

Digital pathology and artificial intelligence to guide decisions in cancer therapy



TYPE	Roadbook/Implementation plan/Strategy	LAST UPDATE	June 2021	LITHUANIA • NATIONAL
STATUS	Decision is pending			Setting • Diagnostic and treatment • Decision-support tool

PROBLEM & OBJECTIVE

PROBLEM Digital and computational pathology is becoming a core component of multimodal AI solutions for cancer patient management; however, an investment into the necessary infrastructure, staff, and processes is slow.

OBJECTIVE Development of hospital-based AI ecosystems paves the way to integrate with emerging federated multi-institutional platforms for AI-enhanced knowledge base and clinical applications.

KEY COMPONENTS / STEPS

- Upgrade digital pathology platform and develop AI environment at the VUHSK.
- Ensure interoperability of the platform with other VUHSK (2022) and National Biobank information systems (2023) as well as with National Cancer Control Program Information systems (for cervical, breast and colorectal cancer, 2024).
- Support development of pathology, clinical, informatics and AI research teams within the VUHSK and outside.
- Explore business models, interoperability, and research collaborations with the BIGPICTURE consortium (central repository for digital pathology, IM2) as slide contributing third party.

KEY CONTEXTUAL FACTORS

- Digital pathology enables use of high-capacity and advanced AI tools. Along with informatics in various oncology domains, it allows to go beyond patient stratification based on human expert perceptions¹. In particular, computational pathology becomes crucial for assessment of tumor immune microenvironment and intratumoral heterogeneity²⁻⁴. Since 2010, National Center of Pathology (an affiliate of Vilnius University Hospital Santaros Klinikos), which also provides pathology services for the National Cancer Institute and other oncology units in Lithuania, has developed a digital pathology platform with over 150,000 whole slide images, collected during diagnostic routine and research projects. Multidisciplinary research teams are building up to support and utilize the digital data collected. To support further collaborations and interoperability at the hospital and international level, it is necessary to upgrade digital infrastructure, processes, and promote dedicated staff

MAIN IMPACTS / ADDED VALUE

- Digital pathology, radiology and other image-based machine learning is a powerful addition to molecular testing in oncology. Multimodal AI solutions will bring a new level of precision to personalized cancer therapy. In general, they maximize the utility of the testing already performed in clinical routine. Digital technology and AI benefits, by their nature, can be equitably distributed across the oncology institutions, patient groups, and regions.

LESSONS LEARNED

- Close collaboration of health IT staff, AI research teams, and decision makers is crucial to design the development plans.
- Legacy health information systems with outdated architecture structured may obscure the integration efforts.
- Synchronized action at the institutional, national, and international level is necessary.

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REFERENCES & DOCUMENTATION

- Topol EJ: High-performance medicine: the convergence of human and artificial intelligence - Nature medicine 2019
- Koelzer VH, Sirinukunwattana K, Rittscher J, Mertz KD: Precision immunoprofiling by image analysis and artificial intelligence. Virchows Archiv 2019. <Go to ISI>://WOS:000463683700010
- Galon J, Bruni D: Tumor Immunology and Tumor Evolution: Intertwined Histories - Immunity 2020
- Laurinavicius A, Rasmusson A, Plancoulaine B, Shribak M, Levenson R: Machine-learning-based evaluation of intratumoral heterogeneity and tumor-stroma interface for clinical guidance. Am J Pathol 2021

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