Universidad de Navarra
Facultad de Ciencias

Propuesta de Trabajo Fin de Máster
Año académico 2025-2026
MÁSTER EN CIENCIA DE DATOS PARA CIENCIAS EXPERIMENTALES

Proyecto Nº 23
Título: Machine learning models to elucidate the transcriptional dynamics in mCRPC at single-cell resolution
Departamento/ Laboratorio: Biología Computacional
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Resumen: The work will build on our previous collaborative efforts between CIMA and Mayo Clinic to expand the data sets to include multi-omic and spatial single-cell sequencing on our unique and precious prospectively collected mCRPC tumor biopsy samples obtained from our PROMOTE study. These data will be joined by additional publicly available clinical trials and prostate cancer single-cell data to identify new targets and new therapies for the treatment of mCRPC. Specifically, we plan to apply spatial and single-cell analysis on tumor biopsy collected from pre- and post-abiraterone-treated patients enrolled in our PROMOTE study. We will apply machine learning-based novel methods developed by our group to identify cell-specific gene networks that are differentially regulated between responders and non-responders. These analyses will uncover additional biological mechanisms associated with both tumor and tumor microenvironment that might contribute to different treatment outcomes in patients and lead to the proposal of novel therapeutics. Our strength is also significantly enhanced by our ability to access clinically relevant preclinical patient-derived xenografts (PDX models) generated from our PROMOTE clinical trial patients' tumors plus additional cell and immune-competent mouse models to experimentally test the hypotheses derived from the computational data analysis. The molecular signatures will be further used to prioritize alternative therapies to identify new drugs that can help overcome resistance to the standard of care.

OPTATIVAS RECOMENDADAS
1. Advance topics in machine learning
2. Deep Learning
3. Análisis e interpretación de datos de alto rendimiento
4.