# PetVision Newsletter; 1st edition
## May 2024

## Welcome!
Enter the world of the **PetVision Newsletter** for a glimpse into an innovative project reshaping cancer diagnostic in the EU. Explore insights into cancer statistics, current diagnostic techniques, and the challenges we face. Dive into the vision of PetVision, promising a revolutionary change with state-of-the-art Positron Emission Tomography Imaging technology. Uncover the project's key objectives and innovative approaches. Discover participating partners, their roles, and presentations of their expertise. Unveil the project plan, timeline, and budget, along with opportunities for involvement. Join us in tracking PetVision's progress and expect exciting updates on achievements and simulations in upcoming Newsletter editions.

## Short overview of the project
Over 2.7 million people in the EU were diagnosed with cancer in 2020, while 1.3 million people lost their lives to it. Cancer cases are predicted to increase by 24% by 2035, making it the leading cause of death in the EU. The current leading specific molecular imaging diagnostic technique sensitive to cancer is based on Positron Emission Tomography (PET). Due to the high implementation cost of PET, this high-sensitivity diagnostics, is only available to less than 0,5 % of the medical centers in the world. The critical component of the overall cost is the cost of PET scanners.
Positron Emission Tomography is one of the current leading methods in diagnostic medical imaging. It is based on the precise and efficient measurement of the position, the energy, and the time-of-arrival of two coincident back-to-back annihilation photons from a radio-pharmaceutical. **PetVision proposes a radical vision to translate breakthrough findings in** Time-of-Flight PET detection **to a revolutionary high-sensitive, fully modular, cost-accessible device by developing a technology that will increase 10-fold the sensitivity of current PET scanners and will enable the development of smaller modular open geometry devices**, providing health professionals with **faster, earlier and more precise means of diagnostics**. A limited angle prototype imager constructed during PetVision will be independently **validated** in **two world-renowned hospitals** to provide reliable and solid evidence to health policymakers for reviewing the recommended imaging methodologies and include the proposed imaging technology in everyday medical practice. The developed cost-effective technology will also reduce the cost of the devices, enable higher patient throughput and in the long term make this functional imaging modality **personalized, more precise, and more accessible to the patients, while offering the possibility to significantly reduce the patients' radiation exposure.**

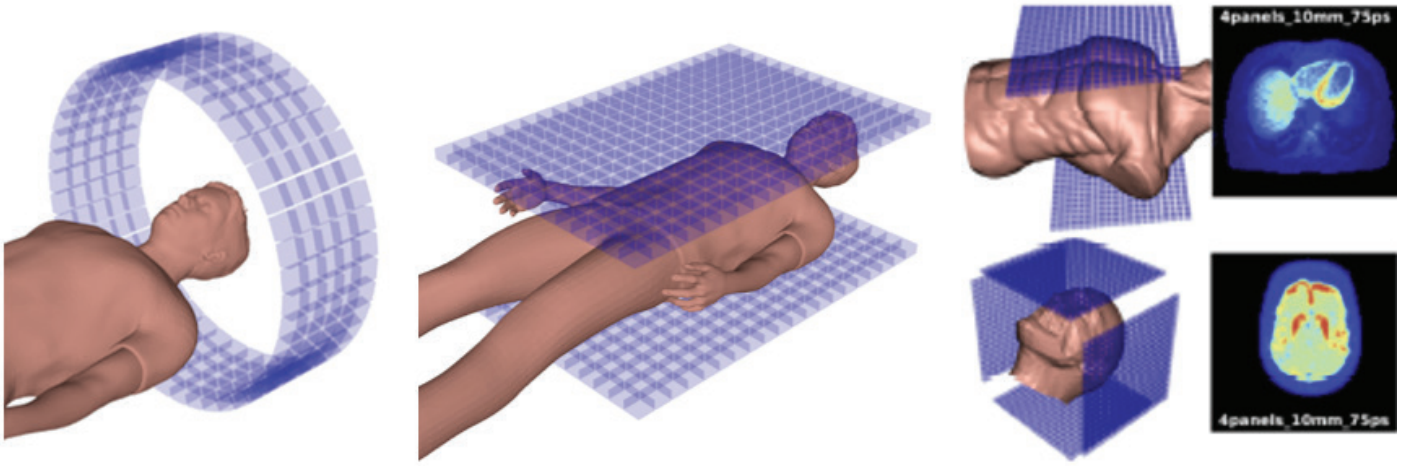


*Figure 1: Standard arrangement of gamma detectors for PET (left); a total body arrangement based on TOF PET panels (centre); thorax and head arrangement based on TOF PET panels with reconstructed images of a digital phantom (right).*

The main objective of PetVision is to develop a flexible, modular PET scanner, based on planar detector panels with exquisite time-of-flight (TOF) resolution and sensitivity, enabling for affordable, fast and precise dynamic scanning, and hence opening the way for early cancer detection and therapy follow-up, paving the way for personalized medicine.

For the realization of the device, a package of breakthrough innovations in detector design, photo-sensor, and front-end electronics are planned. We expect that the proposed device will dramatically impact human health.

The project started in September 2023 and will finish in 5 years. The total budget is 3,3 mio EUR.

## Project partnership

The project requires a highly interdisciplinary approach. The coordinating **JSI team** has a lot of experience with the design, calibration, and running of complex detection systems. **Yale** and **TUM-Med** will complement this knowledge with their solid experiences with pre-clinical and clinical diagnostics, having direct insight into the unmet diagnostics/ treatment needs. The key components, integrated light sensors, will be designed in **FBK**, one of the world's leading research centers for Silicon photomultipliers (SiPM), while **UB** will develop the ASIC needed for the integration with the sensor. **CSIC** will develop the DAQ. Based on the design by **Oncovision**, the system will be built at **JSI**, the final system will be validated in the **Yale** and in the TUM-Med. Partners have successfully cooperated also in the past.

The **Jožef Stefan Institute (JSI)** is the leading Slovenian research institute, covering from basic to applied research. The team with more than 25 years of experience from the **Experimental Particle Physics Department** is/was involved in the design, construction, calibration and running of several High Energy Physics Experiments and detector instrumentation knowledge transfer to Medical Physics. Involved in the R&D of complex systems for the detection of low levels of light.

**University of Barcelona (UB)** with the staff having more than ten years of experience focuses on the R&D of read-out electronics for scientific and industrial instrumentation. They design low-noise and high-speed front-end electronics (ASICs), and digital back-end acquisition systems, including slow control and monitoring electronics.

**Fondazione Bruno Kessler (FBK)** is one of the top Research Institutes in Italy and among the worldwide recognized leaders in SiPM development. The CRS unit focuses on the research and development of advanced solid-state radiation detectors and image sensors. Its expertise in silicon photomultipliers includes the sensors' design, tuning of the fabrication process and its implementation.

**The Spanish National Research Council (CSIC)** members have 20 years of experience developing sensors and systems for Medical Imaging. The group has developed several CT, PET, and SPECT systems, with more than 50 innovative patents, for biomedical studies with small animals and for clinical diagnosis, that has been very successful in the market.

**Oncovision** is a molecular imaging company, with offices in Spain and Boston and a 15+ successful track record of technology transfer and launching of innovative products, developed hand in hand both with top global research institutions and with hospitals and leading clinical innovators. With more than 100,000 (primarily cancer) patients successfully diagnosed and treated with the support of its products in 35+ countries, a solid, result-focused, and experienced team combining medical and business values and a vibrant pipeline.

**Yale University PET Center of the Yale School of Medicine, Yale University**, is a multidisciplinary research center dedicated to improving patient care by developing and translating innovative new biomedical imaging technologies used in both diagnosis and therapy to clinical practice. It is one of the biggest world centers for medical imaging.

**The Department of Nuclear Medicine at the Rechts der Isar Hospital (TUM-Med)** is an internationally well-known center for all diagnostic and therapeutic Nuclear Medicine procedures focused on imaging of prostate cancer. The department has a well-established clinical trials office which is highly experienced in the practical and regulatory aspects of clinical trials with new imaging technologies.

## You can meet us here:

- PSMR 2024, 20-23 May 2024, Italy
- MEDAMI 2024, 24-26 May, 2024, Italy
- IEEE NSS MIC 2024, 26 Oct – 2 Nov 2024, USA

## What to expect in the next Newsletter?

Outcomes of the simulated performance of the system under development.
Panel layout and its influence on system performance.

https://petvision.org/

PET VISION

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