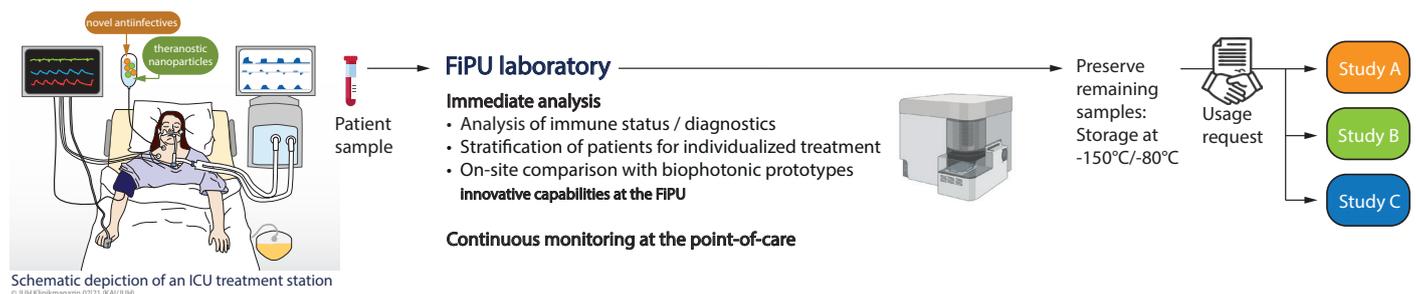


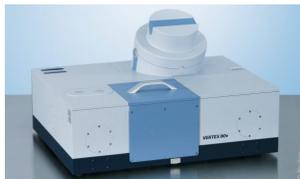


# First-in-Patient Unit – Photonics in Clinical Practice

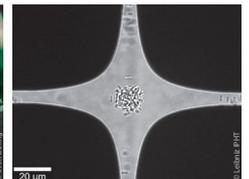
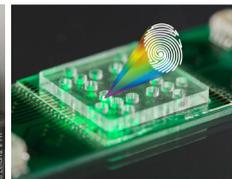
The First-in-Patient Unit (FiPU) is one of the key features of the LPI, serving as its translational unit embedded in the Intensive Care Unit of Jena University Hospital (JUH). Our goal is to provide rapid and cost-effective point-of-care diagnostics, monitoring and therapeutic interventions for severe and difficult-to-treat infections. Located within JUH, the FiPU embodies our mission to translate photonic and infection research directly into clinical practice and patient care. At the FiPU, novel diagnostic technologies and therapeutic treatment options can be tested, adapted and clinically validated under real-life conditions. From 2027 onwards, pilot bedside studies will be launched.



## Beyond the state of the art



High-resolution spectral data of patient samples allows for characterization of host metabolic and immune responses as well as pathogen identification in seconds via infrared spectroscopy.



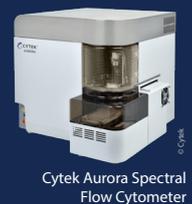
Laser-based rapid test: The RamanBioAssay™ enables the detection of bacteria and their antibiotic resistance within three hours instead of days. Thus, clinicians can adapt treatment strategies more rapidly.

## Key Features

- Laboratory unit for immediate sample processing and adaption of technologies
- 1-bed rooms for patient treatment next to labs
- Secure and regulated environment
- Experienced JUH staff ensure safe study implementation

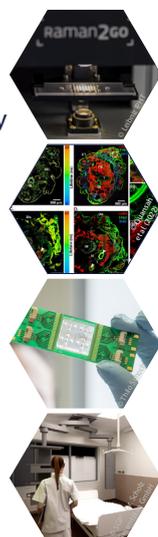
## Laboratory for Cell Separation

Established on-site, a lab for cell separation enables a standardized, multidimensional characterization of immune cells from patient samples. Multispectral flow cytometry serves as a functional reference standard for biophotonic and translational initiatives.



## Innovative Opportunities

- Multimodal spectroscopy: hyperspectral Raman microscopy for rapid identification of pathogens
- Non-invasive patient monitoring, e.g., via respiratory gas analysis of volatile organic compounds
- Fiber optics-based technologies: monitoring of antibiotic effects in real time via spectroscopy
- Lensless imaging: coherent diffraction imaging for microscopy with nanoscale resolution



## Innovative Perspectives

- Nanoparticle-based therapies: targeted, optimized substance release at the site of infection
- Phage therapy: the use of specific bacteriophages to fight multiresistant pathogens
- Cold atmospheric plasma therapy: usage of reactive oxygen species for wound disinfection and healing
- Companion diagnostics: development of accompanying diagnostic procedures for personalized therapies

## Contact

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