

15-16 February 2021

COMETH Training course

From omics data

to tumor heterogeneity quantification

EIT Health is supported by the EIT,
a body of the European Union

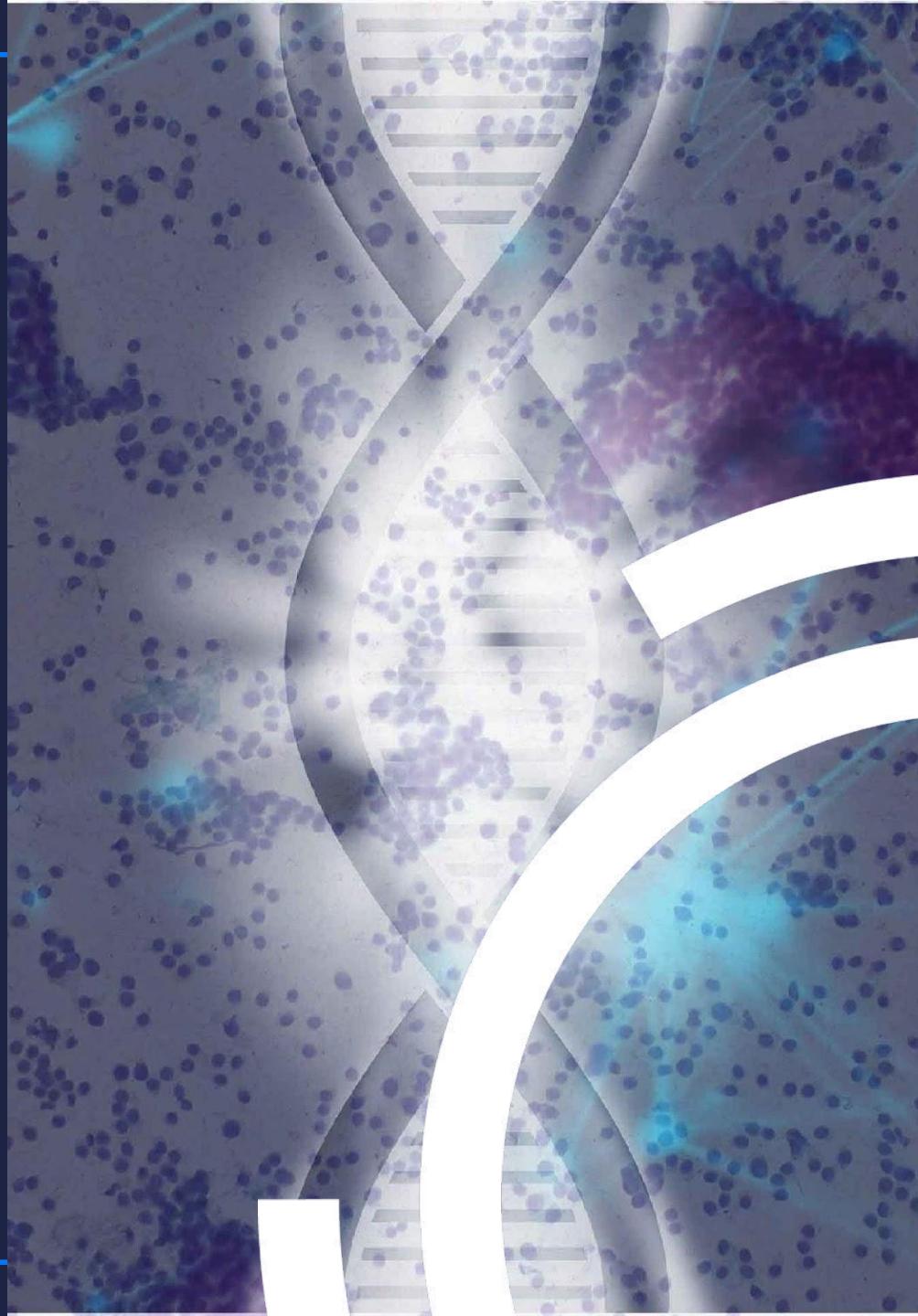




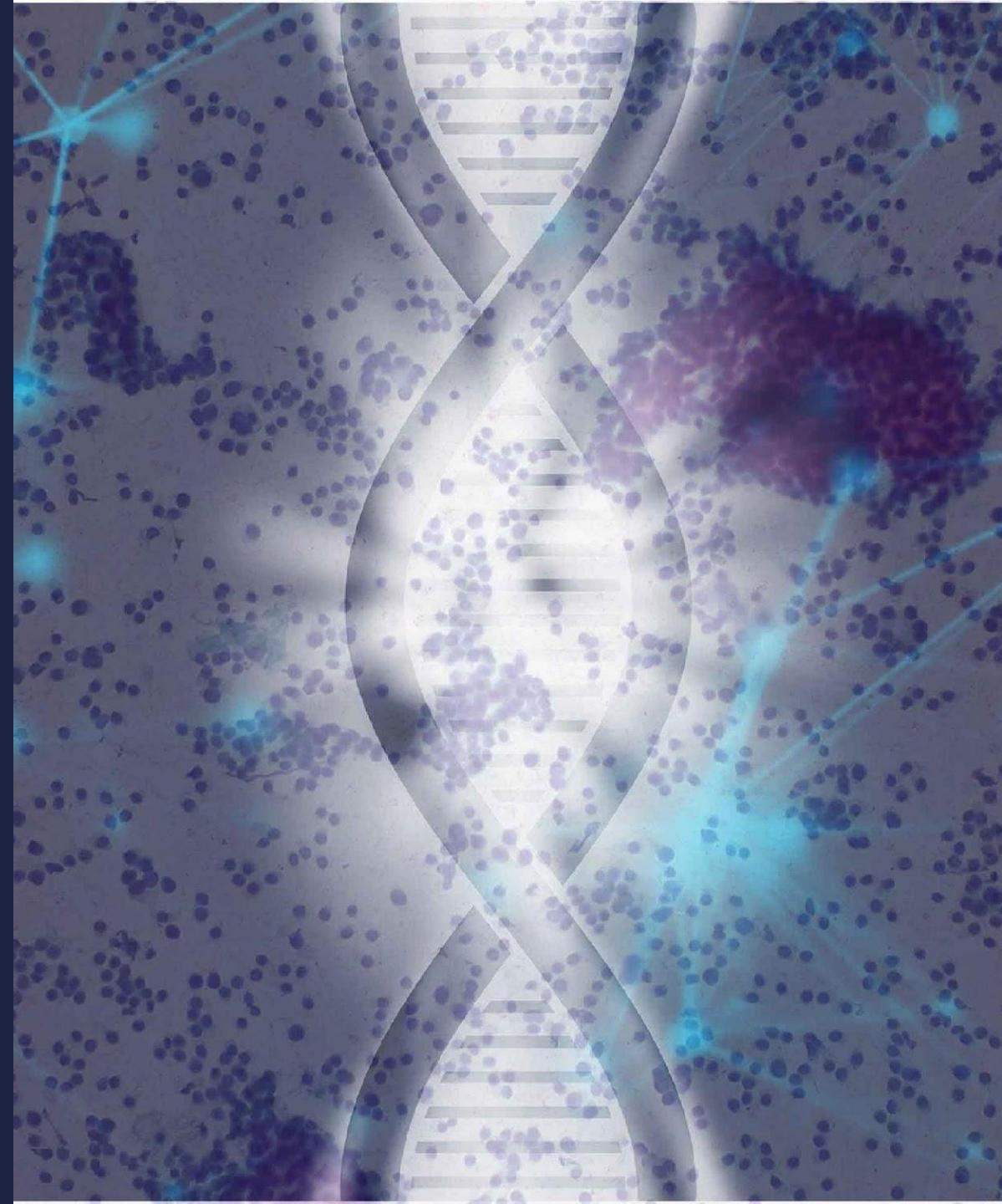
15 January 2021

Introduction to the course

Yuna Blum and Magali Richard

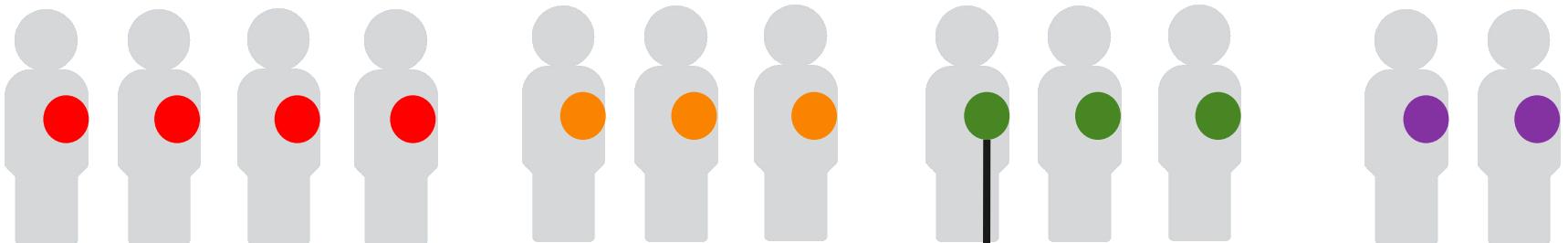


What is tumor heterogeneity?



From omics data to **tumor heterogeneity** quantification

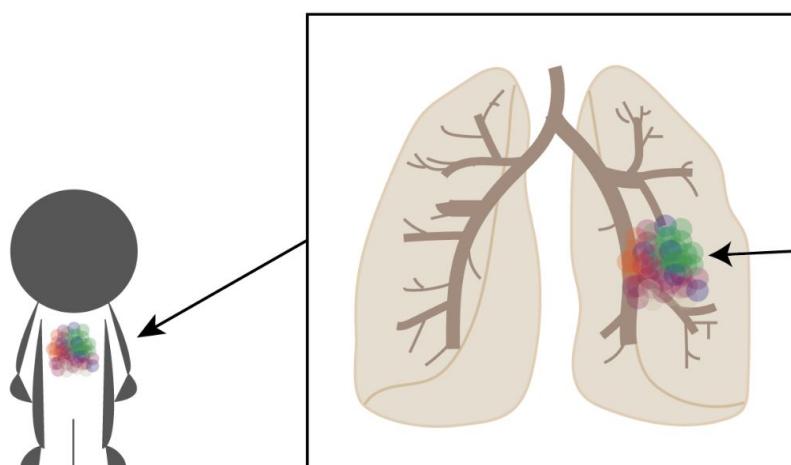
inter-heterogeneity



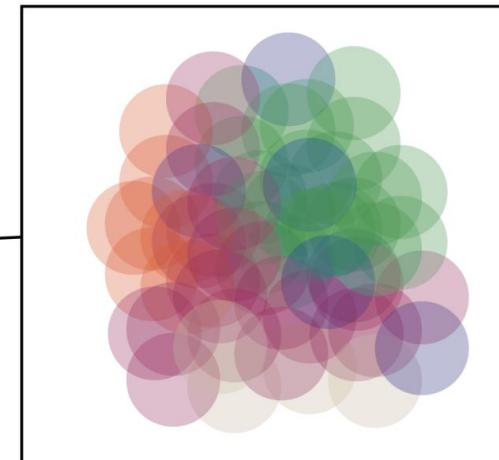
Different cell types

intra-heterogeneity

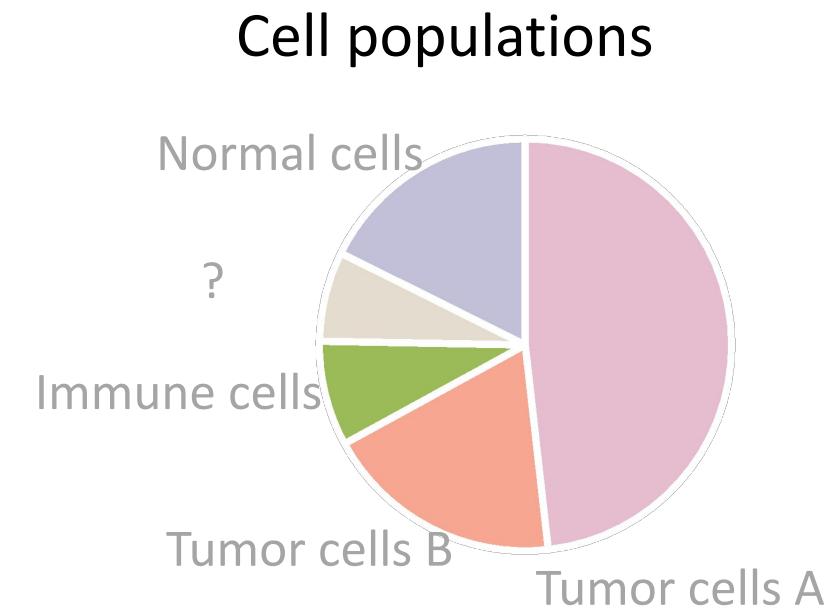
From omics data to **tumor heterogeneity** quantification



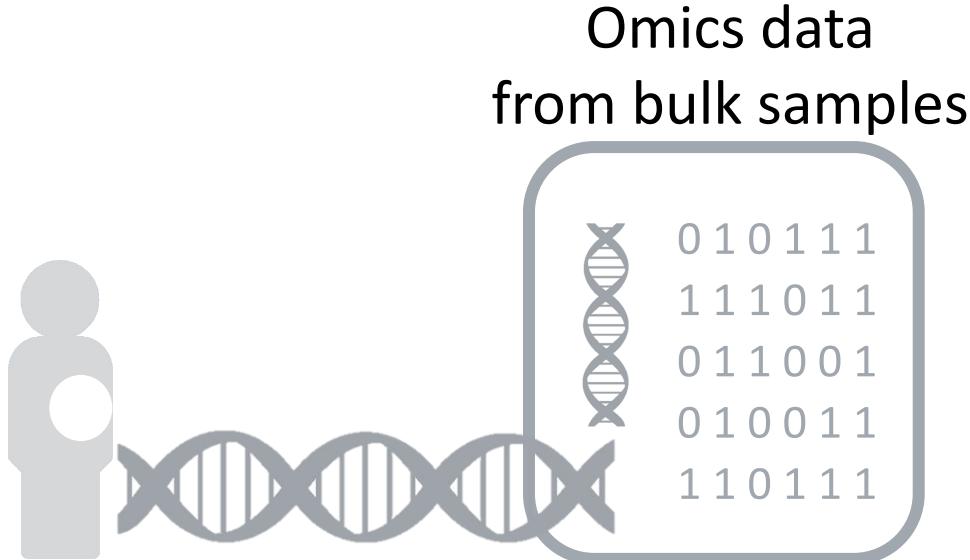
Tumor
intra-heterogeneity



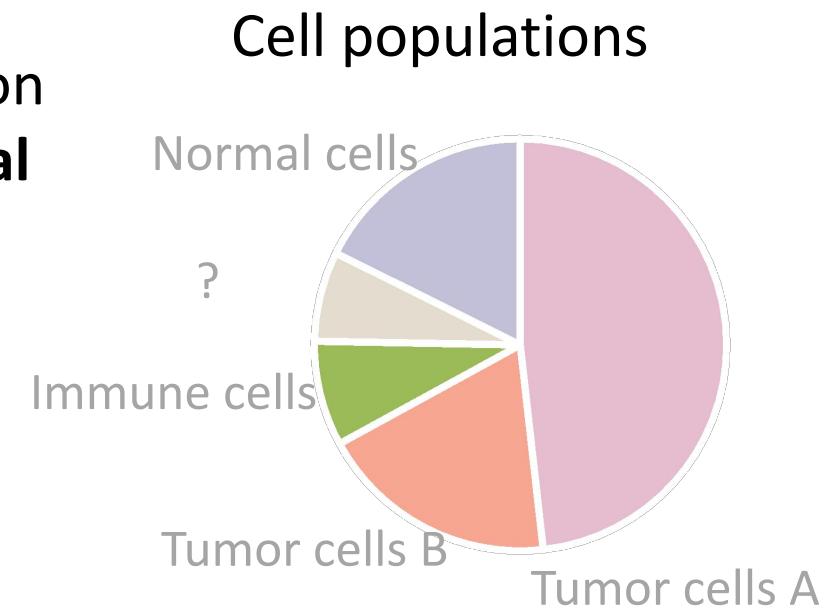
Credits M. Richard



From **omics** data to tumor heterogeneity quantification

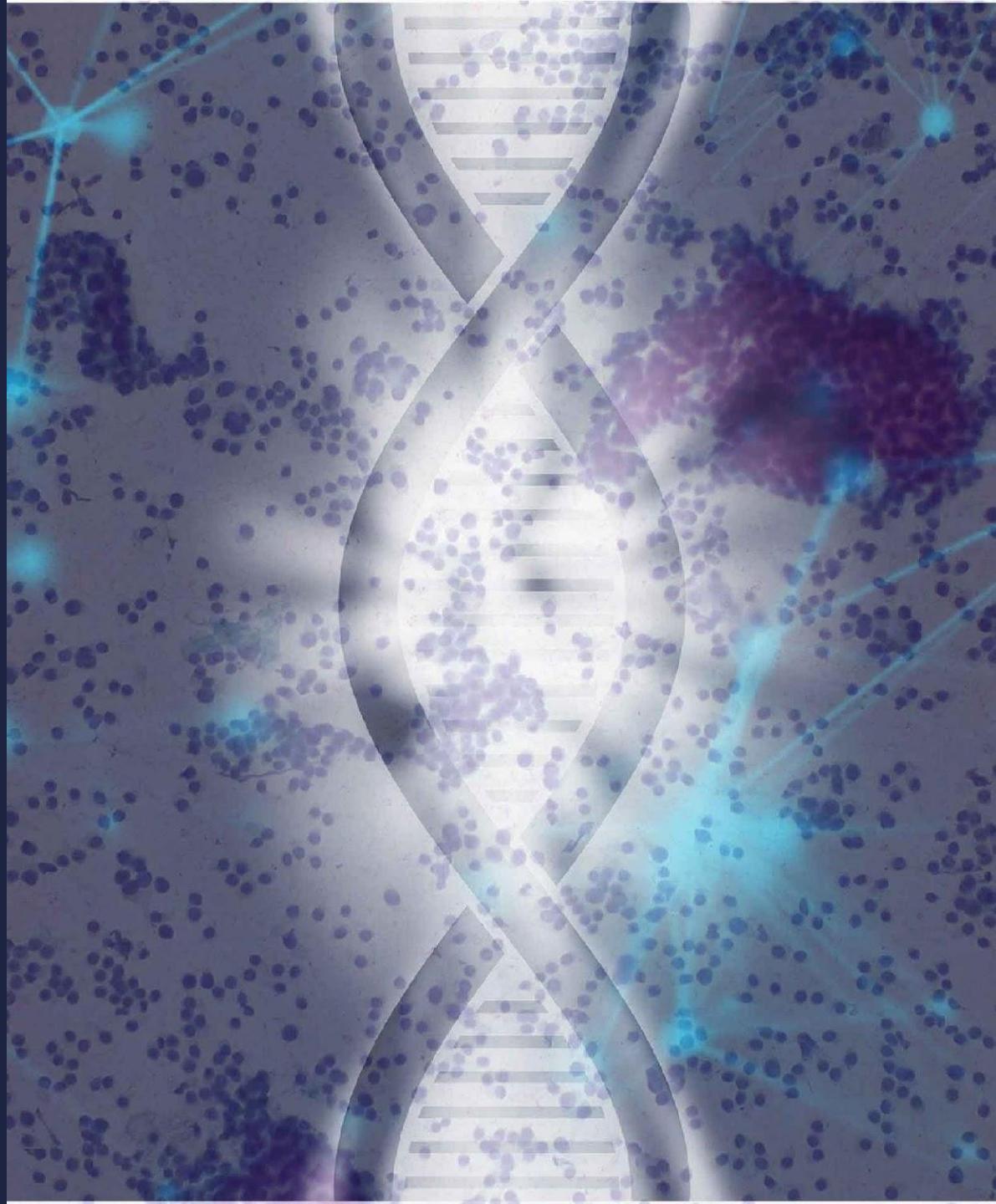


In silico quantification
using **computational
methods**



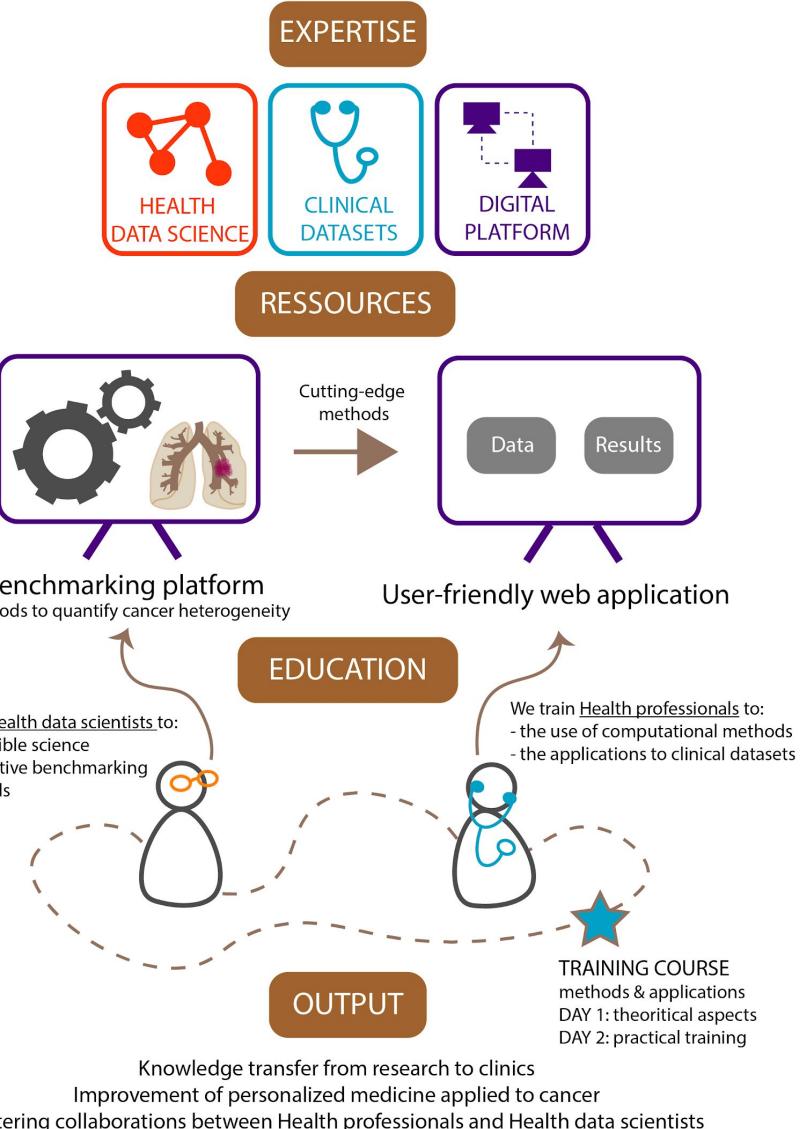
Project in Brief

What is COMETH program?
Aim of the training

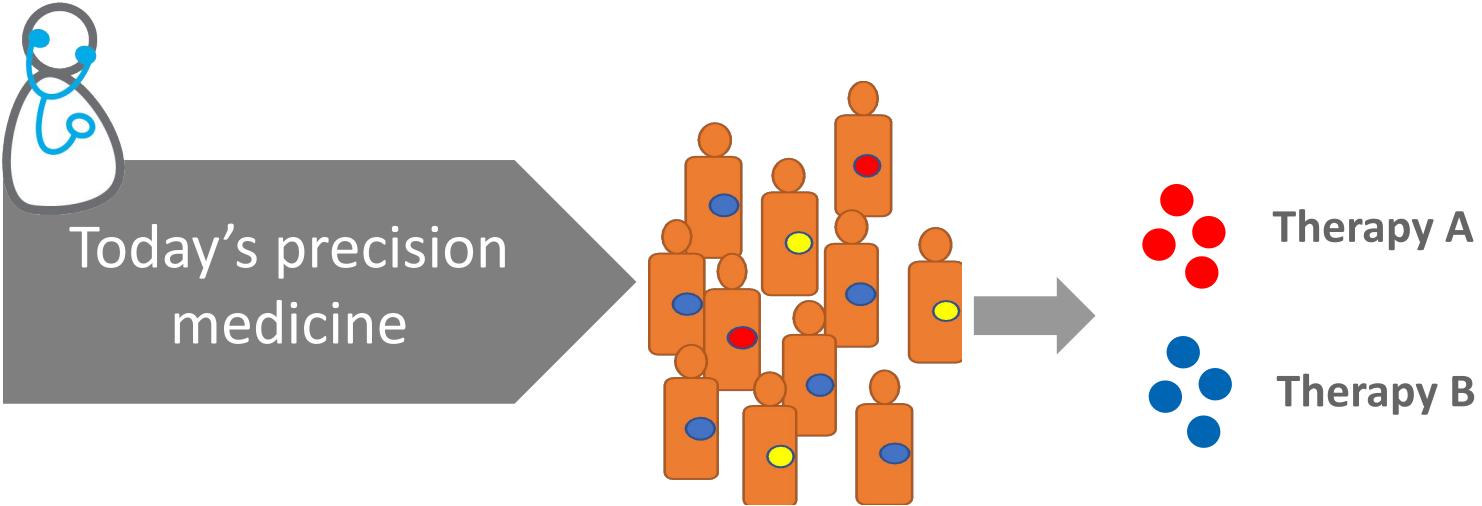


COMETH - COmputational METhods in Health

COMETH PROJECT - 2020 - ACTIVITY



Genomic Big Data & clinics : UNMET NEEDS



500.000 patients/year treated by targeted therapy in Europe

Per-patient lifetime costs for Chronic Lymphoid Leukemia treatment:
\$147,000 to \$604,000 (2006-16)

Genomic Big Data & clinics : UNMET NEEDS



Today's precision
medicine

25
GENES
PANEL



Crude tumor characterization

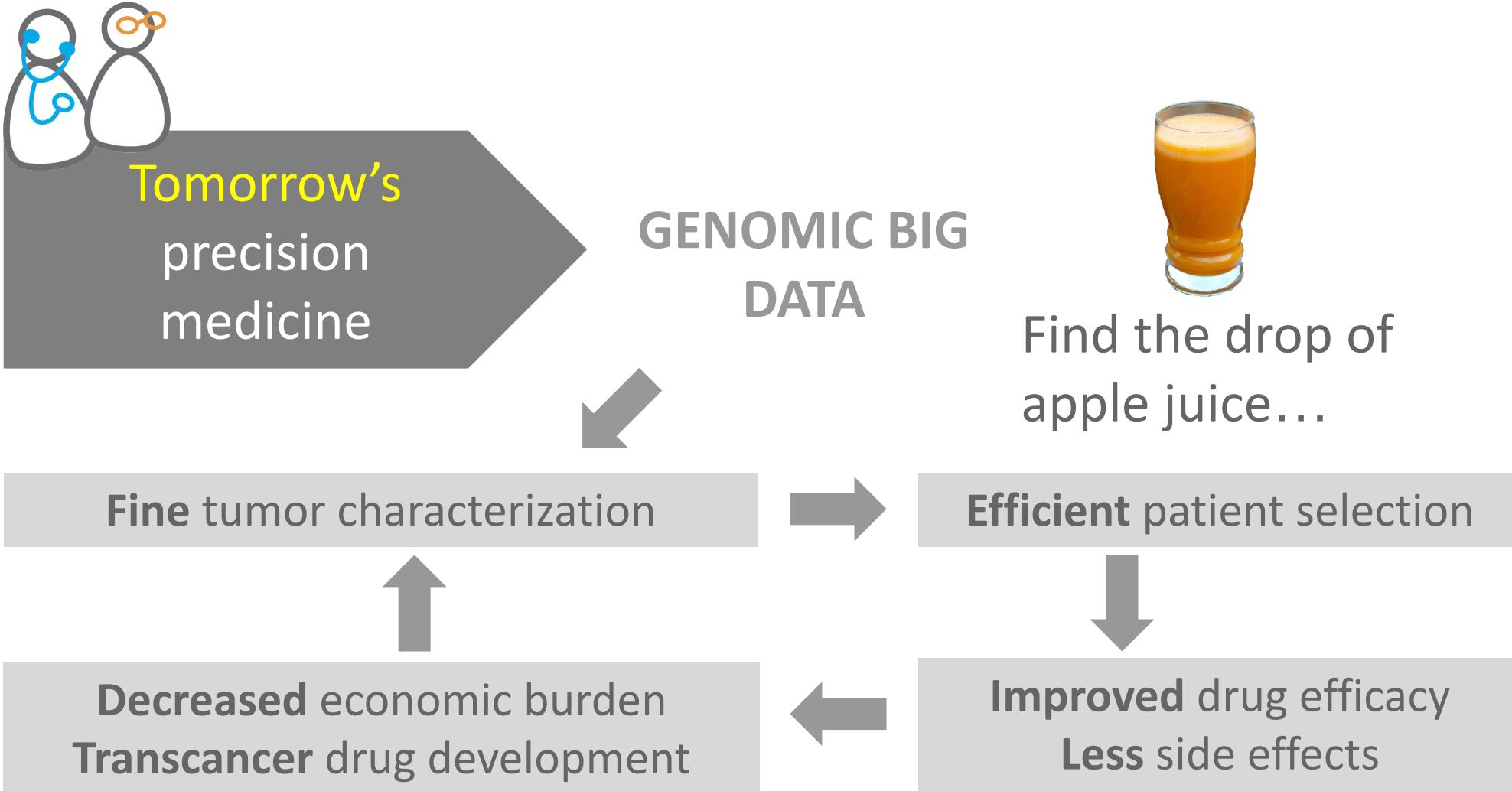
Poor patient selection

Heavy economic burden
Dismissal of potential effective
drugs

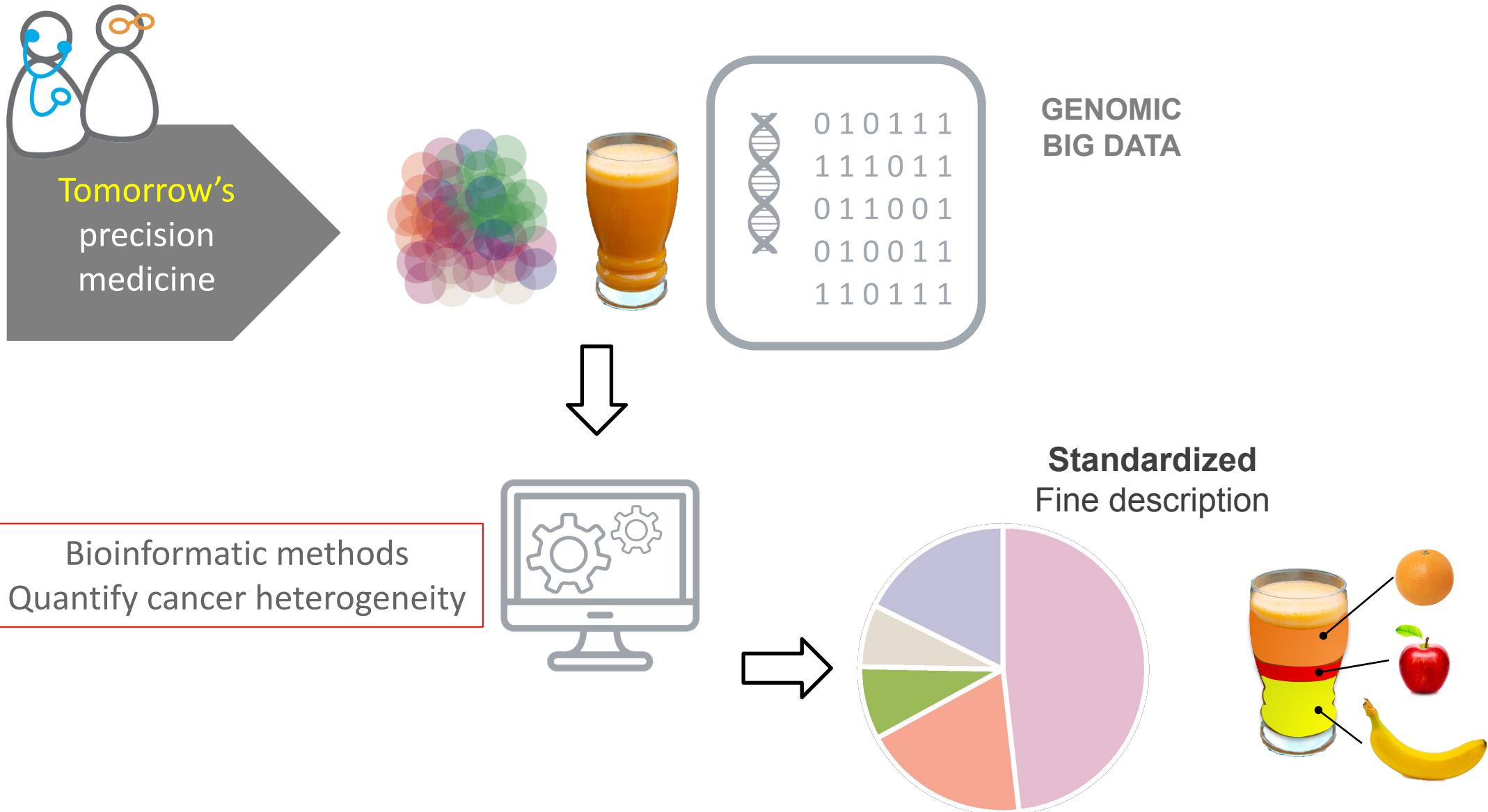
Low drug efficacy
Important side effects



Genomic Big Data & clinics : UNMET NEEDS



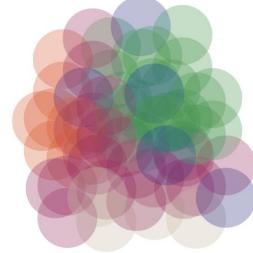
The specific case of tumor heterogeneity quantification



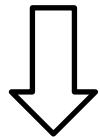
State of the art: Robust analysis tools



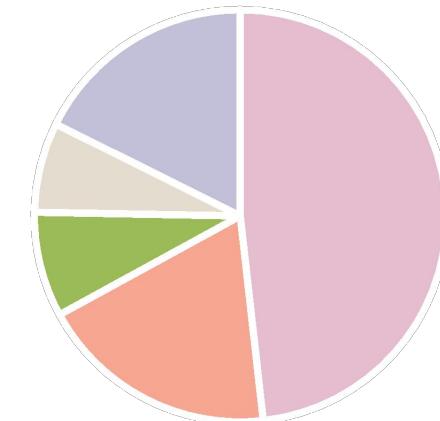
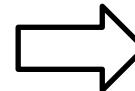
More than **50 methods** in the literature
For research-use only // **0 clinical grade**
0 objective comparison



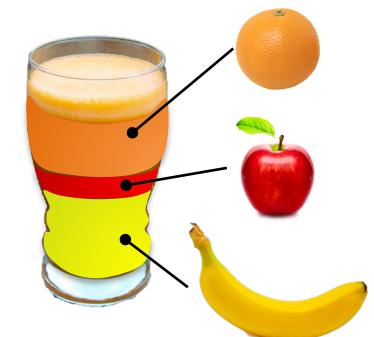
GENOMIC
BIG DATA



Bioinformatic methods
Quantify cancer heterogeneity

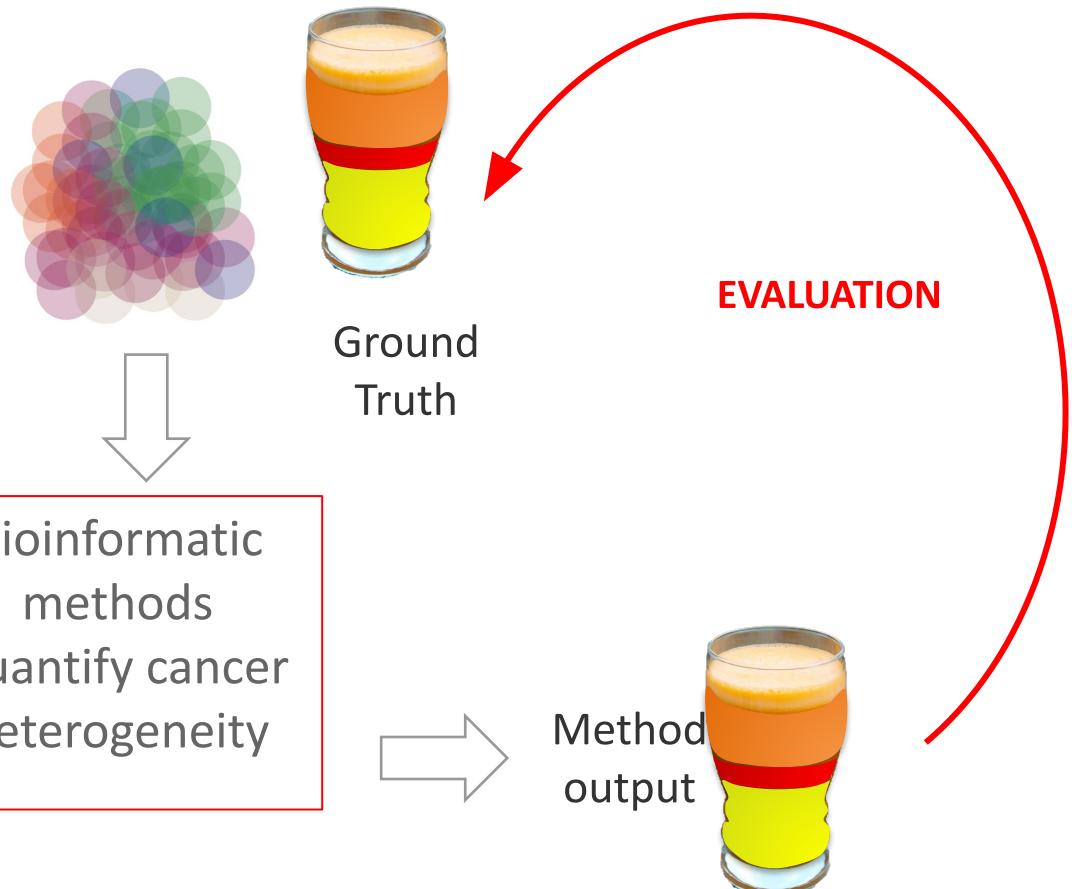


Standardized
Fine description

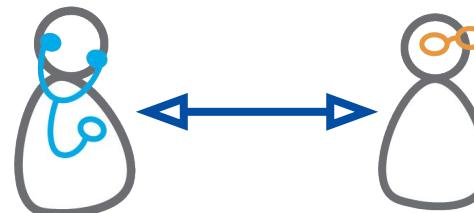


What do we need ?

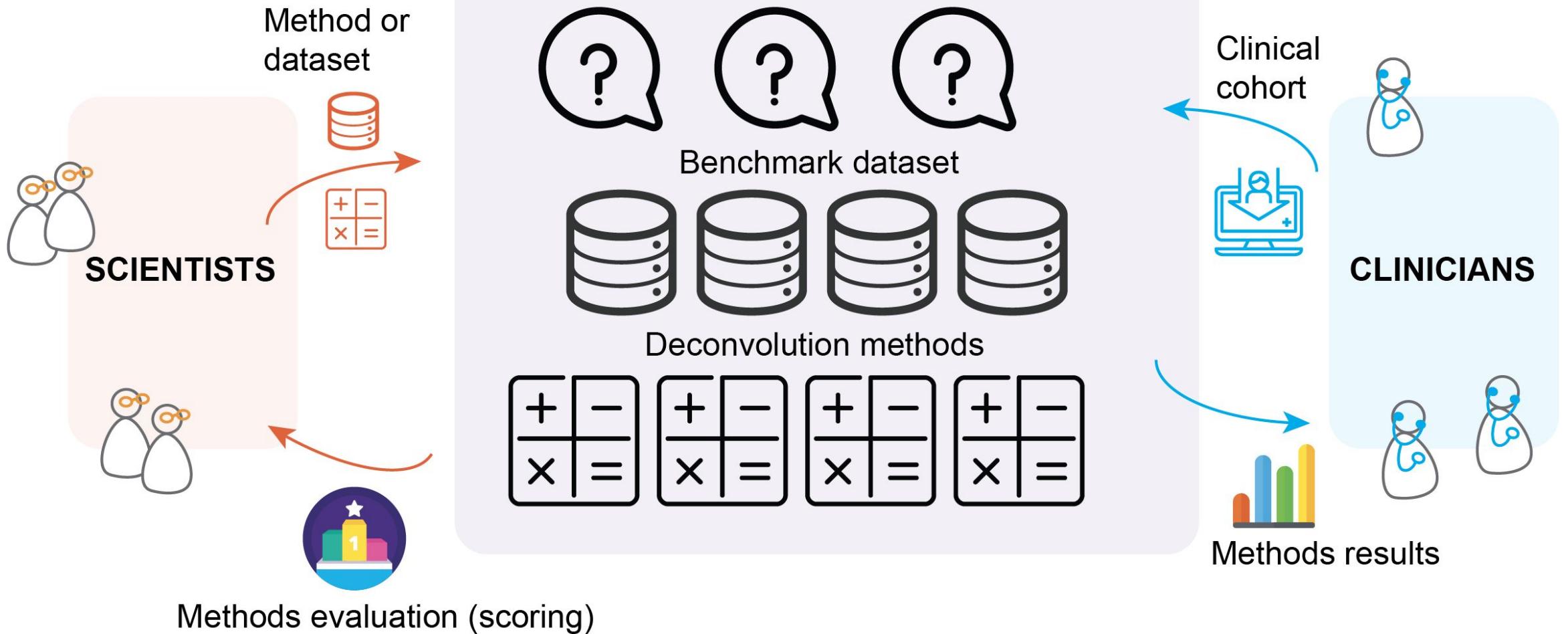
Robust benchmark tools to evaluate methods



Efficient knowledge transfer between scientists and clinicians



The COMETH program



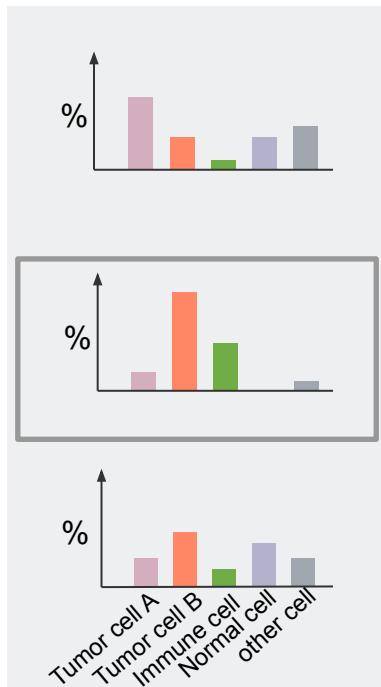
The COMETH program

Codabench

Benchmark bioinformatic platform

Benchmark omic datasets

Known ground truth

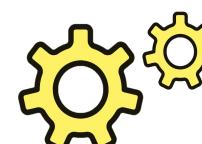
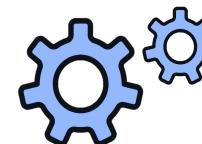
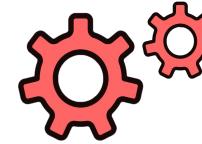
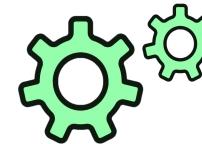


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Application of existing and novel methods



Selection of the best methods

Cometh

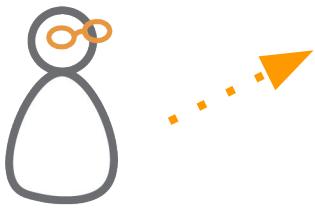
web app



The COMETH interfaces

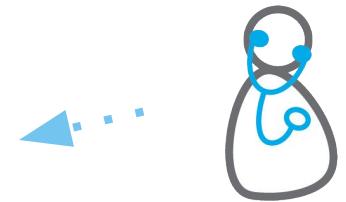
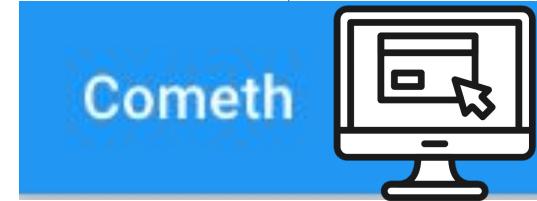
COMETH Data Challenge interface (for data scientists)

Aim: Benchmark new computational methods

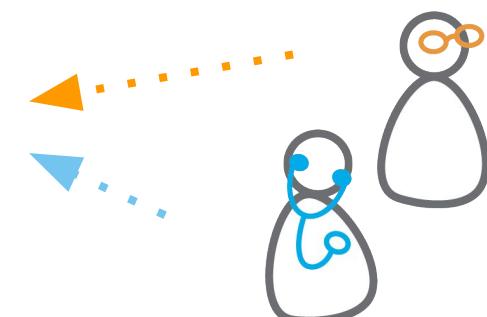
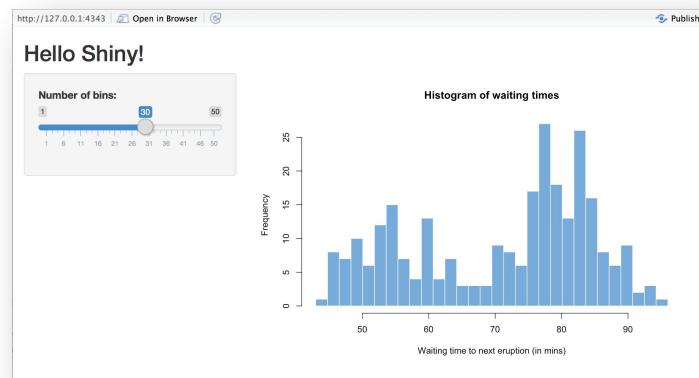


COMETH user friendly web interface
Aim: Choose and apply computational methods

Codabench

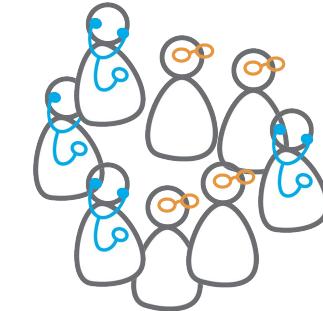
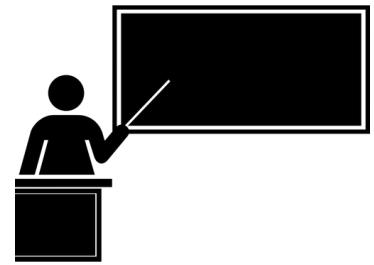


COMETH shiny app
Aim: Visualise the results

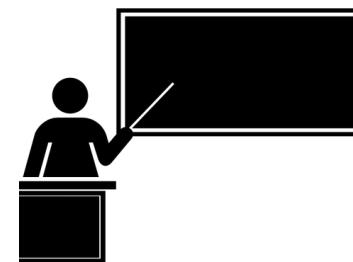
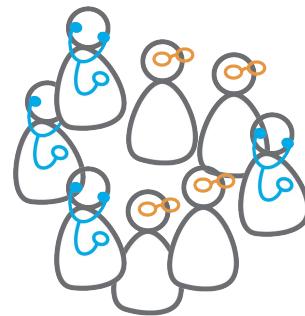


Mutual and interactive learnings

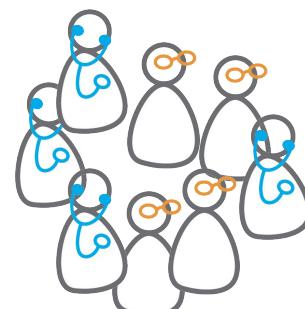
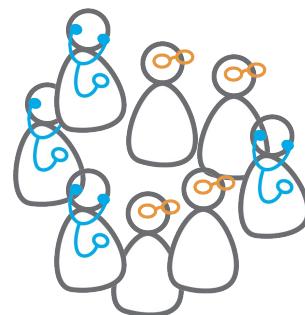
LEARN



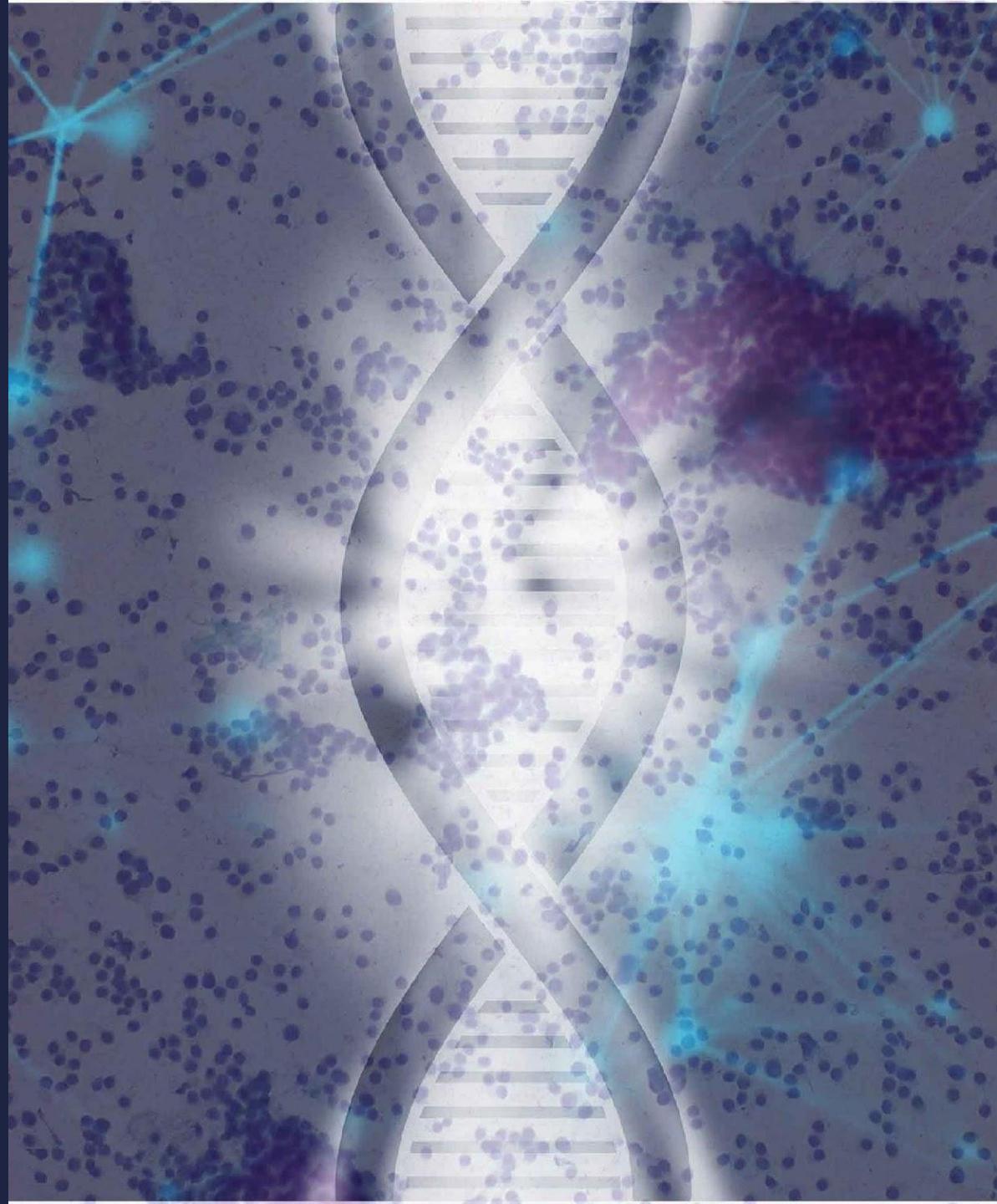
IMPROVE



SHARE



Presentation of the trainers



Instructors



Yuna Blum
Research scientist,
IGDR CNRS Uni. Rennes,
France



Jérôme Cros
Clinician
APHP Paris, France



Carl Herrmann,
Assistant-professor,
Medical Faculty
University Heidelberg,
Germany



Sim Karkar
Researcher, Postdoc
Uni. Grenoble Alpes, France



Magali Richard
Research scientist,
Uni. Grenoble Alpes, France



Ashwini Sharma
Research scientist
Medical Faculty University
Heidelberg, Germany

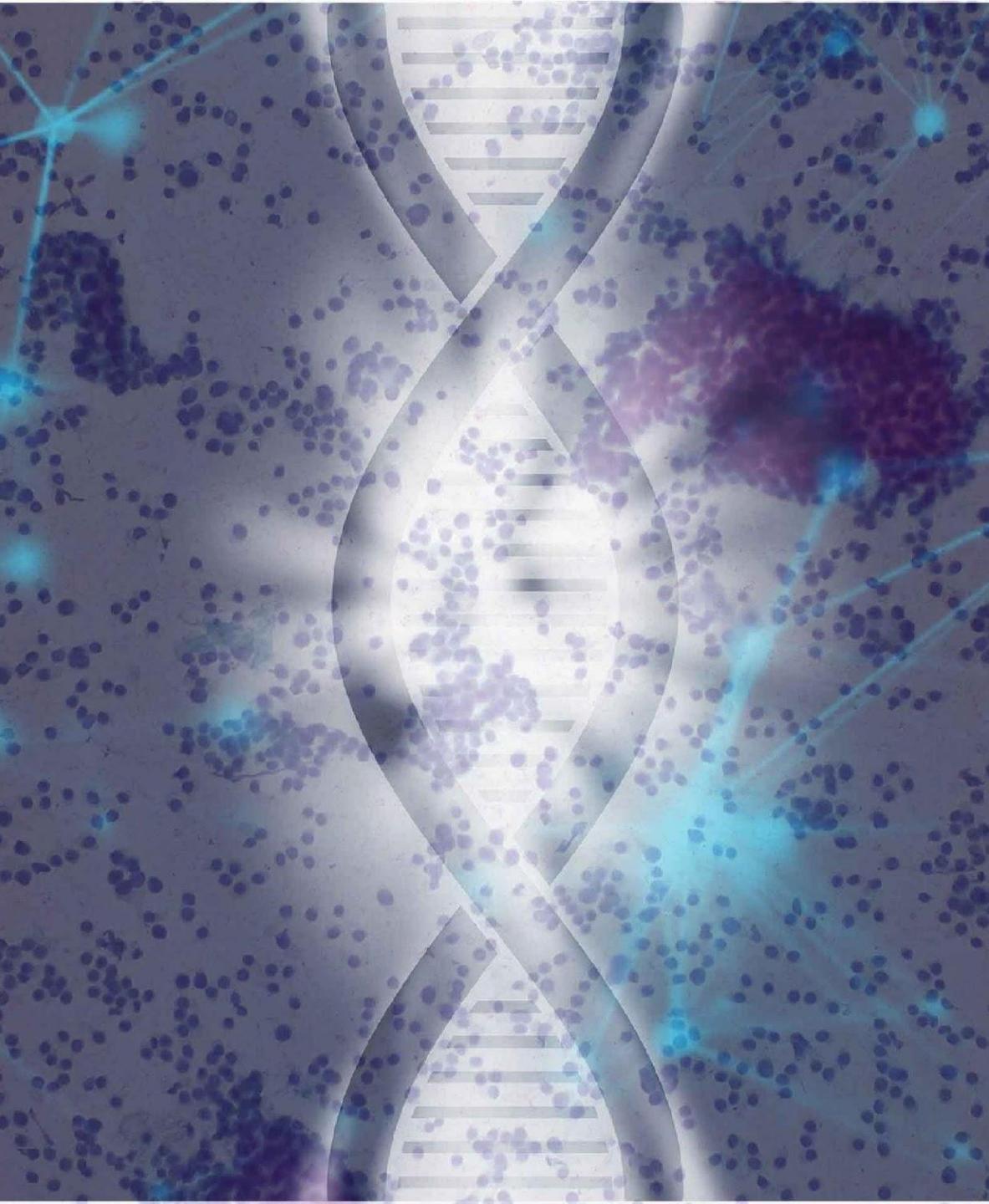


Yasmina Kermezli
Researcher, Postdoc
Uni. Grenoble Alpes,
France



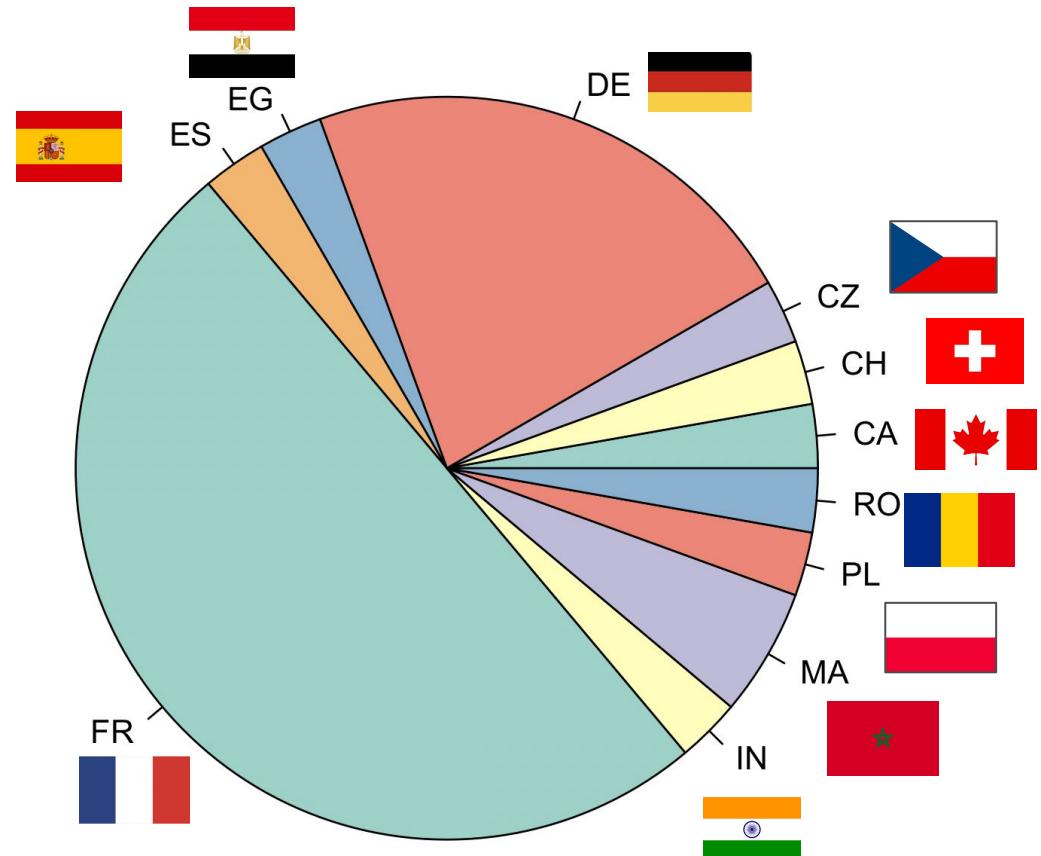
Clémentine Decamps
Researcher, PhD student
Uni. Grenoble Alpes,
France

Participants and groups

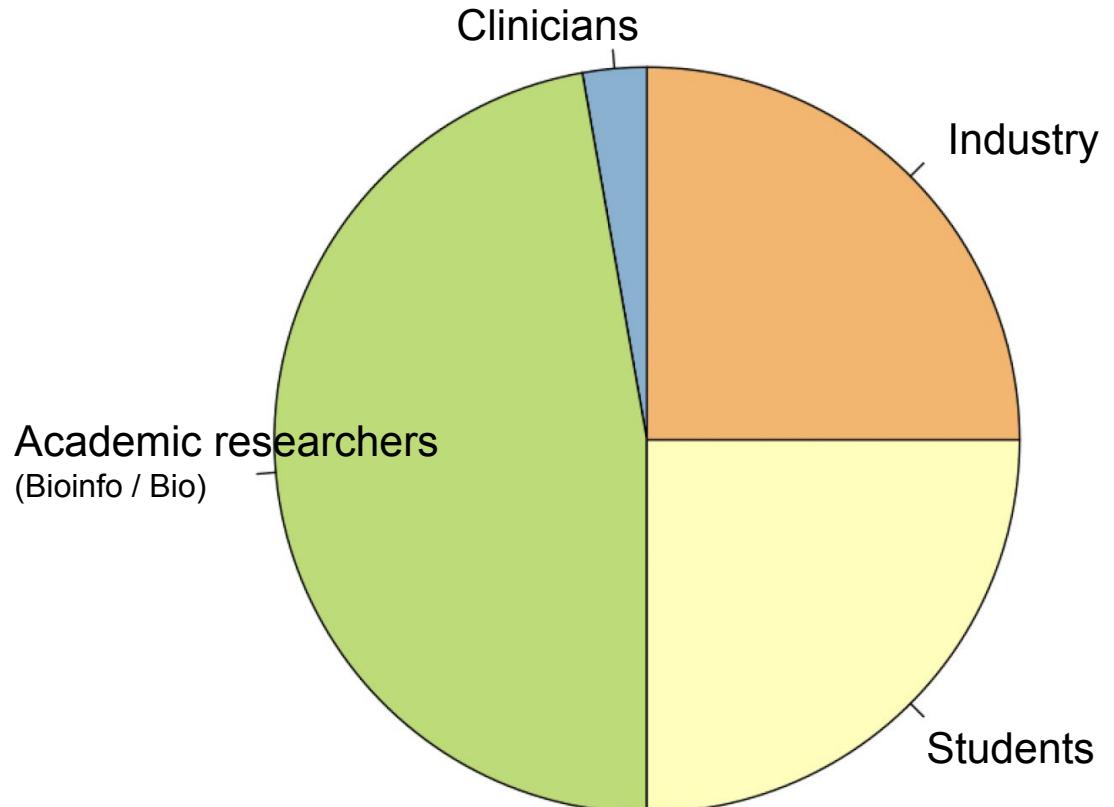


Participants n>30

11 countries



Professional category



Groups and small teams

First Name	Last Name	Medical Group	Teams
Agata	Nosowicz	Medical contributors	G1-M
Lena	Voithenberg	Medical contributors	G1-M
Ferdaous	Idlahcen	Medical contributors	G1-M
Saravanakumar	Selvaraj	Medical contributors	G1-M
Fatima	Berro	Medical contributors	G2-M
Lilija	Wehling	Medical contributors	G2-M
Sebastien	Corre	Medical contributors	G2-M
Bhavana	Rahangdale	Medical contributors	G2-M
Linda	LARBI CHERIF	Medical contributors	G3-M
Lucie	Laplane	Medical contributors	G3-M
Naoual	Menssouri	Medical contributors	G3-M
Fatima Zahra	EL BARCHE	Medical contributors	G3-M
Ibrahim	Bouakka	Medical contributors	
LAMIA	MADACI	Medical contributors	
aakanksha	bansal	Medical contributors	
rousseaux	sophie	Medical contributors	
NIDHI	PATEL	Medical contributors	

Trainers

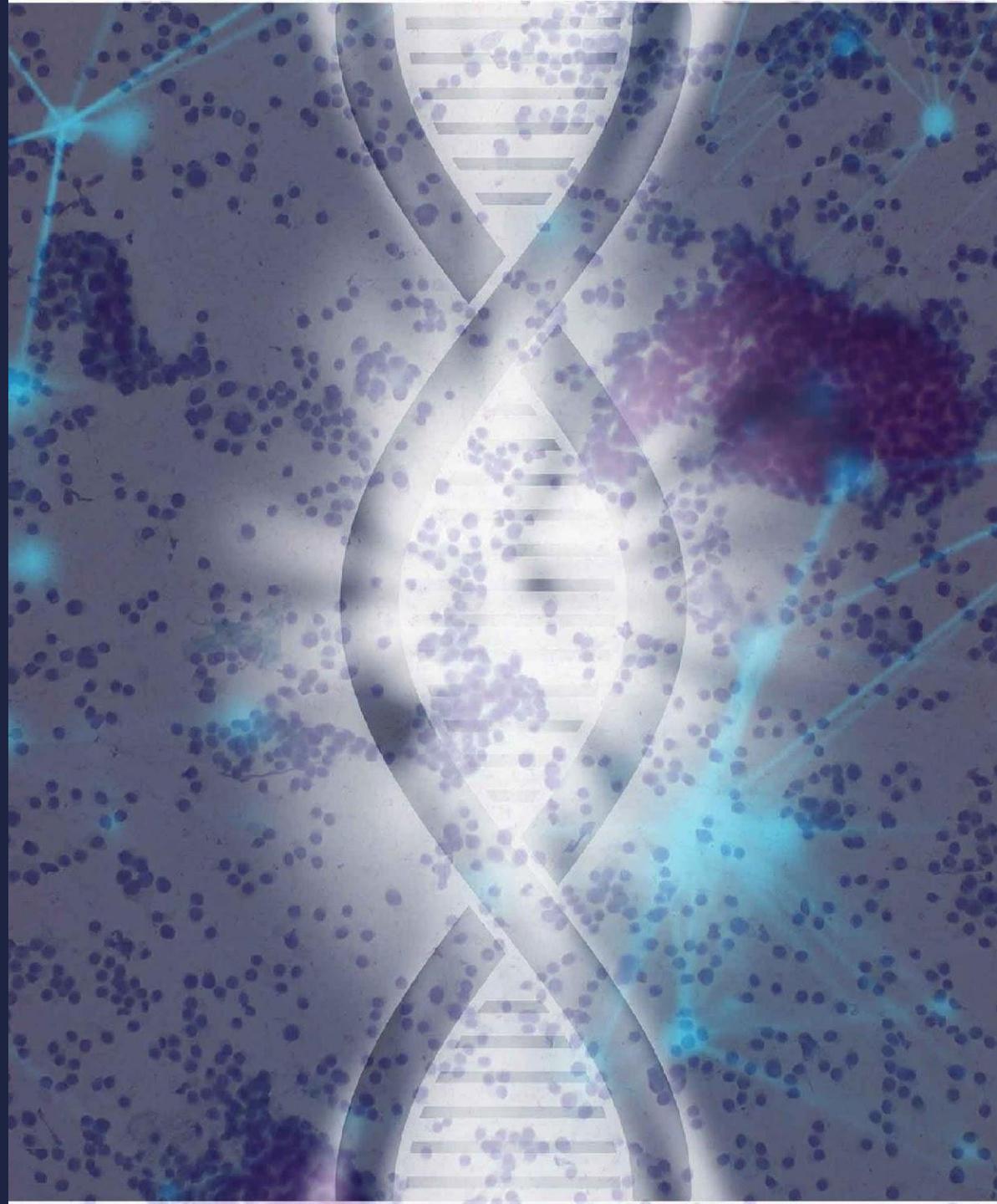


First Name	Last Name	Computational Group	Teams
warda	BOUTEGRABET	Computational contributor	G1-C
Barbora	Zwinová	Computational contributor	G1-C
Joana	Ribeiro Pinto	Computational contributor	G1-C
Swann	Meyer	Computational contributor	G1-C
Juan Manueñ	Garcia	Computational contributor	G2-C
sara	salah	Computational contributor	G2-C
Khawla	Seddiki	Computational contributor	G2-C
Luis	Vale Silva	Computational contributor	G2-C
Agnieszka	Kraft	Computational contributor	G3-C
Yohann	Trivino	Computational contributor	G3-C
Fabien	Quinquis	Computational contributor	G3-C
Marc	Aubry	Computational contributor	G3-C
Yiwen	Lu	Computational contributor	G4-C
Marie	DE TAYRAC	Computational contributor	G4-C
Grégoire	MARRET	Computational contributor	G4-C
Lisa	SALHI	Computational contributor	G4-C
Ayyoub	Salmi	Computational contributor	
delphine	rossille	Computational contributor	
JULIA	GERONIMI	Computational contributor	
Surabhi	JAGTAP	Computational contributor	
Kinga	llyes	Computational contributor	

Trainers



Detailed program and visio tools



The program

DAY1

9:00-12:00 am LECTURE

9:00-9:30 am Introduction

9:30-10:30am Clinical point of view

virtual coffee Break

11:00-12:00 am Bioinformatician point of view



Lunch Break

2:00 -3:15 pm LECTURE

2:00-3:00 pm Data pre-processing
(normalization, transformation...)



3:00-3:15 pm How do I contribute?

3:15 -5:00 pm Practical work



Medical contributors

Presentation of the user-friendly COMETH web app

Computational contributors

Presentation of Codabench
First basic submission

4:45-5:00 pm Debriefing

DAY2

9:00 -10:00 pm LECTURE

9:00-10:00 pm Visualization and interpretation



10:00 -12:00 pm Practical work

Medical contributors

Using COMETH web app on real datasets: small projects



Computational contributors

Submit novel computational methods on codabench

Lunch Break

2:00-4:00 pm Practical work

2:00-2:30 pm Debriefing with slides from teams



Medical & Computational contributors

2:30-4.00 pm Focus on biological interpretation

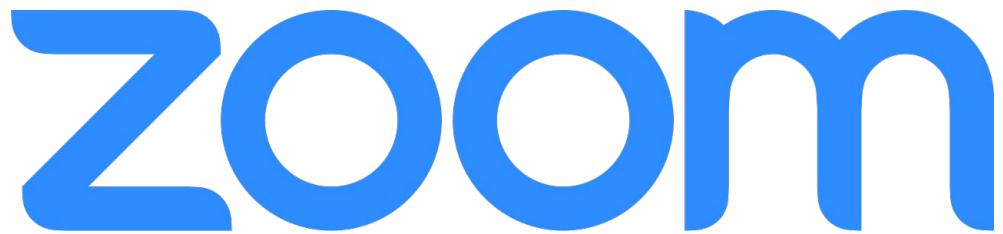


4:00-4:45 pm PRESENTATIONS

2:00-2:45 pm Results presentation & discussion

4:45 -5:00 pm CONCLUSION

Visio conferencing tools



DAY1:

https://univ-grenoble-alpes-fr.zoom.us/meeting/register/tJAscOyvrzktH9Mh_cI-EHGZN7mxu1rZa

DAY2:

https://univ-grenoble-alpes-fr.zoom.us/meeting/register/tJlkduiopzsjGtG_ovpR6MCZbiGFXKyG

Discord



<https://discord.com/invite/ZPxszzeQxnT>

Go on our website to retrieve the links: https://cancer-heterogeneity.github.io/cometh_training.html

The program

DAY1

9:00-12:00 am LECTURE

9:00-9:30 am Introduction

9:30-10:30am Clinical point of view

Break

11:00-12:00 am Bioinformatician point of view



Lunch Break

2:00 -3:15 pm LECTURE

2:00-3:00 pm Data pre-processing
(normalization, transformation...)

3:00-3:15 pm How do I contribute?



3:15 -5:00 pm Practical work



Medical contributors

Presentation of the user-friendly COMETH web app

Computational contributors

Presentation of Codabench
First basic submission

4:45-5:00 pm Debriefing

VISIO TOOLS

ZOOM plenary sessions



Medical

3:15 - 3:30 pm
ZOOM Breakroom
Introduction to the cometh app

3:30 - 4:45 pm

8-8 8-8 8-8
Explore cometh using provided Datasets

4:45 - 5:00 pm

ZOOM Breakroom
Debriefing

Computational

3:15 - 3:30 pm
ZOOM Breakroom
Presentation of Codabench

3:30 - 4:45 pm

8-8 8-8 8-8
Basic submission

4:45 - 5:00 pm

ZOOM Breakroom
Debriefing

The program

zoom plenary sessions



Medical

10:00 - 10:15 pm

zoom Breakroom

Explore cBioPortal

10:00 - 12:00 pm

Small projects in teams

2:00 - 2:30 pm

zoom Breakroom

Debriefing: each team 5 min presentation

2:30 - 4:00 pm

Focus on biological interpretation in teams (#4)

+ each team prepare 5 min presentation for the plenary session

Computational

10:00 - 12:00 pm

Submit novel computational methods on Codabench in teams

2:00 - 2:30 pm

zoom Breakroom

Debriefing: each team 5 min presentation

2:30 - 4:00 pm

DAY2

9:00 -10:00 pm LECTURE

9:00-10:00 pm Visualization and interpretation

10:00 -12:00 pm Practical work

Medical contributors

Using COMETH web app on real datasets: small projects

Computational contributors

Submit novel computational methods on codabench

Lunch Break

2:00-4:00 pm Practical work

2:00-2:30 pm First debriefing (slides from teams)

Medical & Computational contributors

2:30-4.00 pm Focus on biological interpretation

4:00-4:45 pm PRESENTATIONS

2:00-2:45 pm Results presentation & discussion

4:45 -5:00 pm CONCLUSION

Any problem, questions?

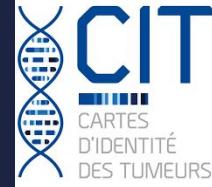
Discord



<https://discord.com/invite/ZPxszQxnT>

Contact us on the discord chat





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Carl Herrmann, Medical Faculty Heidelberg

Slim Karkar, Uni Grenoble Alpes

Yasmina Kermezli, Uni Grenoble Alpes

Magali Richard, Uni Grenoble Alpes

Ashwini Sharma, Uni Grenoble Alpes

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