*Media release*

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**Innovation in imaging processes**

# World-leading nuclear medicine at Inselspital thanks to proximity to University of Bern (CAIM)

In 2020, the world's first ever installation of the fastest whole-body PET/CT scanner took place at Inselspital (Siemens Biograph Vision Quadra). A PET/CT (positron emission tomography / computed tomography) scan can be used to detect or evaluate tumor diseases with regard to progression and therapy response, but also to help answer neurological and cardiological questions.

The procedure involves administering to the patient low-level radioactive substances, the uptake of which is subsequently detected in the PET image and visualized in the form of cross-sectional images. By simultaneously combining this with computed tomography, the uptake of the radioactive glucose molecules is allocated to the individual types of tissue. In addition, the CT image is necessary for spatial attenuation correction of the PET image – a contrast in intensity must be established between processes in the deep interior of the body and superficial processes.

Inselspital already uses the world's best and most sensitive PET scanners, which only require a comparatively low radiation dose. Now this can be reduced even further in selected patient groups.

**An extended axial field of view (FoV) and highly sensitive measurement using AI-supported image attenuation results in better imaging and lower radiation exposure**
The Biograph Vision Quadra scanner, newly installed in 2020, is capable of imaging from the patient's head to pelvis in one go and many times faster than previously. In addition, radiation exposure can be further reduced with a lower dose of radiolabeled substances. In two recently published studies (attachment), it has been demonstrated that the use of deep learning (AI) can further improve image quality.

**Cooperation between AI specialists and physicians**

As the use of Artificial Intelligence techniques becomes increasingly important in medical imaging, close cooperation between physicians and computer scientists is necessary in research. The Department of Nuclear Medicine at the Inselspital implements this interdisciplinary research successfully at a very high level through the Center for Artificial Intelligence in Medicine (CAIM). For instance, the study now published in Nature Communications was conducted in collaboration with the specialized research group "AI in Medical Imaging" of the ARTORG Center for Biomedical Engineering Research at the University of Bern.

Additional research projects are currently underway to reduce the radiation exposure for PET/CT scans even further and ultimately bring it to a level comparable to a transatlantic flight. However, this requires the use of the whole-body scanner which throughout Switzerland is only available in Bern.

**Experts:**
- Prof. Dr. med. Axel Rominger - Chairman and Head
  Department of Nuclear Medicine
- Prof. Dr. ing. Kuangyu Shi
  Head of Artificial Intelligence and Translational Theranostics (AITT) & Center for Artificial Intelligence in Medicine (CAIM), University of Bern

  Inselspital, Bern University Hospital INO, Level B, Entrance 33, Freiburgstrasse 18
  CH-3010 Bern

**Links**:
- European Journal of Nuclear Medicine and Molecular Imaging
  Quantitative evaluation of a deep learning-based framework
  to generate whole-body attenuation maps using LSO background
  radiation in long axial FOV PET scanners. Hasan Sari · Mohammadreza Teimoorisichani · Clemens Mingels · Ian Alberts · Vladimir Panin · Deepak Bharkhada · Song Xue · George Prenosil · Kuangyu Shi · Mauricio Conti · Axel Rominger
  https://doi.org/10.1007/s00259-022-05909-3

- Nature Communications
  Using domain knowledge for robust and generalizable deep learning-based CT-free PET attenuation and scatter correction. Rui Guo · Song Xue · Jiaxi Hu · Clemes

Mingels · Konstantinos Zeimpekis · George Prensosil · Yue Wand · Yu Zhang · Marco Viscione · Raphael Sznitman · Axel Rominger · Biao Li · Kuangyu Shi
https://www.nature.com/articles/s41467-022-33562-9
- Institutions, Organizations
  o Department of Nuclear Medicine, Inselspital, Bern University Hospital
  o CAIM, Center for Artificial Intelligence in Medicine, University of Bern, Insel Gruppe Bern

**Contact:**

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