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## EUROPEAN KATY PROJECT



### AI-Empowered Personalised Medicine System to Improve Cancer Treatments

*©New Horizon 2020 project will bring AI-based medical knowledge to the fingertips of clinicians and clinical researchers*

The newly launched EU-funded KATY project (<https://katy-project.eu/>) has set out to build a precise personalised medicine system empowered by Artificial Intelligence (AI). The novel AI tool aims to predict the response of kidney cancer to targeted therapies and identify the molecular evidence to support these predictions. Most importantly, the KATY system will offer human interpretable knowledge that clinicians and clinical researchers can trust, adequately evaluate and effectively use in their everyday working routine. The 4-year 8.5M € project is funded by the EU call **“Trusted digital solutions and Cybersecurity in Health and Care”** under the topic **“AI for Genomics and Personalised Medicine”**. Three CEA centers with expertise in experimental and numeric technologies for precision medicine joined forces to participate in the KATY project: the Laboratory of Biology and Biotechnology for Health (UMR1292 INSERM/CEA/Université Grenoble Alpes, DRF-CEA-Grenoble) the Laboratory for Integration of Systems and Technology (DRT-CEA-Saclay) and the National Center of Human Genomics Research (DRF-CEA-Evry).

Personalised medicine has changed how doctors diagnose patients and treat diseases. Researchers and clinicians are increasingly customising treatments to fit patient needs. In cancer care, targeted therapies have been developed as advanced therapeutic options for anti-tumour treatments. They are now part of the primary therapies for treating several cancer types. After profiling the molecular characteristics of a patient’s tumour, these characteristics are then translated into an appropriate therapeutic choice applicable in clinical practice. The procedure requires identifying a molecular signature specific to the patient’s tumour and the signature association with the most effective treatment.

KATY’s personalised medicine tool in cancer care will boost the use of tailored, targeted treatments and answer a problem encountered daily by clinicians: Which targeted therapy is the most suitable for each patient?

**“The real challenge is building AI-empowered personalised medicine systems that can be accepted by and, even more, is worth the trust of clinicians and clinical researchers. It is not sufficient to build a wonderful, precise AI system that gives hints on how to solve big problems in medicine by using -omics resources. AI needs to dissipate the *Dr Google* effect for clinicians and in their relationship with patients.”**, says Prof. Fabio Massimo Zanzotto, coordinator of the KATY project at the Università Degli Studi Di Roma “Tor Vergata”.

KATY will experiment its AI system with data from patients with clear cell Renal Cell Carcinoma (ccRCC), the major subtype of kidney cancer.

KATY’s novel AI system will be built around two main components: A Distributed Knowledge Graph (DKG) and a pool of eXplainable Artificial Intelligence Predictors (XAIPs). While the DKG is an intelligent repository storing large multi-omics patient and scientific information, the XAIPs will enrich the DKG and deliver understandable personalised medicine decisions. By linking patients’ data to extensive

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banks of -omics, biobanks, and publicly available datasets and other registries, clinicians and clinical researchers will be equipped to predict patient response to targeted therapies and to identify of molecular evidence to support these predictions.

Over the next four years, KATY will be supported by € 8.5 million in funding from the European Union's Horizon 2020 Framework Programme. Twenty internationally-renowned institutions from Austria, France, Germany, Greece, Italy, Poland, Portugal, Spain, Sweden, Ukraine and the United Kingdom form the project consortium.

Dr. Christophe Battail, researcher at the Interdisciplinary Research Institute of Grenoble (CEA-IRIG) says: **“We are excited that our technologies and expertises are helping to shape the future of European precision medicine. The three CEA partners involved in KATY have a strong collaborative relationship that will enable the CEA to bring multi-disciplinary expertises to the project. In particular, 1) genomic profiling of patient cohorts, 2) the development of AI-based predictive models from large-scale multi-omics data using the TGCC/CCRT and a European high-performance computing infrastructure, and 3) the validation of predicted patient responses to targeted therapies using cutting edge ex vivo cell culture models (tumoroids, organotypic tissue slice cultures, PDX mouse models). This project is carried out in synergy with the Urology department (Prof. Jean-Luc Descotes) of the CHU Grenoble Alpes.”**

The experience gained within KATY will support the development of precision medicine in our hospitals by providing new AI-based tools for clinicians to help them in choosing the most suitable anti-tumor treatment for each patient.

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