**Cancer Patient Digital Twin**

Optimize Treatment Planning with Clinical Decision Support

**The Need for Clinical Decision Support in Oncology**

In a 2018 survey of oncologists, 46% reported spending 16 minutes or less with each patient, and 43% reported committing more than 20 hours per week on administrative activities.\* The limited amount of time available for patient engagement--coupled with an increasing administrative burden—can make it difficult for physicians to consume all the information they need for optimal clinical decision-making. Accessing and assimilating such information as part of treatment selection is often hampered by the fact that clinical data have traditionally been hidden within large, poorly organized, and unfiltered information siloes. The inability to fully access these data in a timely manner results in a loss of physician productivity, adverse clinical events, as well as higher morbidity and mortality in oncology patients.

**Solution: Cancer Patient Digital Twin**

The Cancer Patient Digital Twin (CPDT) is a point-of-care clinical decision support application that provides oncologists with easy access to the critical clinical data and knowledge needed to inform optimal treatment plans. A physician can use the CPDT to access data from a similar patient cohort and predict responses to his/her treatment decisions–all within an environment that meets the compliance standards for protected health information (PHI). This data-driven approach helps to offset any pre-existing biases that an oncologist might otherwise apply to the treatment planning workflow. Key features included in the CPDT today include:

* **Oncology patient database**. An expanding database of oncology patients from which cohorts with similar clinical and multiomic features can be identified, and predictive ML models can be developed.
* **Virtual model of an oncology patient**. A unified data image of a selected (similar) patient cohort that data scientists and analysts can use to predict patient outcomes in “What if” clinical scenarios. Established healthcare informatics tools plus low-code/no-code ML applications are all easily accessible for algorithm development.
* **Patient summary and problem list.** A patient-centric dashboard that brings attention to the key information oncologists need during clinical decision-making.
* **Cohort health history comparisons.** An intuitive user interface display showing patterns of healthcare interactions and outcomes for a similar patient cohort, which can be used to inform treatment trajectories.
* **Relevant biomedical literature.** Easy access to clinical literature that is deemed most relevant to a treatment decision based on clinician-specified keywords.

In the next phase of development, the collaboration will explore federated architectures that will enable the inclusion of oncological data sets from different institutions and nationalities, across which data ownership and hosting regulations are often inconsistent.

**Call to Action**

The public-private collaboration between Open Health Systems Laboratory (OHSL), All India Institute of Medical Sciences (AIIMS), academic institutions (Arizona State University, Duke, Yale, University of Virginia), and technology companies (Microsoft, Intel, C3 AI) continues to foster this initiative, which will grow with the needs of the community.

**How can our organization accelerate the development of the CPDT?**

We welcome any organizations that are interested in participating in the collaboration. Here are ways to provide support:

* Data Contributions (e. g., clinical oncology data, oncological drug screening data)
* Development of ML models to support oncology treatment selection
* Architecture expertise (e. g., Federated Data Management, Federated ML)
* Testing & feedback related to infrastructure and application development
* Community outreach

**Benefits of Participation**

By joining the collaboration, your organization will have the opportunity to shape CPDT capabilities, become part of a community committed to the delivery of ethical and equitable care, and realize the positive impact the innovation is having on oncology patients. Your organization can also benefit from the following:

* Access to diverse clinical and multiomic data sets from international sources
* Access to platform technology that facilitates the development of ML models for oncology treatment optimization
* Professional development opportunities across clinical, scientific, and technical specialties

Additional details can be found at: <https://ncihub.org/groups/digitaltwin>

**BioIT Presence**

Workshop 5 – Digital Twins - Tuesday, May 3, 2022 10:30 - 12:30 PM

Track 12 – Pathways to Digital Twins in Medicine – Thursday, May 5, 2022 2:35 – 4:00 PM

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