Research Panel

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INDIANA BIOSCIENCES RESEARCH INSTITUTE

Who We Are

The Indiana Biosciences Research Institute (IBRI) is a leading translational research institute that advances academic and industry science through collaboration to improve patient health outcomes.

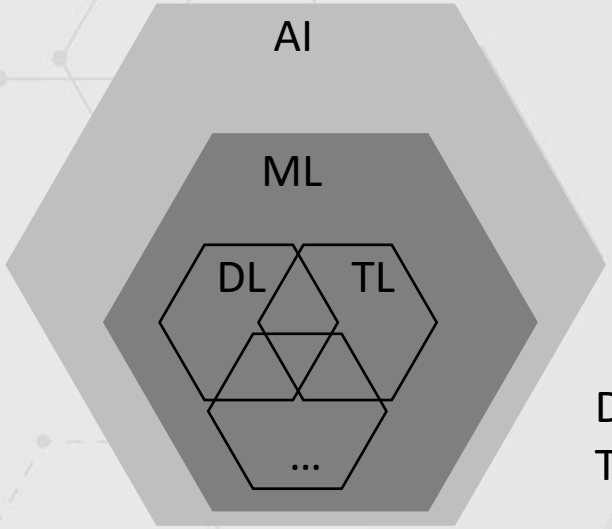
The IBRI Difference

- High-tech open biology and chemistry labs.
- Pharma-level rigor and modeling expertise.
- Collaborative environment that advances disease science and promotes entrepreneurship.

AI - problem solving by machines

AI and more specifically machine learning (ML) has been used for decades in research.

Within ML, there are many subtypes designed for specific tasks.



DL: Deep Learning
TL: Transfer Learning

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Big data drives drug discovery innovation

- Large volumes of data can be especially useful in health care, where pharmaceutical scientists must take into account the variability among people when designing their experiments [and may] … **reveal whether a drug could help a subset of patients**. (Science, June 13, 2014)
- **The pharmaceutical industry started battling large data sets decades ago**. As Jason Johnson, associate vice president for scientific informatics at Merck Research Labs in Boston, Massachusetts says, "Merck has for many years had clinical trials with thousands of patients, and the ability to query millions of de-identified patient records, and now we have next generation genomic sequencing that can create a terabyte of data per sample." (Science, June 13, 2014)
- **Sinces then (2014), data volumes have only expanded**.

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AI is a necessity to process big data

465,998 cells, >1.1 $\times 10^9$ reads

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+
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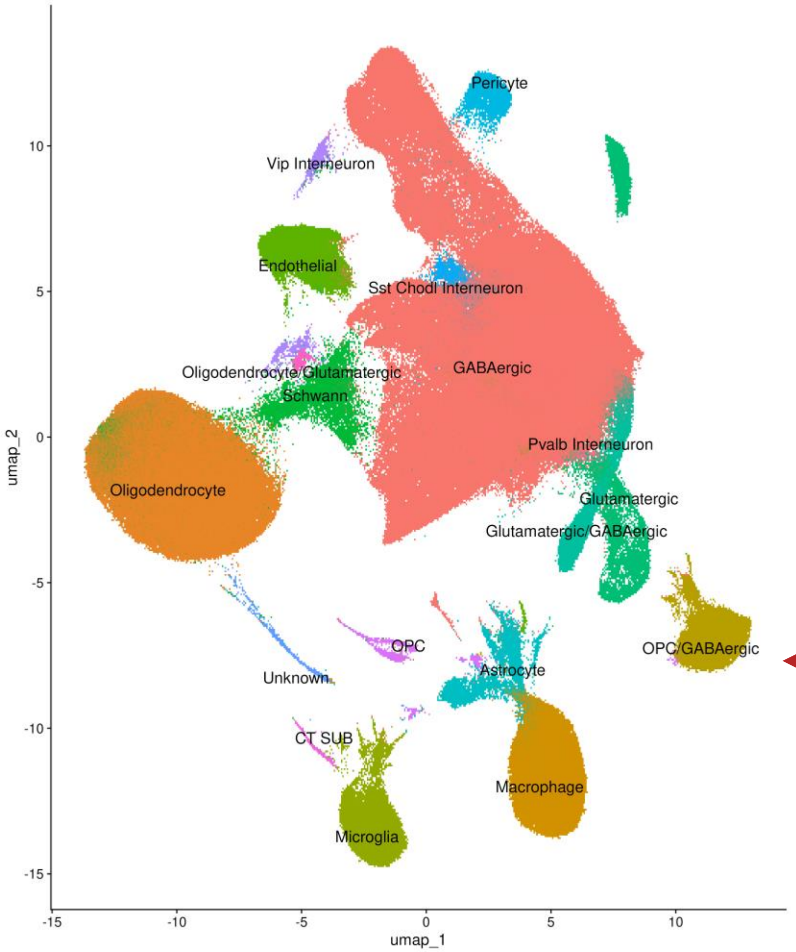
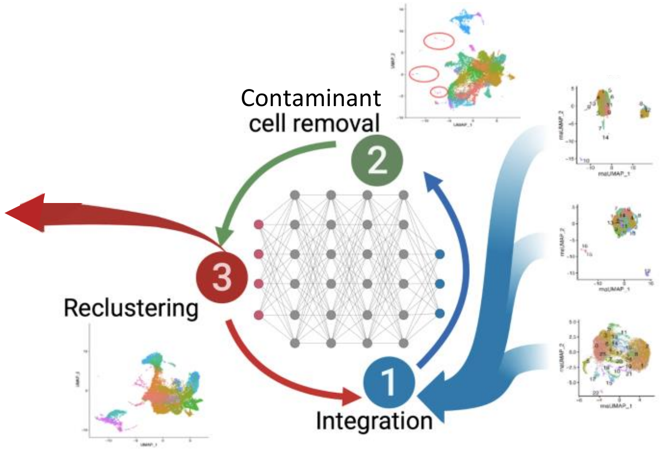
… ×1e9

Alignment, Quantification, Preprocessing





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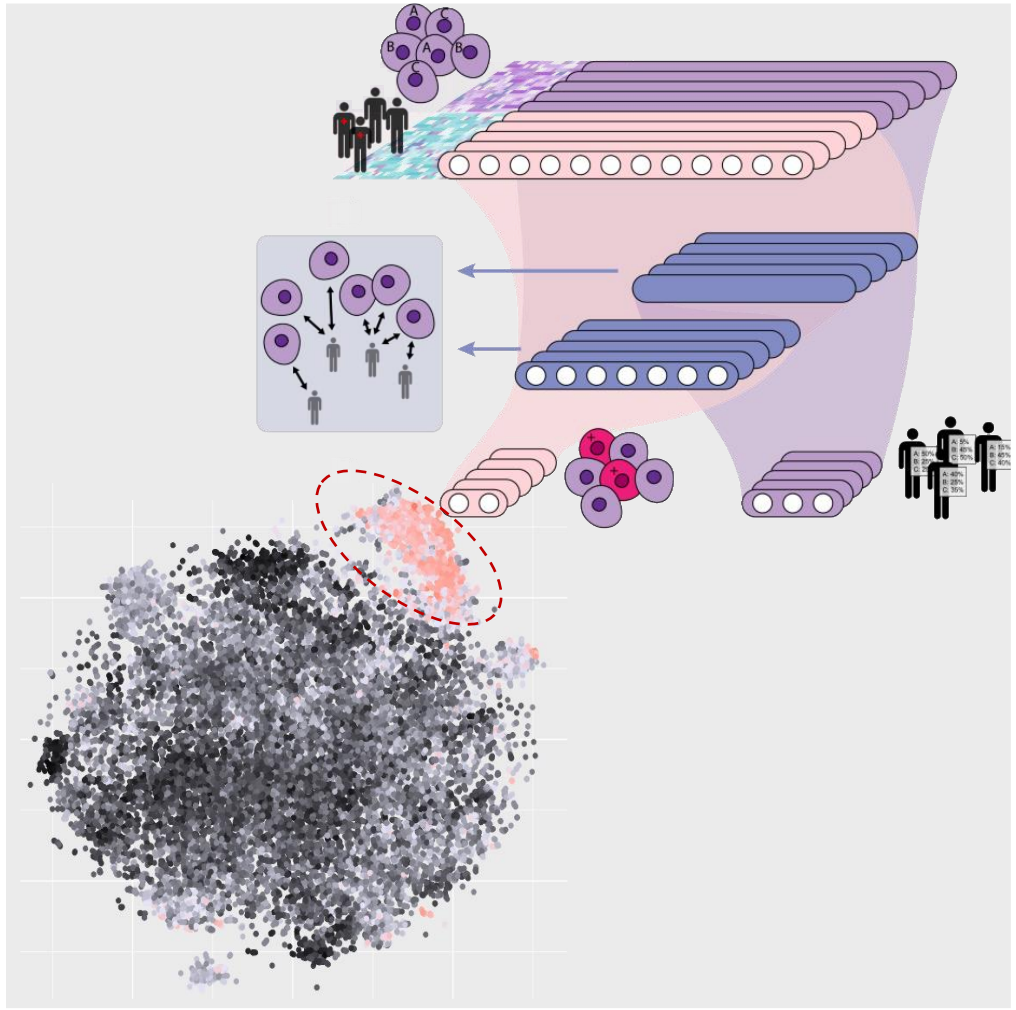
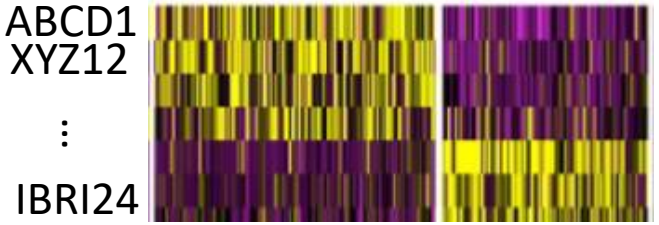
AI can be used to synthesize new information

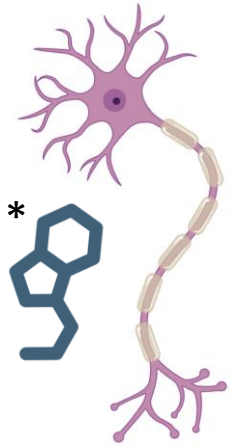
1) Identify disease associated cellular subtypes



2) Identify markers for those cellular subtypes

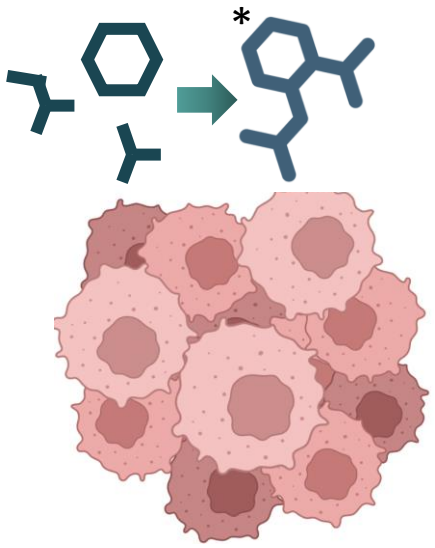


3a) Identify repurposable drugs to treat those cells



We are are testing one repurposed drug in hiPSC neurons.

3b) Develop new drugs to treat those cells



Work will begin shortly testing a novel compound targeting malignant plasma cells.

*Structures are not representative

Questions