

# Computational Genomics

Máster en Bioinformática y Biología Computacional  
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# Príncipe Felipe Research Center

## **Goal:** biomedical research

- **Basic research** in genes, targets, molecular and cellular processes, Nanomedicine and Computational Medicine
- **Translation into clinical practice:** personalized medicine, cancer, rare diseases, metabolic and functional impairment

<http://www.cipf.es/>



# Who are we?

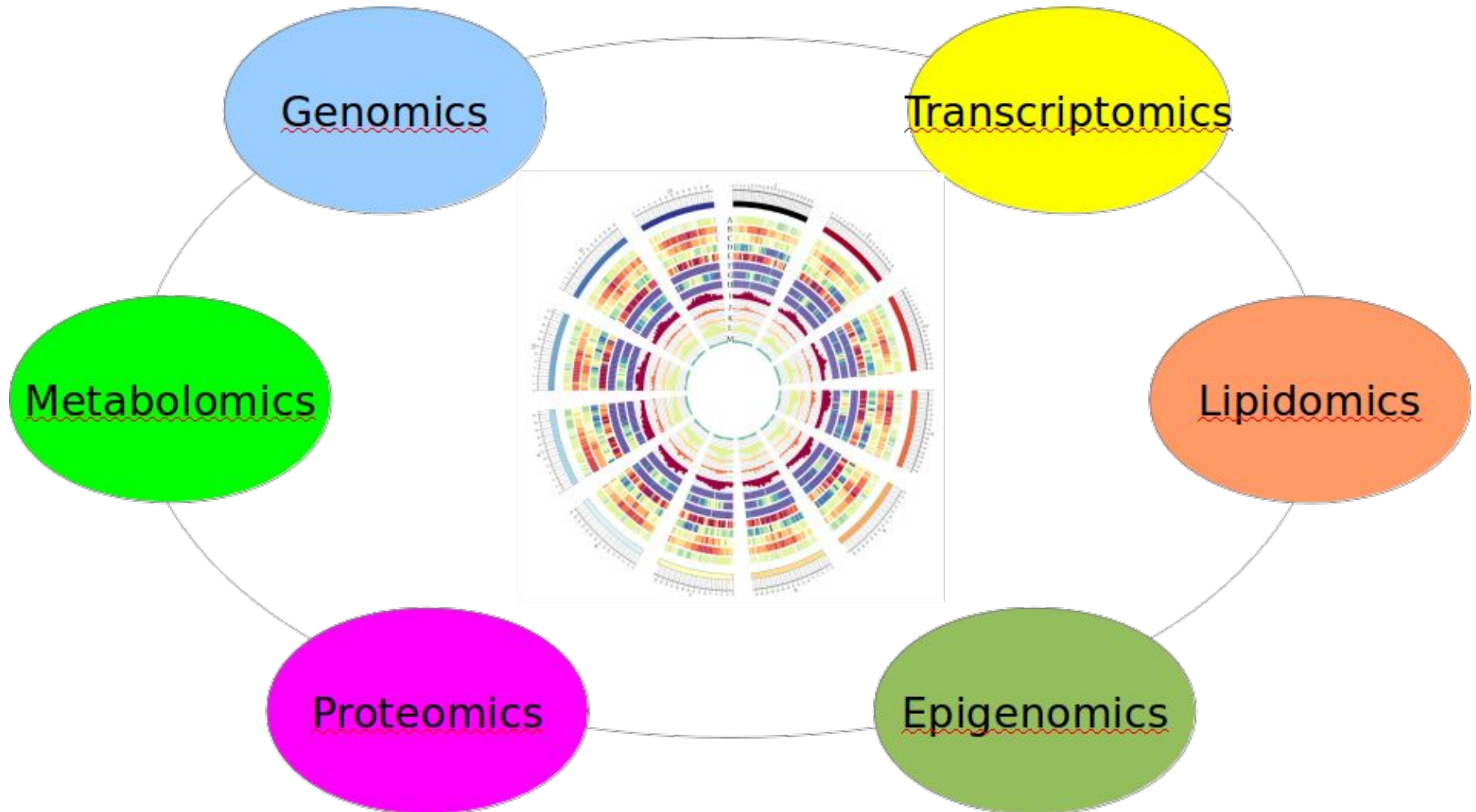
- The **Computational Genomics** Department, in Research Center Prince Felipe
- **Team:** multidisciplinary group of 14 researchers and technicians led by Joaquín Dopazo

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

# Who are we?



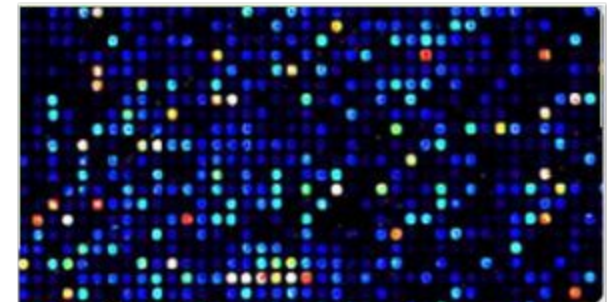
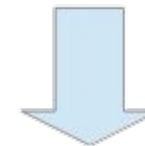
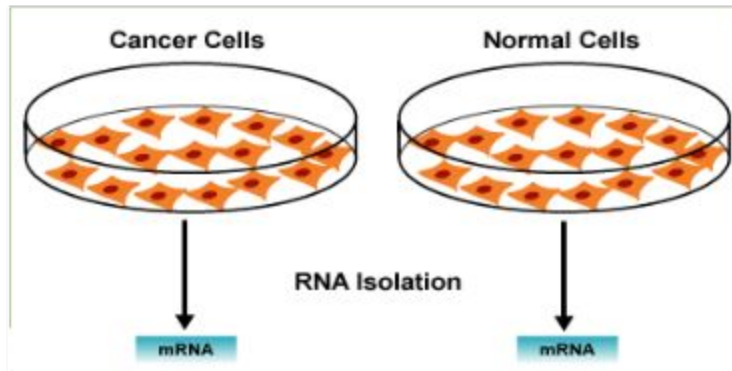
# Computational Genomics





# Computational Genomics

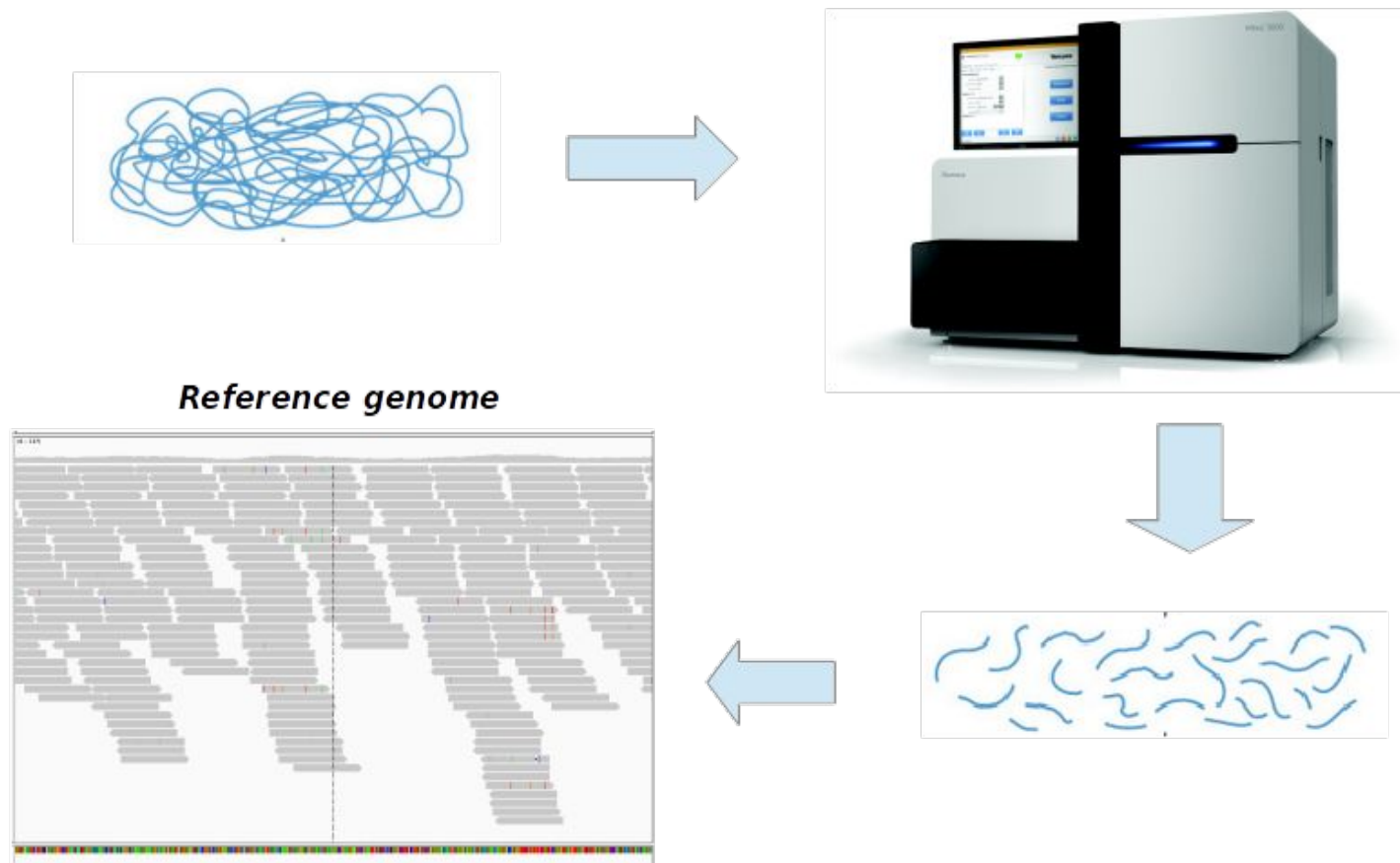
## High throughput technologies: microarrays



UID	NAME	GWEIGHT	spo0	spo30	spo2	spo5
EWEIGHT			1	1	1	1
YAL003W	EFB1	1	0.23	-1.79	-1.29	-1.56
YAL004W		1	0.41	-0.38	-0.89	-1.06
YAL005C	SSA1	1	0.61	-0.07	-1.29	-1.29
YAL010C	MDM10	1	0.16	-0.15	-0.76	-1.25
YAL012W	CYS3	1	0.03	1.39	-0.84	-1.64
YAL015C	NTG1	1	-0.18	-0.18	-0.62	-1.32
YAL018C	YAL018C	1	-0.51	-0.62	-0.76	3.74
YAL025C	MAK16	1	-0.14	-3.32	-1.84	-1.12
YAL034C	FUN19	1	0.19	-0.03	-1.03	-1.29
YAL035W	FUN12	1	0.01	-1.47	-1.15	-0.69
YAL036C	FUN11	1	-0.15	-2.74	-1.79	-1.32
YAL038W	CDC19	1	-0.06	-1.89	-1.69	-2.32
YAL040C	CLN3	1	-0.17	-2.25	-1.69	-2.25
YAL054C	ACS1	1	0.51	2.6	1.9	1.7
YAL055W	YAL055W	1	-0.32	0.83	0.58	0.82

# Computational Genomics

## High throughput technologies: Next Generation Sequencing



# Computational Genomics

Biological  
knowledge

KEGG  
pathways

Gene  
Ontology

Regulatory  
elements

MiRNA, CisRed  
Transcription Factor  
Binding Sites

Biocarta  
pathways

InterPro  
Motifs

Gene  
Expression  
in tissues

Bioentities from  
literature

Clinical  
knowledge

HUMSAVAR

ClinVar

HGMD

COSMIC



# How do we work?

  
PRINCIPE FELIPE  
CENTRO DE INVESTIGACION

Computational Genomics



snow

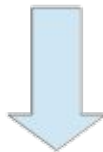
31  
Image

TEAM



Network Miner

BierApp 



Proyectos PROMETEO  
Generalitat Valenciana  
nagen ...

23  
Image



ciberer  BIER

BULL  STATegra

# How do we work?

IT4Innovations#  
národní01\$!@%#0  
superpočítačové  
centrum \$@0@\$0%\$



# OMICS MASTER



# Outline

1. Introduction to Babelomics
2. Functional Profiling: over-representation methods
3. Unsupervised Classification: Clustering
4. Supervised Classification: Prediction

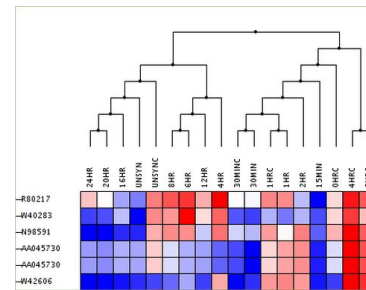
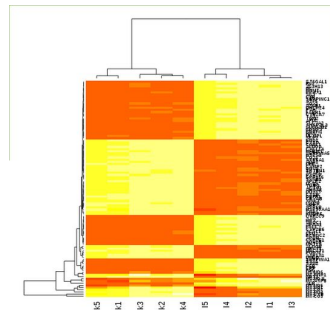
# Outline

Design

Processing

- Differential expression
- Clustering
- Predictors

Functional profiling



Any questions?

