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Biostatistics applied to precision medicine

Transforming complex data into efficient and personalized clinical solutions

The problem

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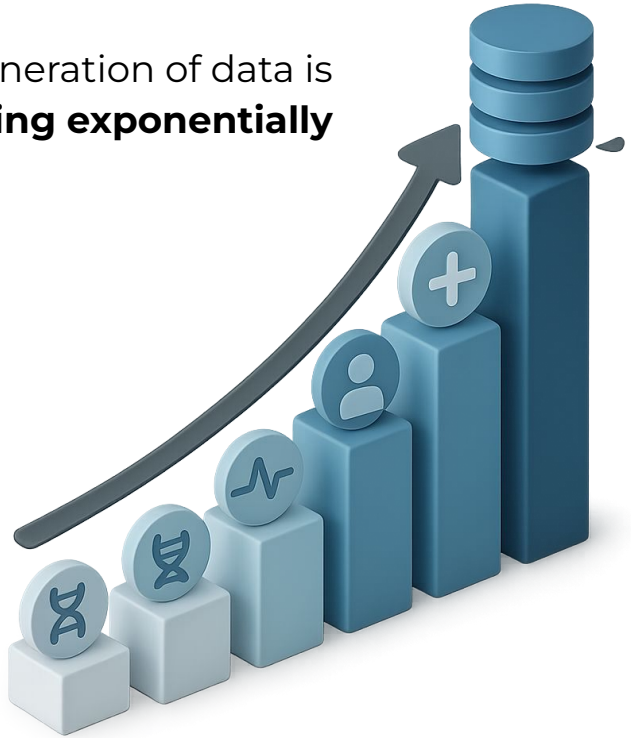
The generation of data is
growing exponentially



Consequences

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Insufficient sample size
in clinical studies

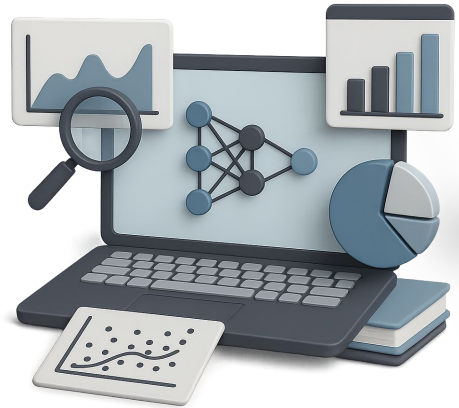
Multiple **data sources**
difficult to integrate

Poor data analysis =
miscalculated results

Complex clinical studies

Million biomarkers,
difficult-to-determine effects

Your strategic ally for transforming complex data into reliable, high-impact evidence



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Our value proposition

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Interpretation and causality

Explaining the 'Why' ⇒
solid conclusions

Scientific rigor + innovation

Biostatistics rigor +
cutting-edge data science ⇒
reliable, scalable models

Total scalability

Diverse data & any cohort ⇒
maximum information

Unlike generic AI solutions, we turn **your own data** into a competitive advantage with transparent methodology and clinical value.

Types of data we work with

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Multi-omics data

(transcriptomics, metagenomics, metabolomics, proteomics, ...)

Clinical and demographic data

(medical history, laboratory results, age, sex, ...)

Other types of data

(behavior, public health, medical images, ...)

Experts in **data fusion** to create a holistic and causal vision

Areas of application

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Precision medicine

Patient stratification
Biomarker discovery
Predictive models

Clinical studies

Design and analysis of experiments

Multi-omics

Analysis and integration of large databases

Pharma / MedTech R&D

Optimization of drug / device design

Areas of application: Precision medicine

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- Well-defined patient subgroups
- Clear clinical evidence
- More robust diagnosis and prevention

Areas of application: Clinical studies

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- Optimized experimental design
- Rigorous data analysis
- Reliability in small cohorts

Areas of application: Multi-omics

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- Biomarker identification
- Clinical applications with real impact
- Understanding of diseases

Areas of application: Pharmaceutical R&D

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- Agility in research
- Discovery of safer and more scalable drugs
- Optimization of clinical studies

Our solution

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CONSULTING SUPPORT

SOFTWARE DEVELOPMENT

SaaS / On-premise /
API / Pay-per-use

TRAINING CAPABILITIES

Our expertise

CODAS LAB
LET'S DO SCIENCE TOGETHER

UNIVERSIDAD DE GRANADA

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Over **20 years** of **high-impact** international research **experience**

Advanced **Biostatistics** and analysis of Multi-omics & and Multi-modal data

Consulting and support on **Experimental Design** and **Data Mining**

Predictive Model Development for Clinical Decision Support Systems

Advanced **software** solutions

Scope of services

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	PHASE	WHAT WE DO	WHAT YOU GET
1	**Experimental design**	Definition of key questions and sample size	Robust initial trials, with less risk of rejection and better use of resources
2	**Data curation**	Multi-source cleaning and integration	Reliable datasets, ready for analysis, and free from biases
3	**Exploratory analysis**	Visualization and descriptive statistics	Rapid understanding of patterns and anomalies, which guides advanced analysis
4	**Inference and causality**	Univariate and multivariate models	Solid and defensible conclusions
5	**Machine Learning and interpretable AI**	Predictive models and classification	Precise and transparent predictions, avoiding "black box"
6	**Delivery and publication**	Reports and writing support	Clear and publishable results that reinforce credibility and accelerate funding

Scope of services: Experimental design

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Pre-clinical study experimental advisory

The key to the success of your project

- Strategic planning
- Question validation
- Sample size estimation

Scope of services: Data cleaning and curation

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Data cleaning and curation

The foundation of a reliable analysis

- Data cleaning
- Format standardization
- Data quality validation

Scope of services: Exploratory analysis

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Exploratory Data Analysis (EDA)

The first step toward knowledge

- Data visualization
- Descriptive statistical analysis
- Identification of relationships between variables

Scope of services: Inference and causality

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The "why" behind the data

Inference and causality

- Univariate inference
- Multivariate inference
- Key visualization and interpretation techniques

We offer advanced analysis, including predictive modeling (linear regression) and specialized survival analysis.

Scope of services: Machine Learning and interpretable AI

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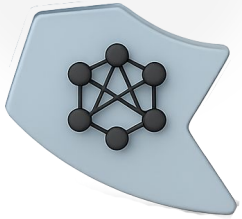

An accurate and reliable AI

Decisions based on understanding

Prediction

Anomaly detection

Classification

Optimization

Scope of services: Delivery and publication

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Delivery of results and publication support

- Drafting of the scientific-technical report
- Presentation meeting
- Support in writing the scientific article
- Revisions and post-delivery advice

Flowchart

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1. **Initial interview**
2. **Project analysis and definition**
3. **Proof of concept and data request**
4. **Analysis execution**
5. **Report drafting and presentation**
6. **Revisions and post-delivery advice**

Examples: Precision Medicine

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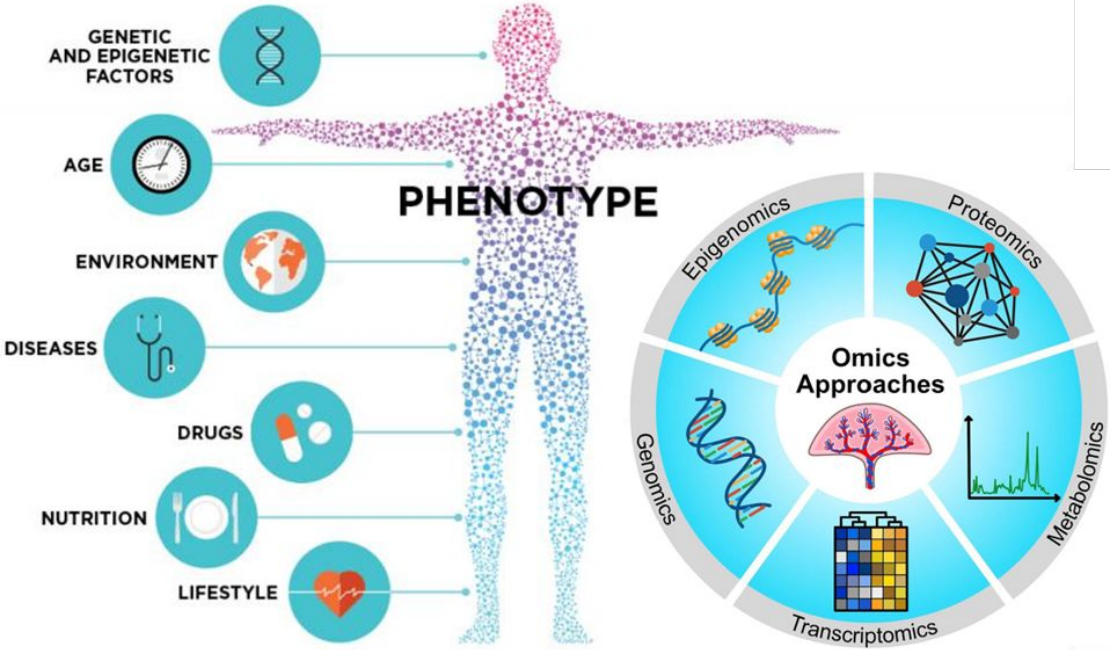
Omics

Personalized
Prevention
Diagnosis
Treatment



González-Olmedo, C., et al. Metabolomics signature as a survival predictor in patients with resectable colorectal liver metastasis. Clinical and Translational Medicine, 2024, 14 (1) : e1541.

Díaz, C., et al. Predicting dynamic response to neoadjuvant chemotherapy in breast cancer: a novel metabolomics approach. Molecular Oncology, 2022, 16 (14) : 2658 - 2671.

Examples: Cancer Epigenetics

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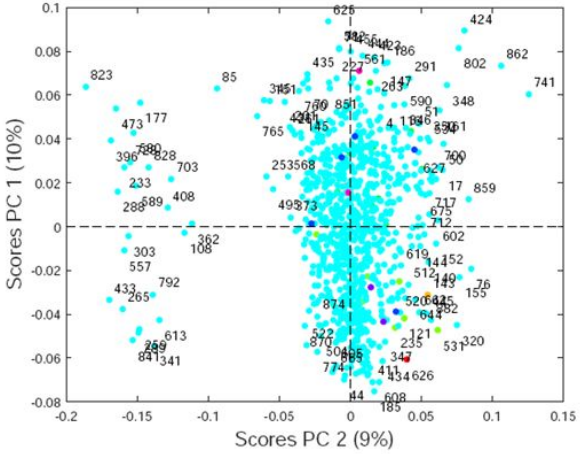
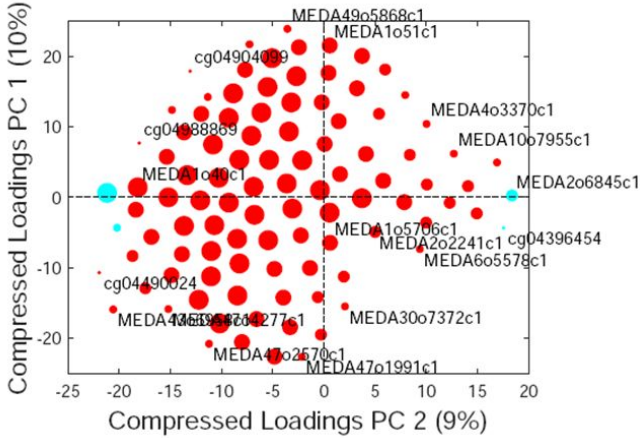
Patient stratification

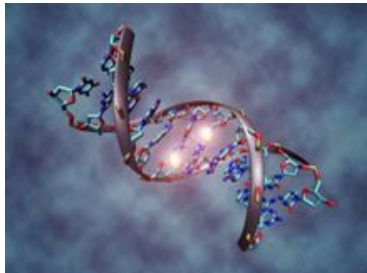


Biomarker selection



The Cancer Genome Atlas Program (TCGA)

Breast Cancer. DNA Methylation (CpG) : 900 x 500,000 (MEGA-variate)



Camacho, J., Saccenti, E. Chemometrics Analysis of Big Data Comprehensive Chemometrics, Chemical and Biochemical Data Analysis, Second Ed.. Elsevier. ISBN 9780444641656. 2020.

Examples: Sparisity for Autism Transcriptomics

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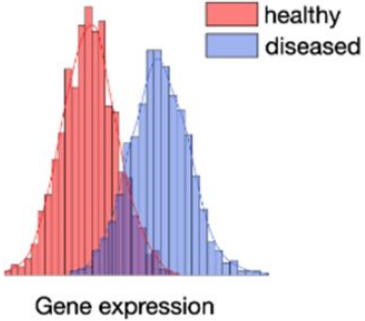
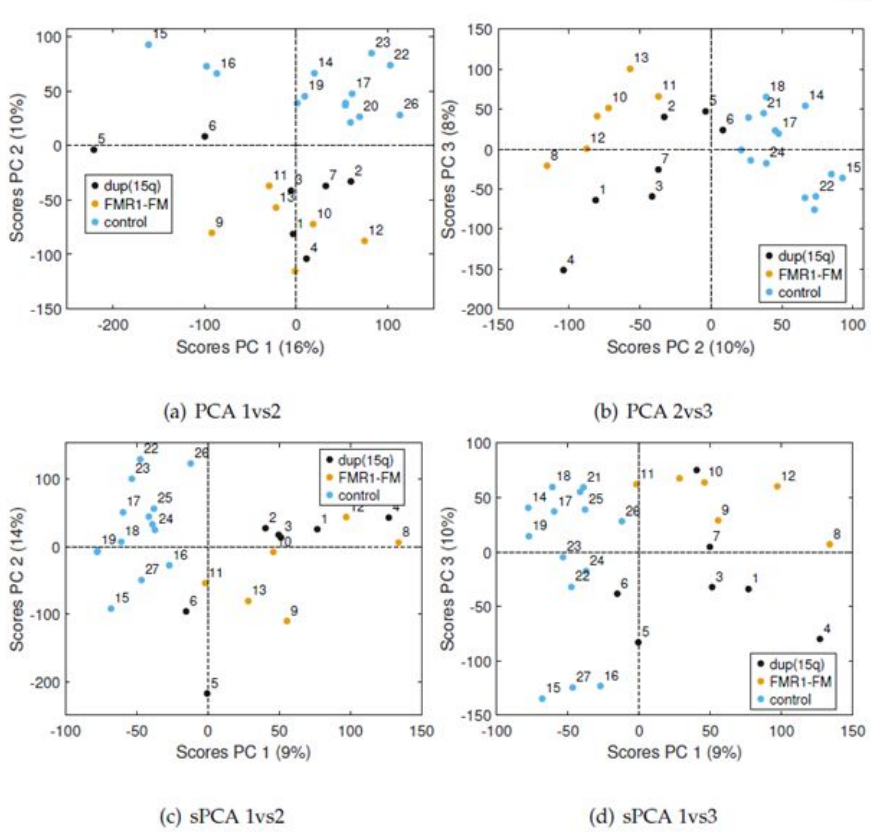
MEGA-variante

X: 27 x 41657
PCA: 3 PCs, 125K par, 33%
sPCA: [4, 4, 4], 12 par, 32%





1 PC:
NM_020156
NM_012247
NM_001008756
NM_000690

2 PC:
NM_032799
A_24_P213321
NM_018362
NM_001039690

3 PC:
NM_002139
NM_001001481
A_24_P144149
NM_018453

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Examples: Causal Inference in Longitudinal Studies

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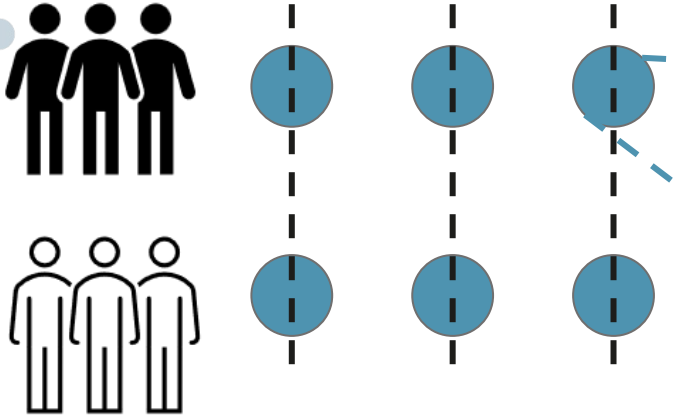
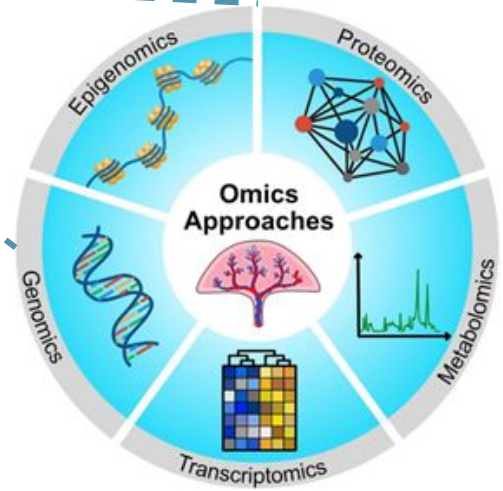
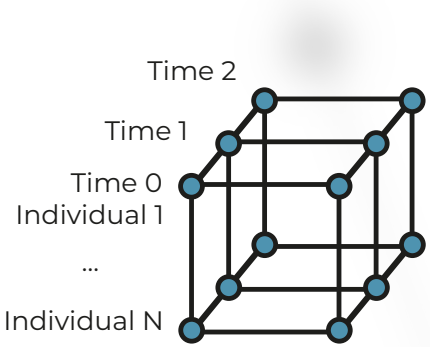
Precision Medicine

Multivariate: Multiple responses

Multiway: Multiple factors in the experiment







Camacho, J., Sorochan Armstrong, M. Population Power Curves in ASCA with Permutation Testing. Journal of Chemometrics, 2024, 38 (12) : e3596.

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Examples: Causal Inference in Cancer

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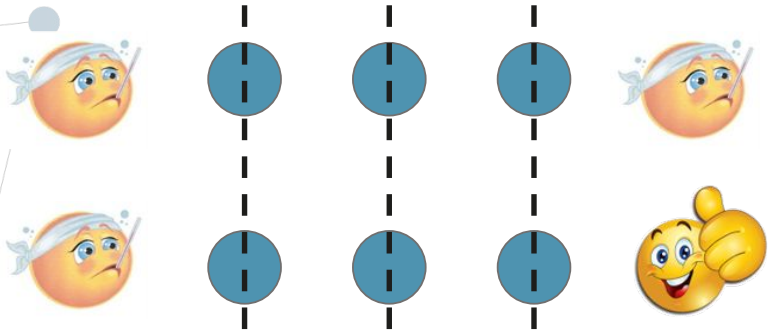
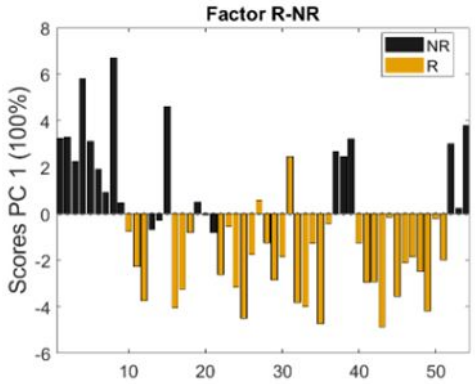
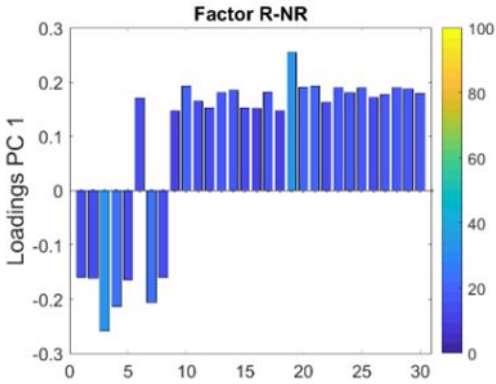
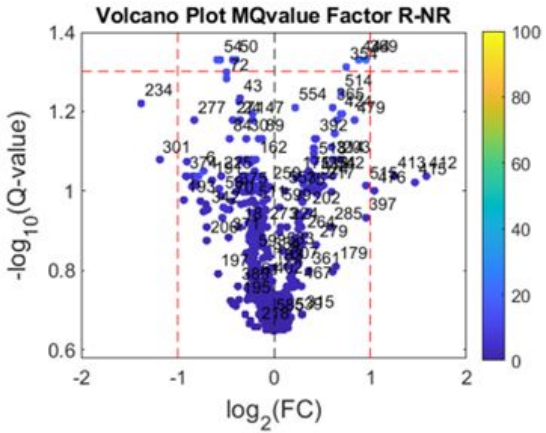
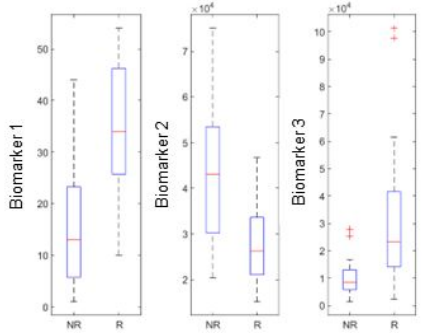


21 patients (8 NR, 13 R)









Examples: Spatial single-cell (ssc) omics

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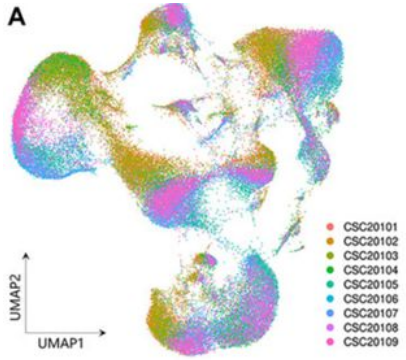

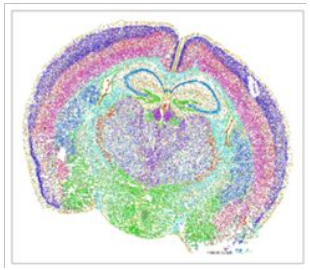

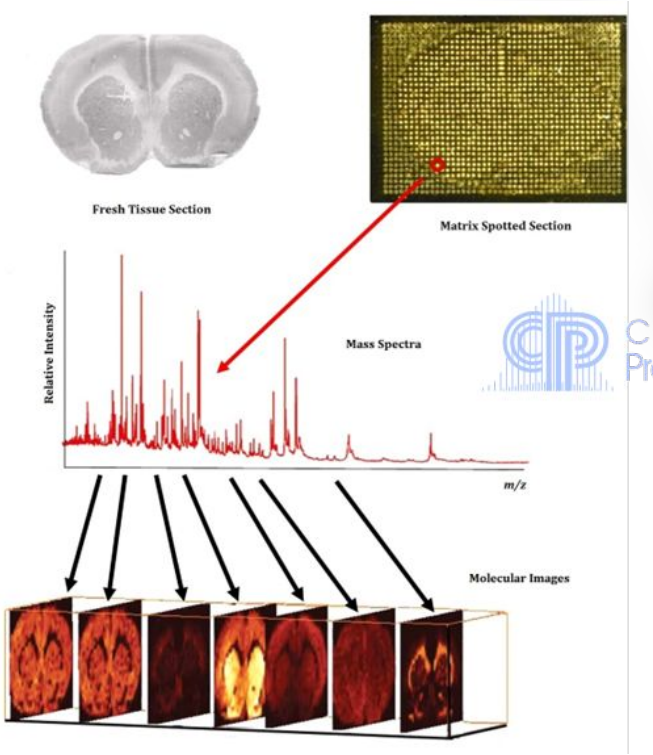

Camacho, J., Armstrong, M.S., Garcia-Martinez, L., Diaz, C. and Gomez-Llorente, C., 2025. Single-cell spatial (scs) omics: Recent developments in data analysis. TrAC Trends in Analytical Chemistry, 183, p.118109.

Examples: Spatial single-cell (ssc) omics

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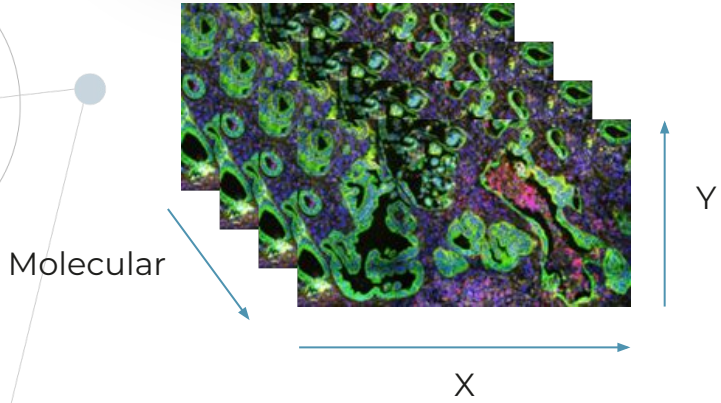
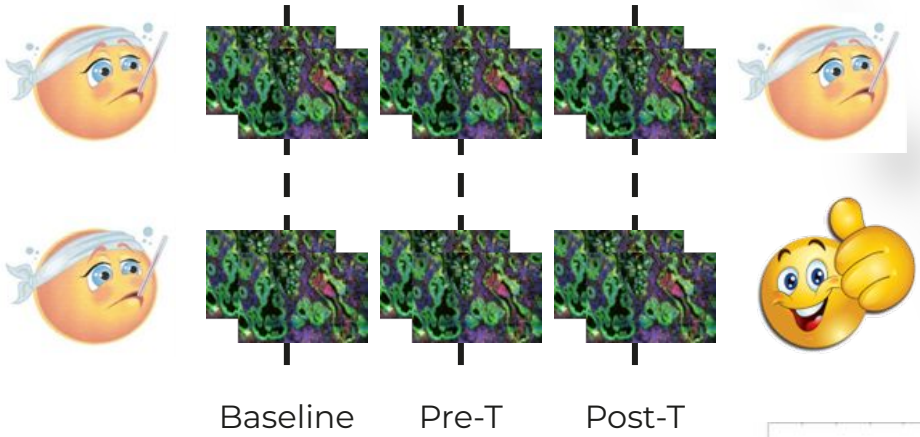
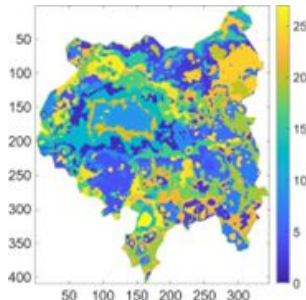


Precision ssc Medicine





mustard

Multi-scale Spatio-Temporal Analysis of Research Data

https://codas.ugr.es/mustard

info@datharsis.com

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Let's transform the future of health together

Thanks!

Do you have any questions?

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