Universitat Pompeu Fabra Barcelona | Master in Bioinformatics for Health Sciences

Master project 2020-2021

Personal Information

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Project

Computational genomics

Project Title:

Understanding cancer biology

Keywords:

Cancer drivers, selective advantage, mutational processes, tumorigenesis

Summary:

A tumor has between hundreds and thousands of mutations and only a few are directly involved in tumorigenesis, frequently called driver mutations. These mutations affect genes which when mutated confer the cell with a growth advantage with respect to its neighbors. Our lab has developed methods to identify these driver genes, and has analyzed tens of thousands of tumors, producing a catalog of the genes underlying tumorigenesis in the most frequent cancer types. Currently, we are interested in cataloguing the downstream effect that mutations affecting these driver genes have in different tumor types. While many mutations in driver genes are capable of driving tumorigenesis, some are not, and the range of driver mutations of a cancer gene varies between tumor types. Understanding the functional effect of driver mutations thus constitutes a key goal of cancer genomics research.

References:

Tamborero et al, 2018. Cancer Genome Interpreter annotates the biological and clinical relevance of tumor alterations. Genome Medicine. 10:25 Pich et al, 2018. Somatic and Germline Mutation Periodicity Follow the Orientation of the DNA Minor Groove around Nucleosomes. Cell doi:10.1016/j.cell.2018.10.004 Sabarinathan et al., 2016. Nucleotide excision repair is impaired by binding of transcription factors to DNA. Nature 532, 264-267 Mularoni et al, 2016. OncodriveFML: A general framework to identify coding and non-coding regions with cancer driver mutations. Genome Biology. 17: 128 Rubio-Perez et al, 2015. In silico prescription of anti-cancer drugs to cohorts of 28 tumor types reveals novel targeting opportunities. Cancer Cell. 27(3):382-396 Gonzalez-Perez et al, 2013. IntOGen-mutations identifies cancer drivers across tumor types. Nature Methods. doi:10.1038/nmeth.2642

Expected skills::

Basic programming, data analysis and statistics skills. Willing to learn

Possibility of funding::

To be discussed

Possible continuity with PhD: :

To be discussed