Canadian Bioinformatics Workshops

bioinformatics.ca

bioinformaticsdotca.github.io

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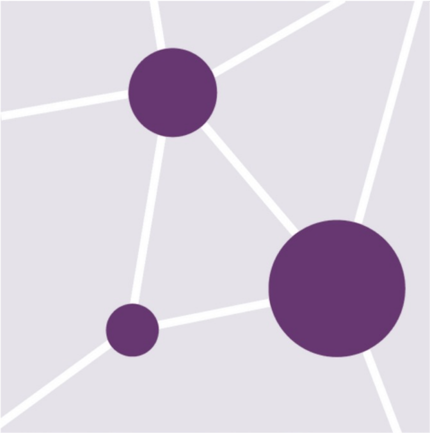
Canadian
Bioinformatics
Workshops

Module 4 Lab

Constance Li

Pathway and Network Analysis

May 13, 2026



UNIVERSITY OF CALGARY

Arnie Charbonneau Cancer Institute

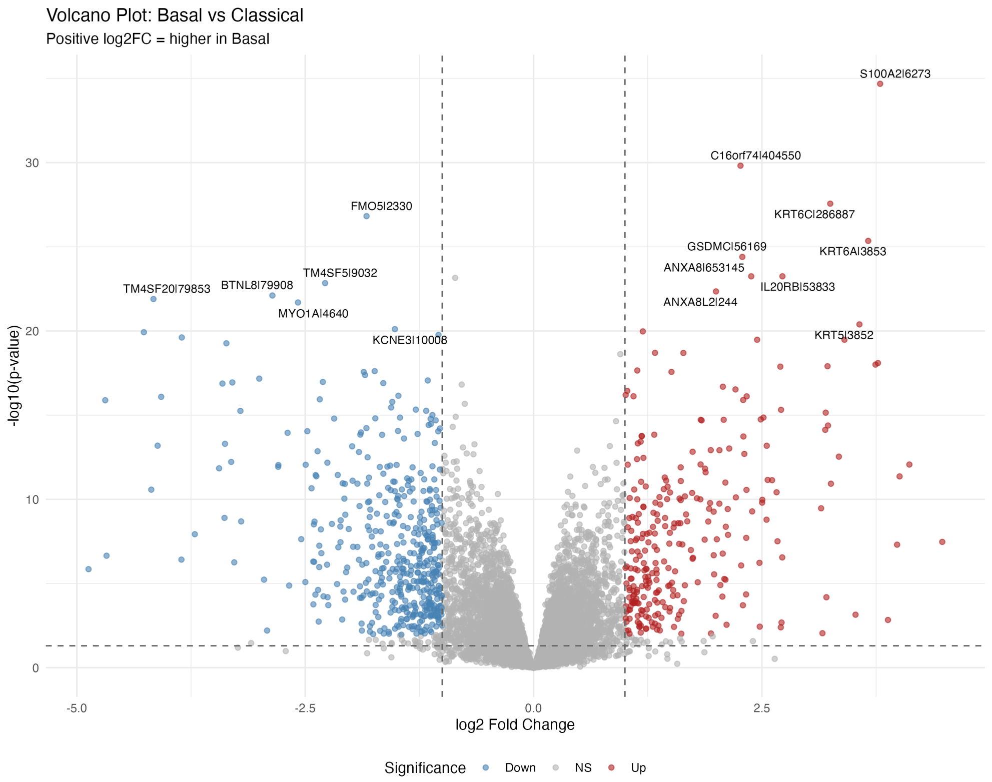
UNIVERSITY OF CALGARY

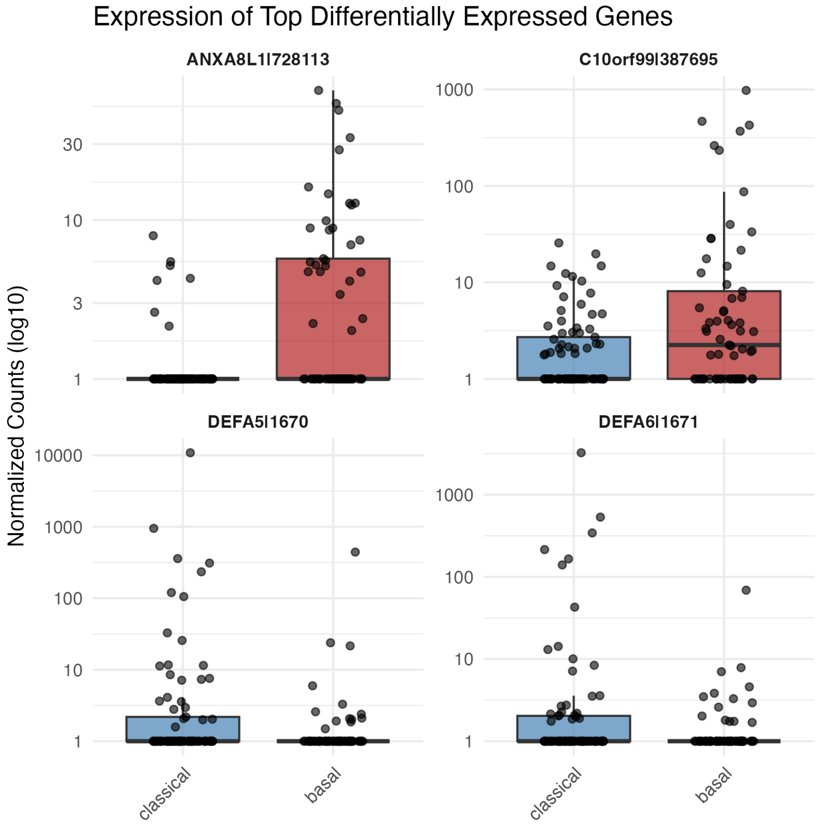
Alberta Health Services

Learning Objectives

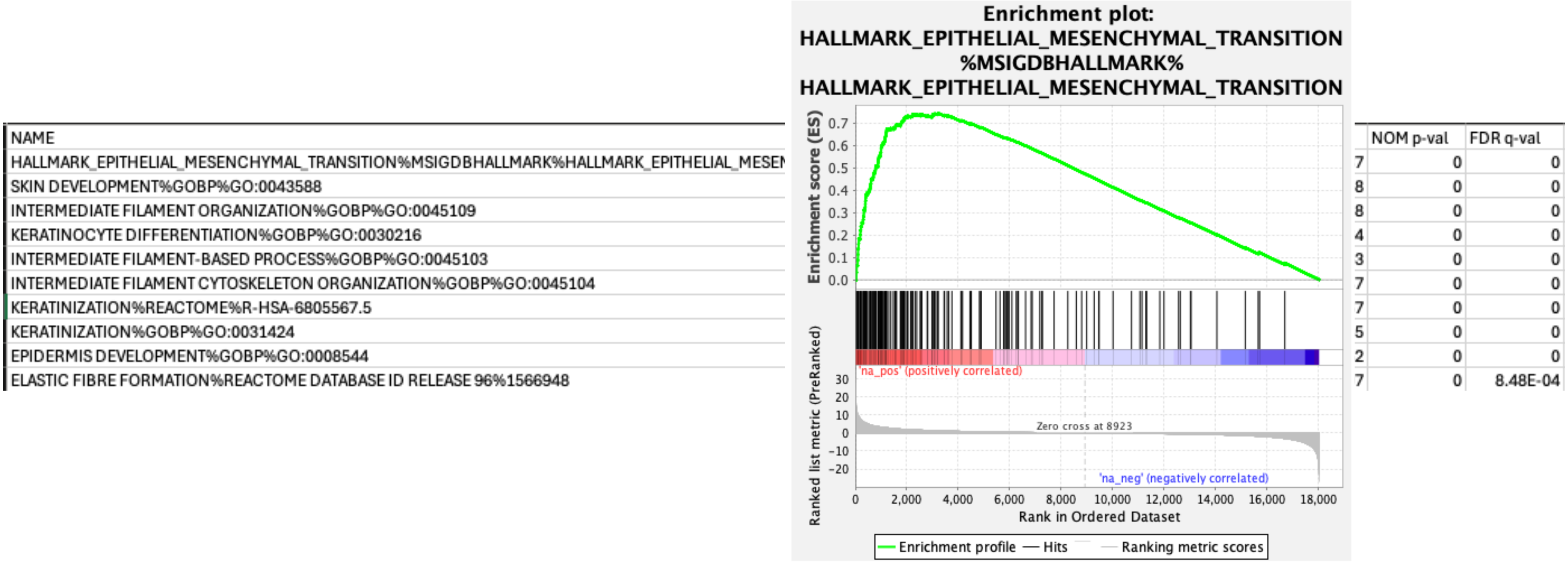
1. Analyze mutation data using ReactomeFI
2. Use GeneMANIA to integrate findings across expression and mutation data types
3. Draw biological conclusions from multi-omics pathway analysis

Recall Lab 2a





Recall Lab 2c



NAME		NOM p-val	FDR q-val
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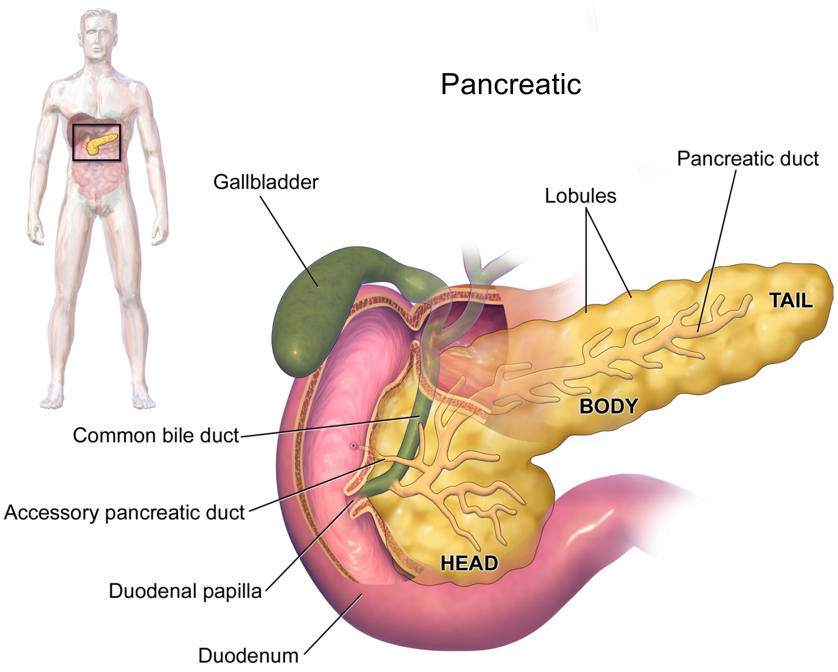
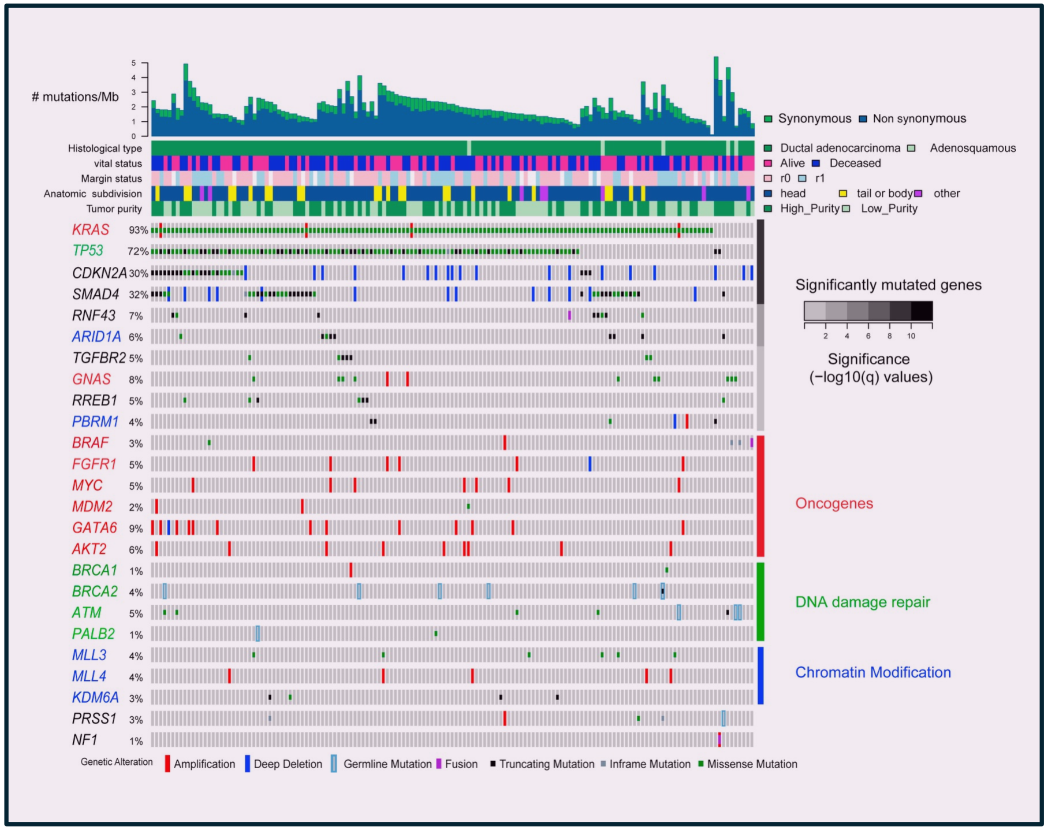
SKIN DEVELOPMENT%GOBP%GO:0043588	8	0	0
INTERMEDIATE FILAMENT ORGANIZATION%GOBP%GO:0045109	8	0	0
KERATINOCYTE DIFFERENTIATION%GOBP%GO:0030216	4	0	0
INTERMEDIATE FILAMENT-BASED PROCESS%GOBP%GO:0045103	3	0	0
INTERMEDIATE FILAMENT CYTOSKELETON ORGANIZATION%GOBP%GO:0045104	7	0	0
KERATINIZATION%REACTOME%R-HSA-6805567.5	7	0	0
KERATINIZATION%GOBP%GO:0031424	5	0	0
EPIDERMIS DEVELOPMENT%GOBP%GO:0008544	2	0	0
ELASTIC FIBRE FORMATION%REACTOME DATABASE ID RELEASE 96%1566948	7	0	8.48E-04

Remember PAAD?





https://en.wikipedia.org/wiki/Pancreas

What is “integration”?

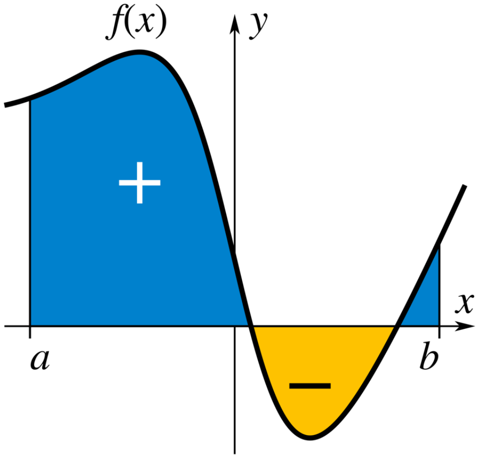
The process of combining separate parts or systems into a unified whole

Integrate different molecular profiles

Integrate a collection of networks

Integrate everything you’ve learned in this workshop

Let’s integrate



- Download the lab materials:
    - https://bioinformaticsdotca.github.io/PNA_CalSask-2605/module-4.html
    - Module 4: Instructions PDF, gene list text files
- Make sure Cytoscape is installed
    - You’ll need the ReactomeFI and GeneMANIA apps

Information and data sources

Moffitt subtype paper

- Moffitt RA, Marayati R, Flate EL, Volmar KE, Loeza SGH, Hoadley KA, et al. Virtual microdissection identifies distinct tumor- and stroma-specific subtypes of pancreatic ductal adenocarcinoma. Nat Genet. 2015 Oct;47(10):1168–78. doi:10.1038/ng.3398

Mutations data

- Raphael BJ, Hruban RH, Aguirre AJ, Moffitt RA, Yeh JJ, Stewart C, et al. Integrated Genomic Characterization of Pancreatic Ductal Adenocarcinoma. Cancer Cell. 2017 Aug;32(2):185-203.e13. doi:10.1016/j.ccell.2017.07.007

RNA-seq counts data

- https://gdac.broadinstitute.org/