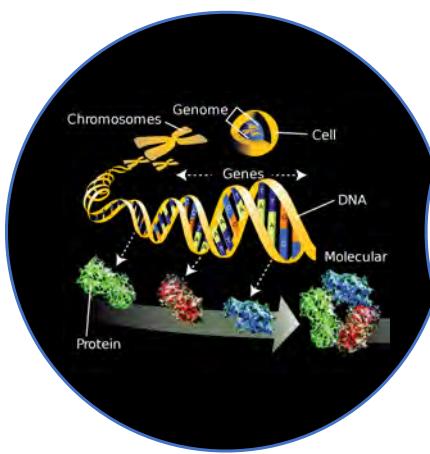


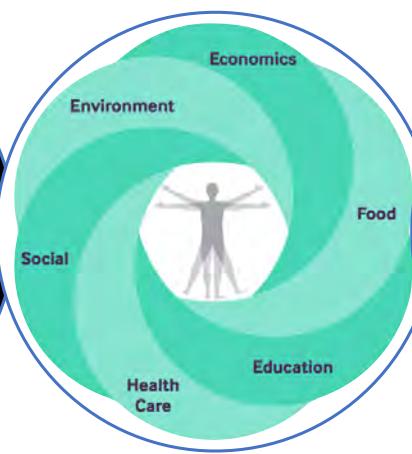
# ADVANCED ANALYTICS and BIG DATA

## EINSTEIN GLOBAL ADVANCED TECHNOLOGY for EQUITY

### Framework



Biology  
(Omics)



Ambient  
(Context)



Behavior  
(Self)

# Big Data

What

Artificial  
Intelligence

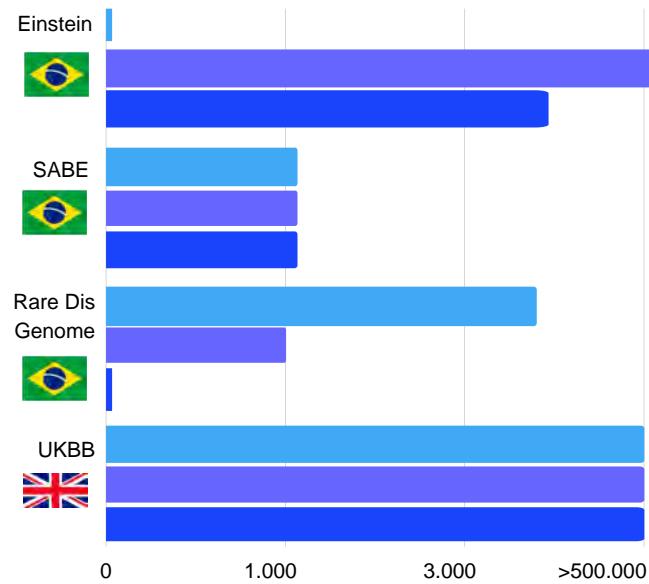
Critical  
thinking

Critical  
reasoning

Purpose  
Driven

## DATABASE

Currently in Brazil there is no single database\* with genomic, clinical and lifestyle data organized on a platform available for the creation of analytical models in large-scale Precision Medicine.



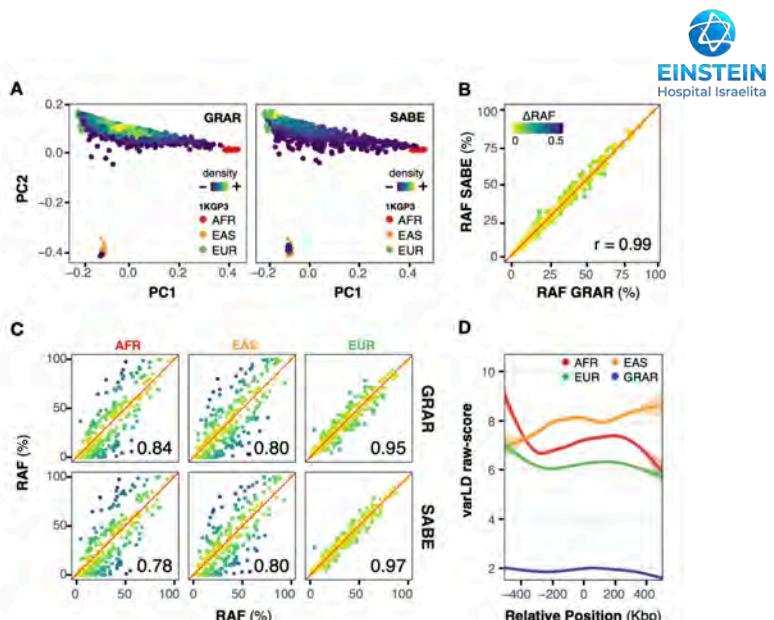
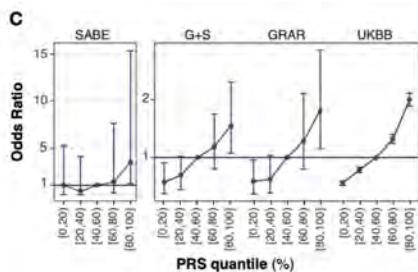
\* scenario: several initiatives, but non-connected

## Federated Analytics (FA)



### Assessing the Risk Stratification of Breast Cancer Polygenic Risk Scores in a Brazilian Cohort

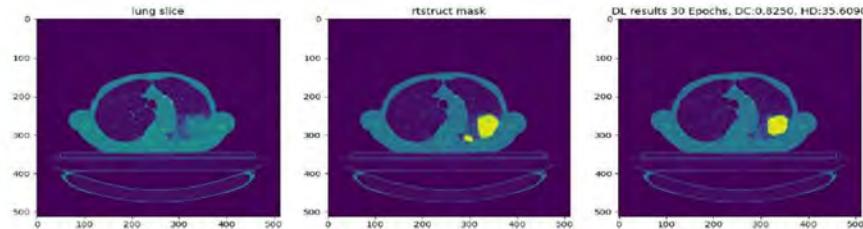
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Catarina dos Santos Gómez<sup>†,4</sup>, Frederico Monfardini<sup>†</sup>, Allysson Allan de Faria<sup>†</sup>,  
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# ARGOS

*“Accessing worldwide imaging data with federated deep learning”*

(AR)tificial intelligence for (G)ross tumour v(O)lume (S)egmentation



- Fully open-sourced code for federated deep learning
- 22 institutional partners across 10 countries
- Executed legal agreements in multiple jurisdictions incl EU, Switzerland, US, China and India
- Inclusivity and diversity – low resource threshold for small clinics and LMICs; each contributes 200+ cases
- In-kind funding from participants

 **OHDSI**  
\* 3.266 colaboradores  
\* 80 países  
\* 21 fuso horários  
\* 6 continentes  
\* 1 comunidade

 **Rede de dados**  
\* 453 bases de dados  
\* 41 países  
\* 928 milhões de registros de pacientes únicos (12% de toda população mundial)



Einstein is an OHDSI partner

## GATE: *Global Advanced Technologies for Equity*



GATE encapsulates a visionary initiative aimed at harnessing **advanced technologies** to address **global equity** challenges. The initiative aligns itself with principles of innovation, ethical inquiry, and a transformative approach to solving complex problems. It has a **deep commitment** to using the power of AI, Data, IoMT and HPC to create **equitable solutions** across various sectors, including healthcare and promote inclusive opportunities worldwide, particularly in South America.

## GATE: Center for IA, HPC, ImT and global data

### *G.lobal*

### *A.dvanced*

### *T.echnologies for E.quity*

#### **Global Data Connection**

- Global (Mayo / BIOS / ALIS)
- New sources: BioSensors
- B.D. MultiOmics\*/P4M

Data is the input for all technologies discussed here. Create new **data superstructure** (new generation of Big Data with a design **dedicated to accessing global data**).

Ensure access to a large volume and variety of complex data (**MultiOmics\***), fed in real time by **bioSensors** and their integration to enable analysis.

Create a **data hub in South America** and its inclusion in global databases, contributing to reducing bias and inequity in the use of AI.

#### **Advanced Analytics**

- A.I. Center
- A.I. multimodal/foundational
- A.I. MultiOmics\*

Transform data and create valuable structures and processes. Develop and participate in **global teams in the creation of advanced AI algorithms** (Foundational / Multimodal / Generative and Quantum Machine Learning) and data processing at scale (**MultiOmics\***) **P4 medicine**: personalized, participatory, predictive and preventive.

Expand participation in the network of National AI Centers (in addition to BIOS) and test-beds for responsible AI adoption.

#### **High Performance Computing**

- Quantum Computing
- Decentralized Computing
- Edge Computing

Focus on creating self-sustainable computing environment for model integrating high-performance technologies in an integrated concept to serve LA countries. Stimulate and establish **partnerships** with universities and research institutions **with global reach** that have experience in advanced computing and healthcare.

Access to cutting-edge research and create **opportunities to incorporate new talents** into the team.

#### **Health Equity**

- Activities: Public Programs
- Targeted PROADIs
- Climate and Environment

Projects aimed at establishing a **direct connection between practical applications of advanced technologies in solving inequalities and reducing environmental impacts on health in diverse populations** in Brazil and Latin America. Prospecting for **medicines and sensors applied to problems of vulnerable populations**. Example Intelligent Assistants (for doctors and patients) to improve and expand care for less favored populations.

\*genomics, proteomics and other biological bases will be the largest source of Big Data in the next decade, surpassing astronomy and social media