

Babelomics 5: Gene Expression, Genome Variation and Functional Profiling Analysis Suite

MDA course on NGS Data Analysis
Valencia, 29 Sep 2015



PRINCIPE FELIPE
CENTRO DE INVESTIGACION

Computational • Genomics



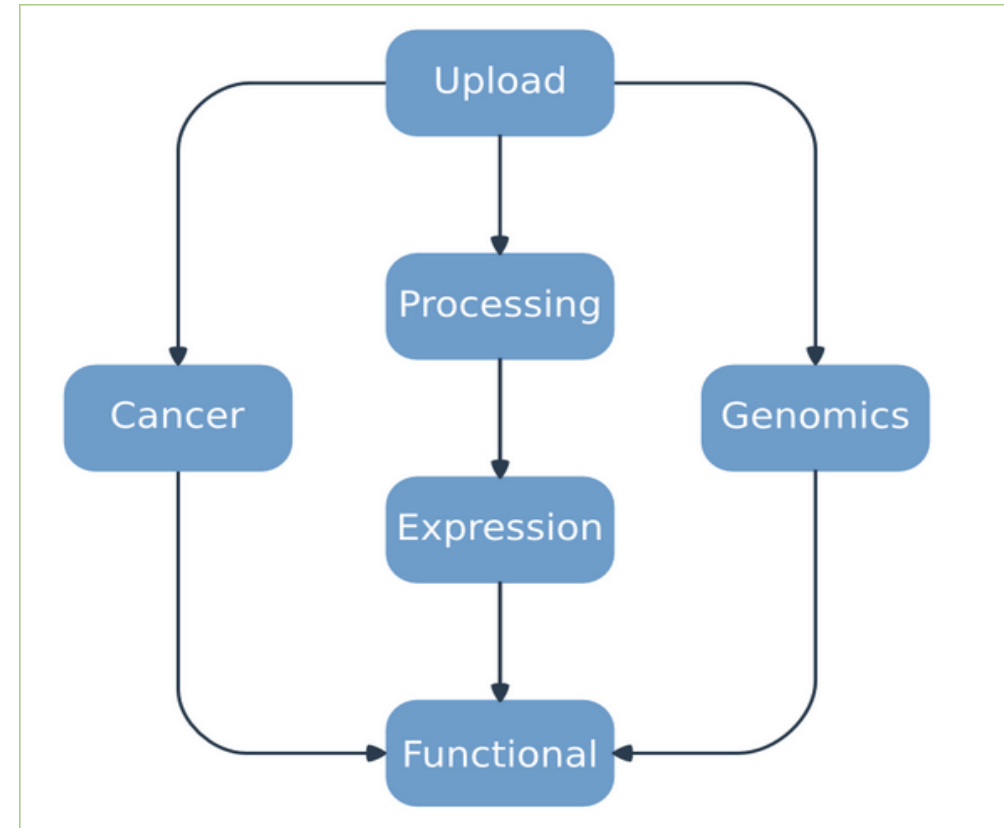
Francisco García
fgarcia@cipf.es

Analyzing omics data + functional profiling

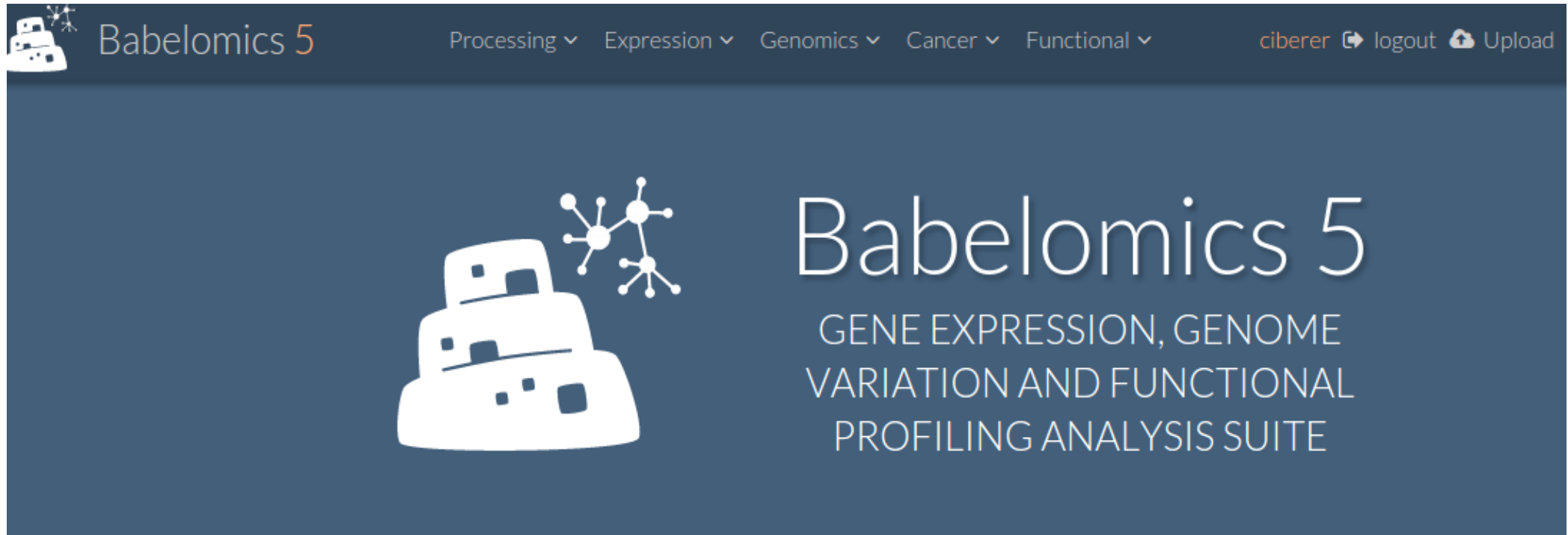
Analysis tools

Babelomics 5

GENE EXPRESSION, GENOME
VARIATION AND FUNCTIONAL
PROFILING ANALYSIS SUITE



Tool interface



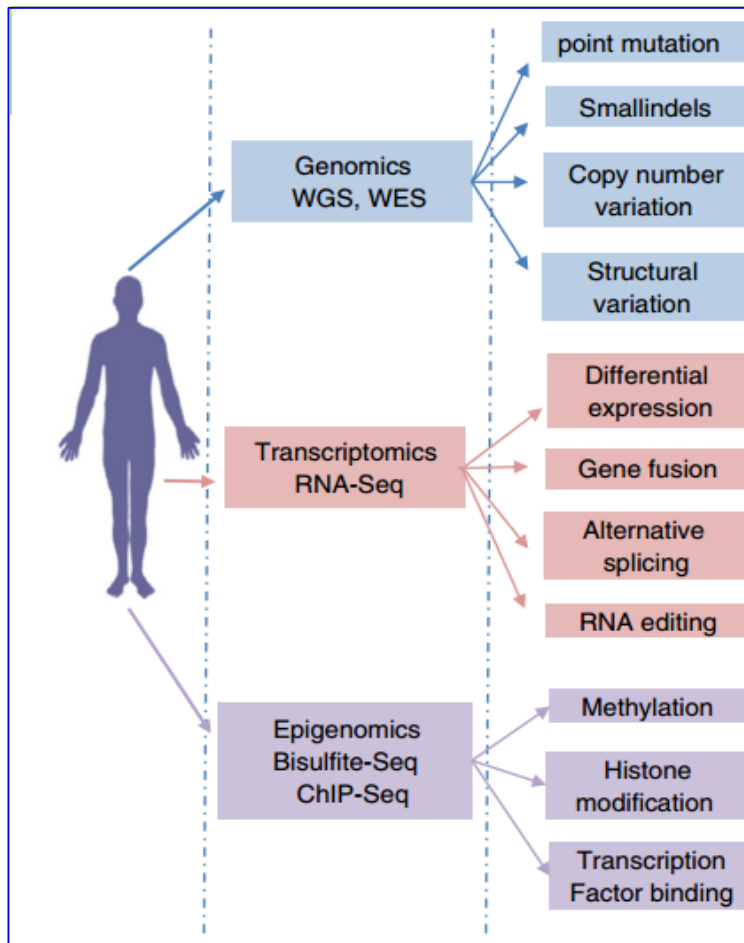
<http://babelomics.bioinfo.cipf.es/>

Babelomics 5

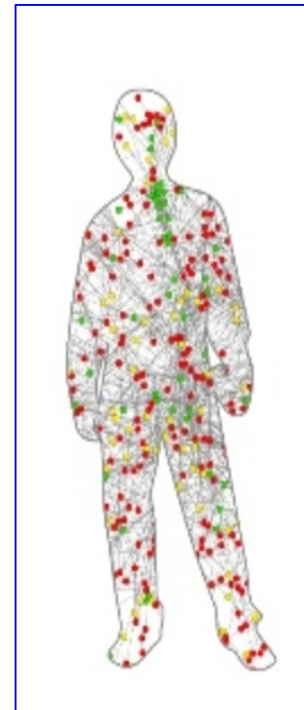
Analyzing omics data + functional profiling

Next methods and tools

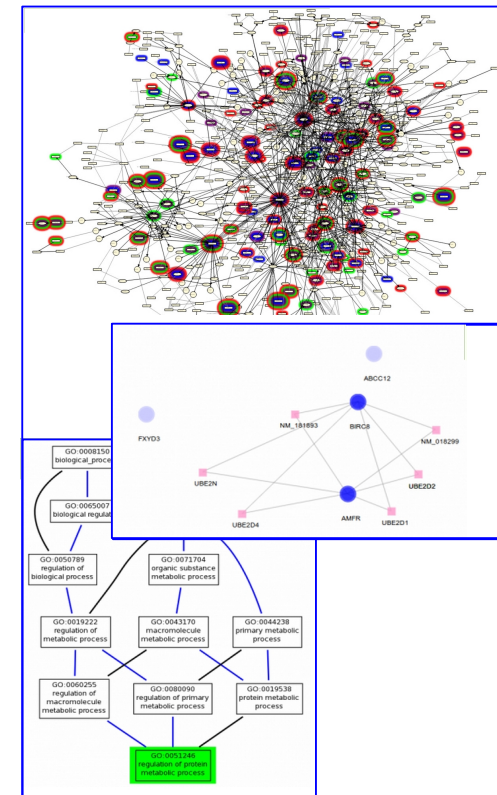
Patient Technologies Data Analysis



Integration and interpretation



Molecular and clinical model



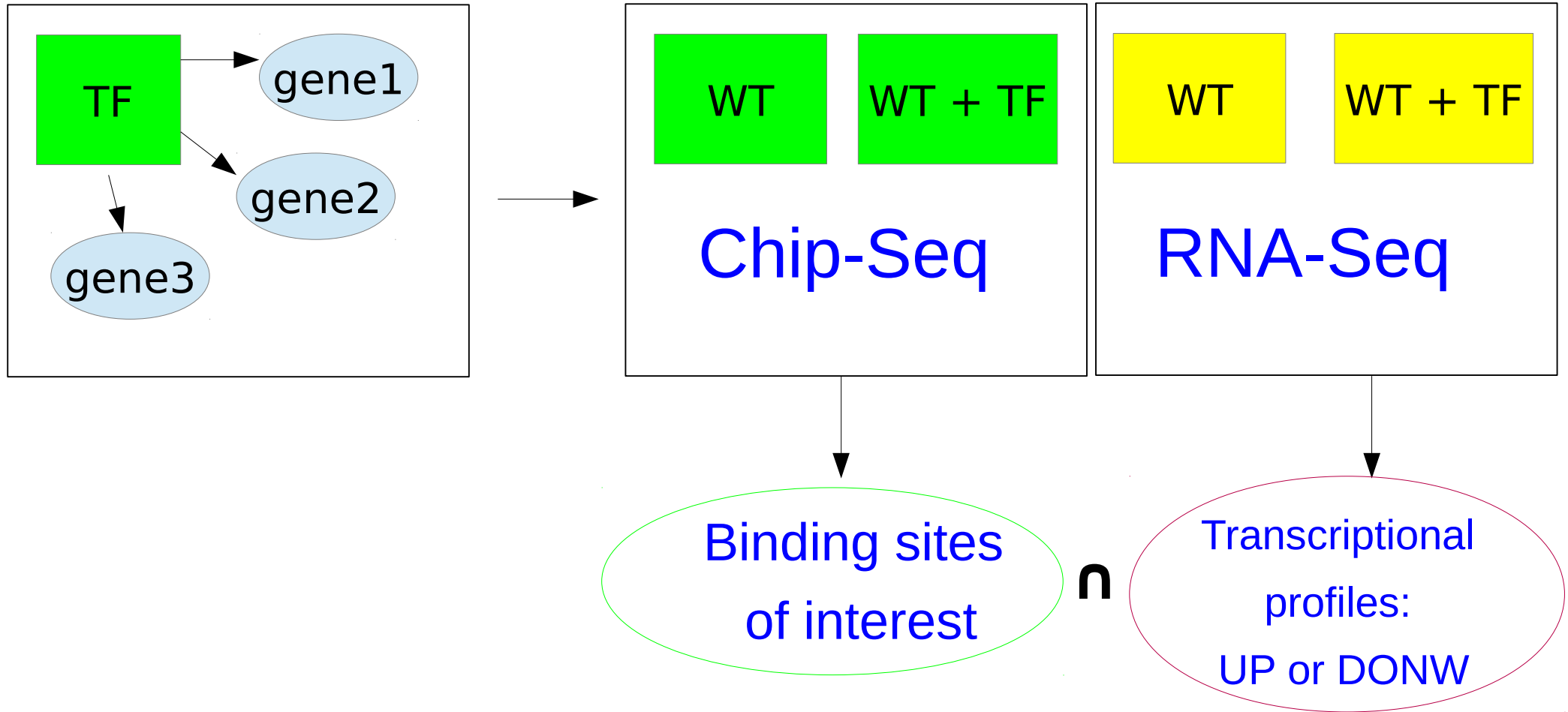
Omic Data Integration

Different strategies:

- 1) Ad-hoc approaches
- 2) Multidimensional Gene Set Analysis
- 3) Functional Meta-Analysis
- 4) PATHiVAR: a web tool to integrate transcriptomics and genomics results

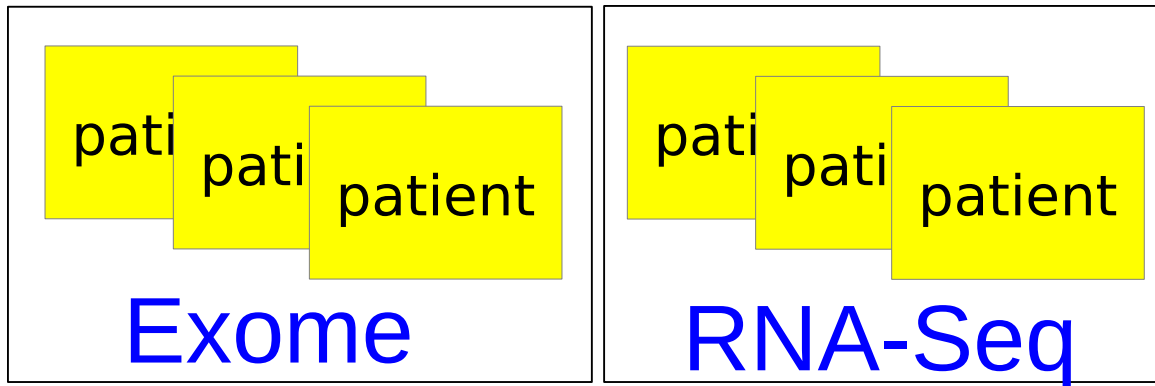
Ad-hoc approaches (1)

Chip-Seq & RNA-Seq



Ad-hoc approaches (2)

Exome & RNA-Seq

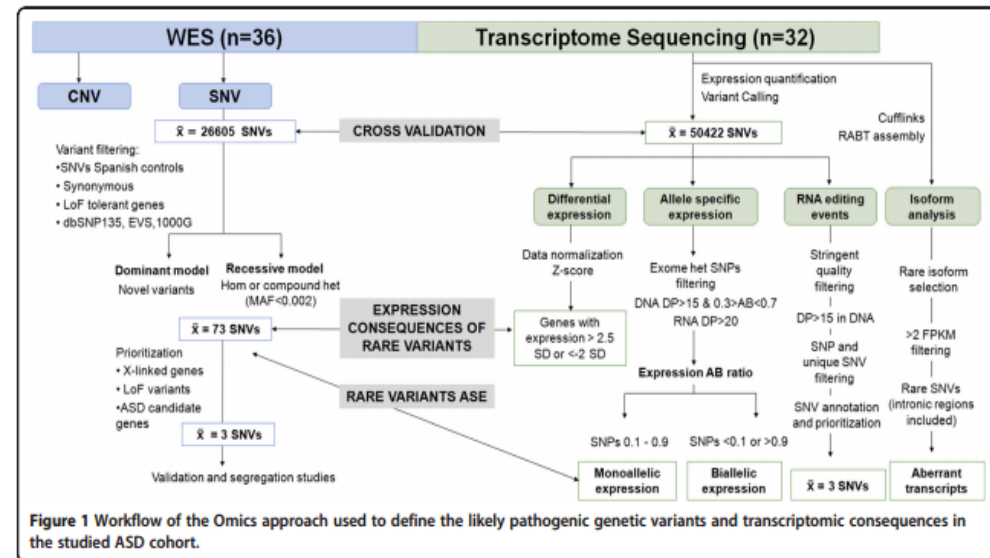


→ Intronic causative mutations

Exonic causative mutations

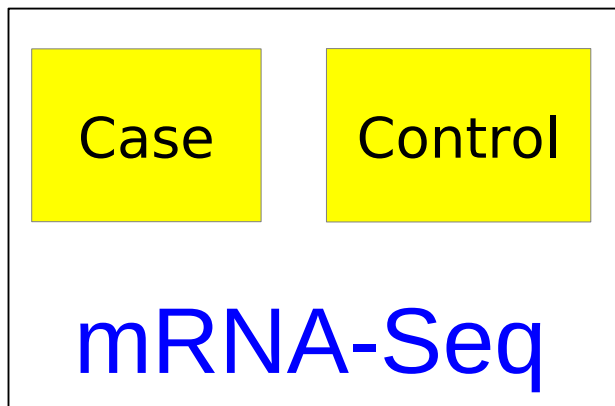
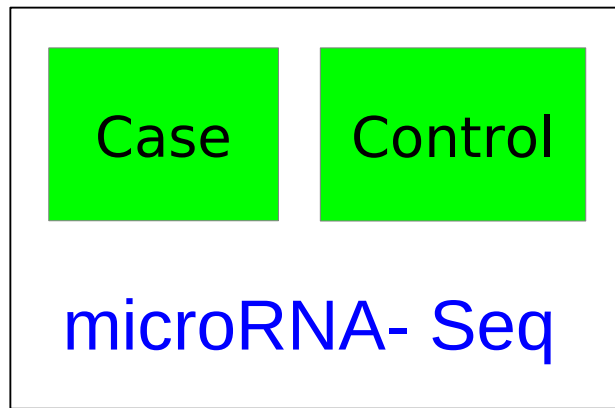
Integrated analysis of whole-exome sequencing and transcriptome profiling in males with autism spectrum disorders

Marta Codina-Solà^{1,2,3}, Benjamín Rodríguez-Santiago⁴, Aïda Homs^{1,2,3}, Javier Santoyo⁵, María Rigau¹, Gemma Aznar-Lain⁶, Miguel del Campo^{1,3,7}, Blanca Gener⁸, Elisabeth Gabau⁹, María Pilar Botella¹⁰, Armand Gutiérrez-Arumi^{1,2,3}, Guillermo Antifoño^{1,13,15}, Luis Alberto Pérez-Jurado^{1,2,3*} and Ivon Cusco^{1,2,3*}



Multidimensional Gene Set Analysis

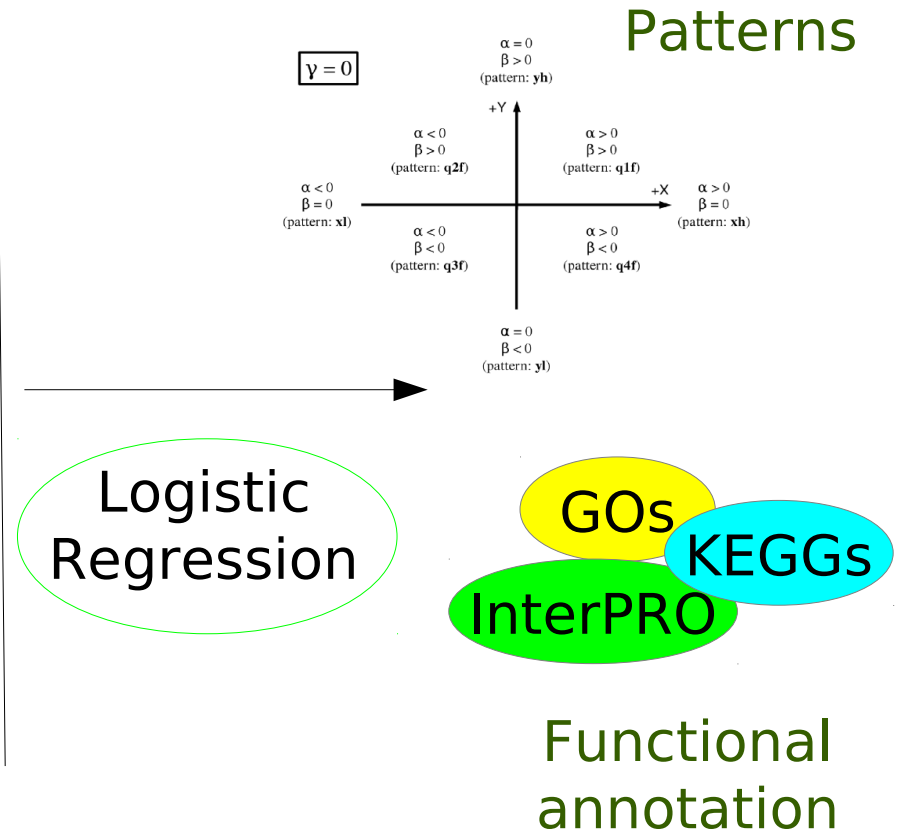
MicroRNA-Seq & mRNA-Seq



miRNA1 0.5
miRNA2 1.2
miRNA3 1.3
miRNA4 1.7
...

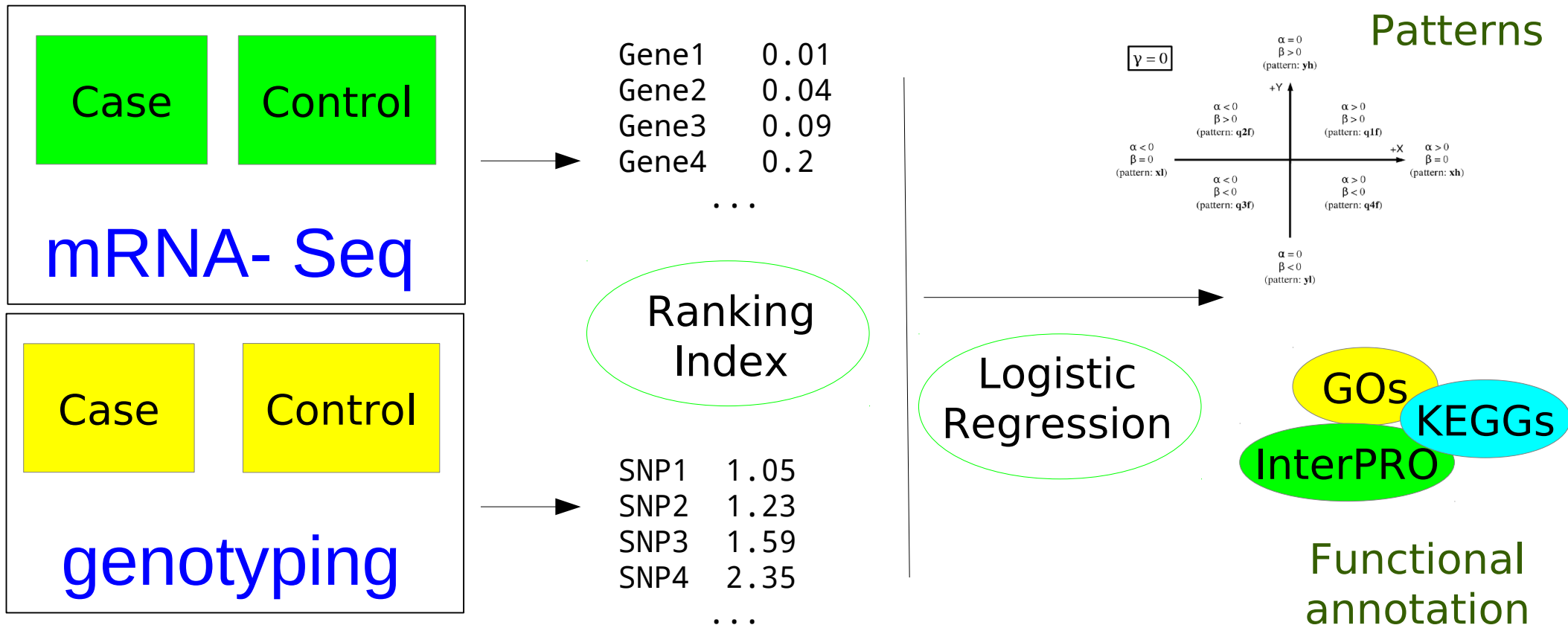
Ranking Index

Gene1 0.01
Gene2 0.04
Gene3 0.09
Gene4 0.2
...



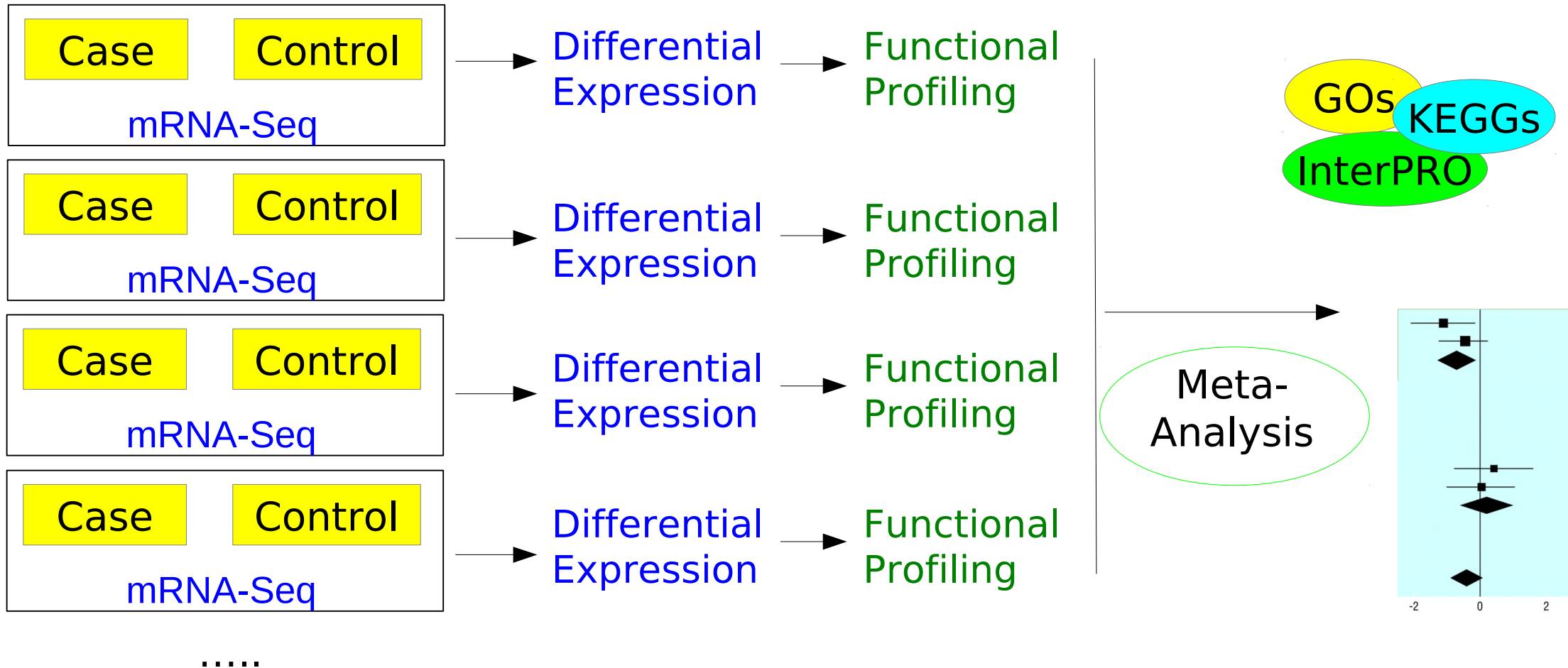
Multidimensional Gene Set Analysis

mRNA-Seq & genotyping association



Functional Meta-Analysis

N mRNA-Seq studies



Strategies

Omics Data Integration

More information

OPEN ACCESS Freely available online



Multidimensional Gene Set Analysis of Genomic Data

David Montaner^{1,2}, Joaquín Dopazo¹

Nucleic Acids Research Advance Access published April 16, 2015

Nucleic Acids Research, 2015 1
doi: 10.1093/nar/gkv349

Assessing the impact of mutations found in next generation sequencing data over human signaling pathways

Rosa D. Hernansaiz-Ballesteros¹, Francisco Salavert^{1,2}, Patricia Sebastián-León¹, Alejandro Alemán^{1,2}, Ignacio Medina³ and Joaquín Dopazo^{1,2,4,*}



PATHiVAR tutorial:

<http://pathivar.babelomics.org/>

Strategies

Omics Data Integration