund M., Lundberg J. COVID-19 pathophysiology may be driven by an imbalance in the renin-angiotensin-aldosterone system. Nat Commun 12, 2417 (2021). https://doi.org/10.1038/s41467-021-22713-z

Savva, C., Helguero, L. A., González-Granillo, M., Couto, D., Melo, T., Li, X., Angelin, B., Domingues, M. R., Kutter, C., & Korach-André, M. (2021). Obese mother offspring have hepatic lipidic modulation that contributes to sex-dependent metabolic adaptation later in life. Commun Biol, 4(1), 14. https://doi.org/10.1038/s42003-020-01513-z

Rysz, S., Jalde F. C., Oldner A., Eriksson L. I., Lundberg J. and Jonsson Fagerlund M. Treatment with angiotensin II in COVID-19 patients may not be beneficial. *Crit Care* **24,** 546 (2020). https://doi.org/10.1186/s13054-020-03233-6

Rysz, S. *et al.* The effect of levosimendan on survival and cardiac performance in an ischemic cardiac arrest model – A blinded randomized placebo-controlled study in swine. *Resuscitation* **150**, 113–120 (2020). https://doi.org/10.1053/j.jvca.2013.03.027

Ahmed, M., Tegnebratt, T., Tran, T. A., Lu, L., Damberg, P., Gisterå, A., Tarnawski, L., Bone, D., Hedin, U., Eriksson, P., Holmin, S., Gustafsson, B., & Caidahl, K. (2020). Molecular Imaging of Inflammation in a Mouse Model of Atherosclerosis Using a Zirconium-89-Labeled Probe. Int J Nanomedicine, 15, 6137-6152. https://doi.org/10.2147/IJN.S256395

González-Granillo, M., Savva, C., Li, X., Ghosh Laskar, M., Angelin, B., Gustafsson, J., & Korach-André, M. (2020). Selective estrogen receptor (ER)β activation provokes a redistribution of fat mass and modifies hepatic triglyceride composition in obese male

Thank you!

…and we hope to hear from you with your future projects

https://ki.se/keric