



## Master project 2024-2025

### Personal Information

<b>Supervisor</b>	Robert Castelo
<b>Email</b>	robert.castelo@upf.edu
<b>Institution</b>	Universitat Pompeu Fabra
<b>Website</b>	<a href="https://functionalgenomics.upf.edu">https://functionalgenomics.upf.edu</a>
<b>Group</b>	Functional Genomics

### Project

## Computational genomics

#### Project Title:

Assessment of gDNA contamination in cell-free RNA samples for biomarker discovery

#### Keywords:

cfRNA, gDNA, biomarker discovery

#### Summary:

Liquid biopsies allow one to diagnose disease by identifying biomarkers present in body fluids such as blood, urine or cerebrospinal fluid. Those biomarkers are expected to be circulating cell-free nucleic acids (DNA or RNA) or protein peptide molecules, secreted in the target diseased tissue, but which made their way into a body fluid. Blood is one of the main body fluids used for liquid biopsy and is made out of main four components: plasma, red blood cells, white blood cells and platelets. Plasma is the preferred component to use when searching for biomarkers for several reasons, the main one being that cell-free molecules circulating in plasma should come from elsewhere than blood. Recent studies have shown the potential of sequencing cell-free RNA (cfRNA) molecules from blood plasma to identify biomarkers of cancer, adverse neonatal outcomes, and their cell types of origin. One technical challenge with cfRNA is the presence of genomic DNA (gDNA) contamination in such samples, which may bias the results. We have recently developed an R/Bioconductor package for diagnosing and adjusting gDNA contamination in RNA-seq samples (<https://bioconductor.org/packages/gDNAX>). In this project we propose to assess the presence of gDNA contamination in publicly available cfRNA sequencing data and show how biomarker discovery can be improved by adjusting gDNA contamination.

#### Expected skills:

Basic knowledge of statistics, and programming with R

#### Possibility of funding:

No

#### Possible continuity with PhD:

To be discussed

#### Comments:

No funding is available, but students with a good academic record can opt to apply to PhD scholarships. The lab is located at the PRBB building and there is the possibility of hybrid work (online/in person).