

# The Clinical Utility of Extracellular Vesicles in Liquid Biopsy

Adam LaBonte, Rachel Short-Miller, Lara Taubner, Sean Lodmell, Matt Manwaring, Claire Seibold, Katie Havranek

## Introduction

FYR Diagnostics is developing **The Next Generation of Liquid Biopsy Solutions** by harnessing the innovative properties of Extracellular Vesicles (EVs). FYR's proprietary SPARCs technology enriches for diseased EV subpopulations. Multi-omic EV subpopulation data outputs are combined with machine learning to enable enhanced detection of disease in patient plasma.



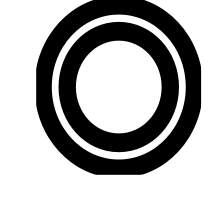
**We are Headquartered in:**  
Missoula, Montana, USA



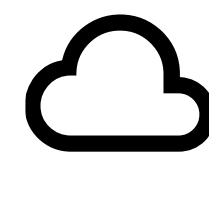
**We are a Biotech Company Focused on:**  
Oncology & Neurological Diseases



**We are also a CLIA Laboratory:**  
Purpose Built for Utilizing EVs



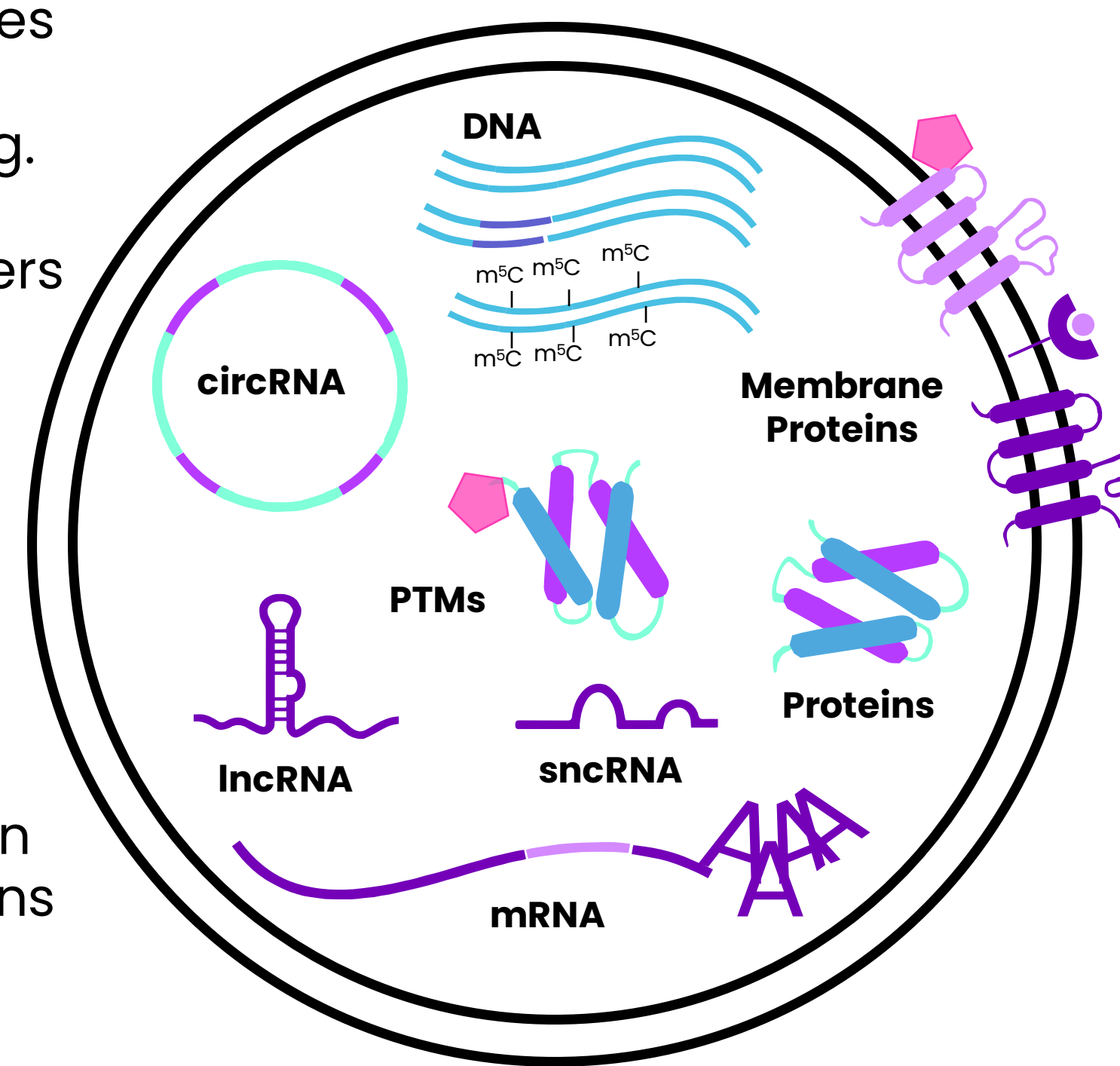
**We are Conducting & Developing:**  
Novel Multi-Omic Biomarker Discovery Platform & EV Enrichment Technology



**We are Leveraging:**  
Proprietary Database and AI/ML-Enabled Analytics

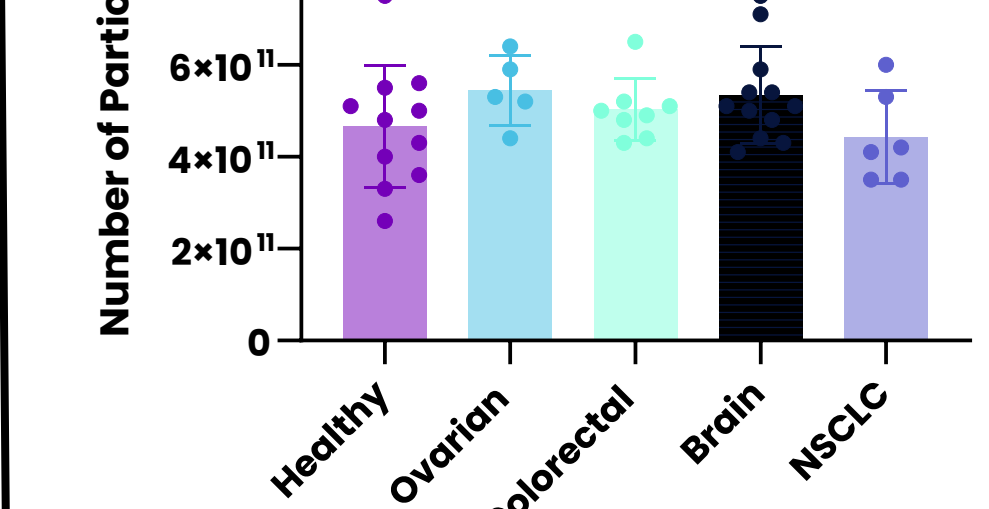
## Extracellular Vesicles

Extracellular Vesicles play a vital role in cell to cell signaling. EVs contain a wide variety of biomarkers and protect these biomarkers in a lipid bilayer membrane. FYR leverages these facts in our EVO Platform to obtain EV-Omic data that can be utilized in an array of applications in BioPharma and Diagnostics.

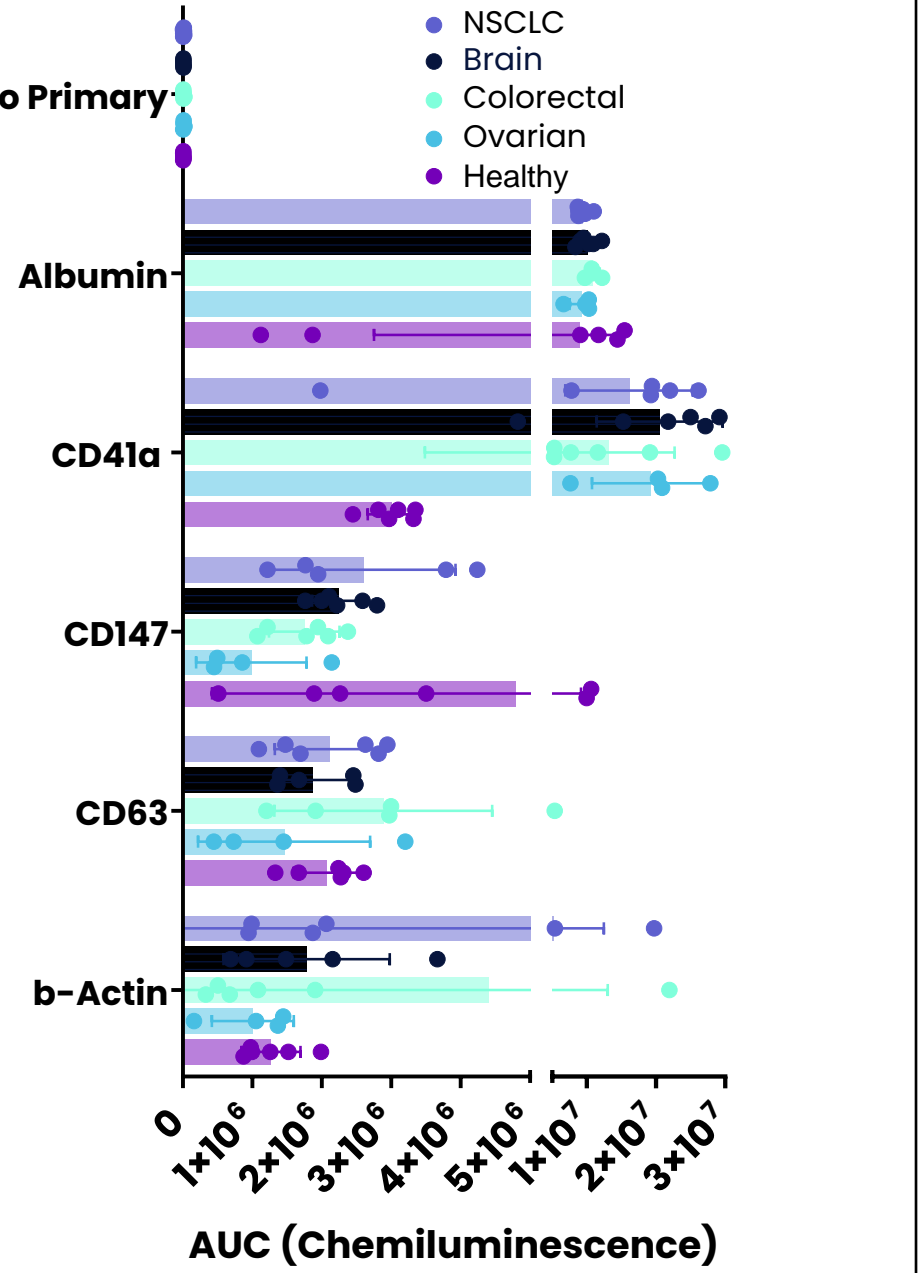


## EV QC and Characterization

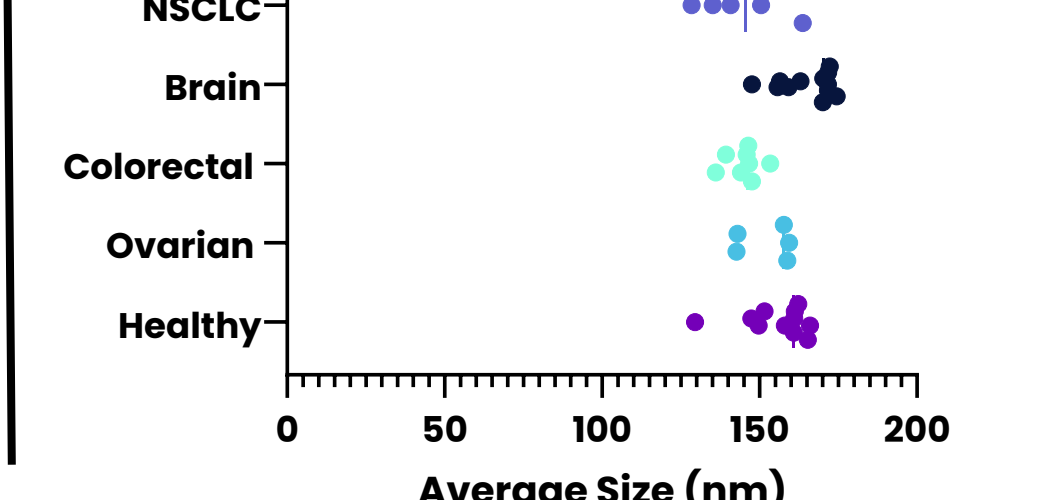
### Nanoparticle Tracking Analysis Concentration



### EV Protein Markers Summarized

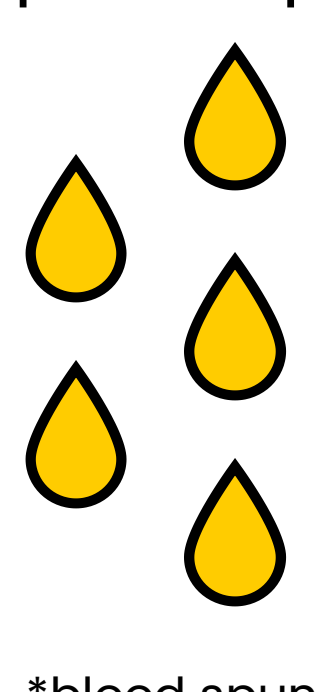


### Nanoparticle Tracking Analysis Particle Size



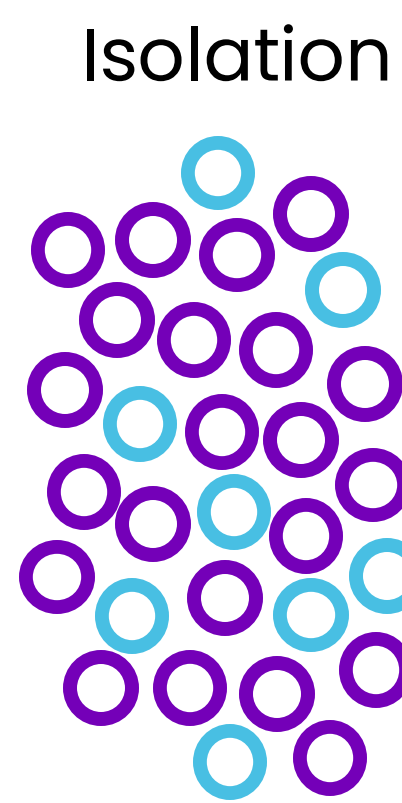
## EVO: EV-Omics Discovery Platform

Liquid Biopsy



\*blood spun into plasma

Total-EV Isolation



EV Subpopulation Isolation

**SPARCs™**

**Selective Protein Affinity Reagent Chemistries (SPARCs™)**  
Proprietary Targeting Technology With Novel Applications in Disease and Tissue Associated EV Subpopulation Isolation for Enhanced Discovery

DNA Discovery



RNA Discovery



Protein Discovery



EV-Omics Database



### Pharma Applications

- Support Clinical Trials
- Patient Enrollment and Stratification
- Treatment Response
- Treatment Selection and Monitoring
- Companion Diagnostics (CDx)

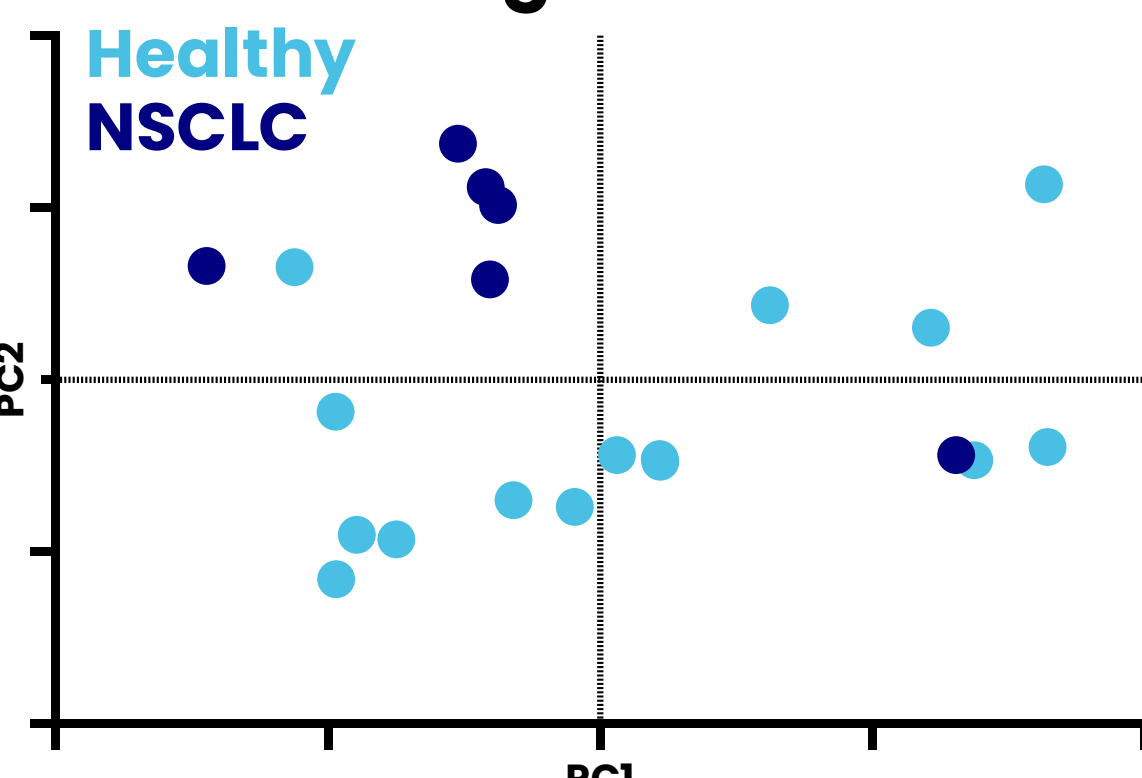
### Diagnostic Applications

- Early Detection/Screening
- Disease Profiling/Prognosis
- Recurrence/Minimal Residual Disease
- Treatment Selection/Monitoring

## SPARCs in Combination with Machine Learning Predicts Patient Classification

Plasma ARI = 0.33

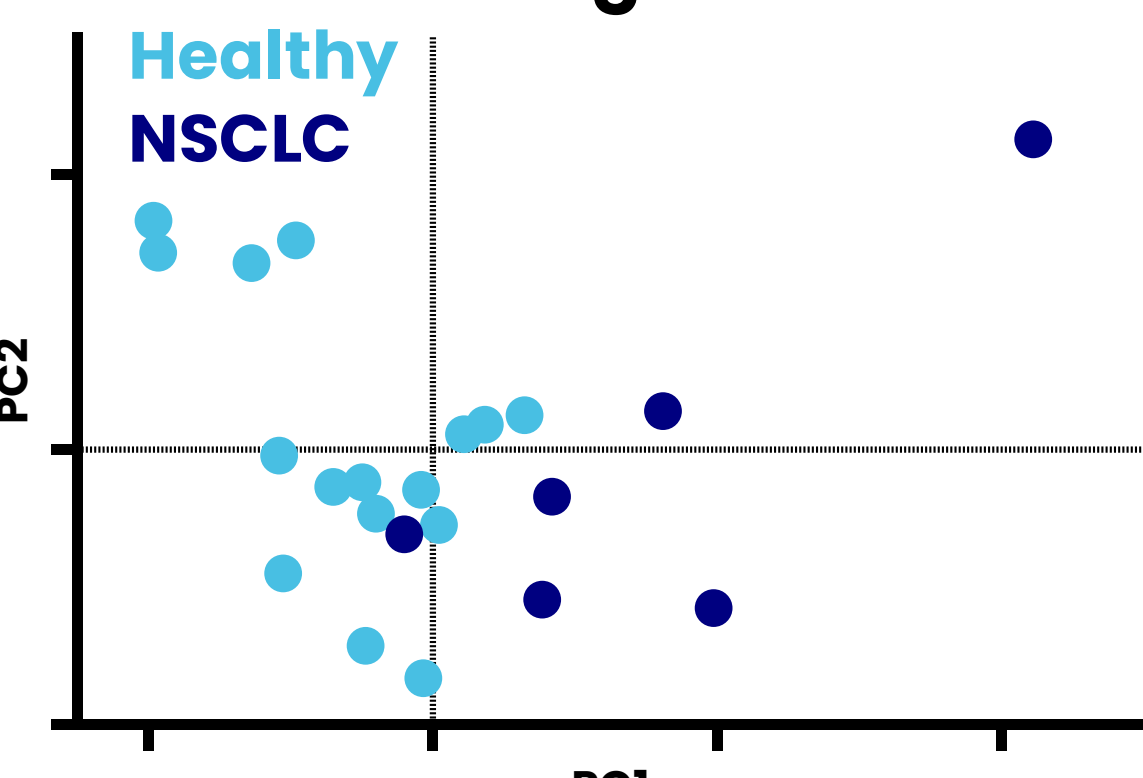
**Patient Classification using Plasma**



SPARCs Enable BETTER Disease vs Healthy Classification than Plasma or EVs in Lung Cancer

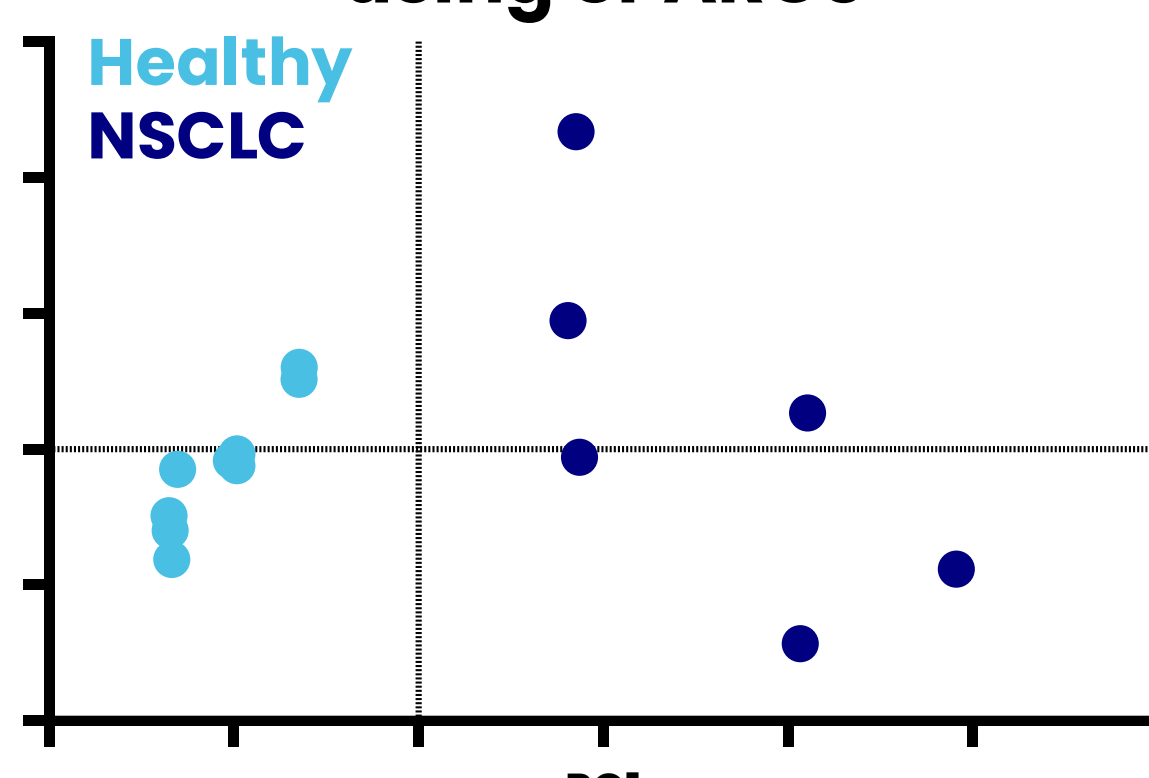
EVs ARI = 0.30

**Patient Classification using EVs**

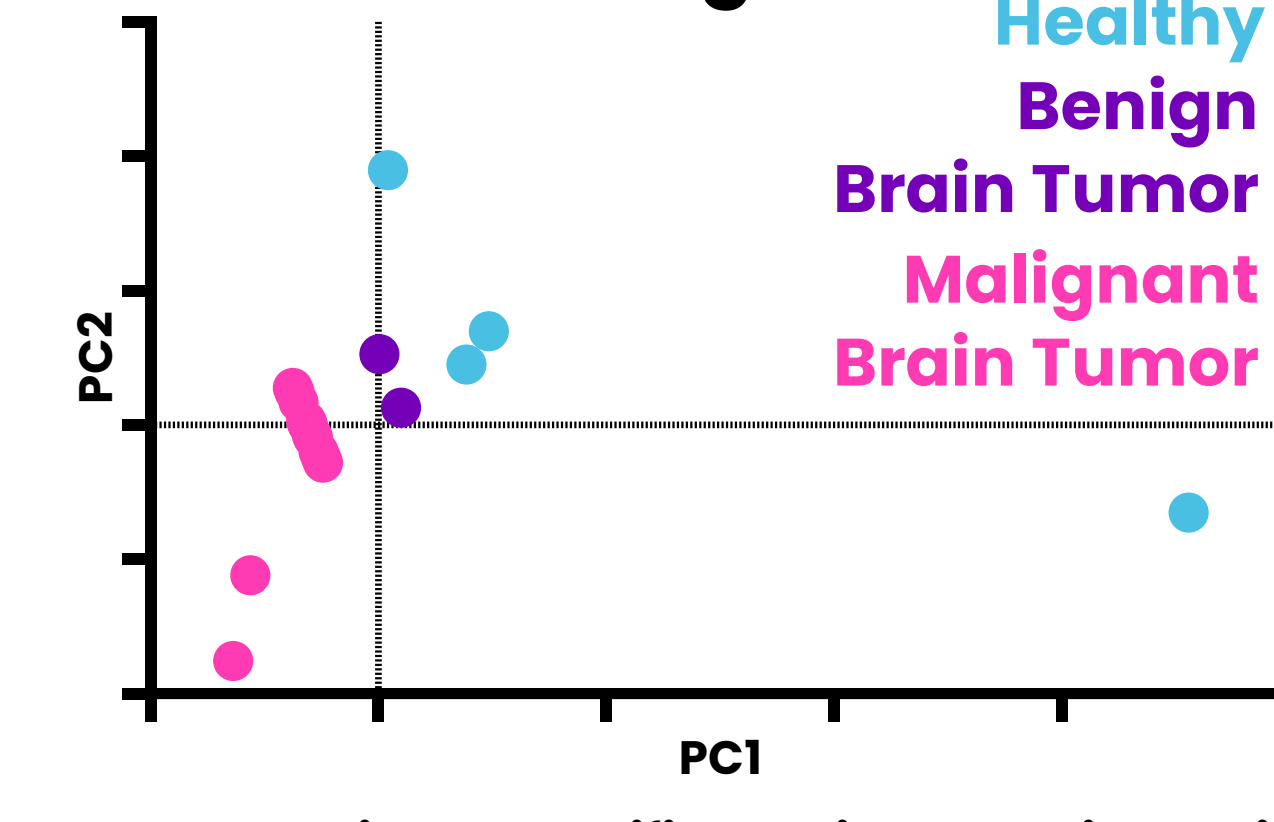


SPARCs ARI = 1

**Patient Classification using SPARCs**

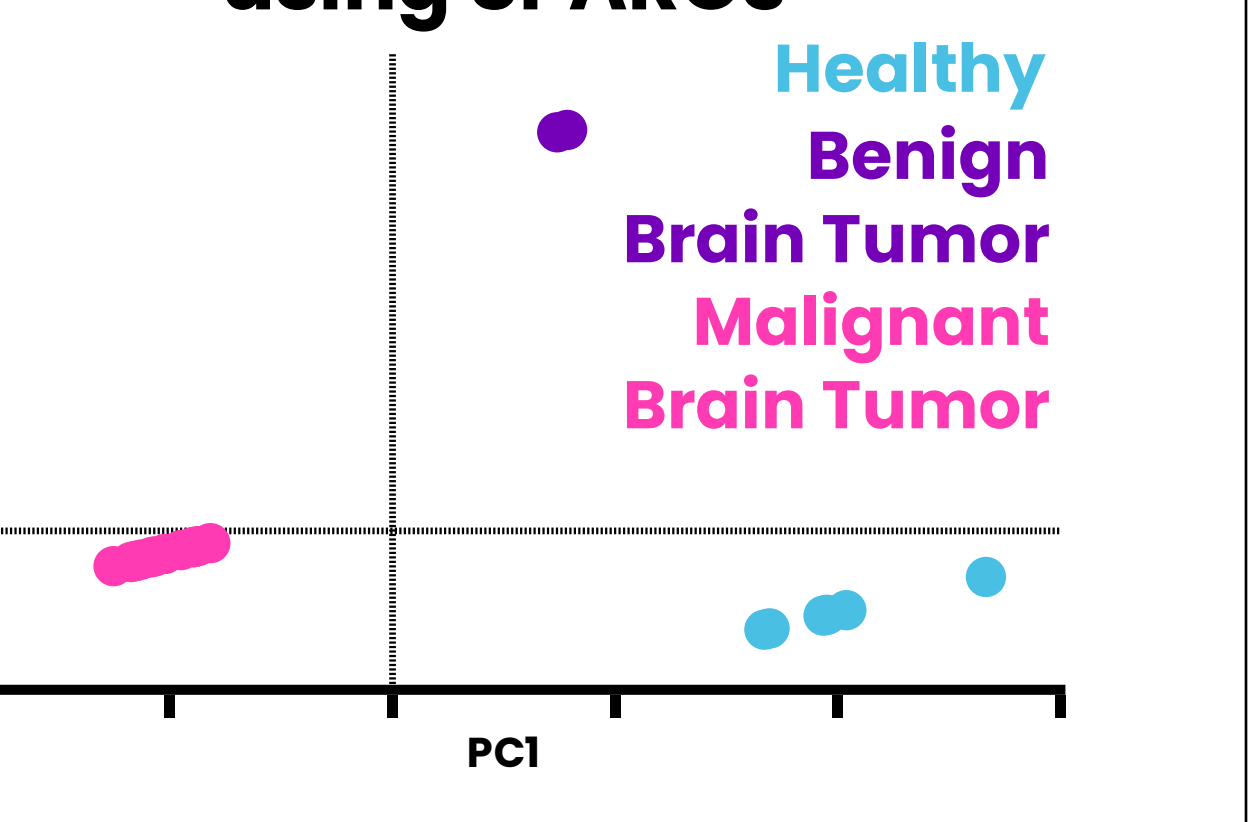


**Patient Classification using EVs**



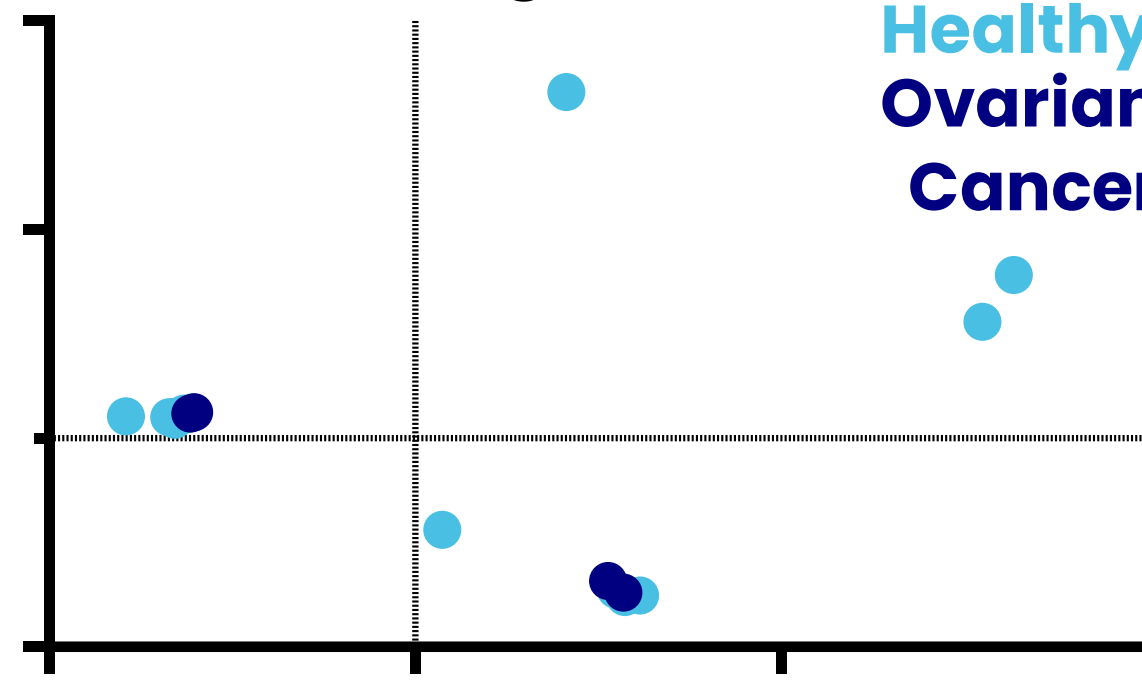
SPARCs with ML stratifies Benign vs Malignant in Brain Tumors

**Patient Classification using SPARCs**



Plasma ARI = 0

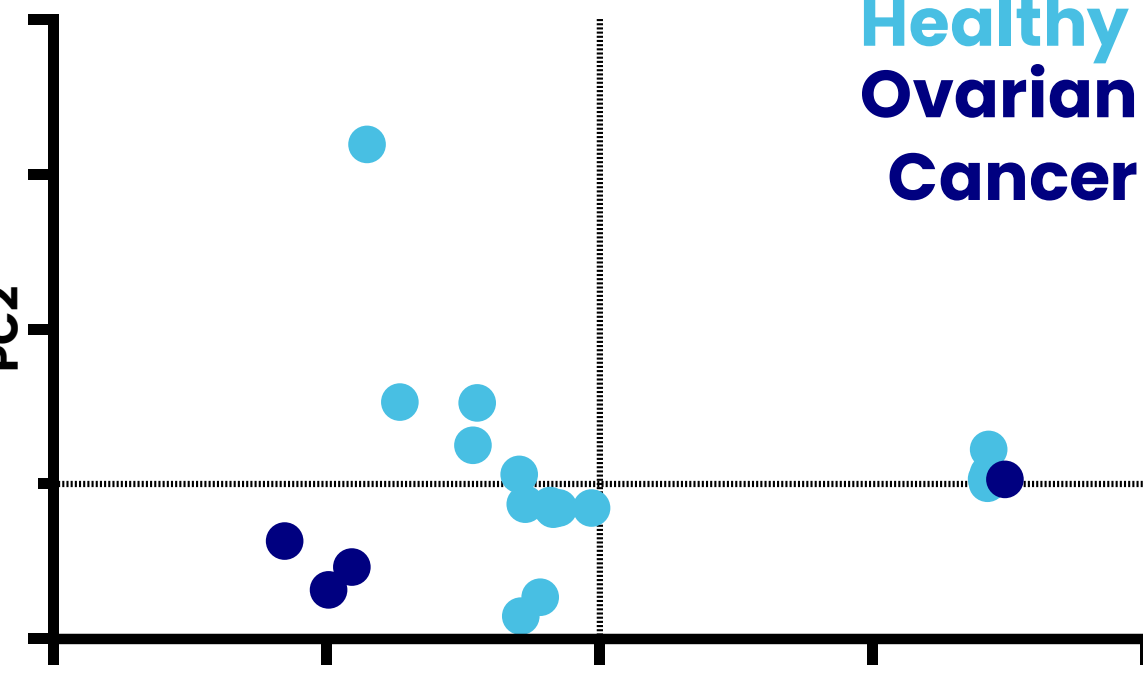
**Patient Classification using Plasma**



SPARCs Enable BETTER Disease vs Healthy Classification than Plasma or EVs in Ovarian Cancer

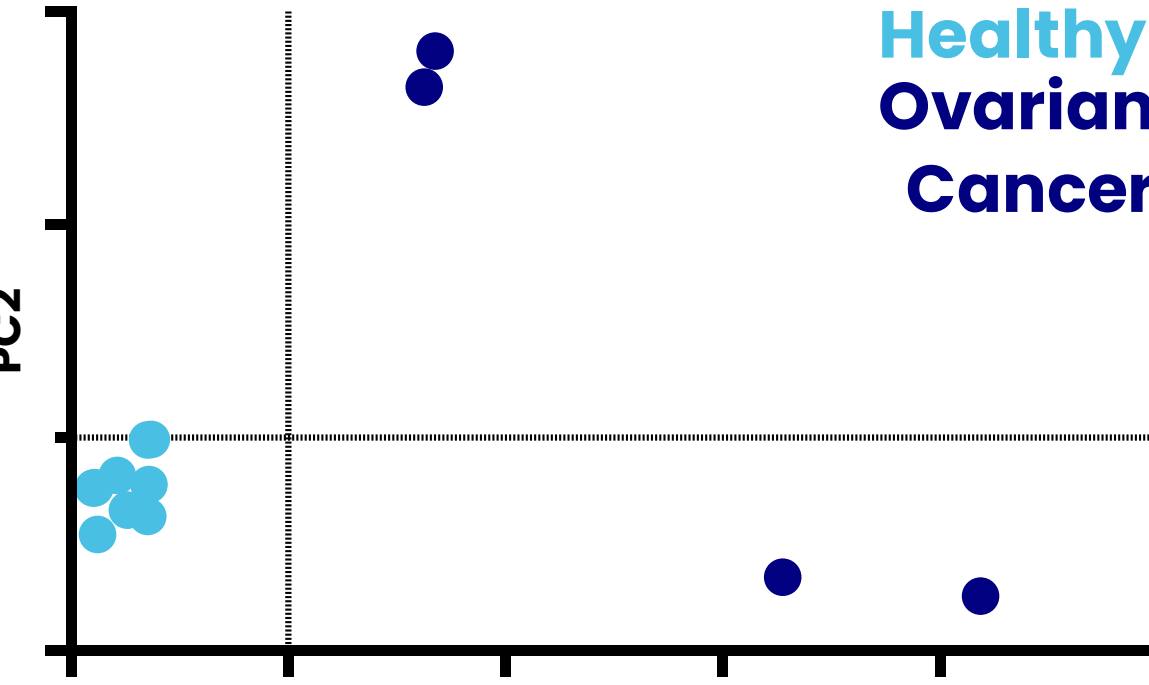
EVs ARI = 0

**Patient Classification using EVs**

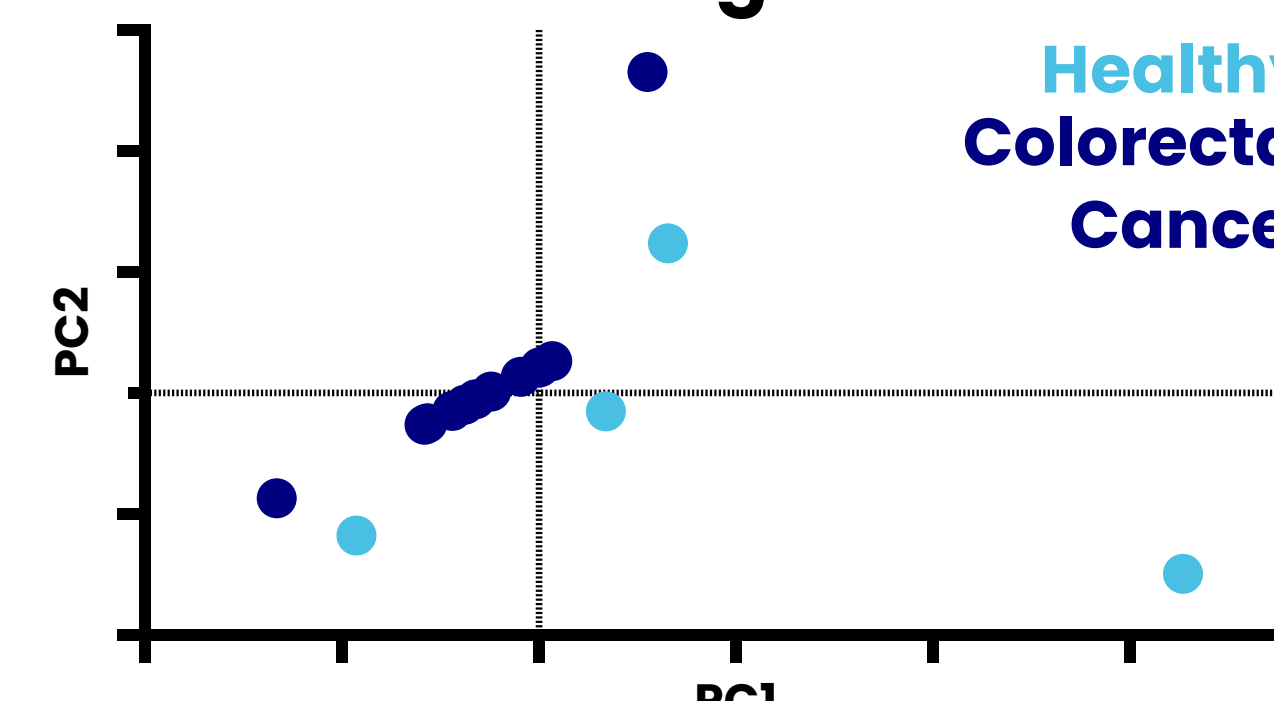


SPARCs ARI = 0.9

**Patient Classification using SPARCs**

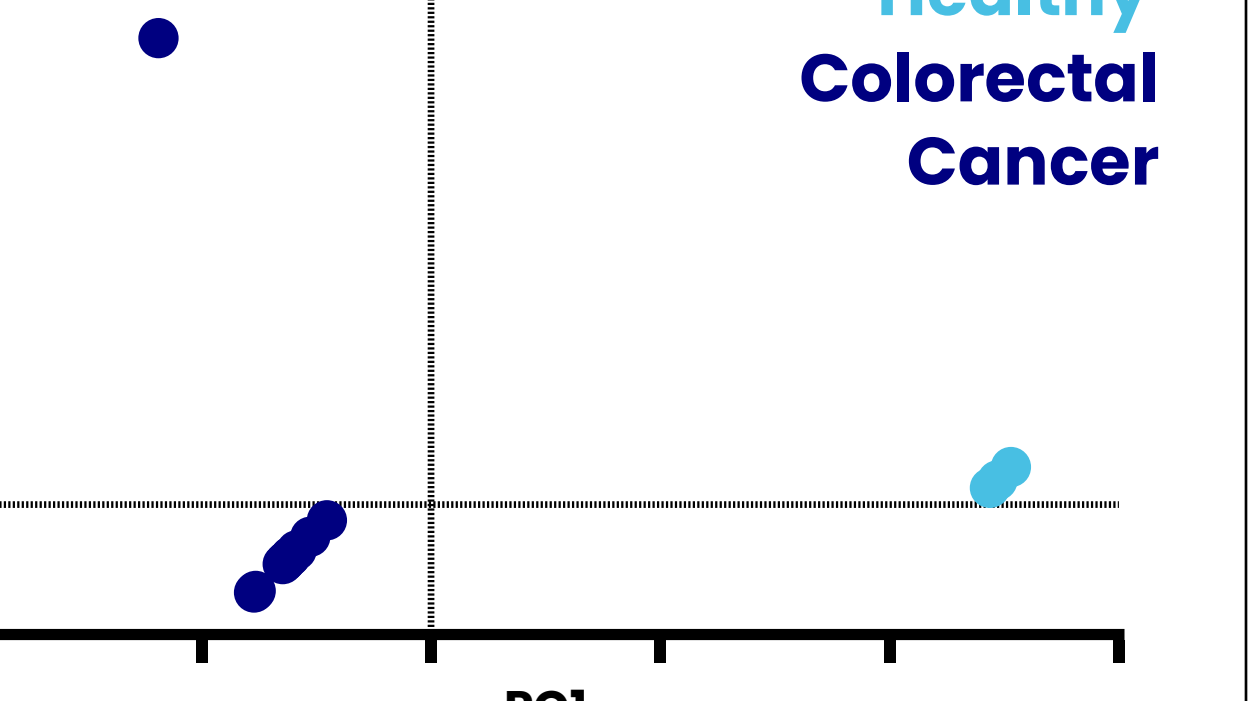


**Patient Classification using EVs**



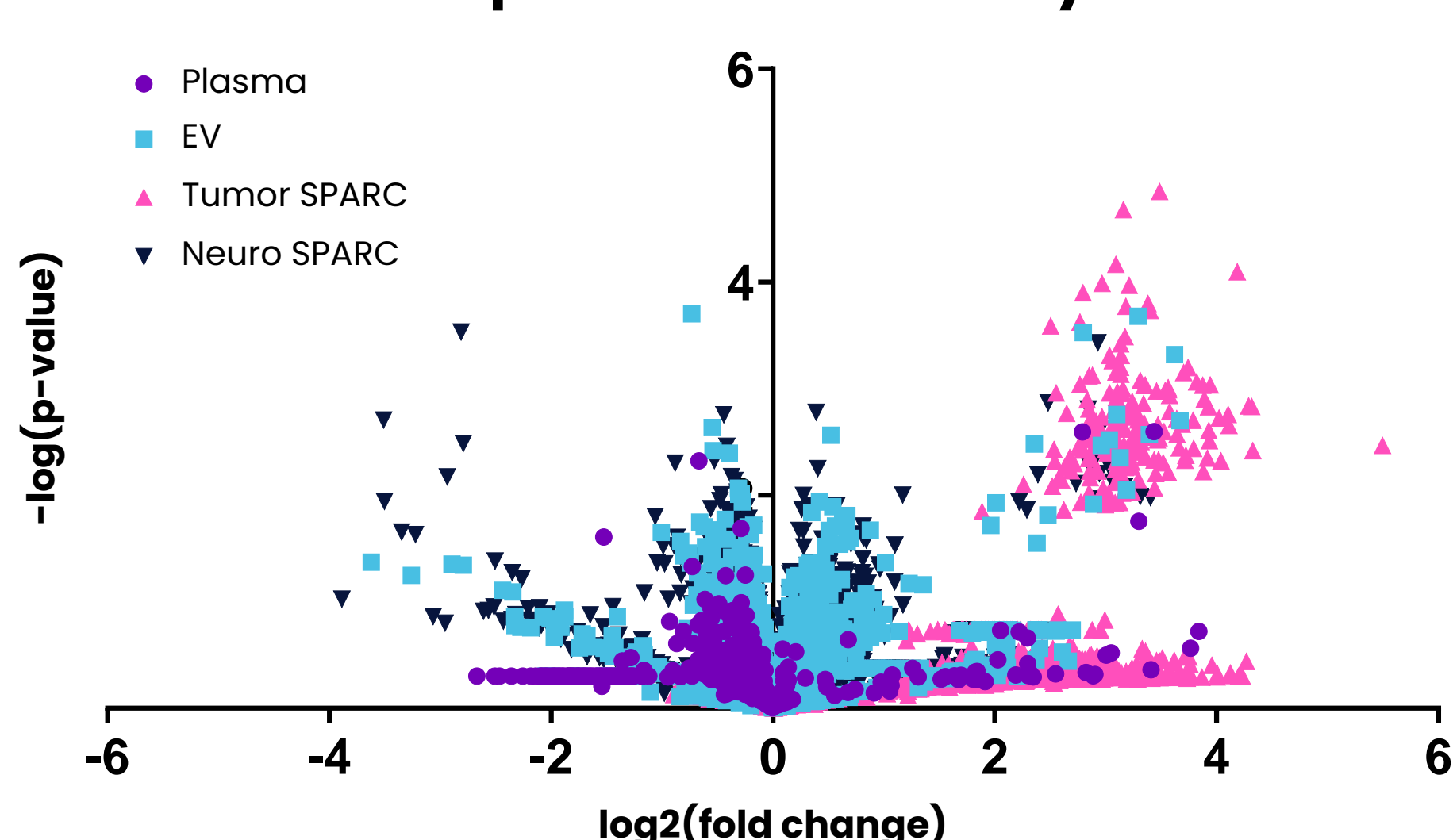
SPARCs Enable BETTER Disease vs Healthy Classification than Plasma or EVs in Colorectal Cancer

**Patient Classification using SPARCs**



## SPARCs Enrich for Markers of Disease

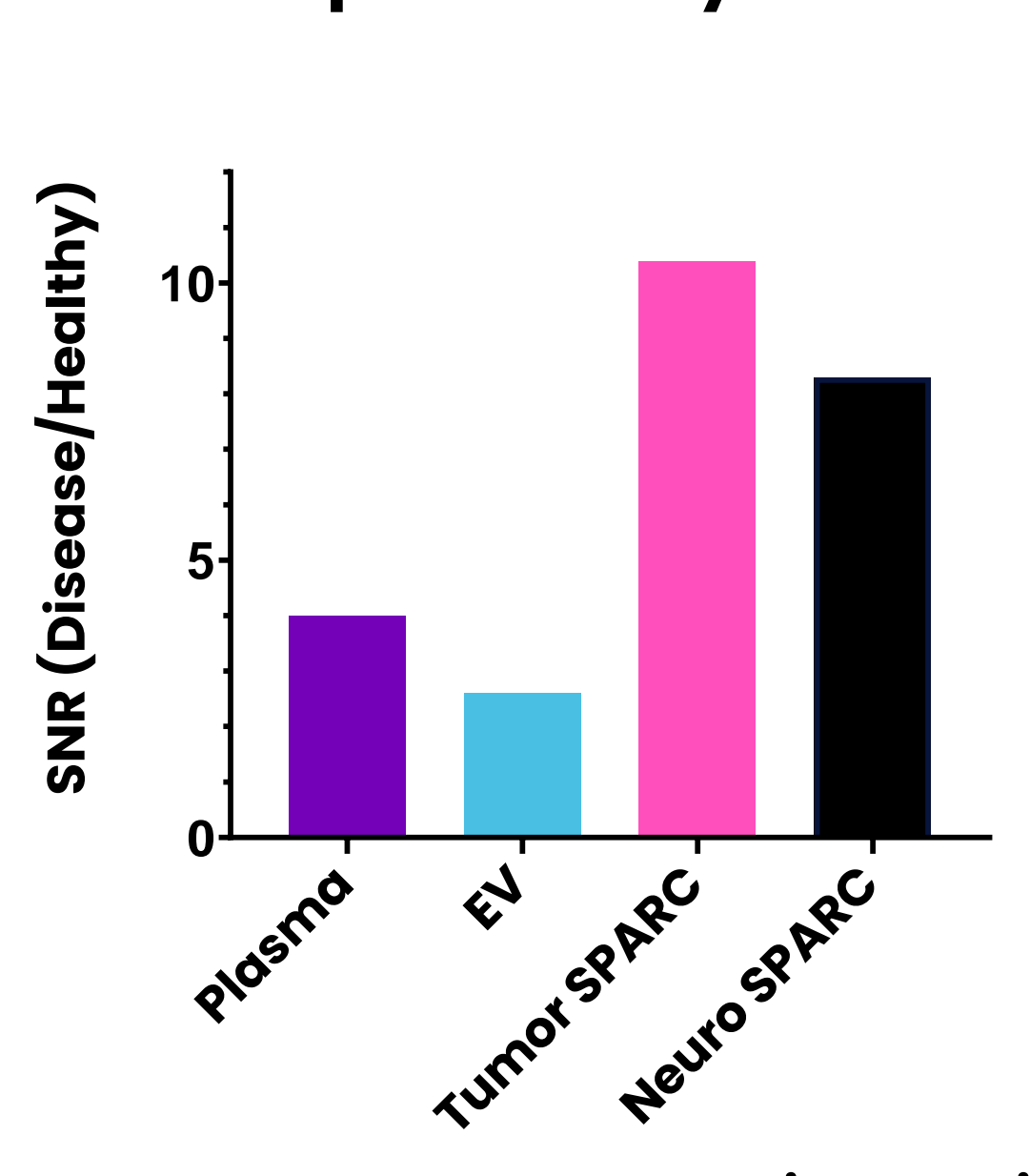
**Enrichment of Brain Cancer Proteins\* in Diseased Specimen vs Healthy Controls**



SPARCs Significantly Increase the Number of Brain Cancer Associated Proteins Identified with Significant ( $p < 0.05$ ) Fold Changes

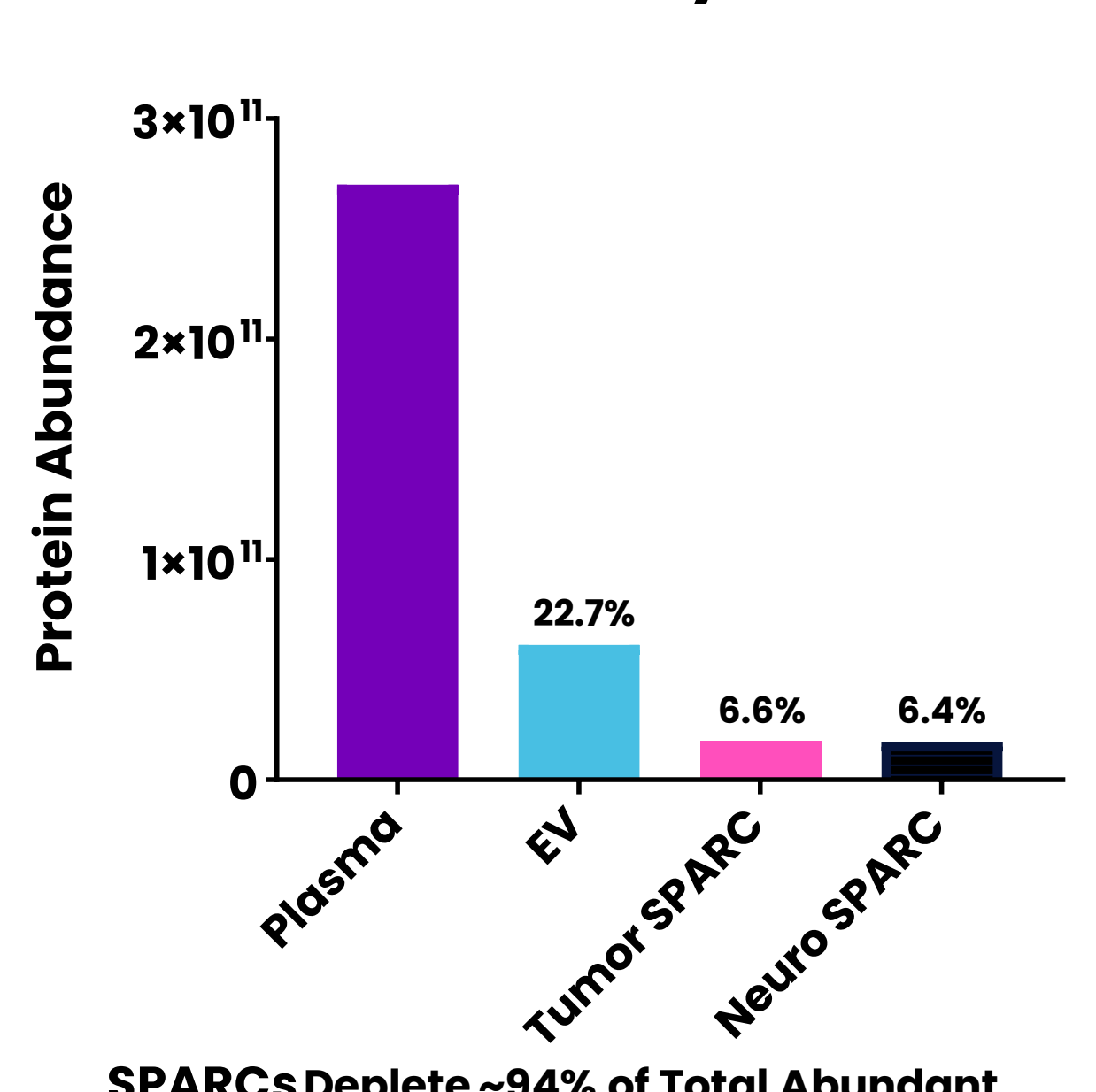
\*Brain Cancer Proteins Determined with QIAGEN Ingenuity Pathway Analysis\*

**Signal to Noise Ratio of Oncoproteins by Method**



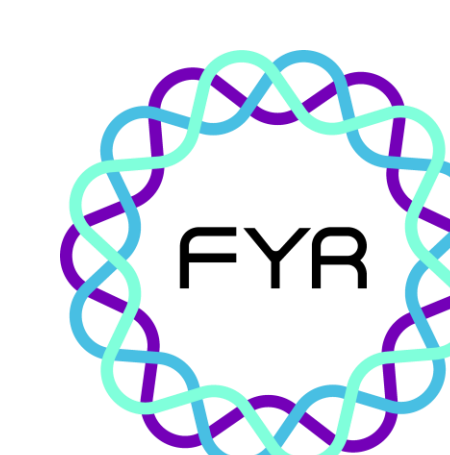
SPARCs Improve Oncoprotein Detection

**Total Abundant Plasma Protein Contamination by Method**



SPARCs Deplete ~94% of Total Abundant Plasma Proteins

## Conclusions



Blood plasma of cancer patients contains EVs derived directly from tumor tissue that serve as rich sources of insight into tumor biology and disease pathology. We have developed a clinically applicable, multi-omic EV subpopulation interrogation pipeline that robustly profiles tumor derived EVs. Application of machine learning approaches to the omics data enables classification and distinction of cancer versus healthy patients.

Learn more at <https://fyrdiagnostics.com/>

Acknowledgements: Reference Medicine, Thermo Fisher Scientific

