2024 Multidisciplinary Research Program in Medicine Project*: Fast-TRIP: Fast TRIage of core biopsy Pathology reports by Natural Language Processing: expediting breast cancer treatment for high-risk breast cancers*

Hypothesis or Research Question(s): Extracting biomarker and hisotological grade information from the core biopsy reports of new breast cancer diagnoses using natural language processing will facilitate accelerated treatment of patients with fast-growing breast cancers.

PROJECT BACKGROUND & SUMMARY

Our project addresses the significant challenge posed by triple-negative breast cancer (TNBC), a subtype that represents 10-15% of all breast cancer cases and is notorious for its poor prognosis. We aim to develop a novel interdisciplinary approach involving the use of Natural Language Processing (NLP) tools in analyzing core biopsy reports of TNBC patients. This method focuses on enhancing the efficiency and accuracy of medical report analysis, which is pivotal in tailoring treatment strategies.

In the context of breast cancer research, Neoadjuvant Chemotherapy (NAC) has emerged as a key treatment, especially for locally advanced cases. It is crucial in reducing tumor sizes, thereby increasing the possibility of breast-conserving surgeries as opposed to mastectomies. However, delays in initiating NAC can adversely affect patient outcomes, underlining the need for rapid and accurate diagnostic processes. Our interdisciplinary project proposes integrating NLP into a specialized extraction system to standardize terminology in biopsy reports, improve consistency, and expedite the review process. This approach is expected to significantly reduce the time required for manual report analysis, thus accelerating the treatment initiation. Additionally, by identifying patterns and trends in these reports, the project aims to contribute valuable insights into treatment outcomes and patient prognosis.

This research is anchored in an interdisciplinary framework, combining medical oncology, computer science (specifically NLP), and data analysis. The expected outcome is a more streamlined, accurate, and timely process for analyzing biopsy reports, ultimately leading to better-informed treatment decisions and improved patient care in the context of TNBC.

BENEFIT TO THE STUDENTS

Students will engage in an interdisciplinary research project bridging breast cancer care with the data sciences world, utilizing Natural Language Processing (NLP) to analyze core biopsy reports for enhanced accuracy and streamlined evaluations. This method is pivotal in uncovering patterns and trends, vital for assessing treatment efficacy and patient prognoses in the field of breast cancer.

Student: Students will apply Natural Language Processing tools to analyze core biopsy reports, enhancing their skills in data analytics and AI within the healthcare context. Conduct an extensive literature search focusing on the treatment efficacy and patient outcomes of Triple-Negative Breast Cancer (TNBC) when treated with Neoadjuvant Chemotherapy (NAC). Then, draft in-depth papers and a brief communication piece exploring these specific aspects. A key role involves contributing to shaping the research framework, which includes critical analysis of research methods and data.

The students will be encouraged to contribute their own ideas to the design of the research project. There are no limitations on the scope of involvement of the students. As they progress, they will be welcomed to take on more responsibility. At the end of their contract, the students will be supported in training the next student who joins this project.

Support and additional opportunities: Weekly meetings with oncology experts and data scientists will provide students with a comprehensive understanding of interdisciplinary collaboration. Students will

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have support from the lab clinical research coordinator if they have questions or concerns that may arise. Students will be given monthly feedback on their progress and work performance. This will help students be accountable for their work.   Students will be invited to plastic surgery grand round lectures. This will give the students an opportunity for a more holistic understanding of the research in our department and an opportunity to meet other trainees, clinicians, and researchers in the department. Students will be given monthly feedback on their progress and work performance. This will help students be accountable for their work.

 This project gives students the chance to delve into scientific research combining breast cancer care with data science, using Natural Language Processing (NLP) for core biopsy report analysis. It's a unique opportunity for them to learn about interdisciplinary collaboration and the development of new knowledge. Their involvement will enhance communication skills, foster project ownership, boost self-confidence, and strengthen their connection to the academic community.