UCR ALL RESEARCH CORE SYMPOSIUM

MONDAY, OCTOBER 13, 2025
10:00AM - 3:00PM

LOCATION - GENOMICS BUILDING AUDITORIUM 1102A & LOBBY

Featured UCR Research Core Posters and Presentations by:
School of Medicine Research - Metabolomics - Proteomics - Bioinformatics - Microscopy - Stem Cell - Genomics - Center for Advance Neuroimaging

Featured talks by Agilent on:

- **11:15am: Seahorse to measure cell metabolism**
- **1:30pm: Novocyte Quanteon for flow cytometry**
- **1:45pm: SPRINT and GeoMX for gene expression and spatial RNA profiling**

Hands On Displays and Demos featuring:
Robotics, 3D Printing, Microscopy

This event is hosted by the School of Medicine Research Department
Light food and coffee provided to registered attendees
RSVP by Wednesday, October 8, 2025 via the QR code

UC RIVERSIDE

UCR All Research Cores Symposium 2025

Welcome

School of Med Research Core

Genomics Core

Plant Transformation Center

Metabolomics Core Facility

Stem Cell Core

Proteomics Core

Center for Adv Neuroimaging

Microscopy and Imaging Core

Makers Services

Bioinformatics

UCR School of Medicine Research Core

How we can support your research in your metabolic, immunology and molecular assays

Mary Hamer
mary.hamer@medsch.ucr.edu

SOM RC- Located in SOM Research Building

https://somresearch.ucr.edu/

School of Medicine Research Building:

- 10X suite
- Flow Cytometer
- Cell Sorter
- Bruker/NanoString suite
- SeaHorse
- Histology Core

Psychology Building Vivarium:

- Multiphoton microscope

Purpose

- Offer quality scientific equipment to **all UCR** and local researchers
- Train users on equipment and make instruments available to researchers throughout the day
- Hold training webinars and hands on sessions with instrument vendors for up-to-date learning

Equipment offered

Flow Cytometer: NovoCyte Quanteon

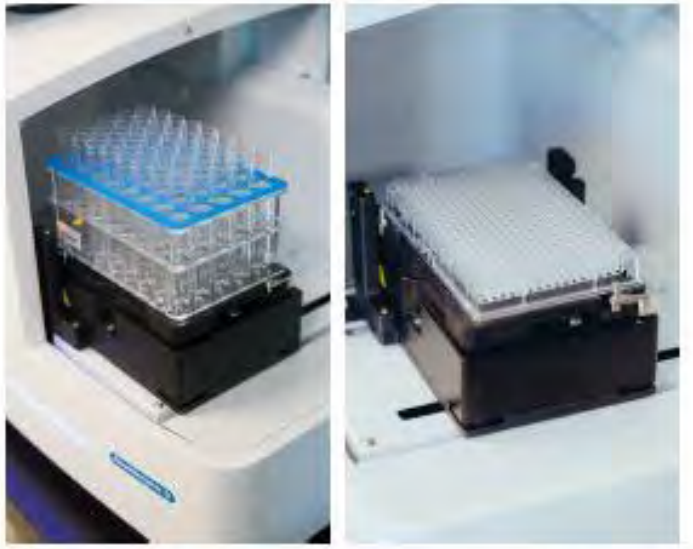
- 4 Laser: High out-put cell data analysis
- 25 Channels, auto-compensation, user friendly

Cell Sorter: Beckman Coulter Astrios

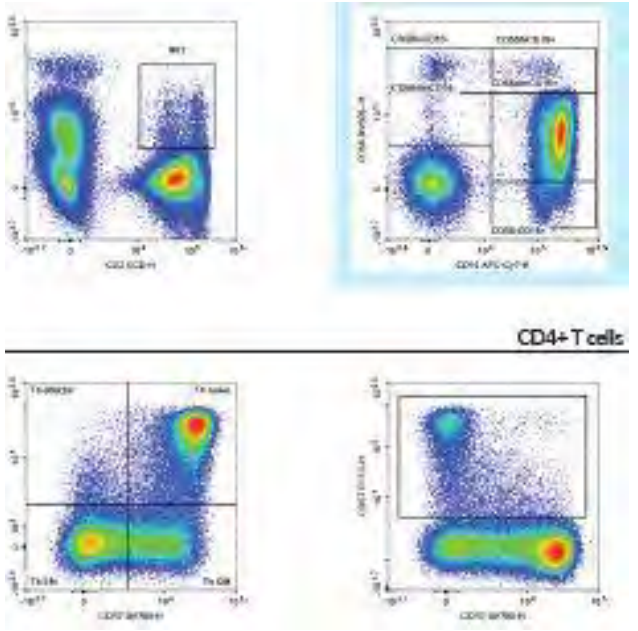
- 4 Laser: 14 Channel cell sorter. 6-way sorts to 96 well single cell
- Sterile sort capability

NovoCyte Quanteon

User friendly operation

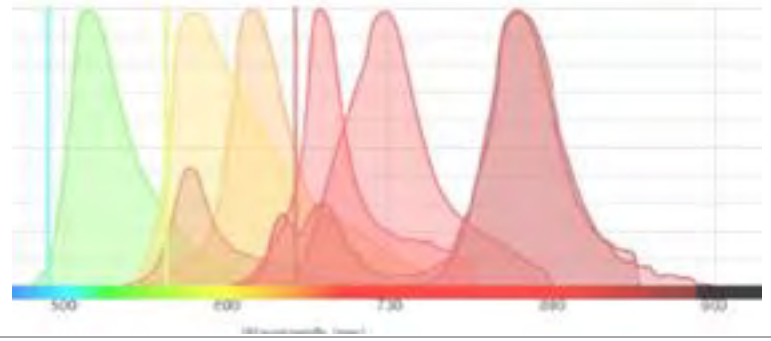


Load and Go capability
Plates to tube sampling
Auto-compensation
Software for Data collection and analysis

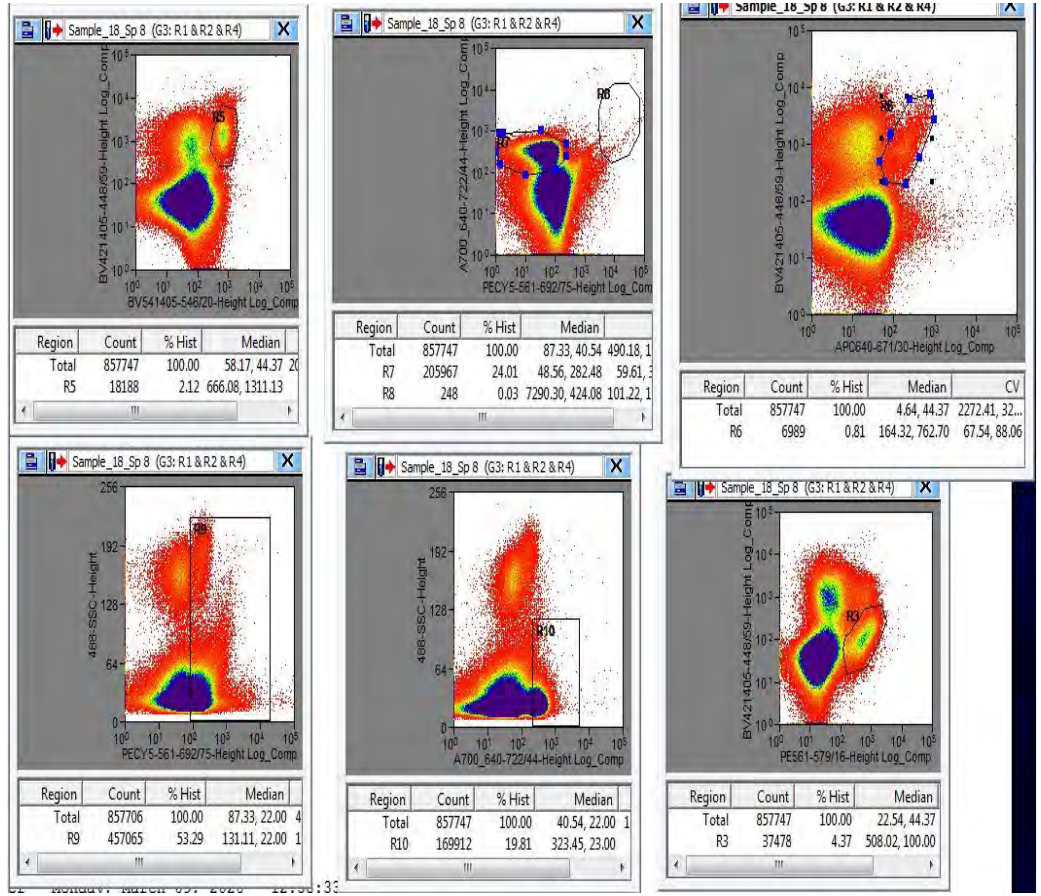


25 Channel
4 Lasers: 405, 488, 561, 637

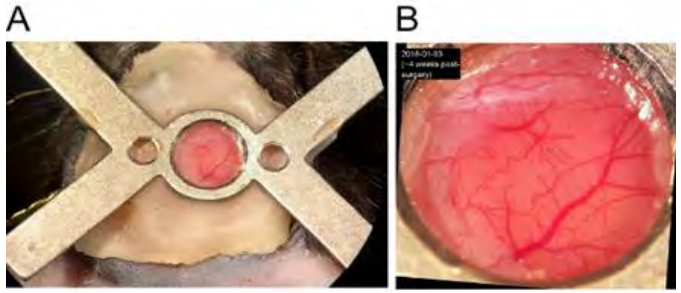
Cell Sorter: Astrios

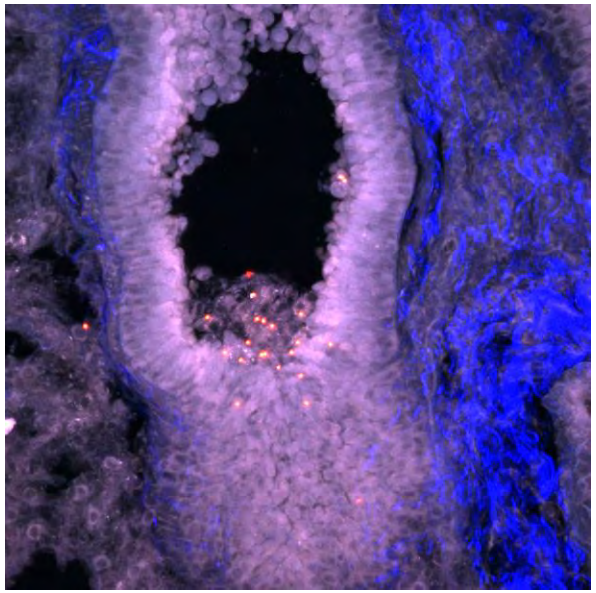


4 Laser: 405, 488, 561, 640
14 Channels
Single cell to 50ml collection
1-6 direction sort
Sterile collection capabilities
Cold sort capable



Multiphoton Microscopy: Nikon A1R





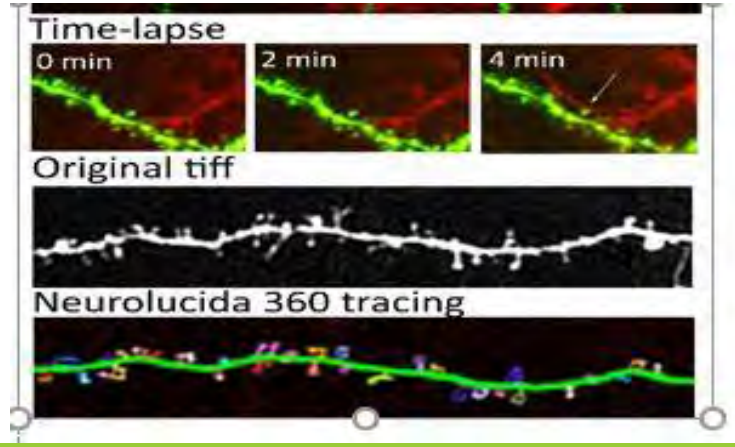
Home Cage Live animal imaging

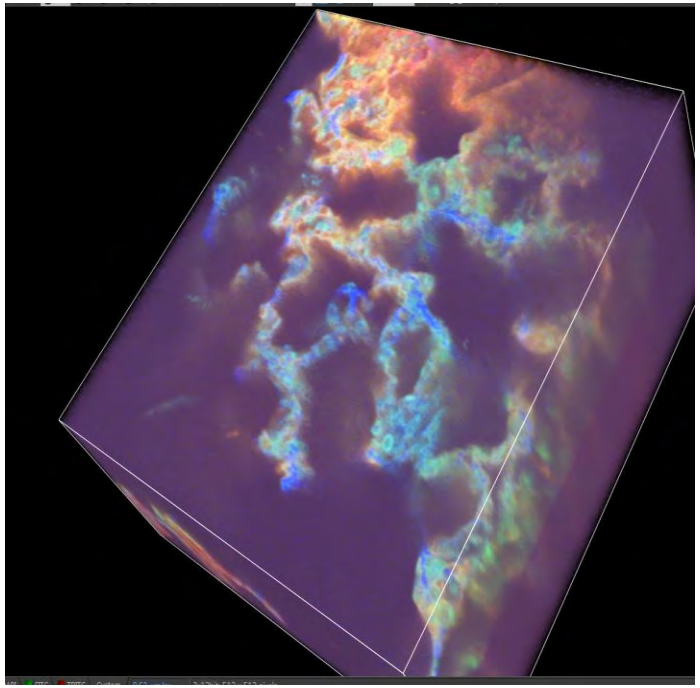
Tracking 2D and 3D data analysis software

32 Channel Spectral Detector capabilities

Dedicated workstation for analysis

Time Lapse tracking abilities





Equipment offered

Histology Core

- Tissue Processor: ThermoFisher Excelsior ES - dehydration and wax penetration
- Tissue Embedder: Tissue Tek - paraffin wax embedding
- Microtome: Leica – sectioning paraffin embedded tissue blocks 2um- 20um
- Cryostat: RWD – sectioning frozen OCT embedded tissue block 5um – 50um

Histology Core: Cryostat, Microtome, Tissue Embedder, Tissue Processor

Cryostat
frozen samples

Microtome
paraffin

Tissue Processor
paraffin

Tissue Tek paraffin embedding

Software work stations:

FlowJo software work station:

Advanced analysis software Free for users of the Novocyte flow cytometer and the Astrios cell sorter. Easy to use tutorials available on line.

https://www.flowjo.com/solutions/flowjo/downloads/tutorials

Nikon NIS Elements software analysis work station:

Nikon NIS Elements software for data analysis, remote access, 3D tracking module

https://www.microscope.healthcare.nikon.com/products/multiphoton-microscopes/a1r-hd-mp

https://somresearch.ucr.edu/sites/g/files/rcwecm2986/files/2019-04/nikon_elements_software_manual.pdf

T-GSRs: Assist with training and usage

Taher Bhaijee:

10X Gene Expression suite, SeaHorse

Bruker/Nanostring Gene Exp Suite,

Samuel Asiedu:

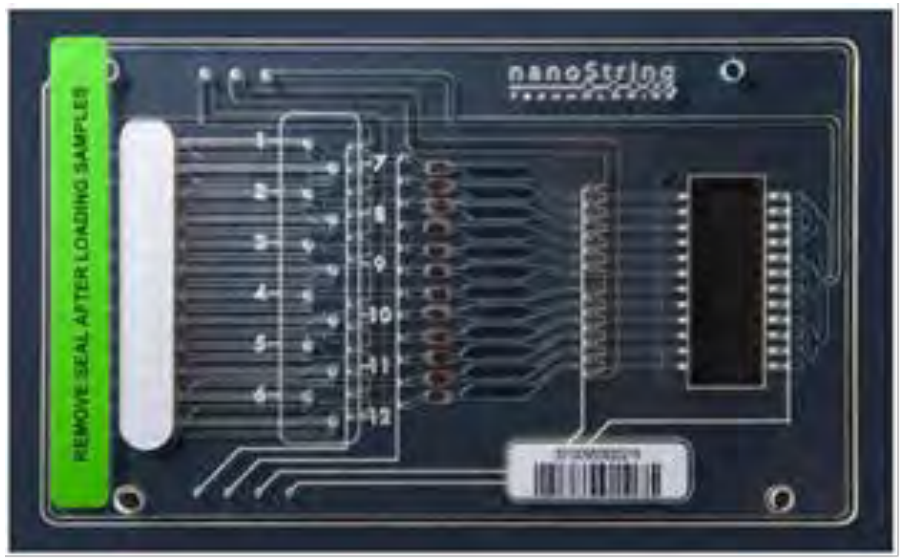
FACS: Novocyte Flow Cytometer, Astrios Cell Sorter

YiLi Lam:

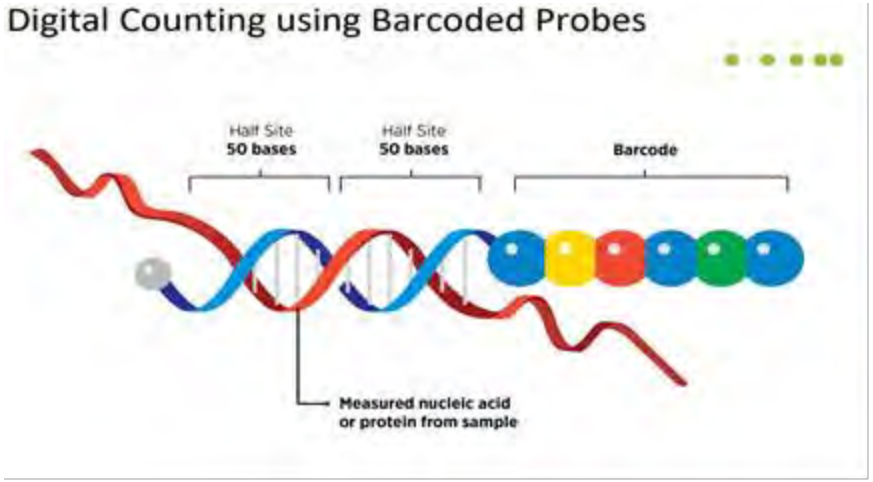
Histology Core

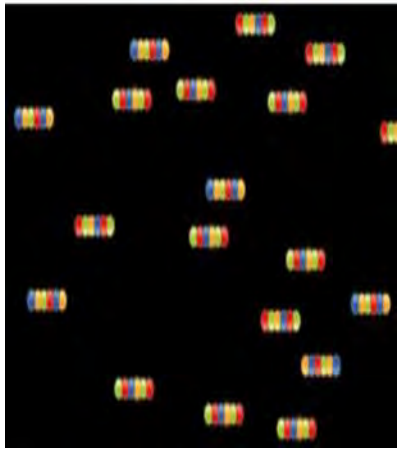
Bruker Nanostring nCounter *Sprint:* Closed transcriptomics profiling

Nanostring.com



Bar codes attach to RNA and are read to quantify

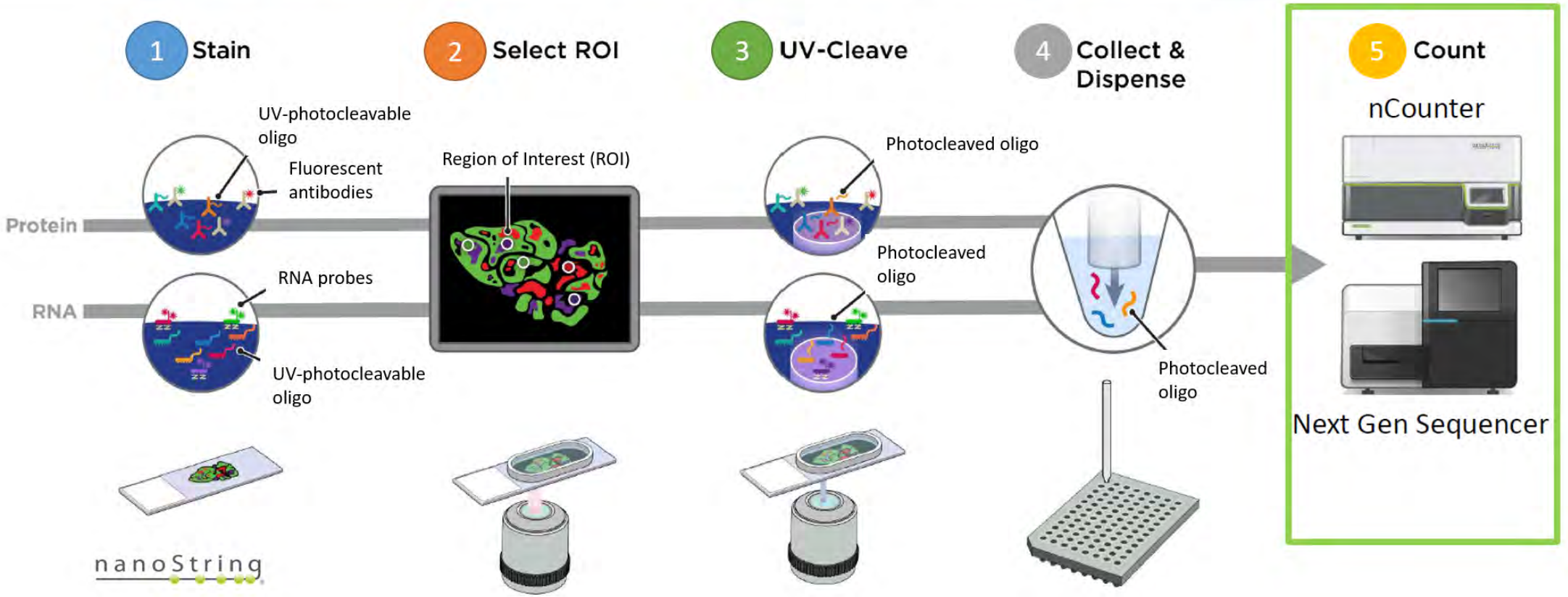




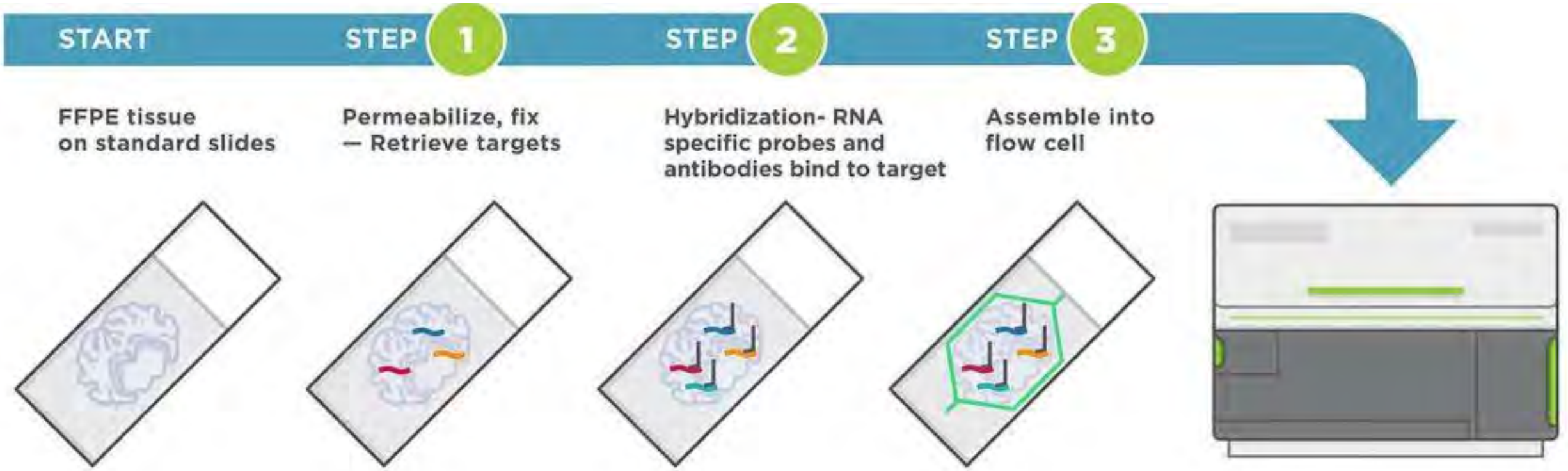
Over 800 Pre designed cartridges or custom made for your specific experiment
Expression profiling by direct quantification of individual RNA molecules
Replaces RNASeq or PCR based platforms

Bruker Nanostring GeoMx: Spatial Resolution

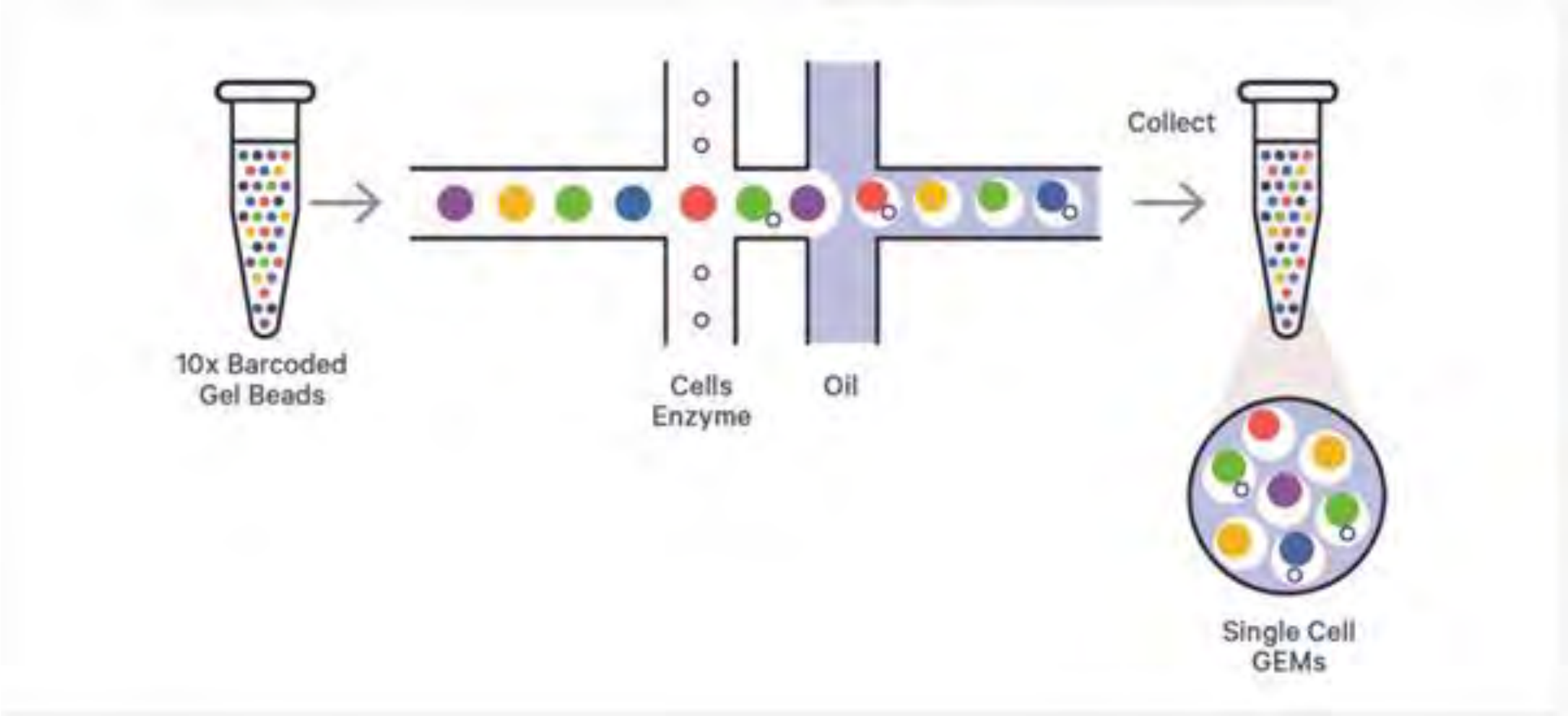
GeoMx DSP with nCounter or Next Gen Sequencer Workflow



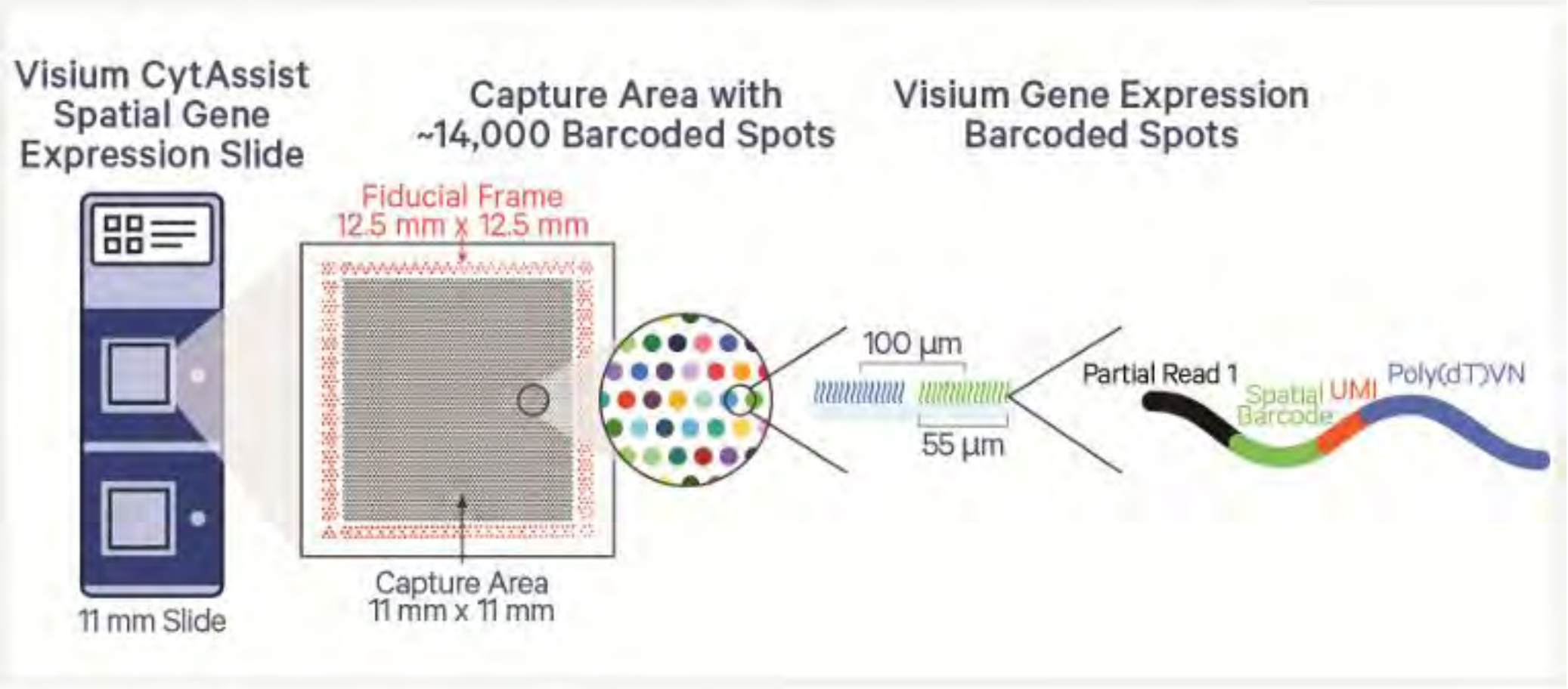
Bruker Nanostring CosMx: Cellular Resolution



10X Genomics Chromium: single cell/ single nucleus sequencing



10X Genomics Visium: Spatial single cell sequencing



Agilent SeaHorse

Real-time analysis of cell metabolism with Agilent Seahorse technology

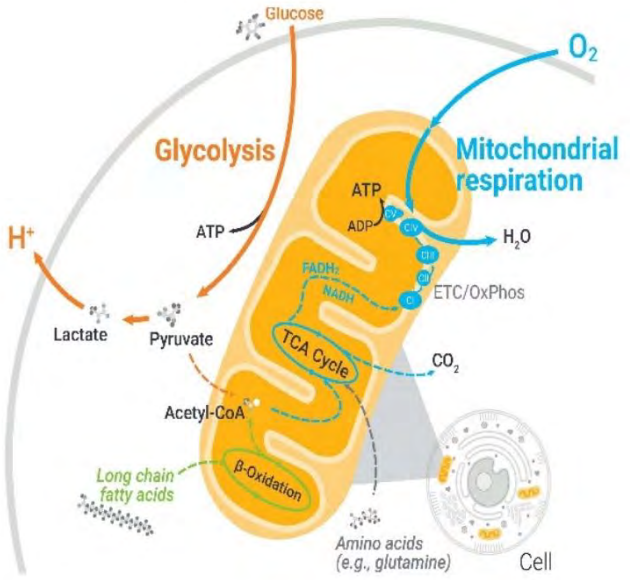
An overview of XF instruments & assay kits

UC Riverside

Arman Nayebosadri, PhD
Product Specialist – Southern California

Fabio Cerignoli, PhD
Sr. Field Applications Scientist – Southern California

James Ongaro
Account Manager



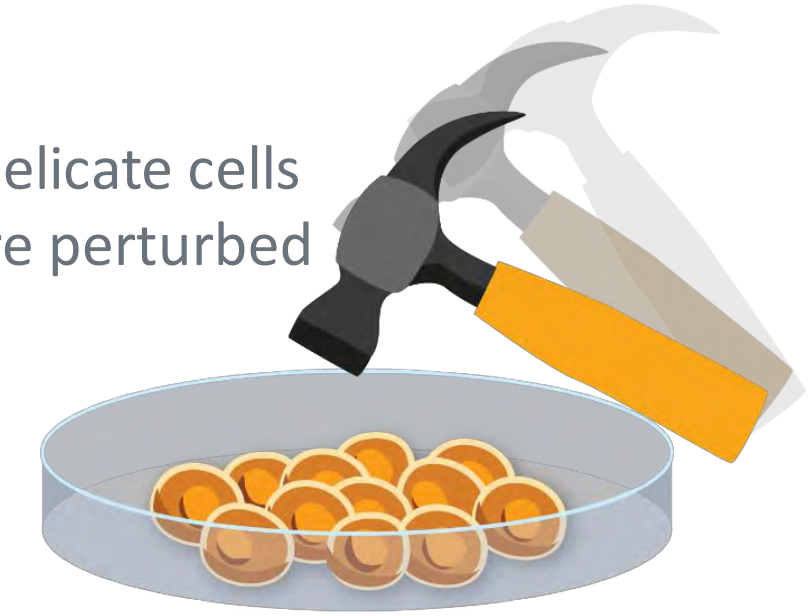
Topics of discussion

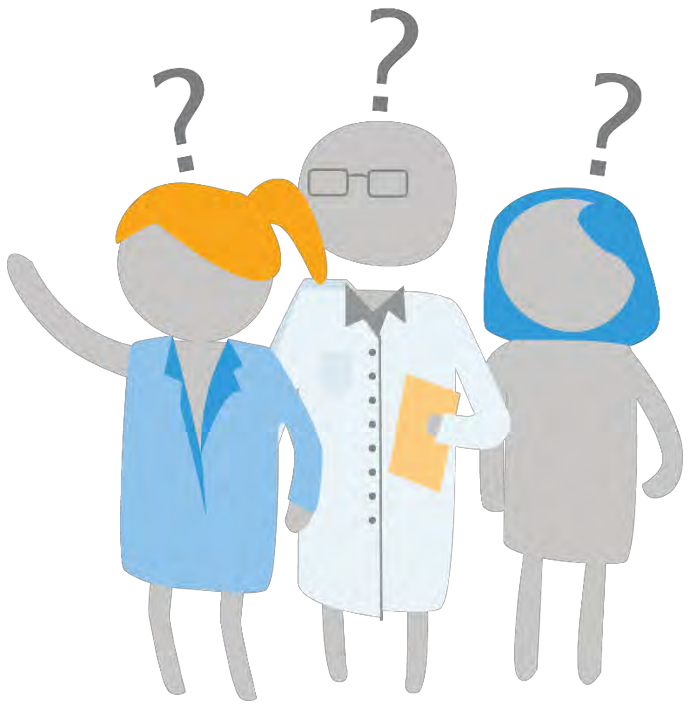
- Cell-based research challenges & value of real-time measurements
- Agilent Cell Analysis solutions – what do we offer in addition to Seahorse?
- Review of mitochondrial biology & how the Seahorse measures glycolysis & respiration
- What kinds of assays can you perform with the Seahorse? What is your goal?
- A new metabolic analysis alternative - using your [BioTek] plate reader
- *New* Seahorse XF Flex – measure metabolism from 3D samples
- Resources for support – on-demand trainings/webinars, etc

Key challenges of cell-based research

Dynamic cell changes are missed

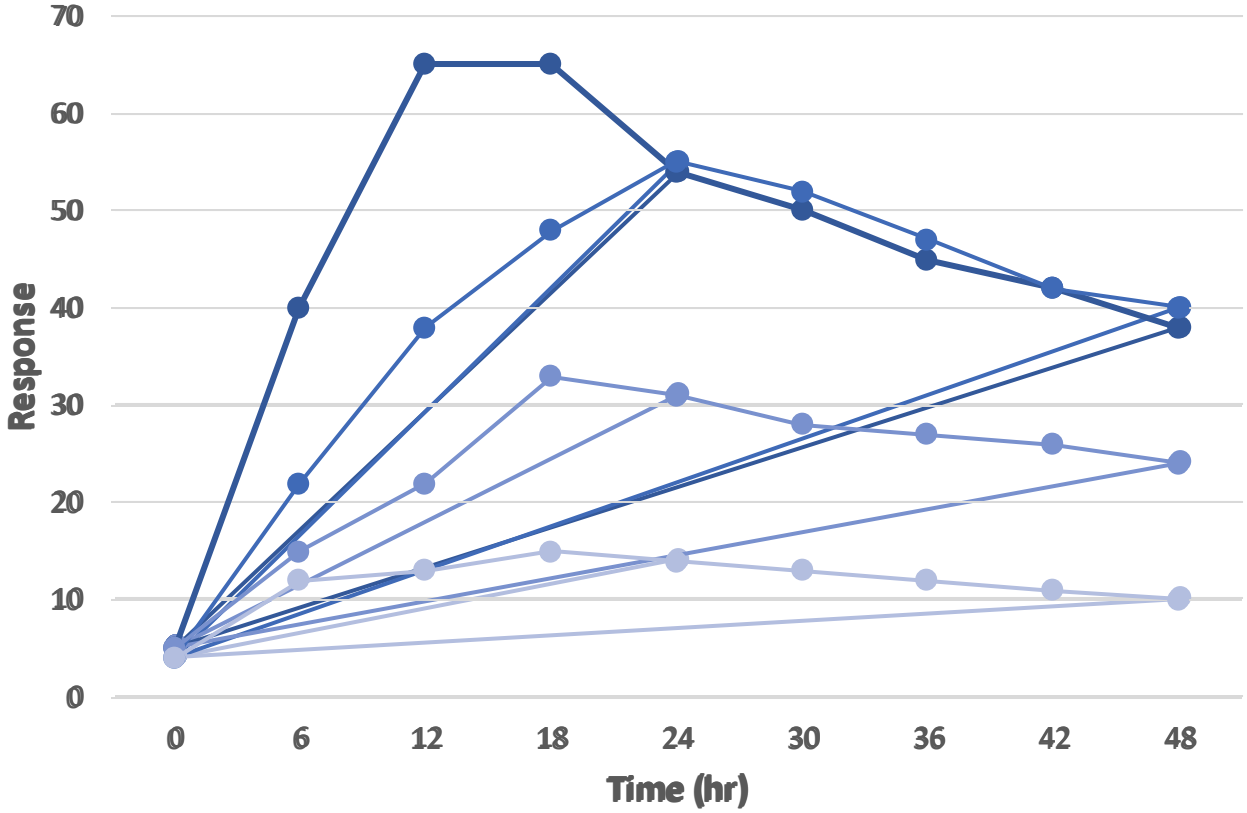
Delicate cells are perturbed

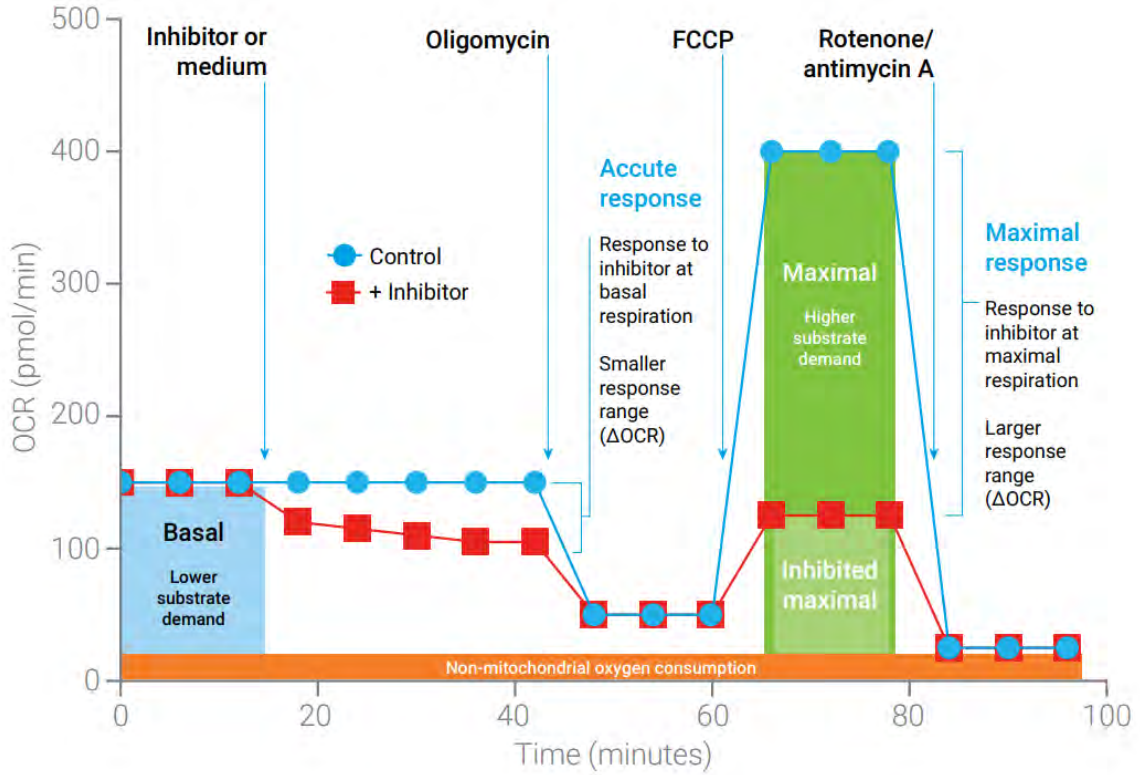




Cell analysis can be difficult to perform or access

Biology happens in real-time, but what about your analysis?





Know the "whole story" of your cell's biology, rather than just see "snap-shots"

Agilent's Real-Time Cell Analysis Solutions

eSight & xCELLigence

- Live-cell imaging *and* impedance biosensors for label-free, multi-modal data output of cell health / movement / function

Cytation

- Automated microscopy & microplate reader; fluorescence, luminescence, absorbance
- 1.25 to 60x magnification & 20+ filter/LED color cubes

Seahorse

- Real-time analysis of bioenergetics (metabolism)
- Quantifies ATP generation rate from *two* metabolic pathways – glycolysis & mitoch. respiration

Seahorse Instrument Portfolio

XF Pro / XFe96

- Highest Throughput – **96-well**
- Compatible with all assay kits; adherent & suspension cells
- Limited 3D support – single spheroid analysis

XF Flex – NEW (May 2025)

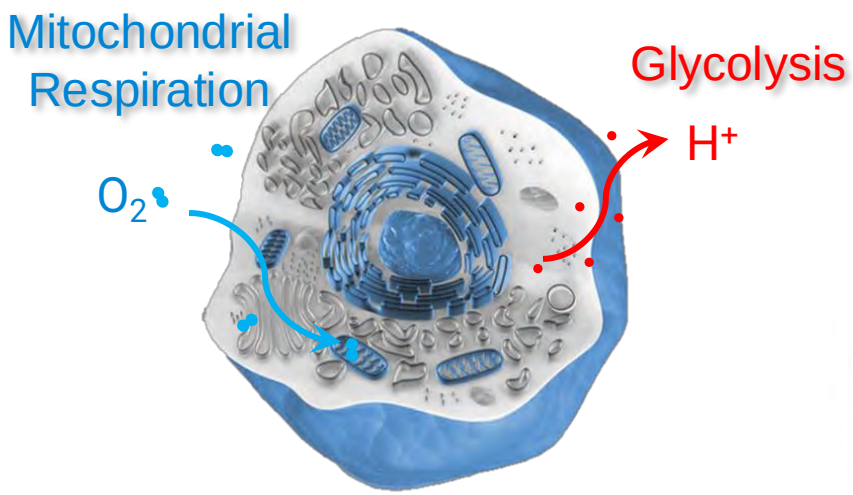
- Suitable for organoids, small tissue samples, islets, biopsy punches, etc
- **24-well** 2D & 3D plate options (capture w/ mesh, organoid); new 3D assay kits
- Wider temperature range (16-42C)
- Higher upper sensitivity range vs XF Pro

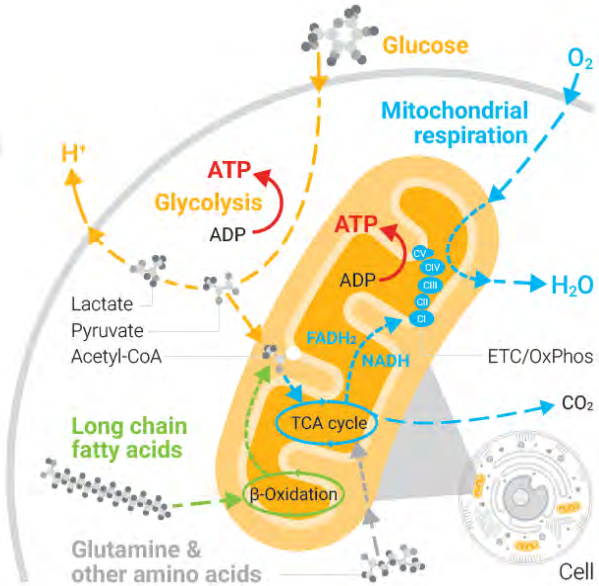
HS Mini

- Suitable for rare samples, low-respiring cell types, T-cell subsets
- Use 3x less cells with new **8-well** plate design
- Pair-wise comparison of two groups (n=3)

Two Metabolic Pathways of Interest

Metabolism is recognized as a key driver & controller of cell function





Glycolysis	Respiration
Anaerobic - conversion to lactate	via mitochondrial substrate oxidation
ECAR (mpH / min) ExtraCellular Acidification Rate ↓ **PER (pmol [H^+] / min)** Proton Efflux Rate	**OCR (pmol [O_2] / min)** Oxygen Consumption Rate

**ECAR = lactate efflux AND OxPhos byproducts (i.e., H^+ + HCO^{3-}) from CO2 generation, + others


Article

SOURCE DATA | TRANSPARENT PROCESS | OPEN ACCESS

EMBO reports

Calculation of ATP production rates using the Seahorse XF Analyzer

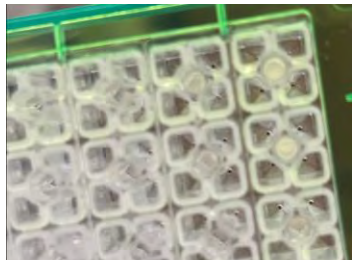
Brandon R Desousa[1], Kristen KO Kim[1], Anthony E Jones[1], Andréa B Ball[1], Wei Y Hsieh[2], Pamela Swain[3], Danielle H Morrow[1], Alexandra J Brownstein[4], David A Ferrick[3], Orian S Shirihai[4], Andrew Neilson[3], David A Nathanson[1], George W Rogers[3], Brian P Dranka[3], Anne N Murphy[5], Charles Affourtit[6], Steven J Bensinger[2], Linsey Stiles[1,4], Natalia Romero[3] & Ajit S Divakaruni[1,*]

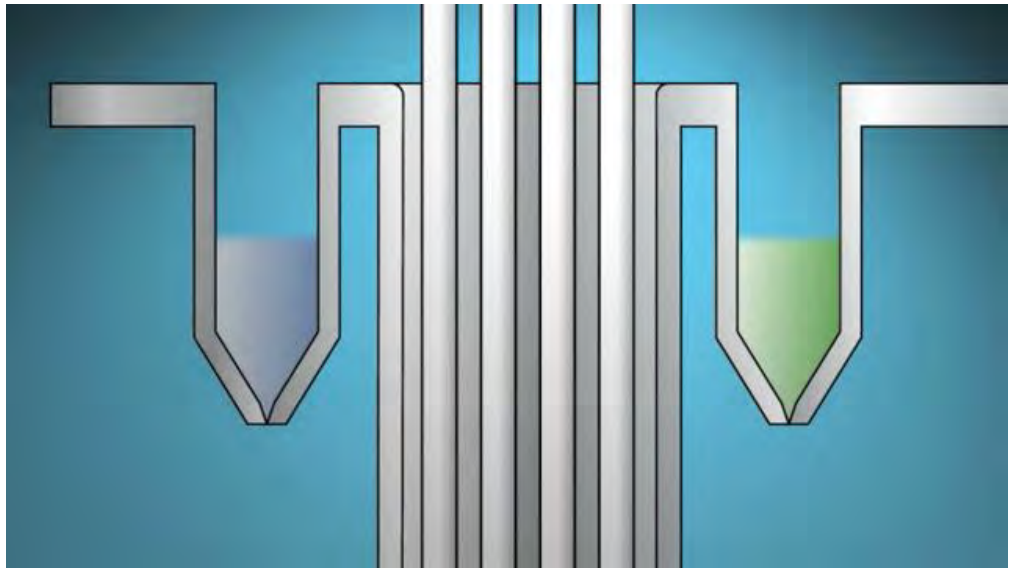
White Paper

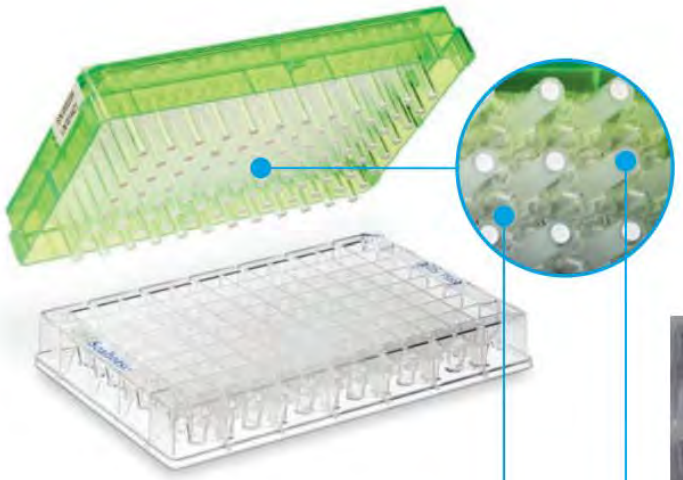
Agilent Trusted Answers

Quantifying Cellular ATP Production Rate Using Agilent Seahorse XF Technology

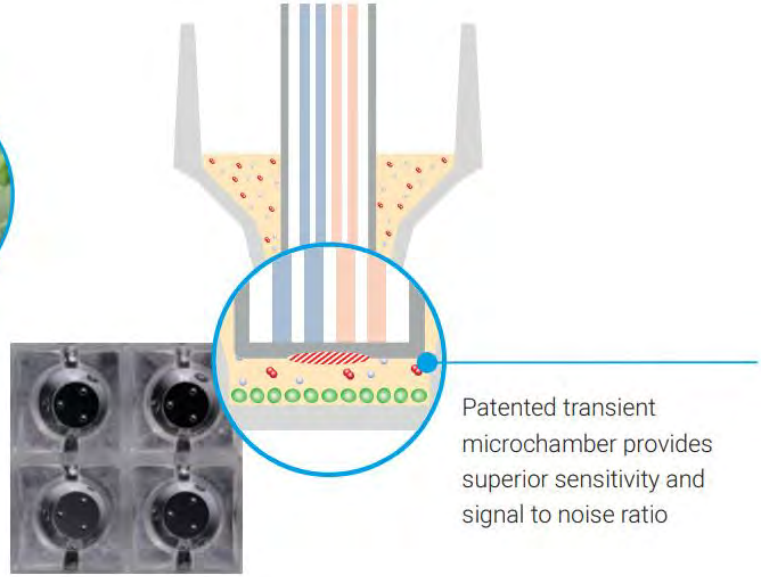
Sensor cartridges with sensitive probes to measure bioenergetic pathways





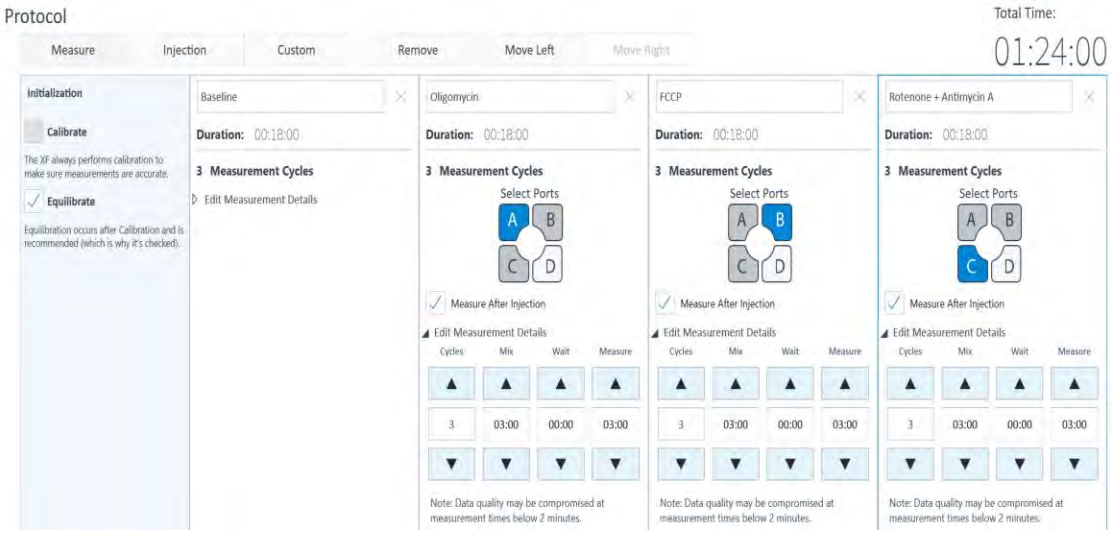


Patented integrated injection ports (4 per well) for adding compounds, stimulators, inhibitors, substrates, and beads conjugated with antigens, let you test multiple conditions per well.



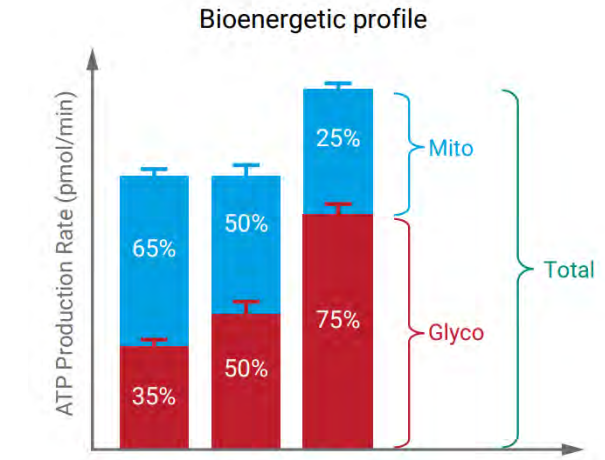
Patented transient microchamber provides superior sensitivity and signal to noise ratio

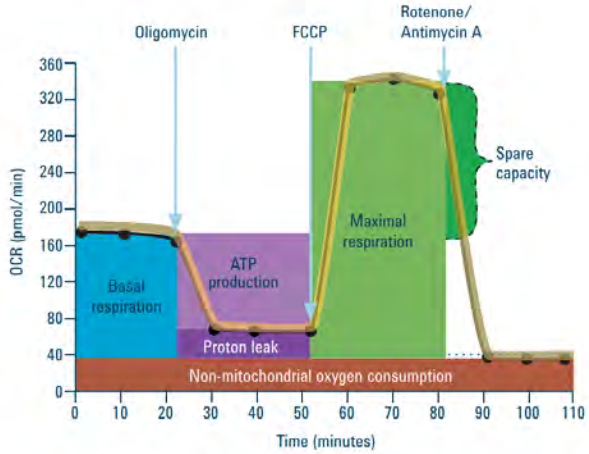
Solid state sensor probes contain polymer embedded fluorophores that are inspected through a machine vision process, allowing detection of OCR and PER simultaneously

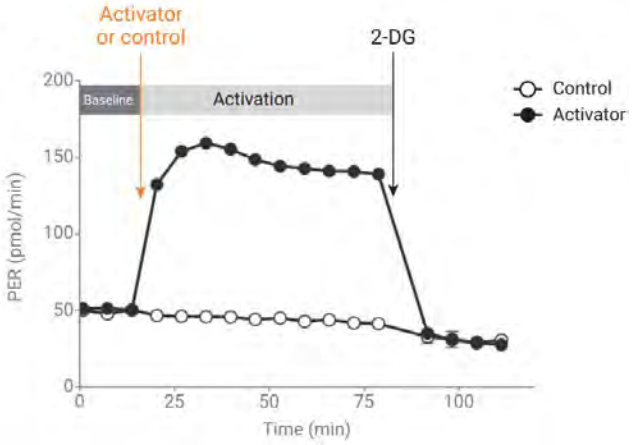


Also available with Poly-D-Lysine coating for suspension cell assays

Seahorse XF Assays

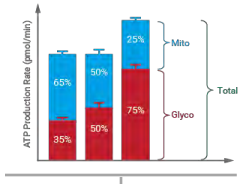






Navigating your Seahorse XF assay journey

XF ATP Production Rate Assay



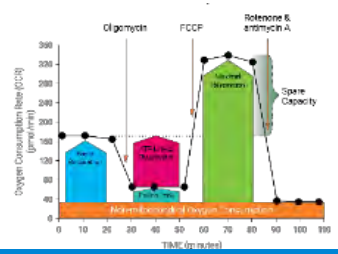
Aerobic?

OCR Specific Assays

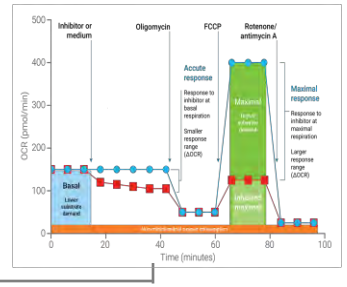
Glycolytic?

ECAR Specific Assays

XF Cell Mito Stress Test

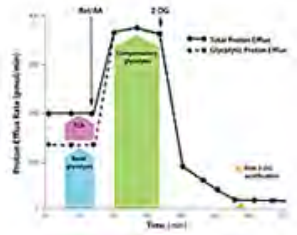


Substrate Oxidations Stress Tests

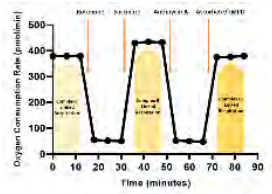


Glucose
Glutamine
LCFA

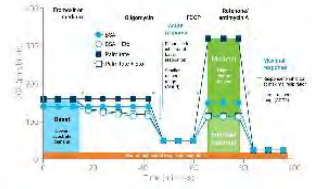
XF Glycolytic Rate Assay



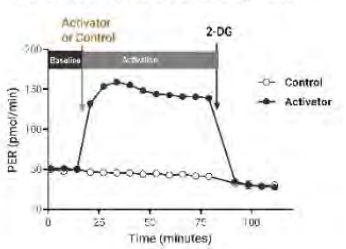
XF PMP (Cell Permeabilizer), Isolated Mitochondria work



Palmitate Oxidation Stress Test



XF Human T-cell Activation Assay



Approach:

Broad

Targeted

The Seahorse XF ATP Production Rate Assay

Glycolytic & mitochondrial metabolic pathways are both responsible for ATP production in mammalian cells

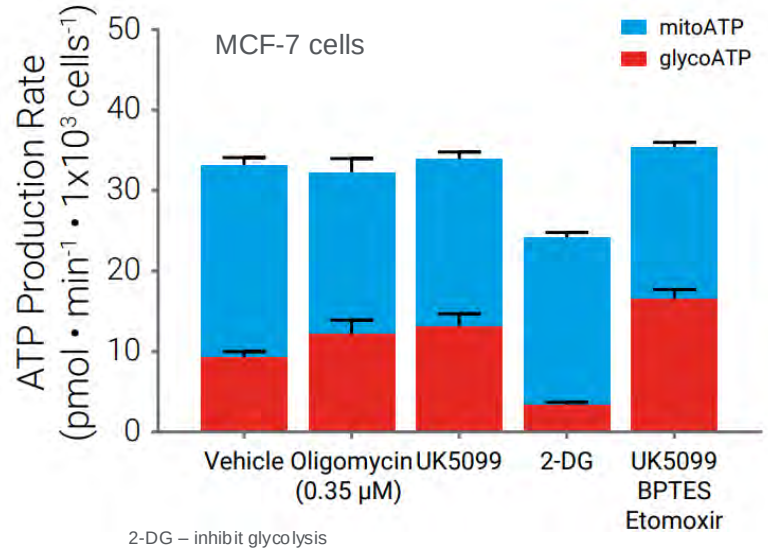
What is the metabolic phenotype of my cells?

What metabolic pathway should we target?

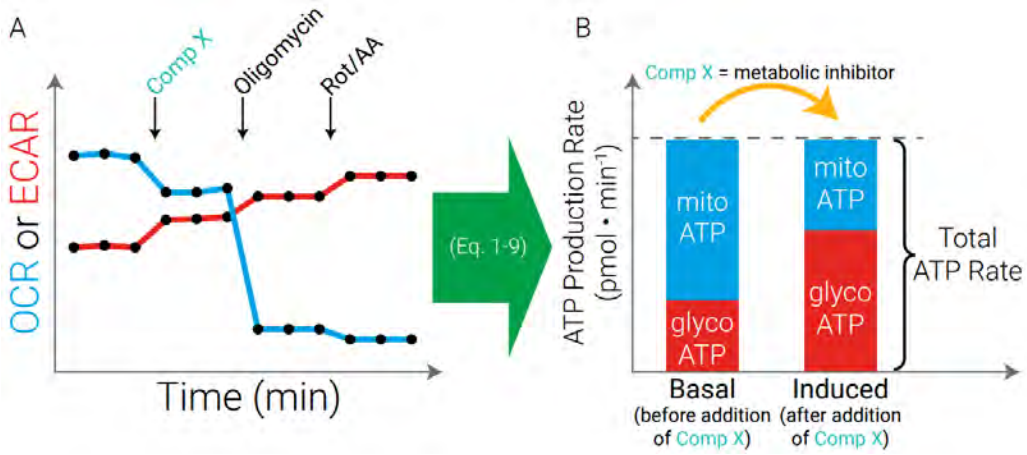
Seahorse XF ATP Rate Assay measures ATP production rates in real-time from living cells:

- **Total** cellular ATP Production Rate
- **Glycolytic** ATP Production Rate
- **Mitochondrial** ATP Production Rate

Is there a transient response / metabolic switch in response to treatment?

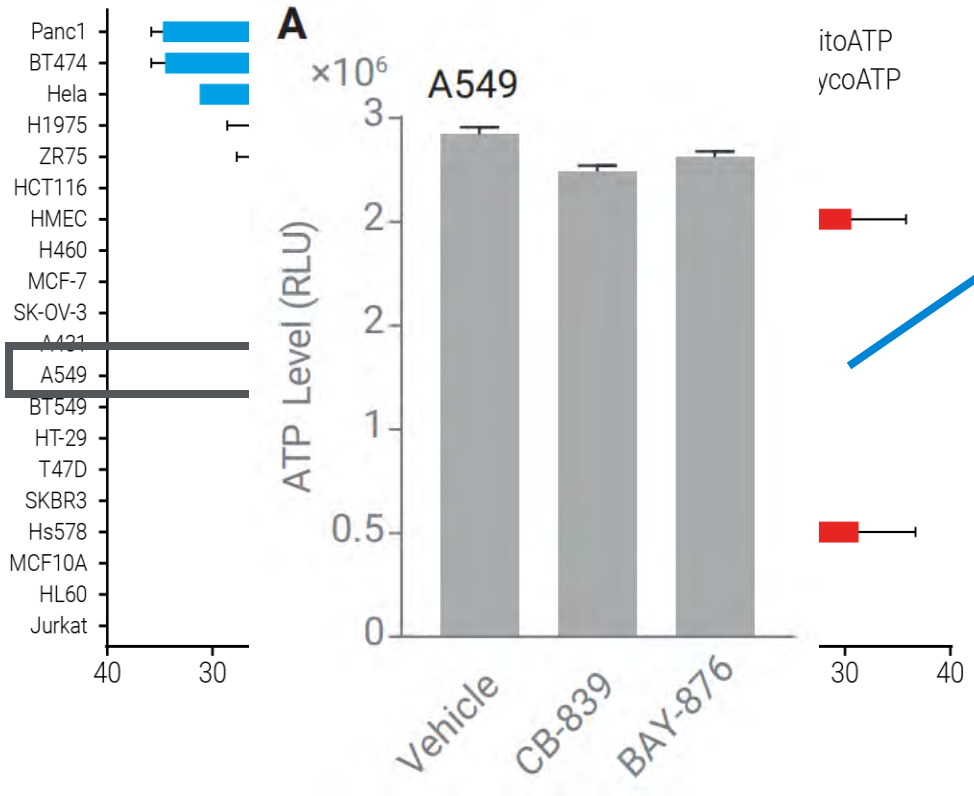


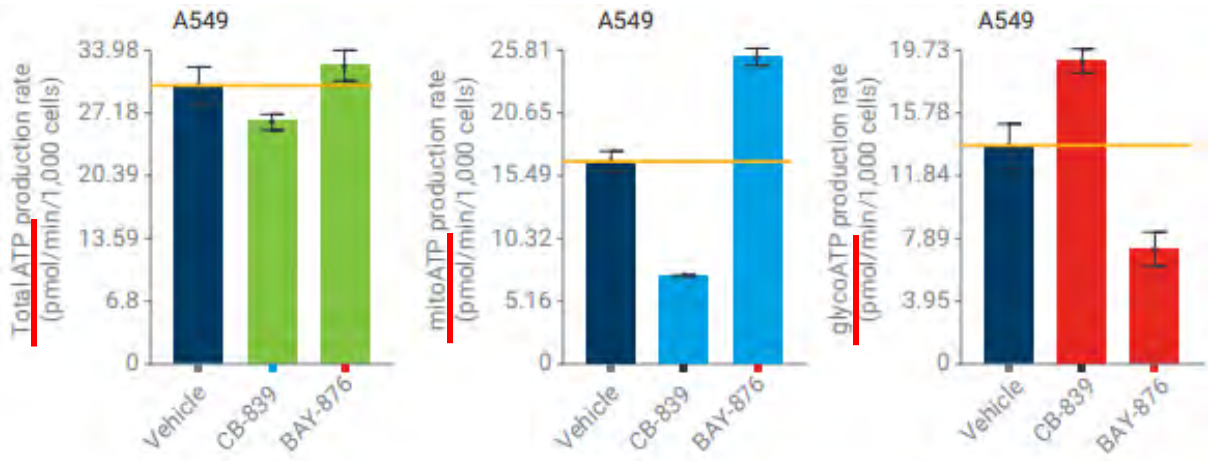
2-DG – inhibit glycolysis
BPTES – inhibitor of GLS1 (converts glutamine > glutamate)
Etomoxir – inhibitor of fatty acid oxidation via CPT1a
Oligomycin – inhibit ATP-synthase
UK5099 – inhibitor of Mitochondrial Pyruvate Carrier



Agilent

Metabolic Phenotype Varies Amongst Cancer Cells



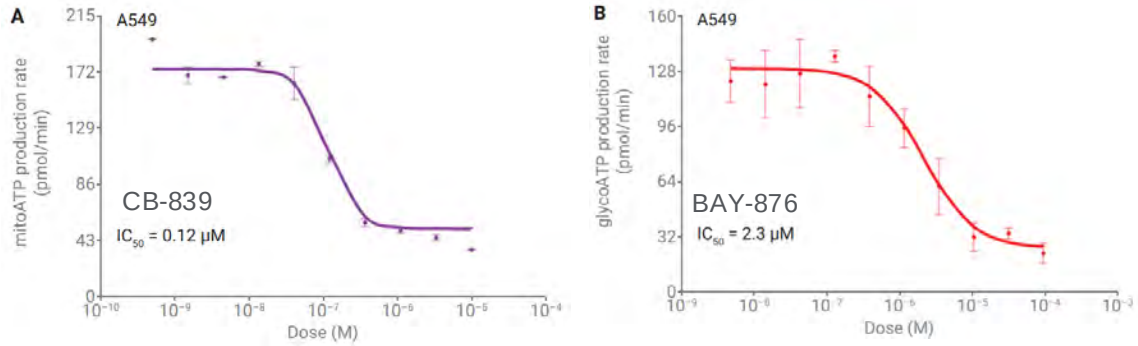


1 hour pre-treatment:

- **CB-839** (glutamine synthase inhibitor), **BAY-876** (Glut1 glucose transporter inhibitor)

Reciprocal metabolic pathways upregulated to compensate for inhibitor effect

- CB-839 >> compensatory switch to glycolysis
- BAY-876 >> compensatory switch to respiration



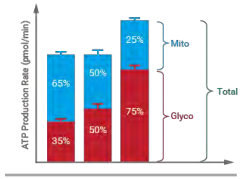
Bioenergetic profiling of cancer cell lines: quantifying the impact of glycolysis on cell proliferation, Poster # 3487 AACR 2018

Navigating your Seahorse XF assay journey

Approach:

Broad

XF ATP Production Rate Assay



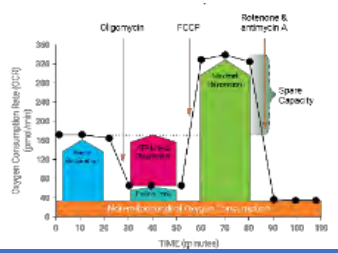
Aerobic?

OCR Specific Assays

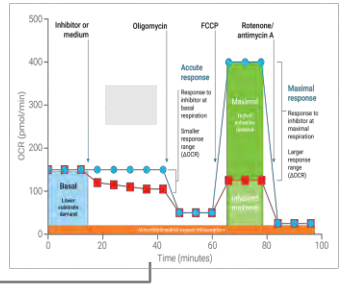
Glycolytic?

ECAR Specific Assays

XF Cell Mito Stress Test

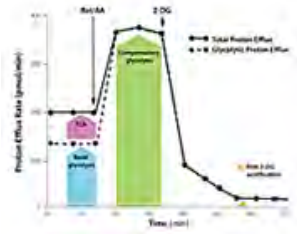


Substrate Oxidations Stress Tests

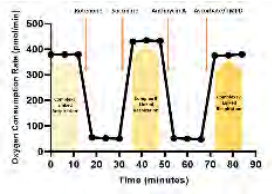


Glucose
Glutamine
LCFA

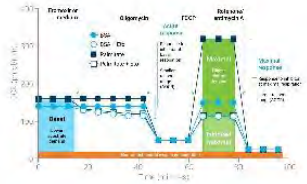
XF Glycolytic Rate Assay



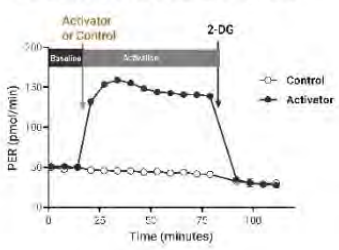
XF PMP (Cell Permeabilizer), Isolated Mitochondria work



Palmitate Oxidation Stress Test



XF Human Tcell Activation Assay

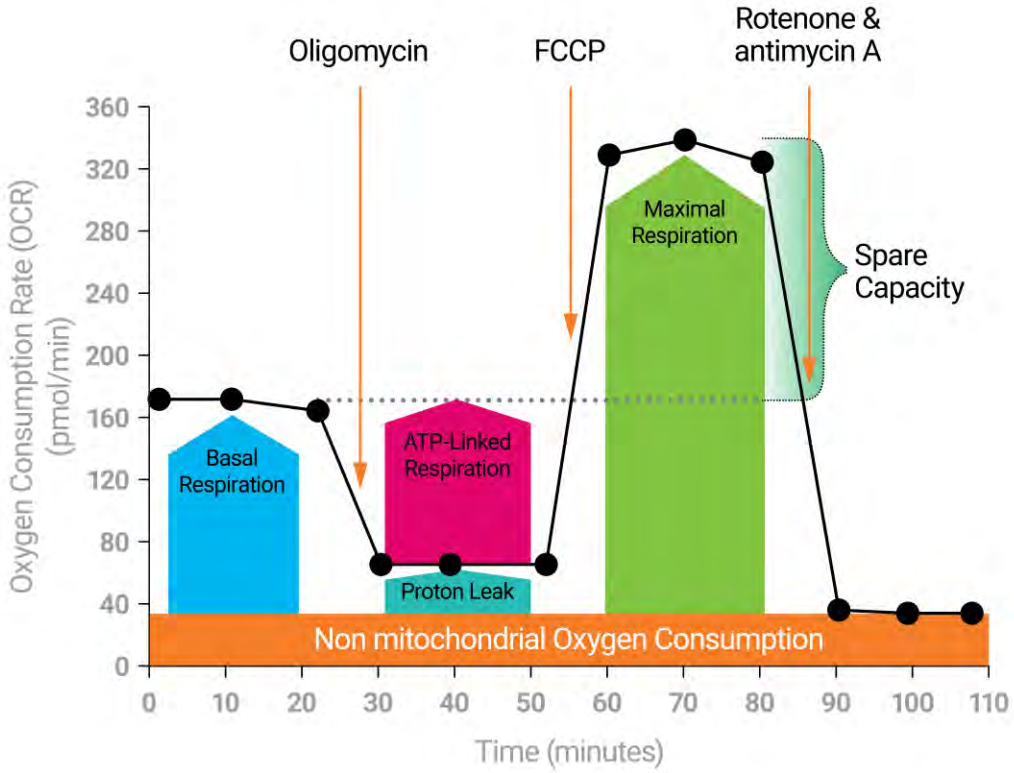


Targeted

Mito-Stress Test (MST)***

Provides a targeted, *OCR-specific* approach that assess various parameters of **mitochondrial function**

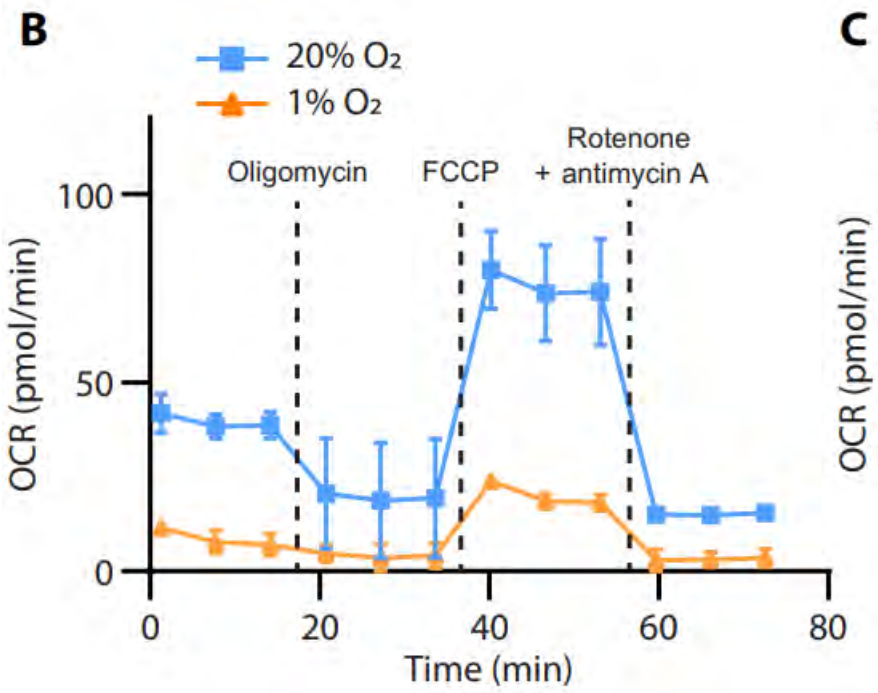
What is the mitochondrial stress profile of my cells?

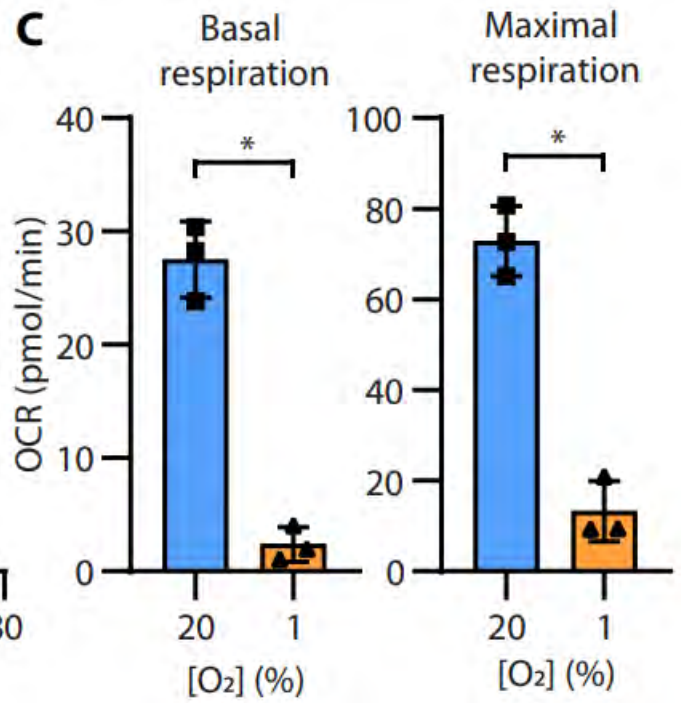


Parameter	Definition
Basal Respiration	Respiration rate required to meet cellular ATP demand
ATP-Linked Respiration *"Coupled Respiration"*	The rate of oxygen consumption that is required for ATP production in the mitochondria
Maximal Respiration	The maximum rate of cellular respiration, dependent on substrate supply, transport, and rate of oxidation
Spare Respiratory Capacity (SRC)	The difference between maximum and basal respiration. Indicates the ability of a cell to meet an increased energy demand. Linked to changes in basal and/or maximal respiration rates
Proton Leak-Linked Respiration *"Uncoupled Respiration"*	Oxygen consumption that is not coupled to ATP Production in the mitochondria. Increases in proton leak often indicate uncoupling between electron flow and ATP Production
Non-Mitochondrial Respiration	Oxygen consumption sourced from other cellular processes.

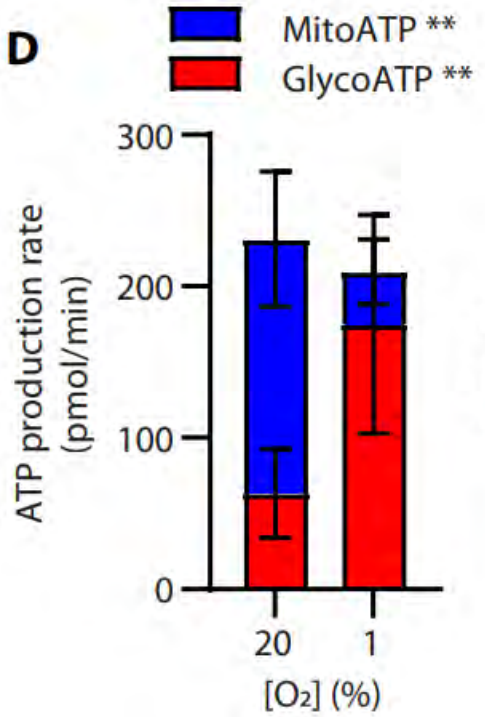
IMMUNOLOGY

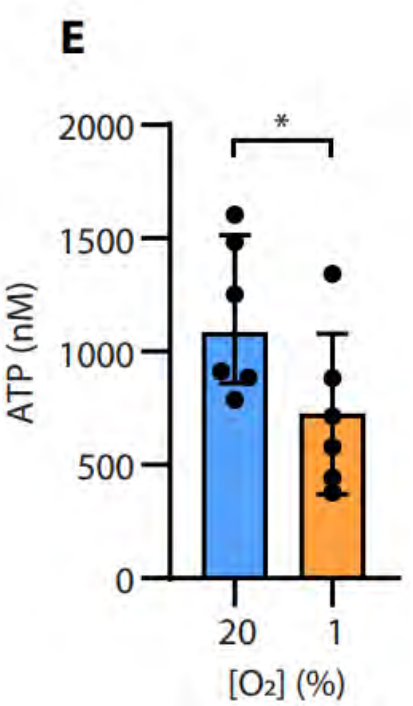
Metabolic programs drive function of therapeutic NK cells in hypoxic tumor environments





Decrease in OxPhos (OCR) in severe hypoxia

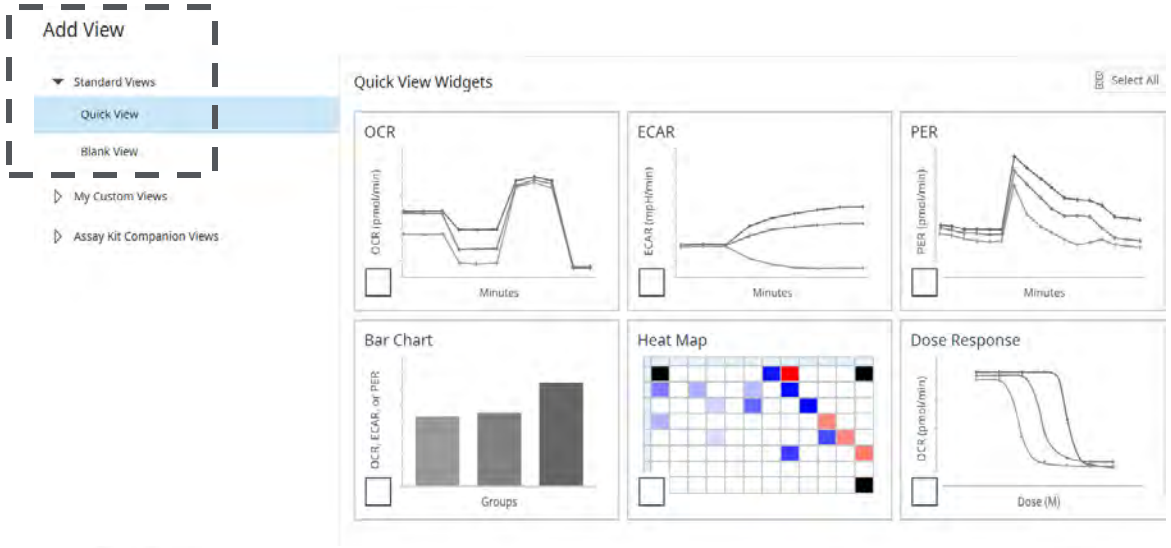


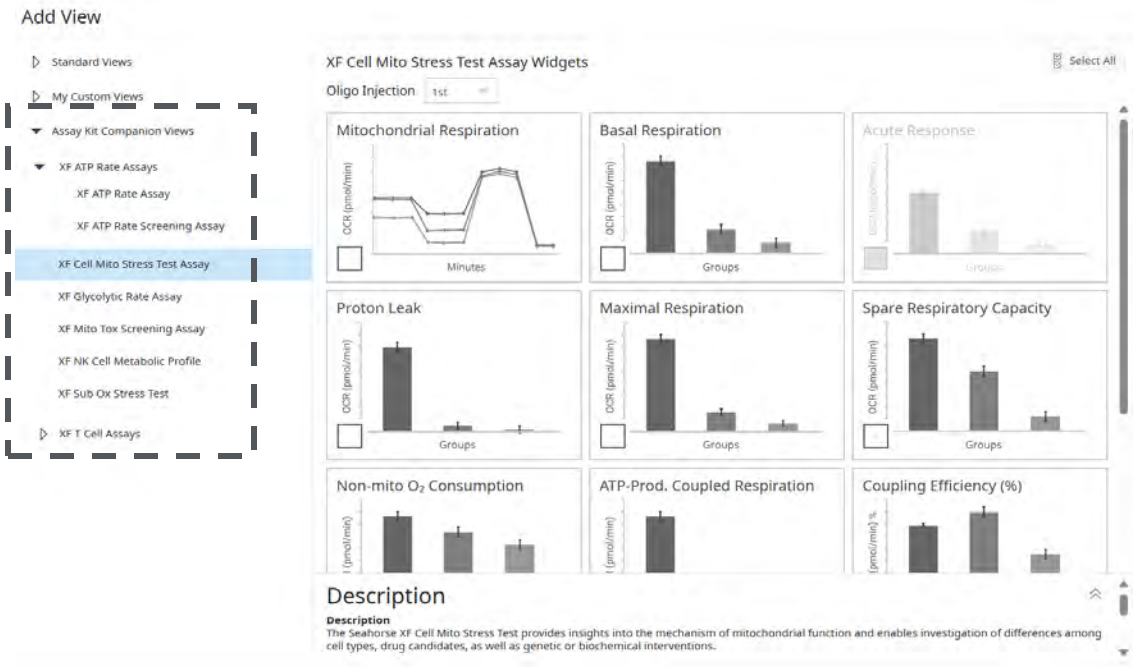


Hypoxia: More ATP generated by glycolysis & less via by OxPhos relative to normoxia conditions

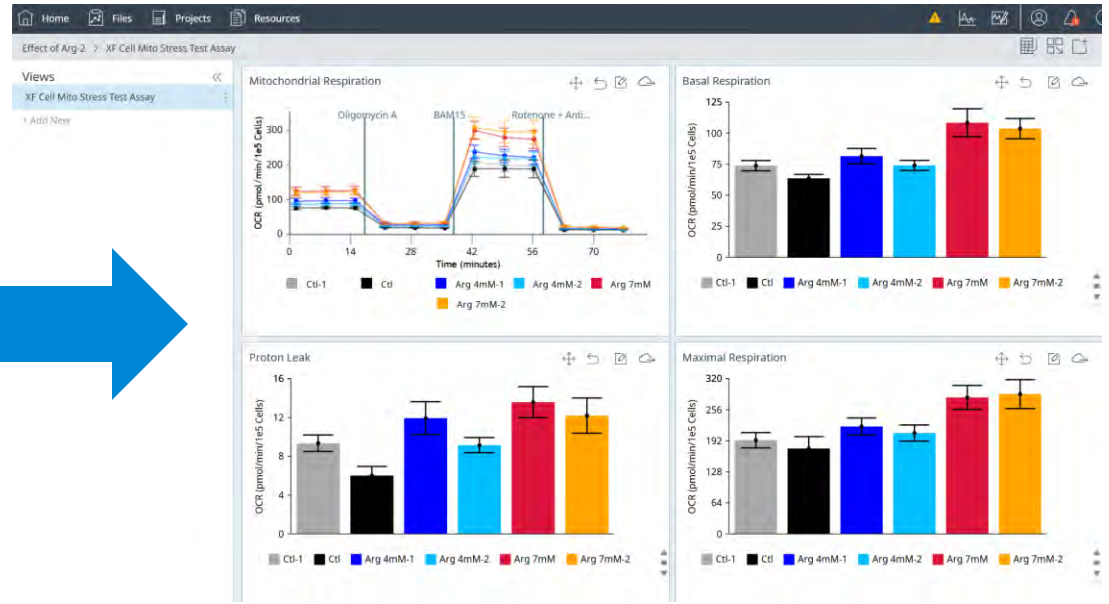
**OVERALL *RATE* OF ATP PRODUCTION WAS NOT DIFFERENT, but *available ATP* was lower in hypoxia (higher energy demands, lower reserves)

Seahorse Analytics – free cloud software for additional data reporting





- Free to create an account
- **Mac** / PC compatible
- Each kit has assay-specific widgets
- Data can be exported to Excel & Prism

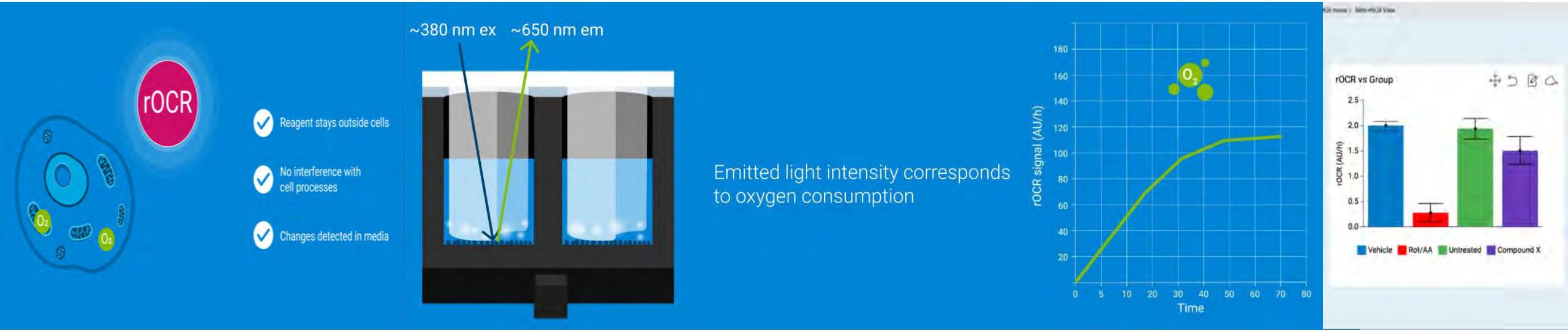


A new Seahorse alternative using a plate reader

Plate Reader Metabolic Assays

Mito-rOCR Assay Kit

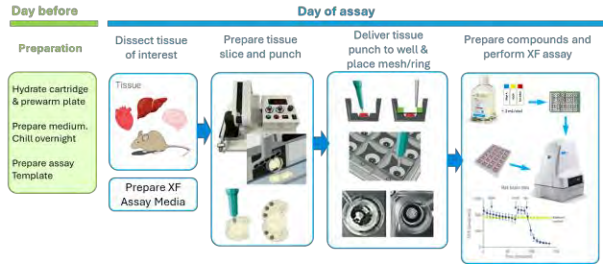
- Can be used on plate reader* with monochromator or filter
- Generate kinetic *respiration* data from *adherent cells* in a 96-well plate
- rOCR reagent initially quenched >> O2 consumption = fluorescence increas
- Cells can be used downstream – imaging, other plate-reader assays
- Seahorse Analytics analyzes & reports data



The Agilent **Seahorse XF Flex** Analyzer, Consumables, and 3D Workflow

Instrument (24-wells) & software

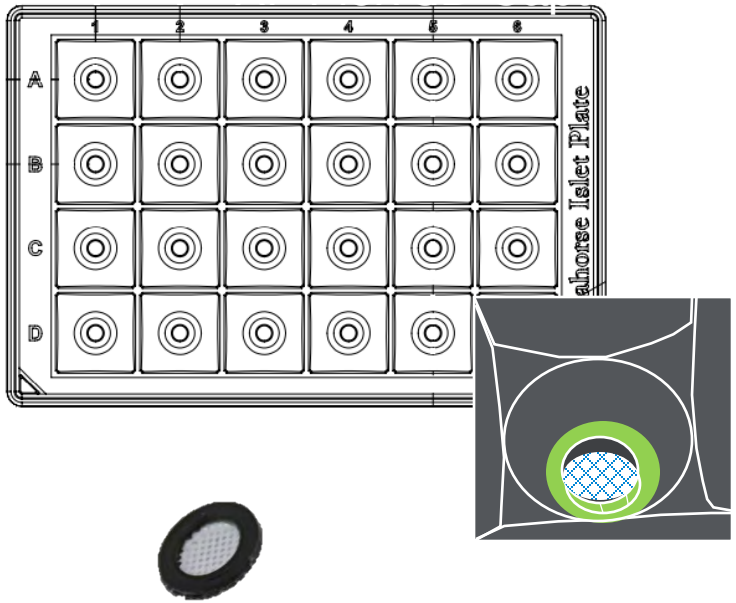
3D consumables



3D workflows

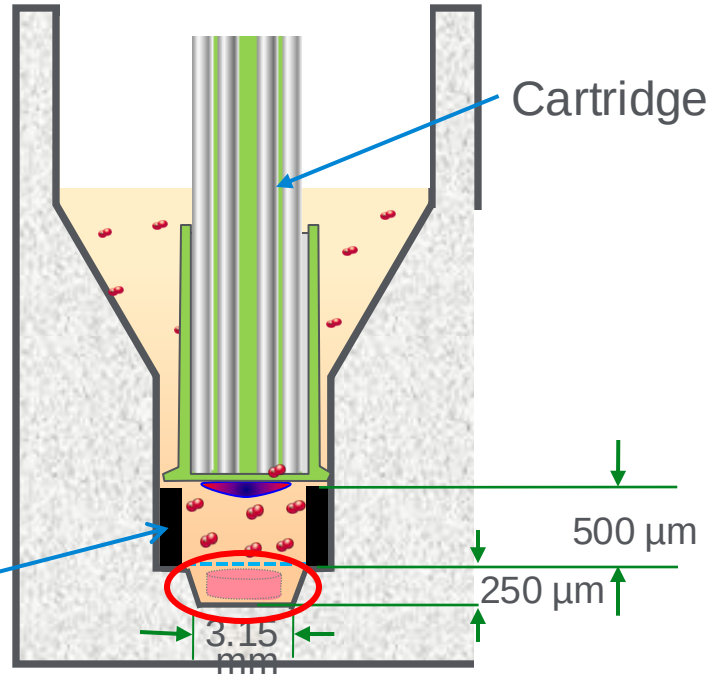
NEW Seahorse XF Flex 3D Capture Microplate-L

Plate/well top view



Ring/mesh
more hydrophilic
with 280 µm pore

Side view of a well



3D capture
ring/mesh

- ✓ Only compatible with Seahorse XF Flex
- ✓ Dual color ring/mesh for easy handling
- ✓ Large mesh size to reduce trapped bubbles
- ✓ Suitable for many material types (tissue, cell clusters, small organisms, etc.)

Seahorse XF Flex 3D Tissue Workflow Diagram

Day before

Preparation

Hydrate cartridge and prewarm plate

Prepare medium
Chill overnight

Prepare assay Template

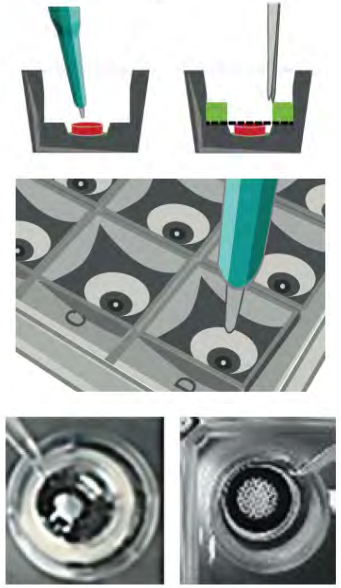
Day of assay

Dissect tissue of interest

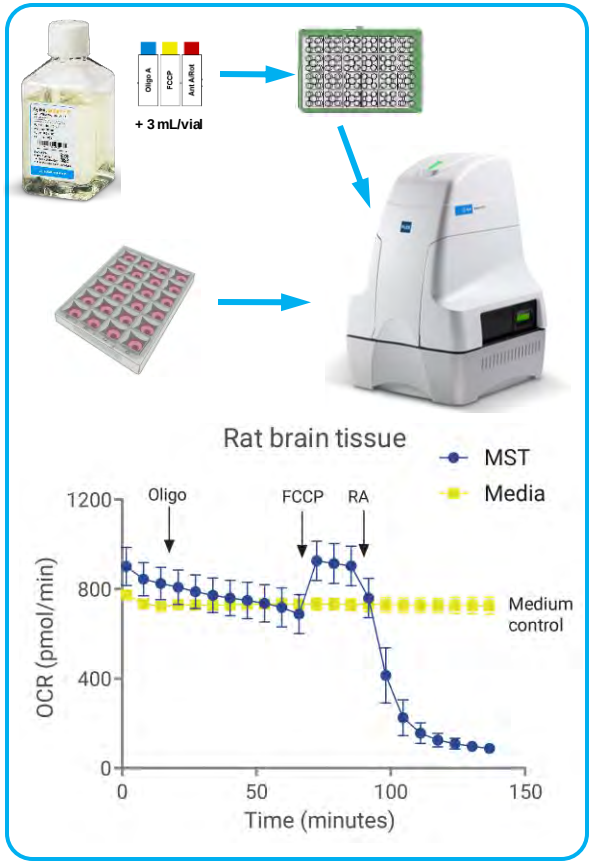
Prepare Seahorse XF assay media

Prepare tissue slice and punch

Deliver tissue punch to well and place mesh/ring



Prepare compounds and perform Seahorse XF assay

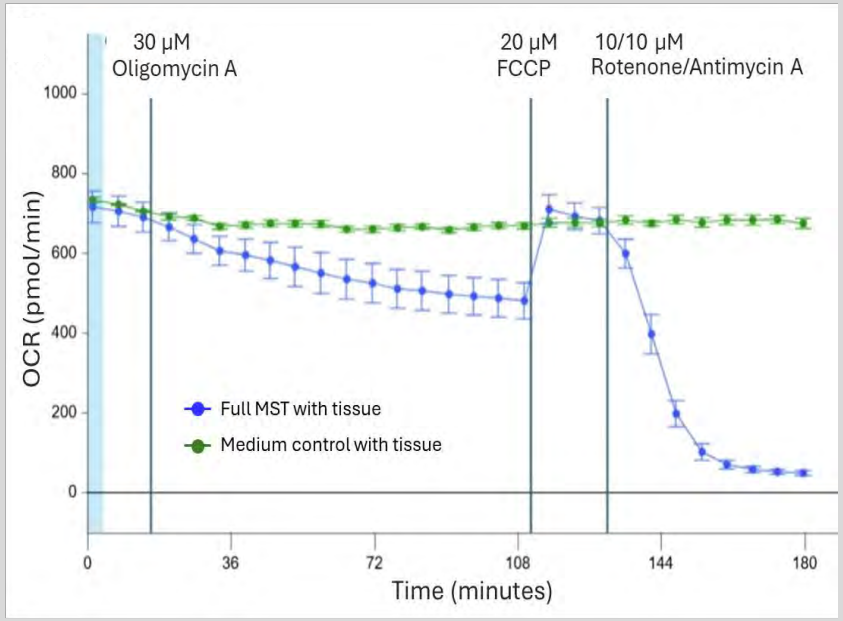


- ✓ Better sensitivity to ensure success
- ✓ Easy to get started for beginners
- ✓ Superior support from Agilent

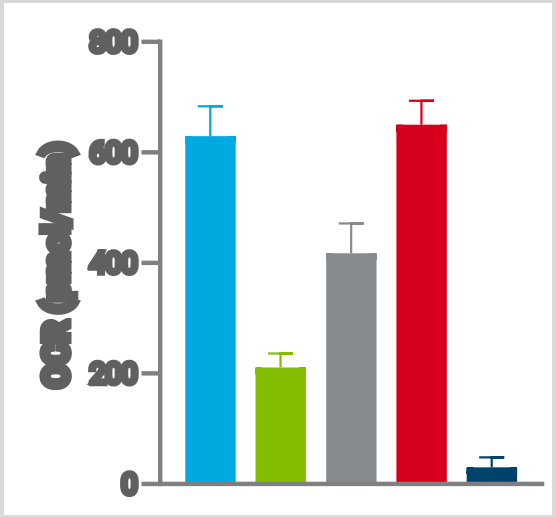
Seahorse XF Flex 3D Tissue Workflow Shows Robust MST Signals

Rat brain tissue sample of 200 µm thick, 2 mm in diameter using Flex 3D capture microplate-L

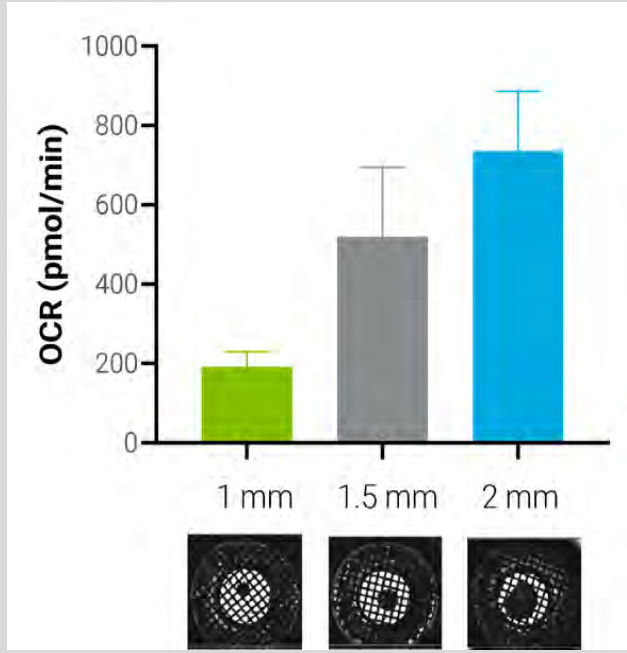
Ref: application note - 5994-8309EN



- ✓ Robust response to all modulators
- ✓ Stable basal signal.

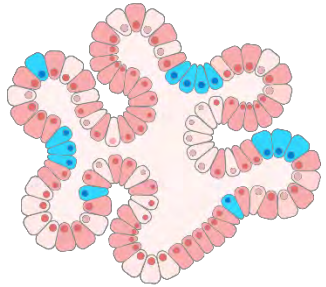


- Basal
- ATP Production linked
- Proton Leak
- Maximal
- Spare Capacity

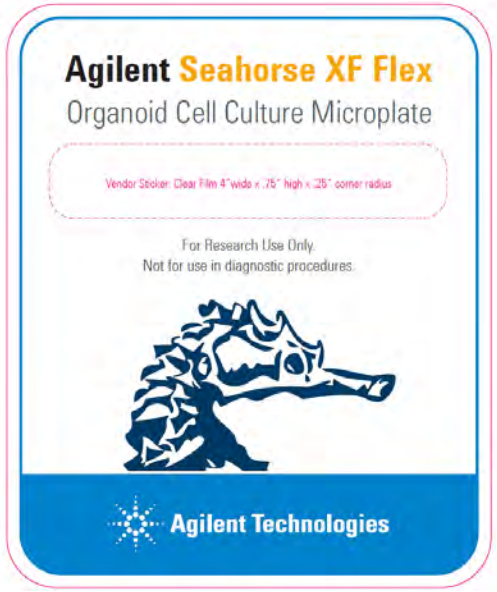


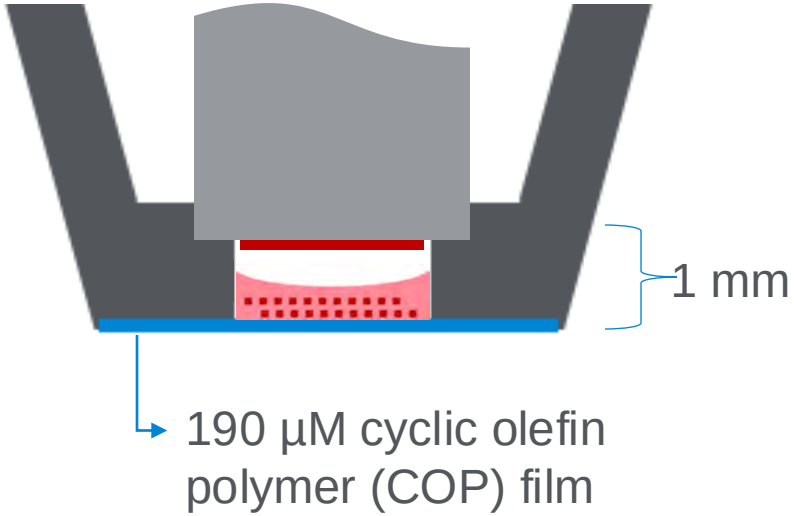
- ✓ Basal OCR is liner to tissue size

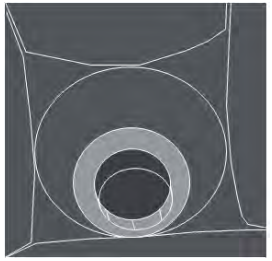
Coming Fall 2025: XF Flex Organoid Microplate



- ✓ Matrigel and imaging compatible

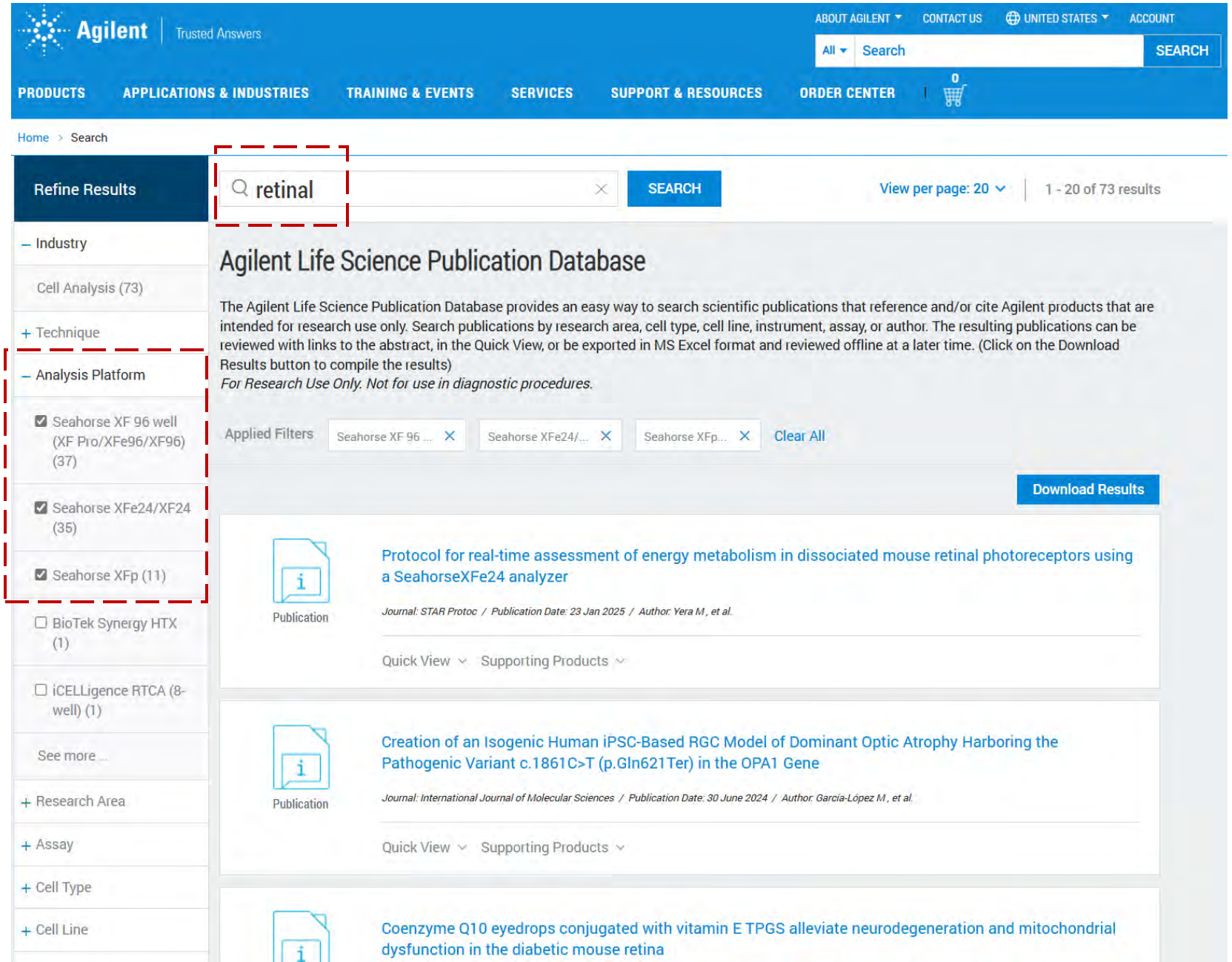






Agilent Cell Analysis & Seahorse Resources

Agilent Cell Reference Database



Agilent On-Demand Webinar Library & virtual trainings

Agilent Cell Analysis Webinar Series

See below for more Agilent Cell Analysis Webinars on a variety of research subjects. Webinars may appear in multiple research areas.

- Aging Research
- Cancer Research
- Cell Physiology Research
- Methods
- Neurobiology Research
- Immunology Research
- Immunotherapy and Cell Gene Therapy
- Infectious Disease
- Virology
- Assays Under Hypoxic Conditions
- Cardiovascular Research
- Drug Discovery
- Model Organisms
- Obesity, Diabetes, & Metabolic Disorders
- Stem Cell Biology
- Toxicology Research
- Translational Research

Aging Research

Title	Presenters	Analysis Platform	Date
From data to biology—uncovering regulators of redox signaling and metabolic physiology	Dr. Haopeng Xiao Research Fellow at Dana Farber Cancer Institute and Harvard Medical School	Seahorse XF Analyzer	May 31, 2023
Metformin treatment for aging-	Leena Bharath, Ph.D. Assistant Professor		

https://www.agilent.com/en/training-events/eseminars/cell-analysis-webinar-series

Seahorse XF Virtual Trainings

- Introducing Seahorse XF Technology
- The XF ATP Production Rate Assay
- The XF Cell Mito Stress Test (MST)
- The XF Substrate Oxidation, and XF Palmitate Oxidation, Stress Tests
- The XF Plasma Membrane Permeabilizer (PMP) Reagent
- The XF Glycolytic Rate Assay (GRA)
- How to Run an XF Assay Part 1: Preparations prior to an XF Assay
- How to Run an XF Assay Part 2: Preparations the day of an XF Assay

Register to view

Speakers




https://explore.agilent.com/XF-Virtual-Trainings


thank you
danke
gracias
obrigado
bedankt
dziękuję
go raibh maith agat
sukriya
kop khun krap
terima kasih
eskerrik asko
dankewol
teşekkür ederim
ngiyabonga
ધન્યવાદ
рахмат
格雷西
תודה
баярлалаа
дзякуй
faafetai lava
kiitos
dankie
dhanyavad
hvala
mauruuru
köszönöm
bayarlaa
grâcie
nanni
nandri
enkosi
sobodi
děkuji
měrsi
didi madloba
sagolun
salamat
kam sah hamnida
rahmat
najis tuke
ありがとう
tanemirt
rahmet
xièxie
고맙습니다
ти благодарам
ευχαριστώ
diolch
toda
taiku
sulpáy
aitäh
gratias ago
akun
dankon aĉiu
dank je
welalin
tack
barka
mersi
kia ora
vinaka
спасибо
blagodaram
misaotra
matondo
paldies
grazzi
mahalo
tapadh leat
благодаря
asante
manana
tenki
obrigada
murakoze
chokrane
mamnun
شكرا لك
djiere dieuf
tau
mochchakkeram
хвала
takk
dakujem
trugarez
дякуємо
shukriya
dhanyavadagalu
merci

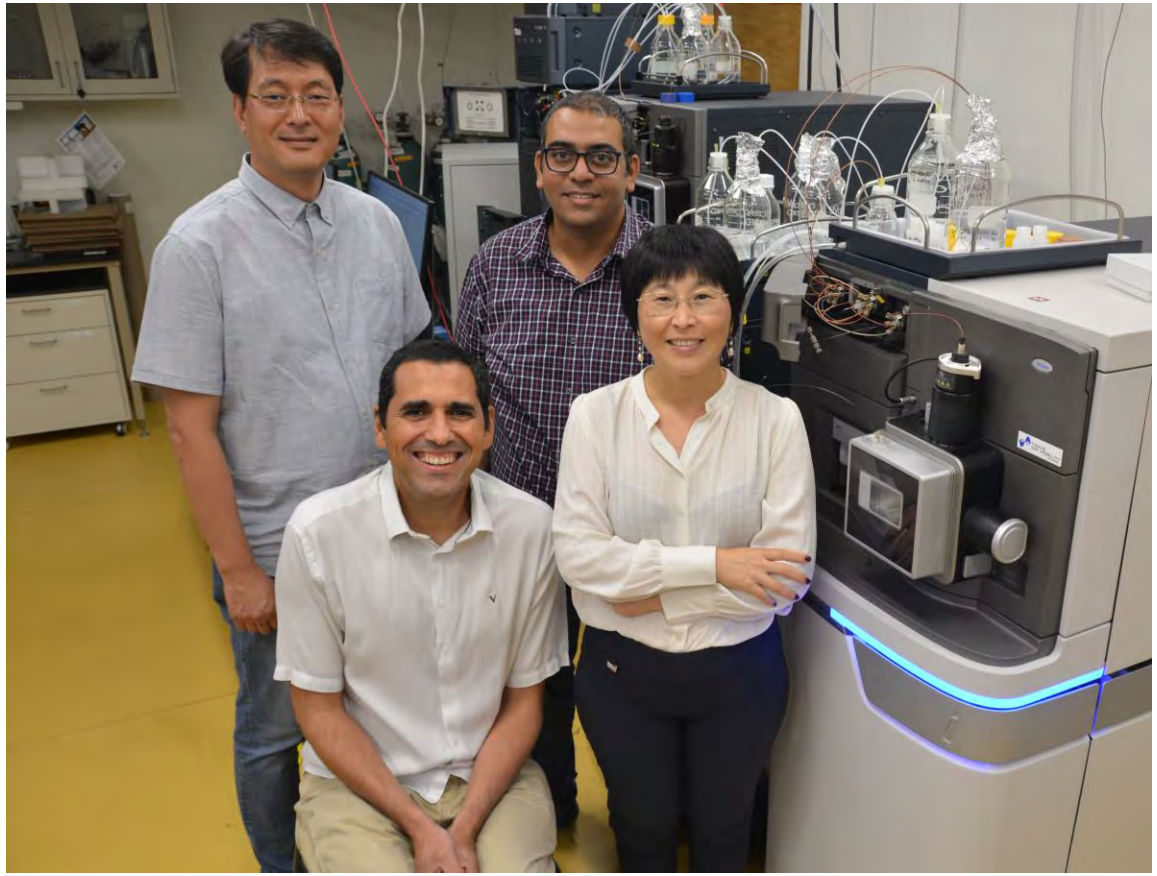
Metabolomics Core

UC Riverside Metabolomics Core Facility

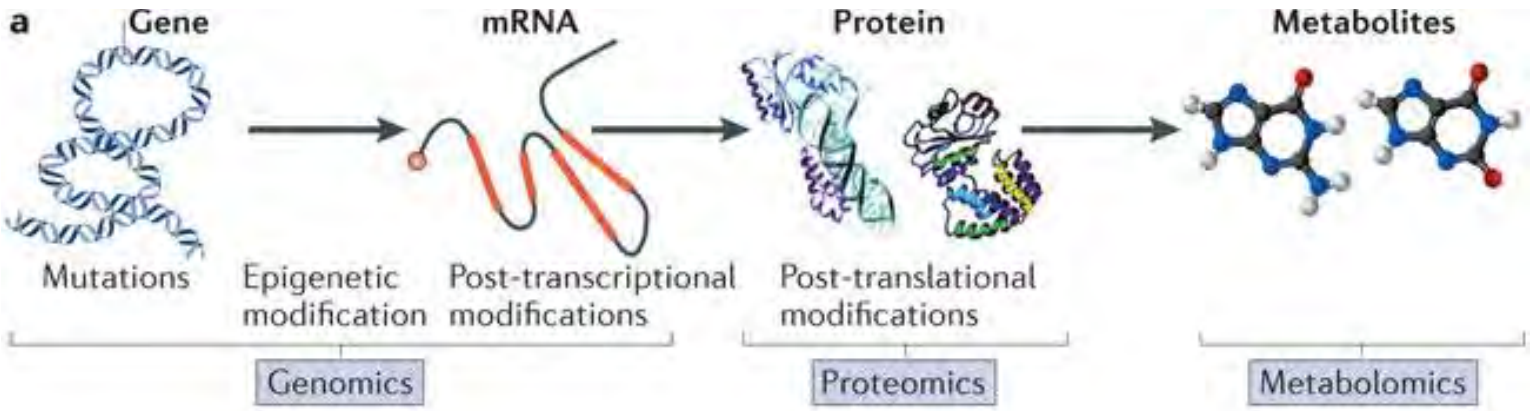
UCR | Institute for Integrative Genome Biology

October 2025

Amancio de Souza
Academic Coordinator



Metabolomics Overview



Nat Mol Cell Biol (2012) Patti et al

Metabolomics is defined as the comprehensive study of metabolites in biological systems.

Metabolomics: How does it work?

liquid chromatography (LC) /gas chromatography (GC)
LC – polarity
GC - boiling point, partition coefficients, volatility and polarity

mass spectrometry (MS)
separate metabolites by mass (m/z) and quantify

Example of LC-MS data

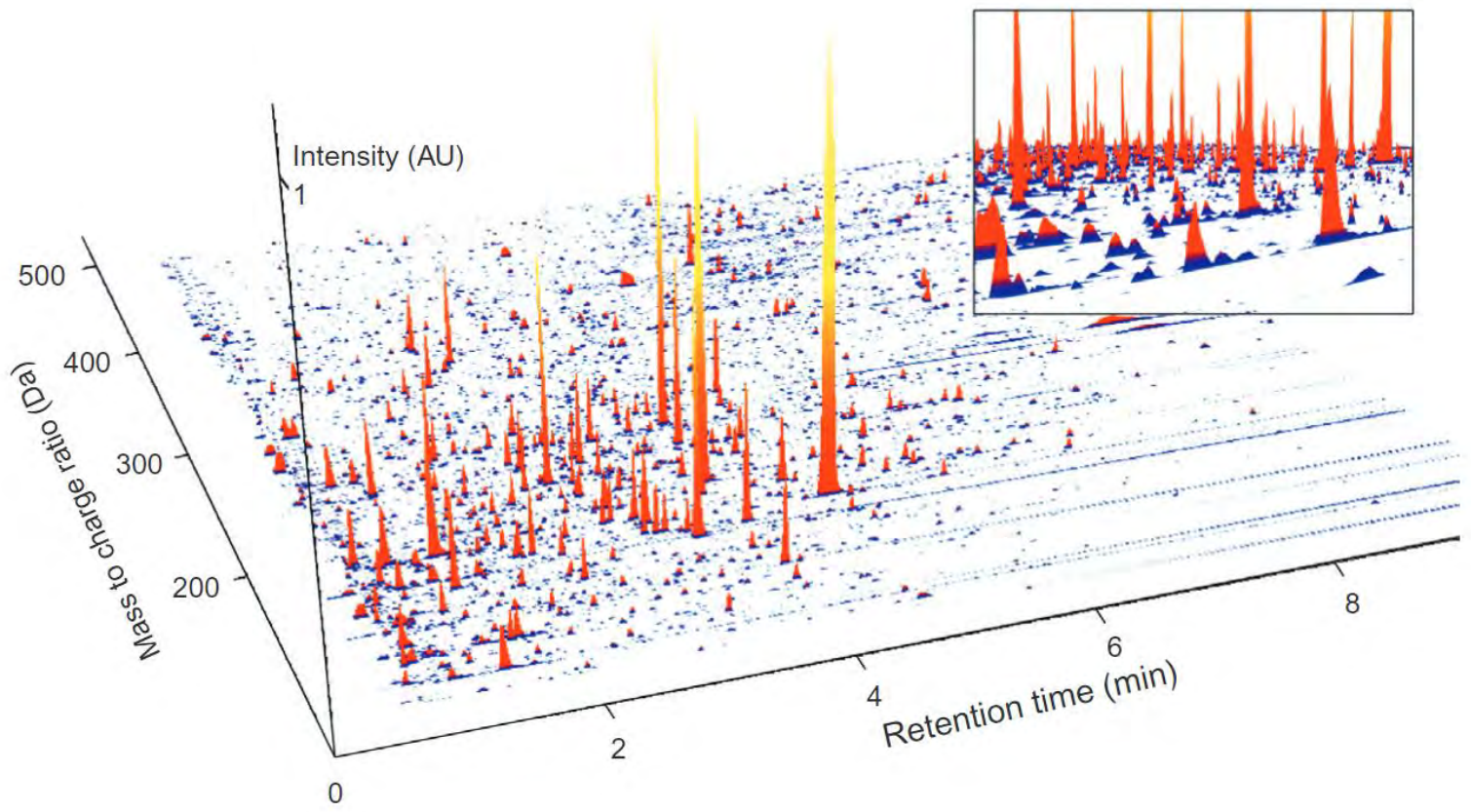
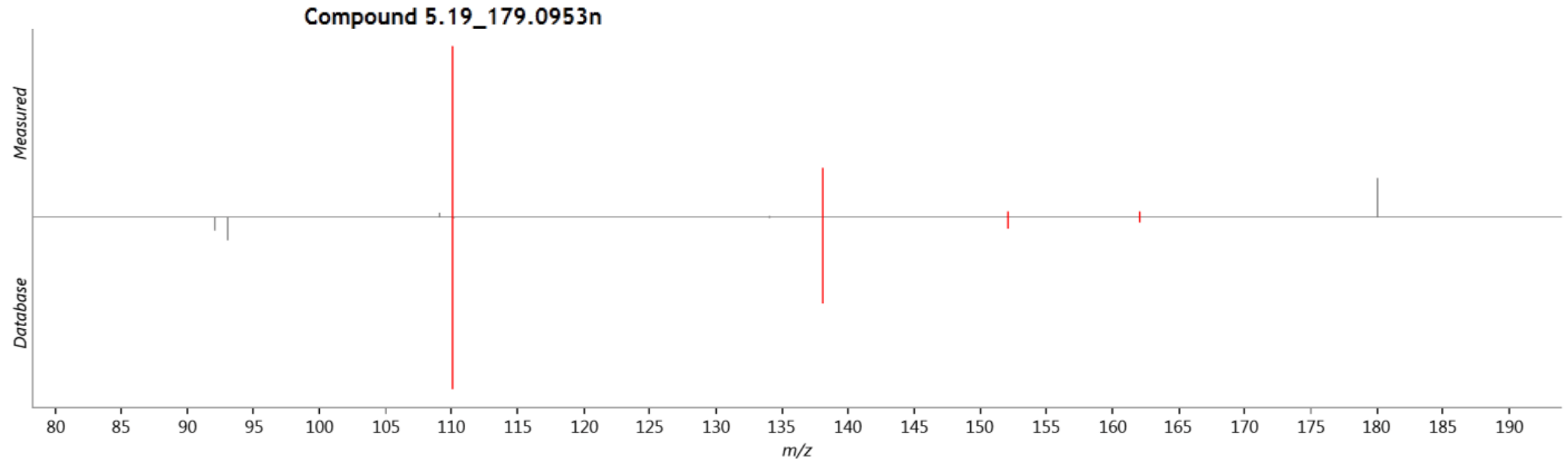


FIGURE 5.2 UPLC–MS data from a human urine sample displaying the two axes of separation. *Inset:* An enlarged portion of the same human urine data file highlighting the sensitivity and detail in the small molecule features collected.

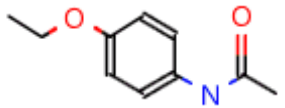
Dona 2013

Metabolite Identification



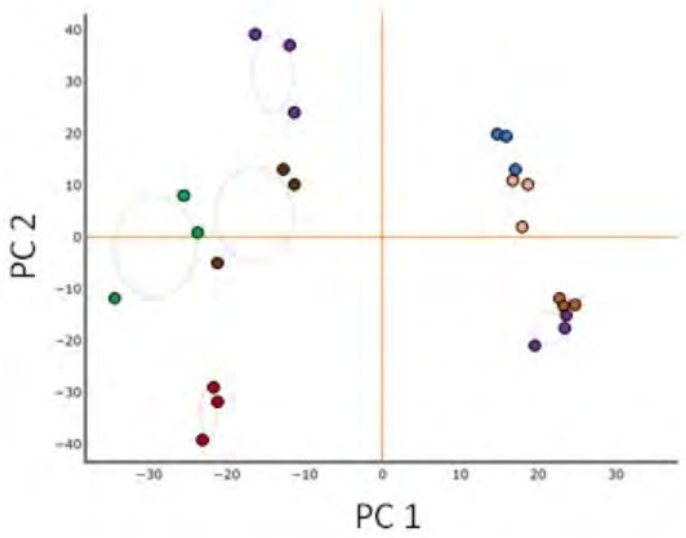
Possible identifications: 23

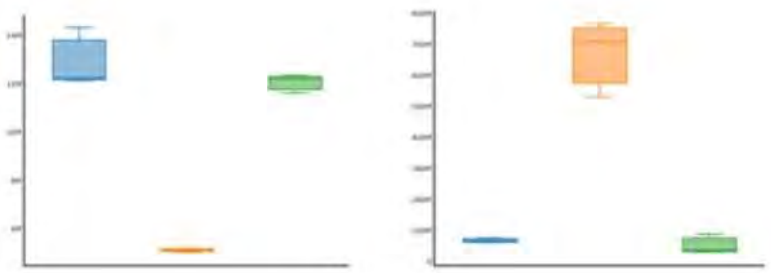
☆	Compound ID	Description	Adducts	Formula	Retenti
★	62442	Phenacetin	M+H,...	$C_{10}H_{13}NO_2$	
☆	HMDB39655	1,2,3,4,5,6-Hexahydro-5-(1	M+H,...	$C_{10}H_{13}NO_2$	
☆	49854487	Phenacetin	M+H,...	$C_{10}H_{13}NO_2$	5.22
☆	HMDB05199	(R)-Salsolinol	M+H,...	$C_{10}H_{13}NO_2$	
☆	HMDB30372	Maltoxazine	M+H,...	$C_{10}H_{13}NO_2$	
☆	HMDB42012	salsolinol	M+H,...	$C_{10}H_{13}NO_2$	
☆	HMDB01189	2(N)-Methyl-norsalsolinol	M+H,...	$C_{10}H_{13}NO_2$	
☆	HMDB29224	N-methylphenylalanine	M+H,...	$C_{10}H_{13}NO_2$	
☆	HMDB40021	2,3-Dihydro-5-(3-hydroxy	M+H,...	$C_{10}H_{13}NO_2$	

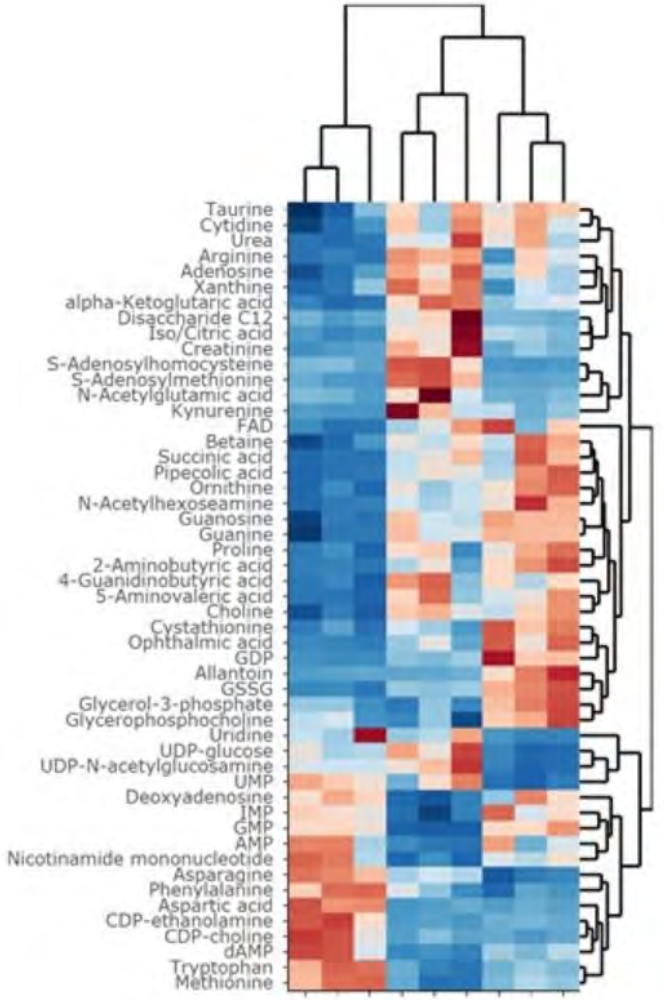


https://www.nonlinear.com/progenesis/qi/how-it-works/

Data analysis







Flower metabolomics

Can these flowers be distinguished by their metabolic profiles?

Nerium

Lantana

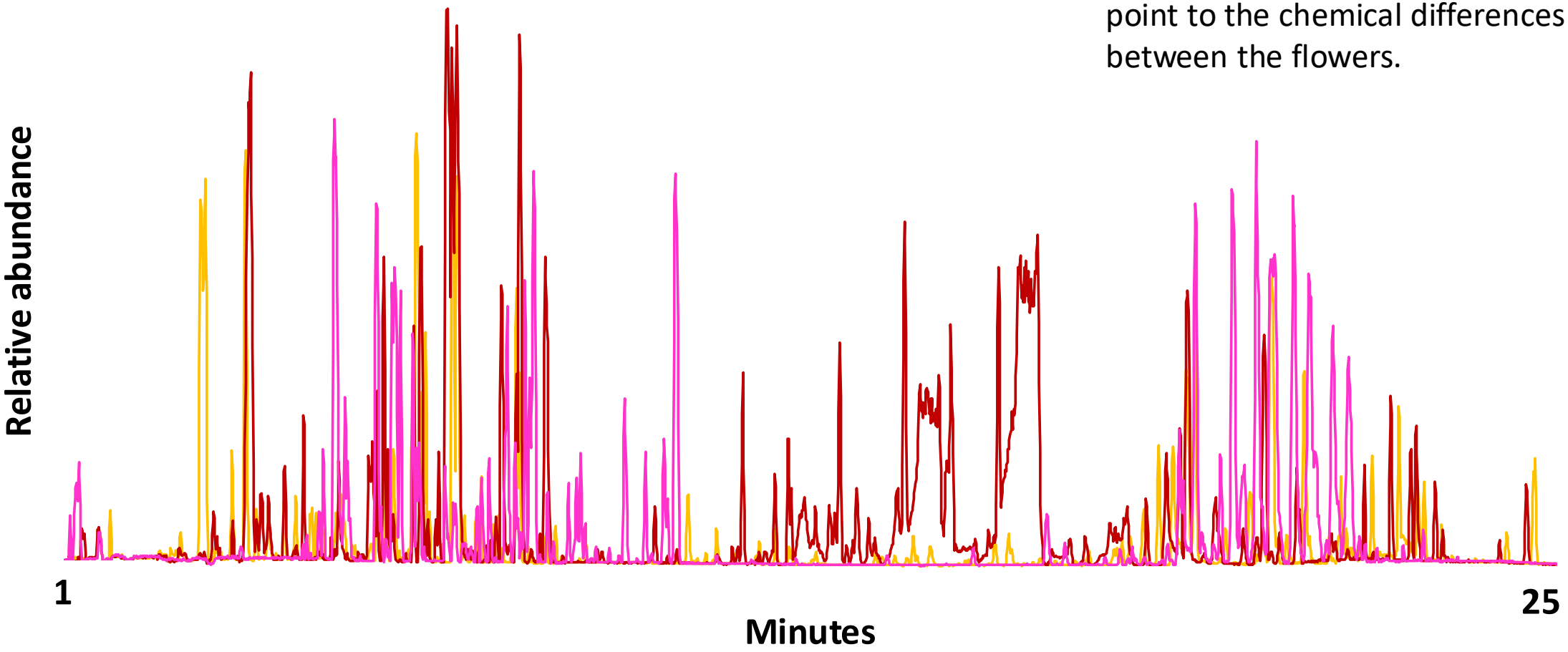
Cofia

Jay Kirkwood

Flower metabolomics

Overlaid LC-MS chromatograms

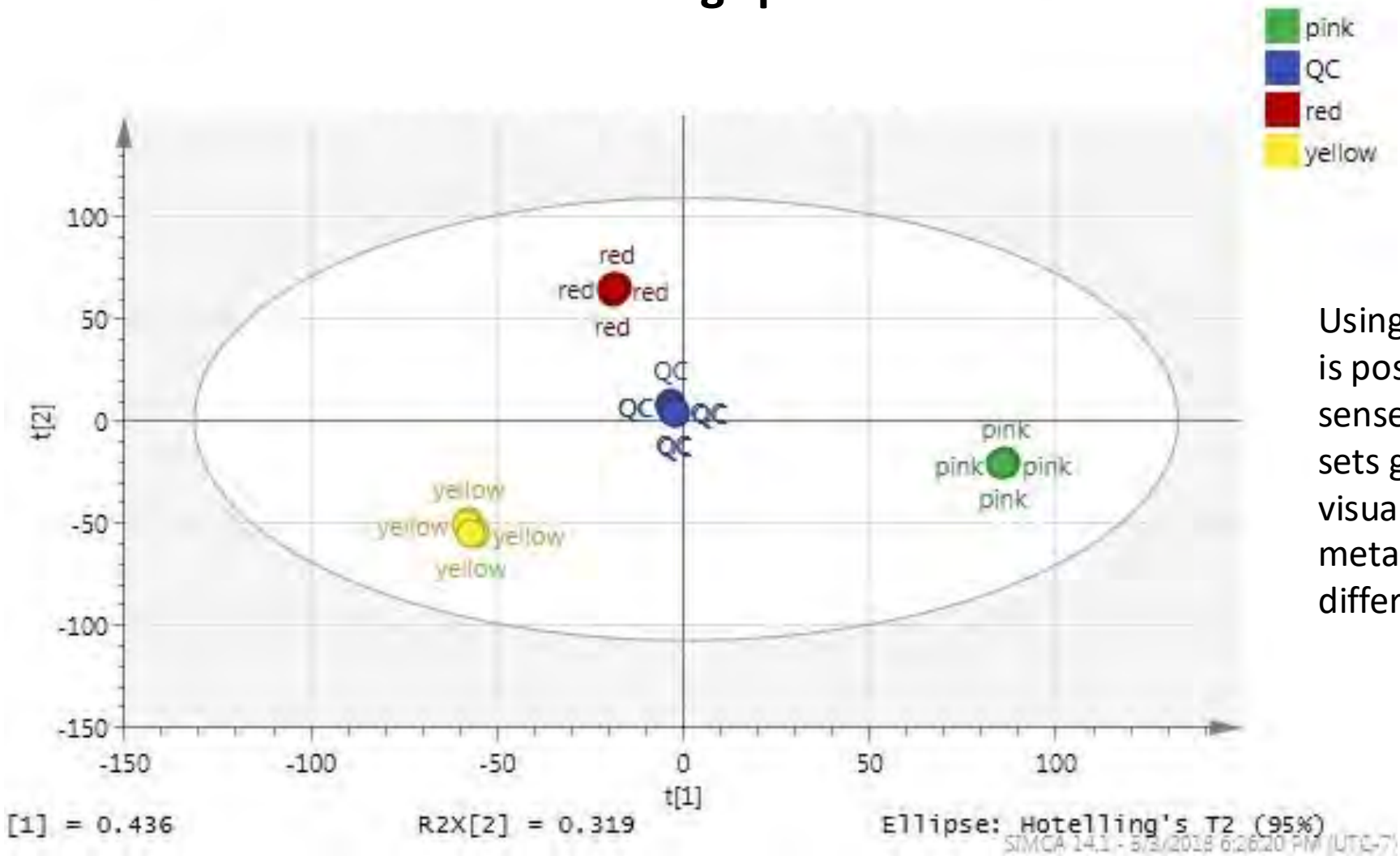
Differences in the chromatograms point to the chemical differences between the flowers.



Jay Kirkwood

Flower metabolomics

Principal components analysis
Loadings plot



Using statistics tools, it is possible to make sense of the large data sets generated, visualize and quantify metabolic profile differences.

Jay Kirkwood

Sample types processed at UCR

- Earth crust exudate
- Bacteria, algae, yeast
- Cell pellets
- Plant tissue
- Hydroponic root exudates
- Fruit juices (Citrus, Pomegranate)
- Cowpea seeds
- Bean Pods
- Aphid saliva
- Whole worms
- Whole brine shrimp
- Mouse lung lavage
- Mouse Blood, urine and feces
- Car Tire powder

Jay Kirkwood/Amancio Souza

Experimental platforms

Targeted:

- **Central Carbon Metabolism (195>213 compounds)**
- Phytohormones (8>11)
- Polyamines (GC-MS)
- Soluble sugar assay (GC-MS)
- Bile acids (10)
- Qualitative FA determination (GC-MS)
- Drug detection (Dexamethasone, Cisplatin)
- Reclaimed water contaminants
- Corticosterone in Chicken blood
- Insect hormones
- Karrikins
- Papaverin
- Suberin

Untargeted:

- **Secondary Metabolites (3,000 compound in house Library; ~300+ compounds)**
- **Lipidomics - Positive and Negative ion modes (~300+ compounds).**
- Polar/primary metabolites (GC-MS)
- Automobile emissions (tires; LC and GC-MS)
- Insect volatiles (bees)
- Biological vesicle analysis – Untargeted

We are continuously developing new methods by request and expanding graduate student and postdoc participation in that process.

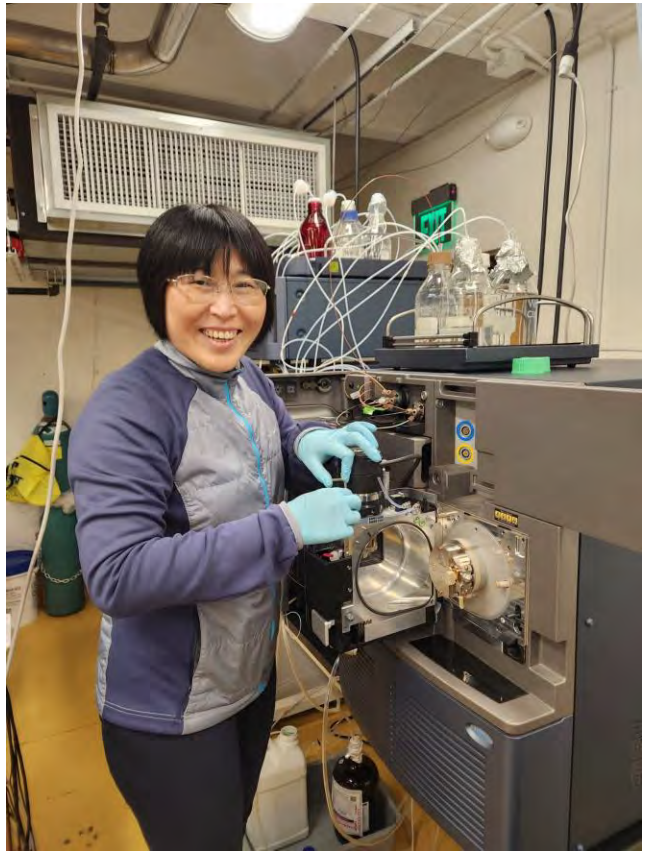
UC Riverside Metabolomics Core Facility

2215 Batchelor Hall

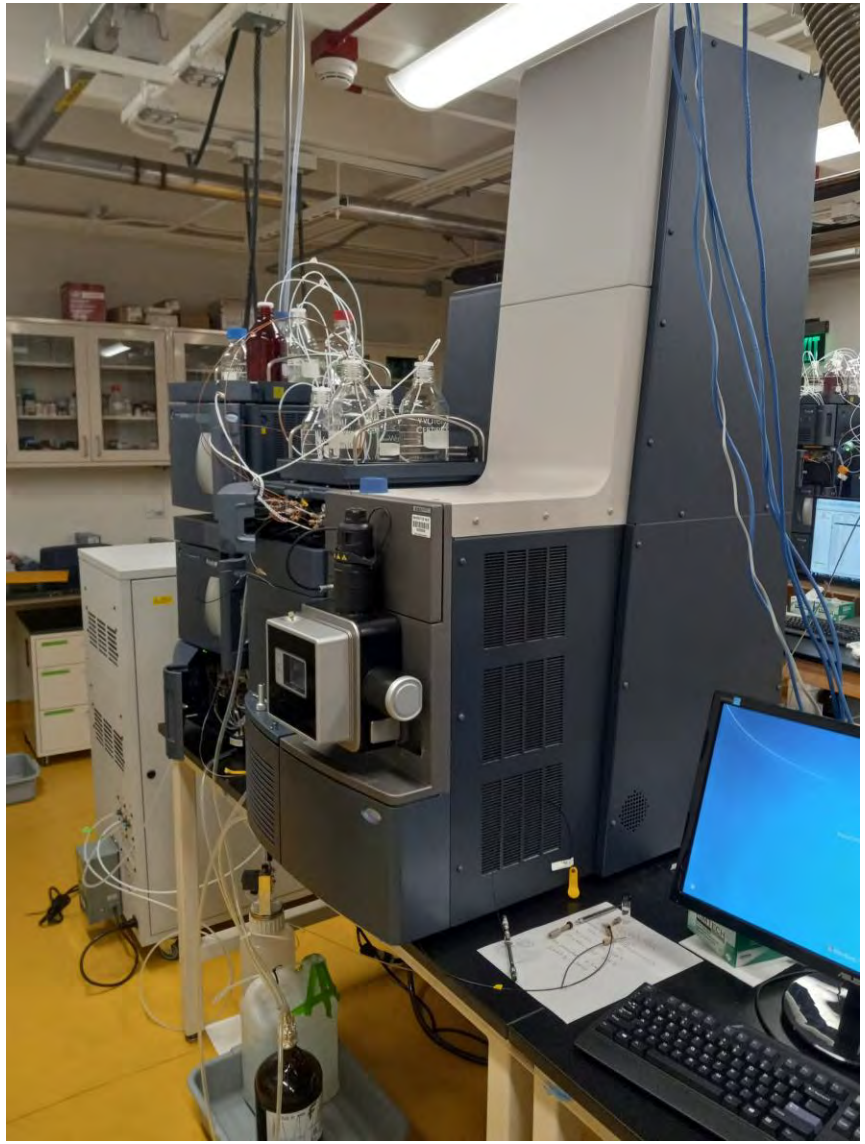
Instrumentation

GC-MS with head space injector (SPME)

Triple quadrupole TQ-XS



Quadrupole time-of-flight
G2-XS



Quadrupole time-of-flight
Synapt G2-Si

Instrumentation

Fraction collector

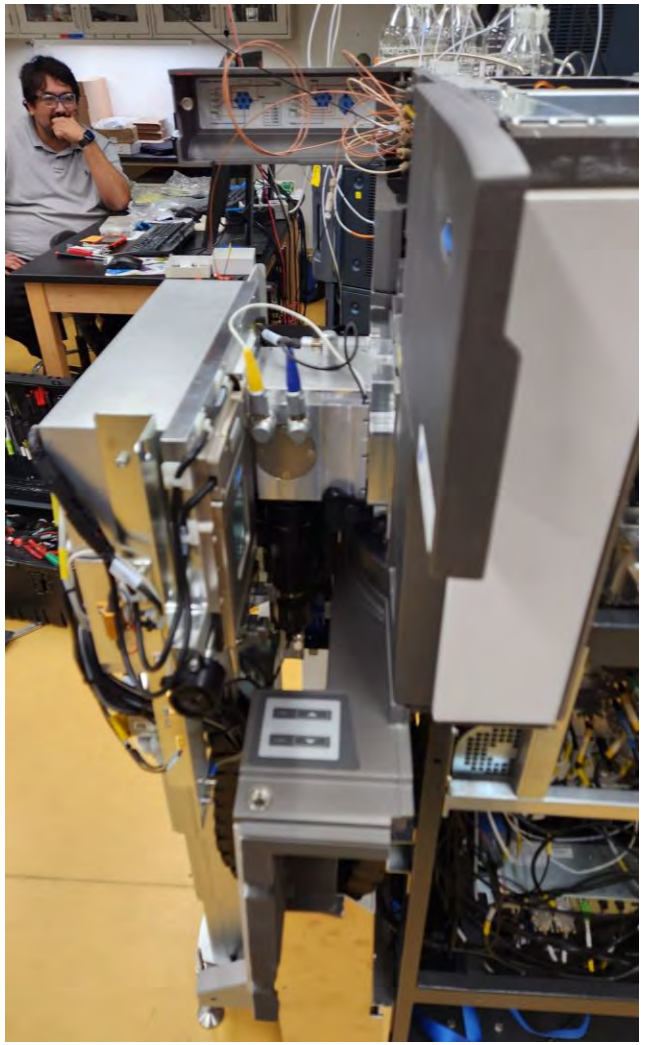
48-position N_2 evaporator

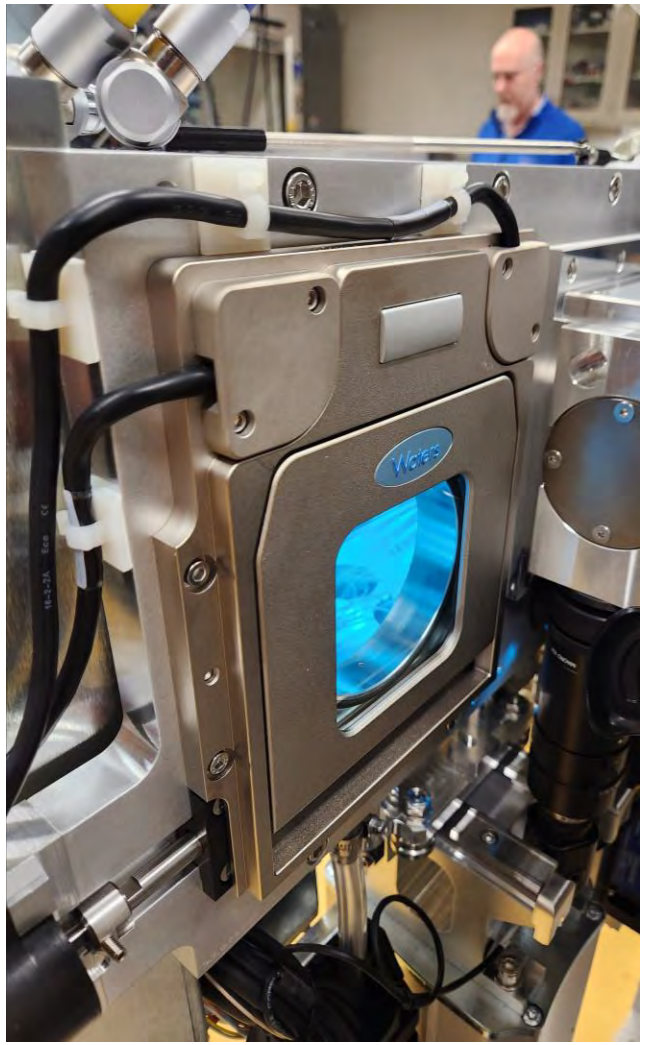
Homogenizer, cooled

Freeze dryer
-84 C, w/ trays

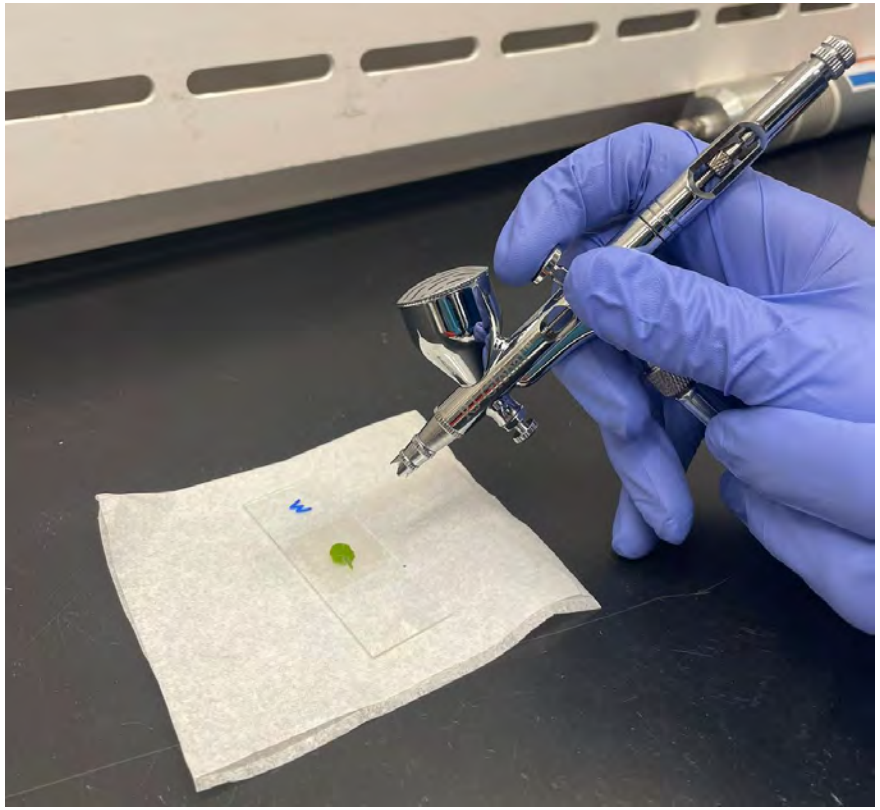
Jay Kirkwood / Amancio Souza

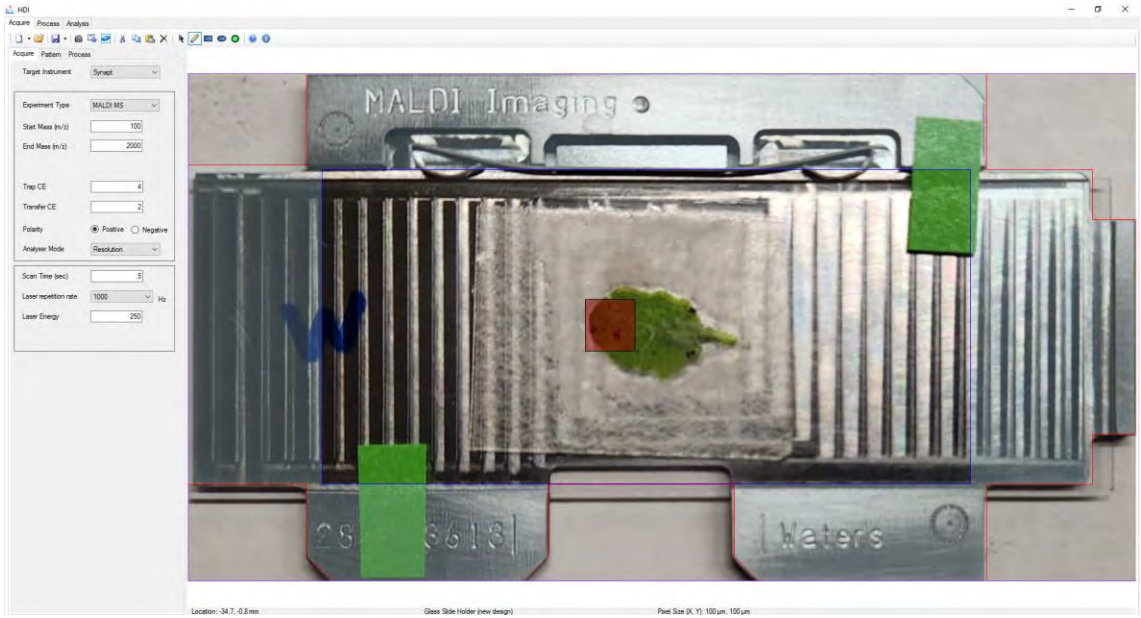
MALDI Source installation to the Synapt G2-si

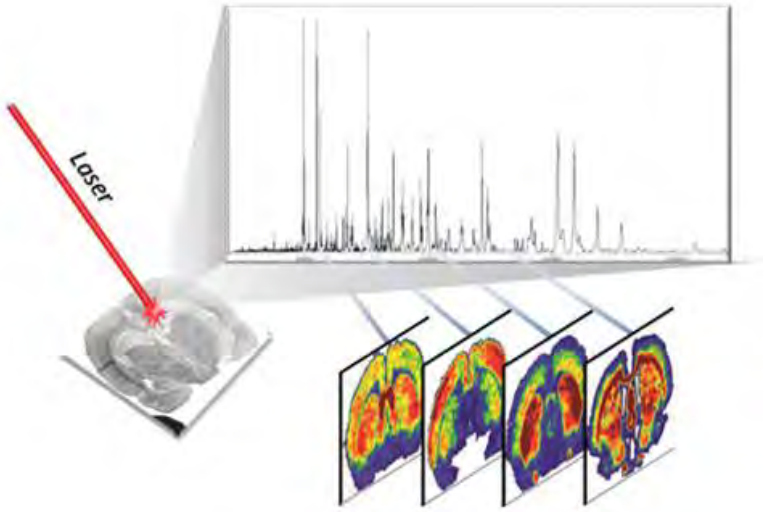




MS Imaging

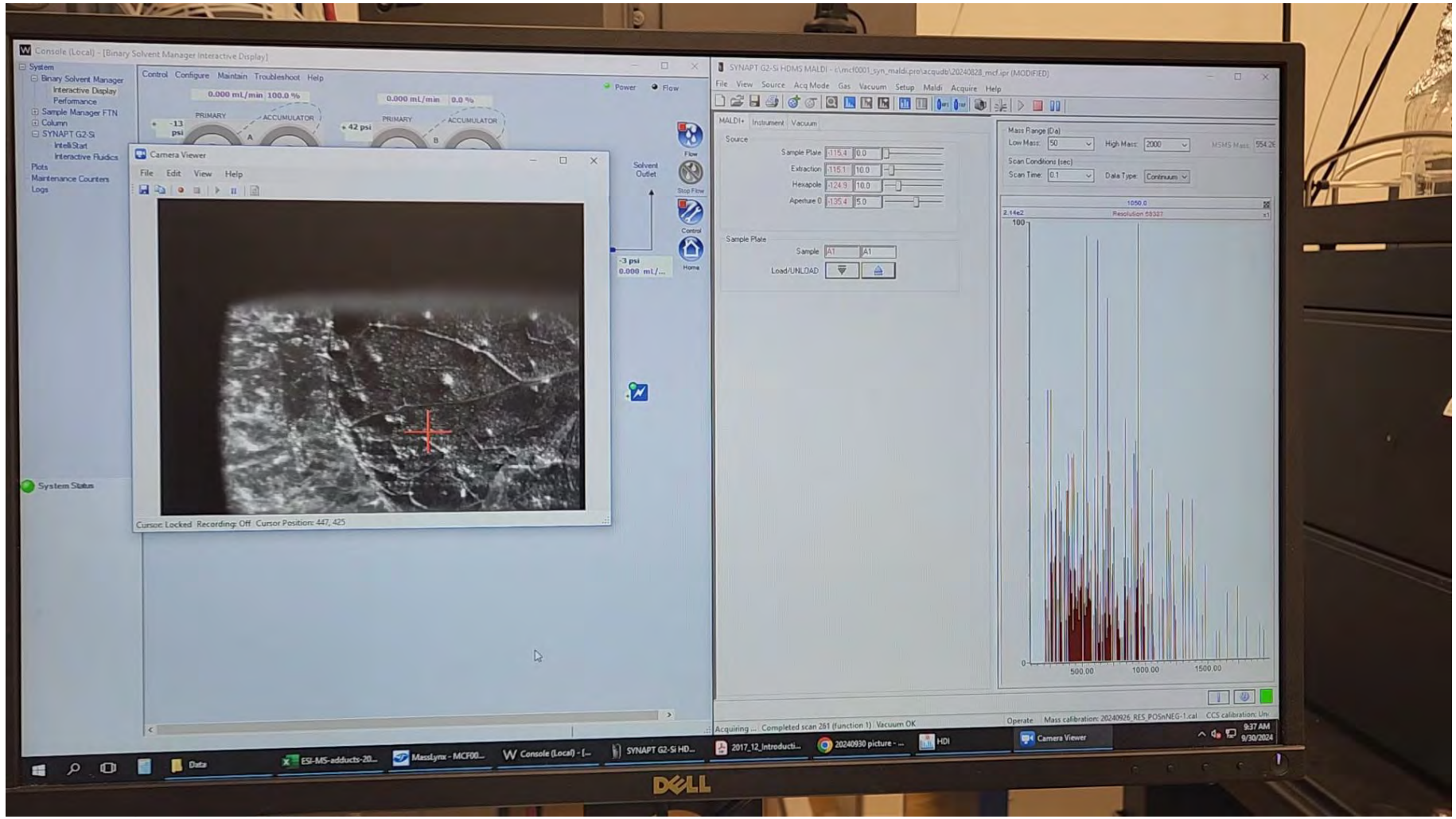




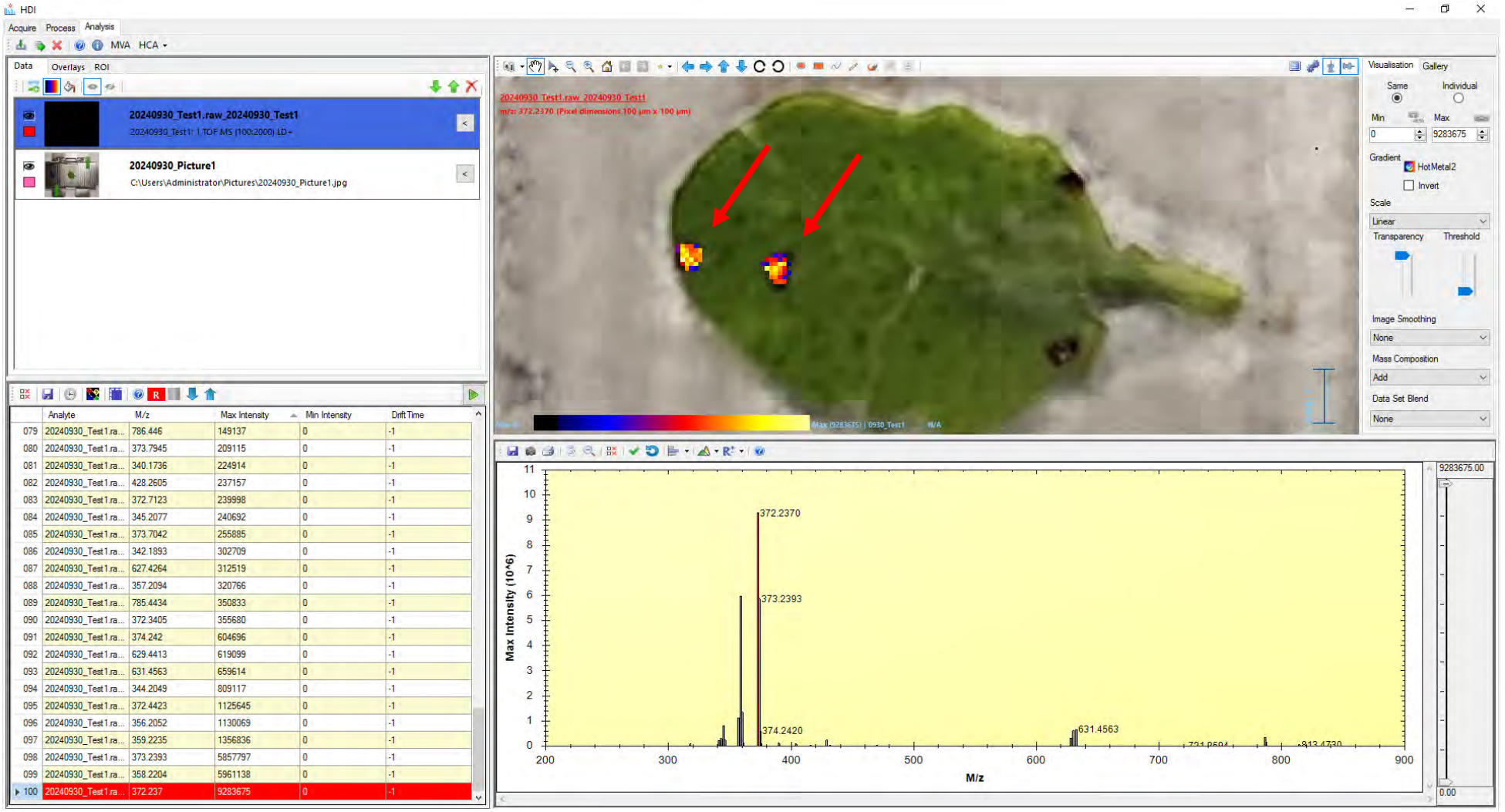


https://www.bruker.com/en/applications/academia-life-science/imaging/maldi-imaging.html

MS Imaging


Console (Local) - [Binary Solvent Manager Interactive Display]
Camera Viewer
SYNAPT G2-Si HDMS MALDI
Cursor: Locked Recording: Off Cursor Position: 447, 425
DELL

MS Imaging

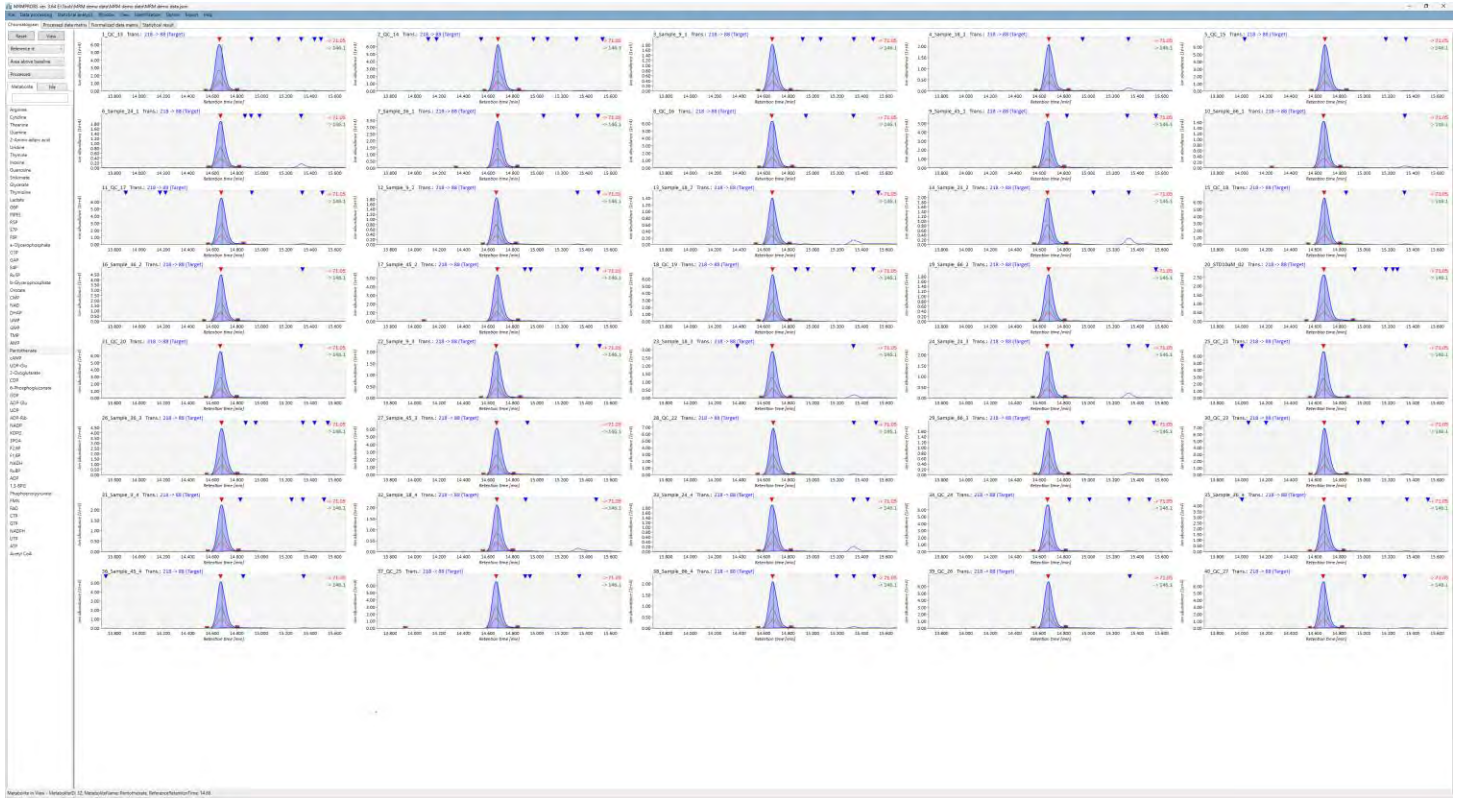


Maximum resolution of 25 µm/pixel, tissue level resolution

Bioinformatic solutions for Metabolomics

MRMPROBS

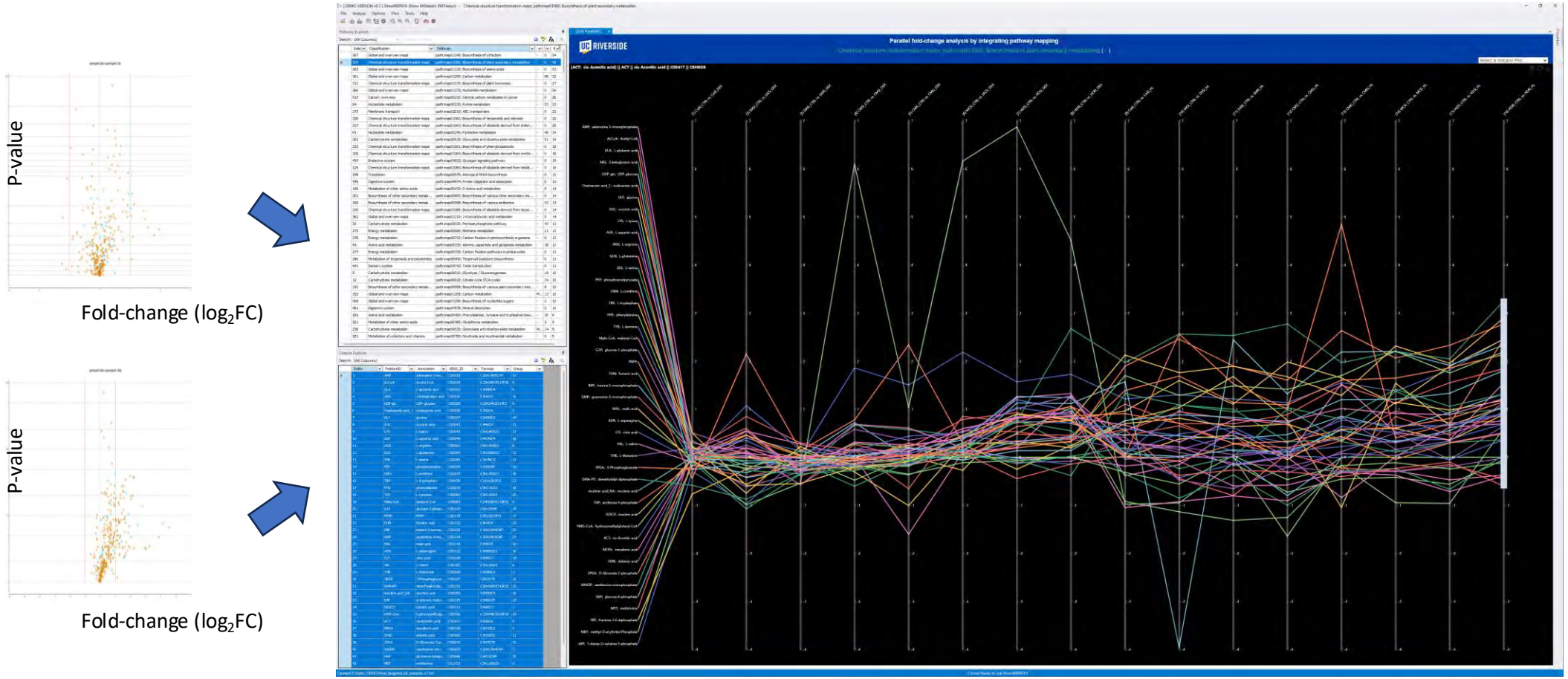
- International collaboration with the **MS-Dial** team led by Hiroshi Tsugawa in Japan.
- UCR contributed code for software improvement.
- Enhance the robustness of targeted metabolomics data processing, replacing old processing platforms.



Manhoi Hur

Development of the “ShowMEPATH” tool

Manhoi Hur



- Multiomics tool capable of integrating multiple volcano plots in one figure to rapidly identify differences between treatments.

UC Case #2023-9AJ- Patent Pending

Collab with UCR – RED

Grace Yee - Assistant Director

UCR - Data exploration tool

UC RIVERSIDE Show/Hide IIGB / Metabolomics Core Project Information

IIGB / Metabolomics Core Project Report (Data/Stats)

Project ID	Study type	Instruments	Participants	Report date	Core contact	Note
MCF-0164	Natural Products	Synapt G2-si	UCR/IIGB Metabolomics Team;	5/28/2024	metabolomics@ucr.edu; (951) 827-1781;	Final version; Imputation(false)

Sample type	Description of biological replicates	Lab PI	Submitter	Submitted date	Lab contact
Solitary Bee pollen with nectar	30 Samples, 10 Biological groups	Nicole Rafferty;Clara Stuligross;	Nicole Rafferty;Clara Stuligross;	07/2023	clara.stuligross@ucr.edu;

Version 0.5 (The recommended screen resolution is a higher resolution than 1920x1080 pixels.)

Summary

#	Total features	Total identified features	Significant features (p-value < 0.05)	Significant features excluding unknown (p-value < 0.05)	Average %Dispersion(D-) ratio (QCs/Samples)	Average %CV in QCs	Normalization
1	2255	177 (7.85%)	1673/2255 (74.19%)	160/2255 (7.10%)	42.00% (Standard range < 50% (preferably much lower))	13.92% (Standard range < 30% (preferably much lower))	TIC Normalised abundance

Statistical analysis (*Including QCs*) | Statistical analysis (*Excluding QCs*)

Principal component analysis (PCA)

#	Plots (w/ individual replicates)	Plots (w/ average)	Description
1	Princomp, Prcomp	Princomp, Prcomp	It visualizes all features.
2	Princomp, Prcomp	Princomp, Prcomp	It visualizes statistically significant features (p-value < 0.05) including unknown features.
3	Princomp, Prcomp	Princomp, Prcomp	It visualizes identified features.
4	Princomp, Prcomp	Princomp, Prcomp	It visualizes statistically significant metabolites (p-value < 0.05) excluding unknown features.

Heatmap with Hierarchical cluster analysis (HCA)

#	Plots (w/ individual replicates)	Plots (w/ average)	Description
1	Both clustering (sample/features), Single clustering (features)	Both clustering (sample/features), Single clustering (features)	It visualizes all features.
2	Both clustering (sample/features), Single clustering (features)	Both clustering (sample/features), Single clustering (features)	It visualizes statistically significant features (p-value < 0.05) including unknown features.
3	Both clustering (sample/features), Single clustering (features)	Both clustering (sample/features), Single clustering (features)	It visualizes identified features.
4	Both clustering (sample/features), Single clustering (features)	Both clustering (sample/features), Single clustering (features)	It visualizes statistically significant features (p-value < 0.05) excluding unknown features.

Manhoi Hur

UCR - Data exploration tool

UC RIVERSIDE Show/Hide IIGB / Metabolomics Core Project Information

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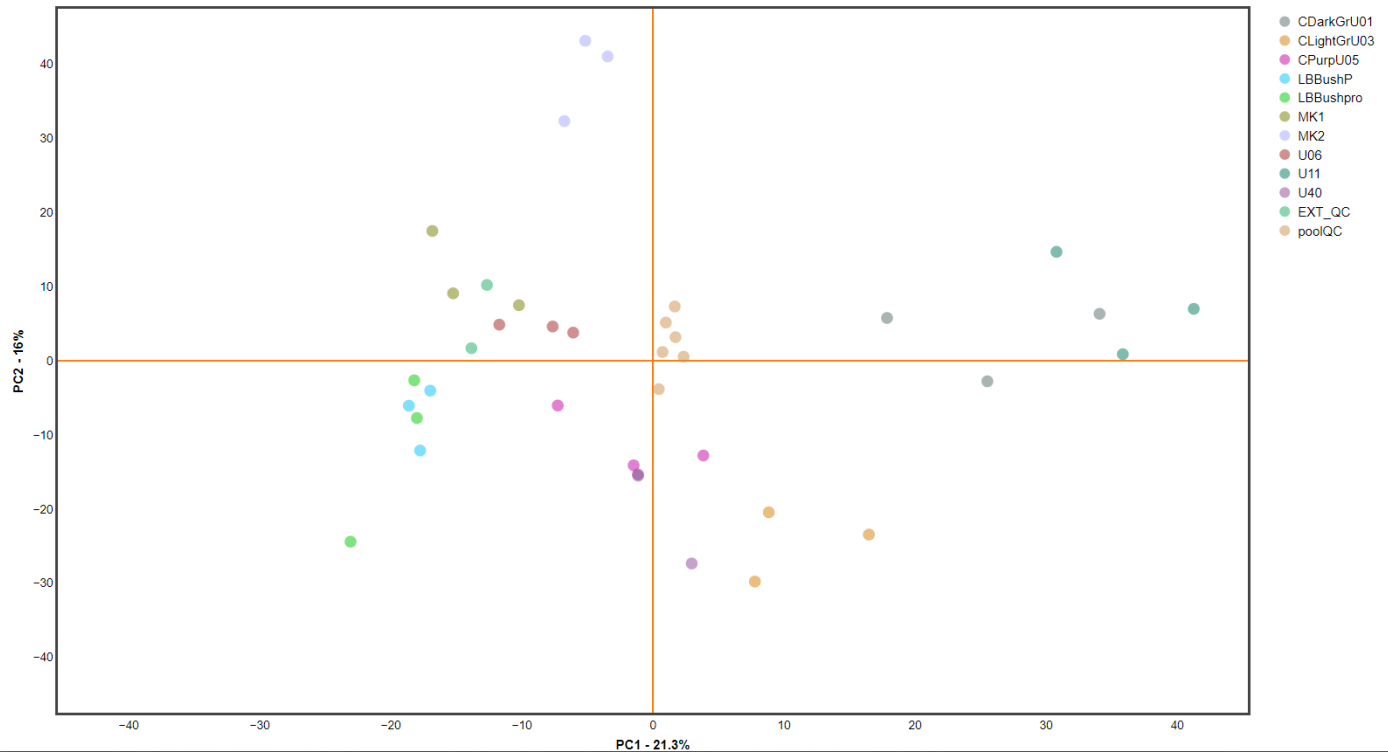
Sample type	Description of biological replicates	Lab PI	Submitter	Submitted date	Lab contact
Solitary Bee pollen with nectar	30 Samples, 10 Biological groups	Nicole Rafferty;Clara Stuligross;	Nicole Rafferty;Clara Stuligross;	07/2023	clara.stuligross@ucr.edu;

Version 0.5 (The recommended screen resolution is a higher resolution than 1920x1080 pixels.)

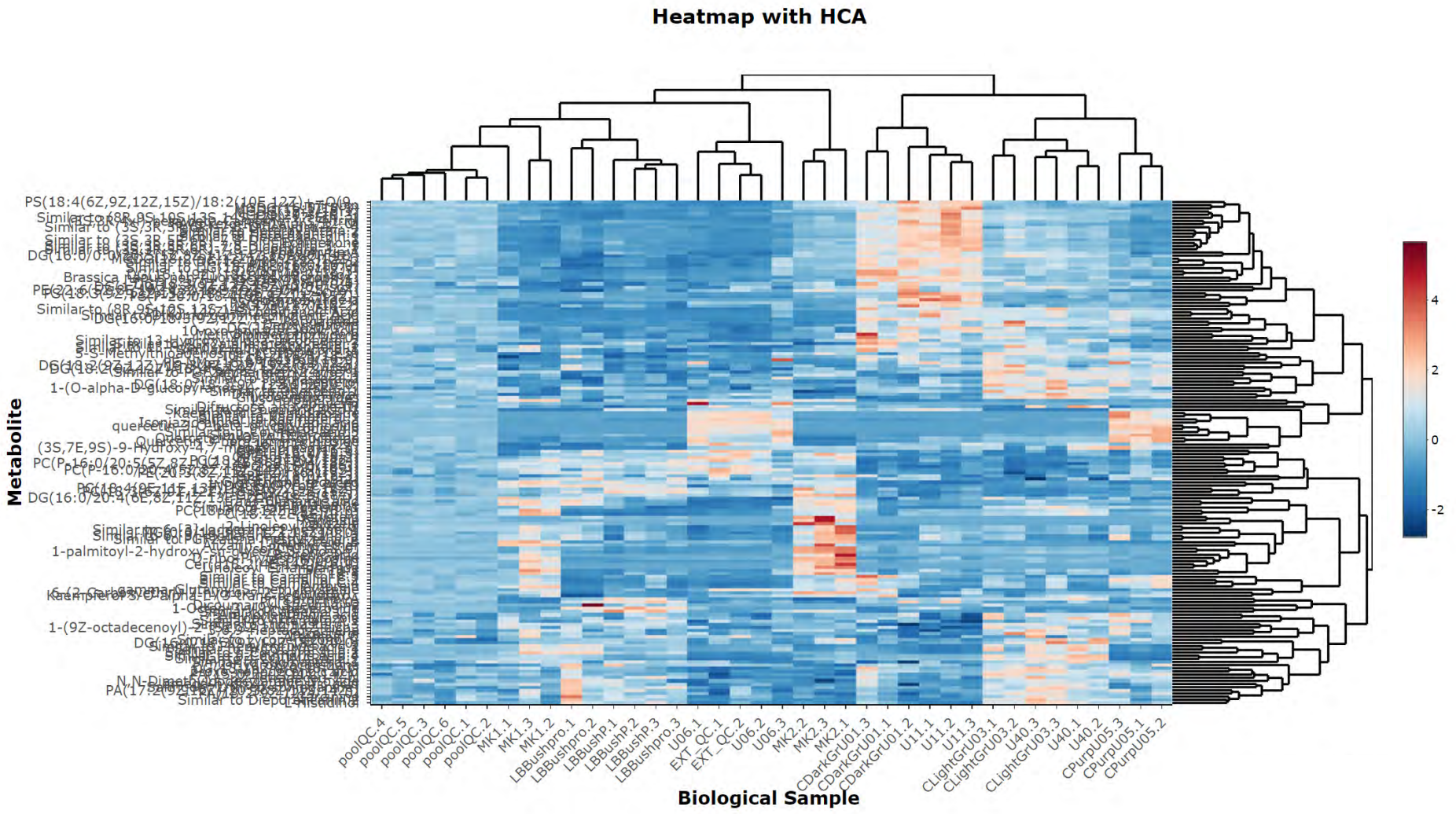
Principal Component Analysis (PCA)

It visualizes all features.

Score Plot



UCR - Data exploration tool



It visualizes significant features (p-value < 0.05) excluding unknown features.

Meet our team

https://metabolomics.iigb.ucr.edu/

metabolomics@ucr.edu

UC RIVERSIDE | Metabolomics Core Facility

INSTITUTE FOR INTEGRATIVE GENOME BIOLOGY (IIGB)

Amancio Souza
Academic Coordinator

Anil Bhatia
Ph.D.Specialist

Manhoi Hur
Research Bioinformatician

Haiyan Ke
Staff Research Associate

Proteomics Core

UC RIVERSIDE UNIVERSITY OF CALIFORNIA

Institute for Integrative Genome Biology (IIGB)

Proteomics Core

Director: Katayoon Dehesh

Manager: Quanqing Zhang

CONTENTS

01

Instruments

- Separation
- Identification

Separation

1

HPLC (Agilent 1260 Infinity II)

Columns ready to use: C18, HILIC, Hydrophilic columns

2

FPLC (ÄKTA pure™ protein purification system)

Columns ready to use: Affinity columns, SEC columns

3

Ultracentrifuge (Optima™ XPN-80)

Rotors: Majority of the rotors available

Identification

1

High Resolution MS (Orbitrap Fusion™ Tribrid™)

High throughput, high resolution

2

High sensitivity (TSQ Altis™ Plus Triple Quadrupole)

High sensitivity

02

Services

- Consultation
- Sample preparation
- Data acquisition
- Data analysis

Consultation

Sample preparation

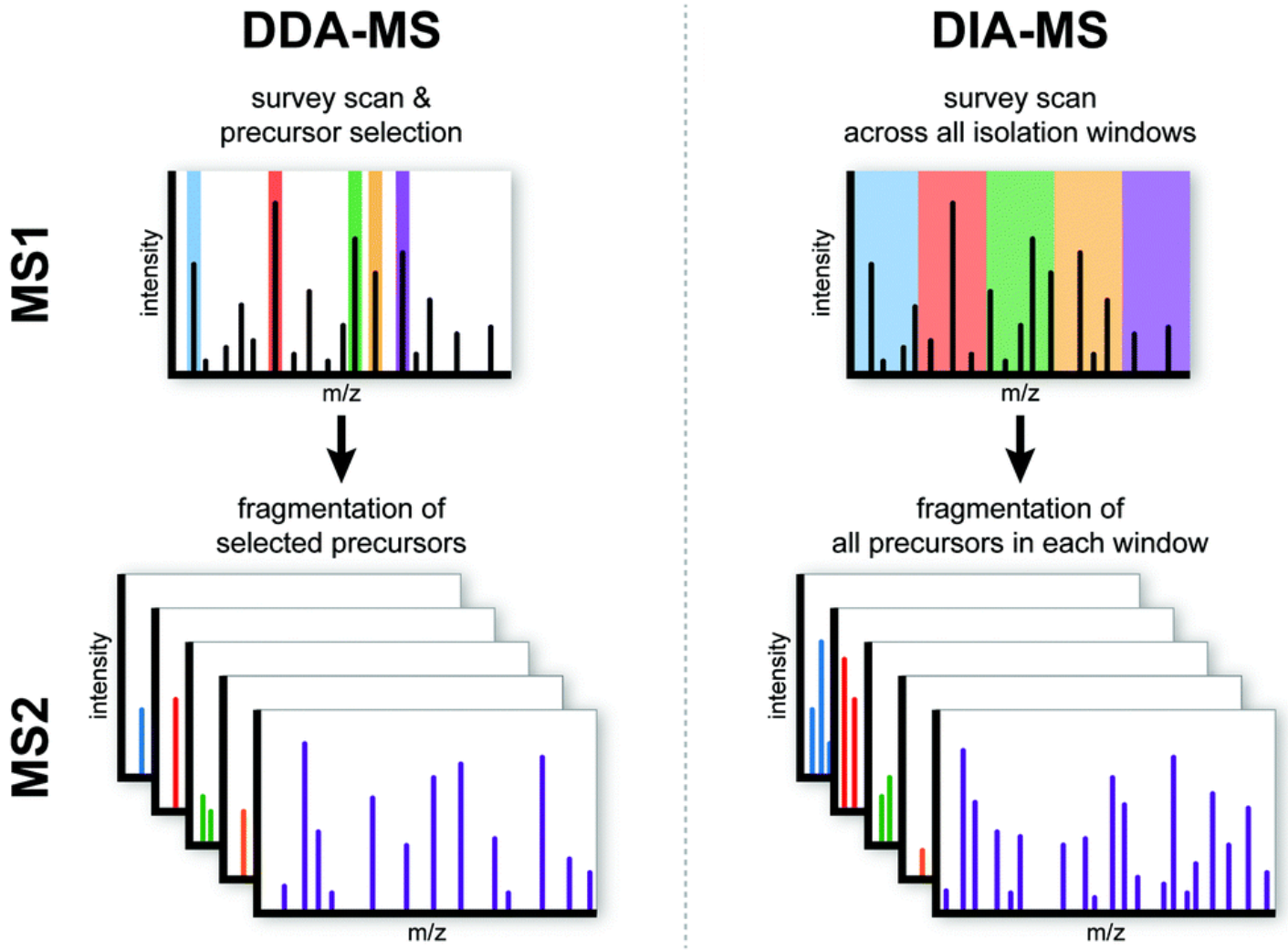
Personalized services

- Basic
  - In solution
  - In gel
  - → Protein extraction
  - → Protein purification
- PTMs
  - Phosphorylation
  - Glycosylation
  - SUMOylation
  - Ubiqitination
  - ⋮
  - → Sample pretreatment optimization
  - → Enrichment method optimization
  - → Sample preparation troubleshooting
  - → LC-MS/MS specific method establishment
- Others
  - Enrichment
  - Separation
  - Digestion
  - Quantification
  - ⋮
  - → Provide technical consultation
  - → Optimize the proteomic analysis strategy
  - → Design and synthesis novel enrichment materials

Identification

Data acquisition

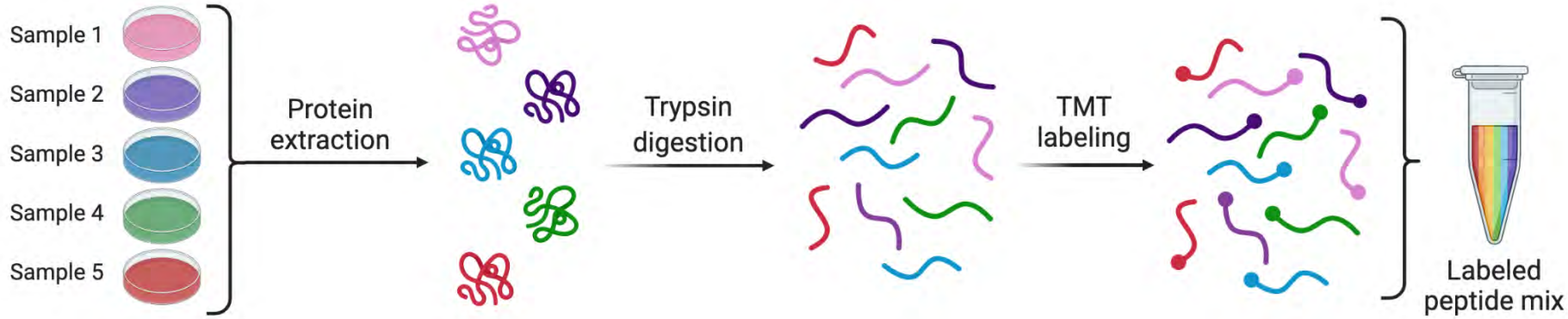
◆ **Untargeted proteomics (Global identification)**



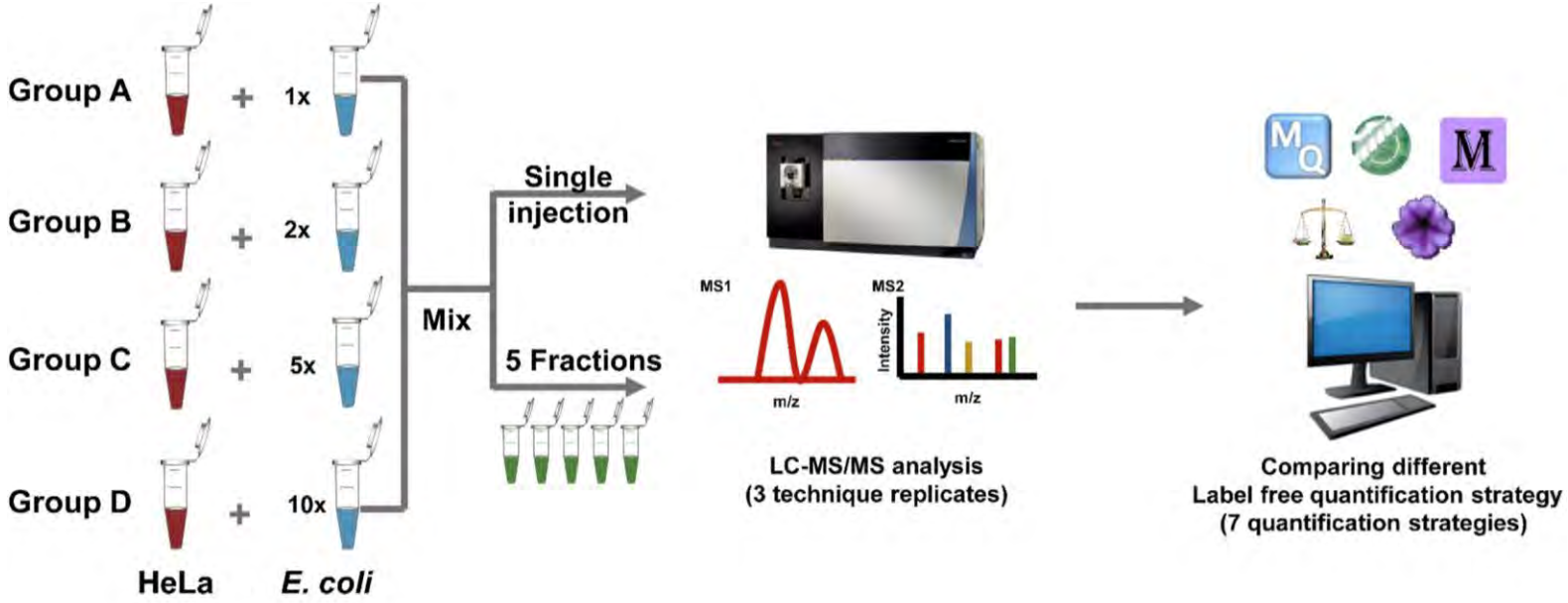
Data acquisition

Quantification

TMT Labeling



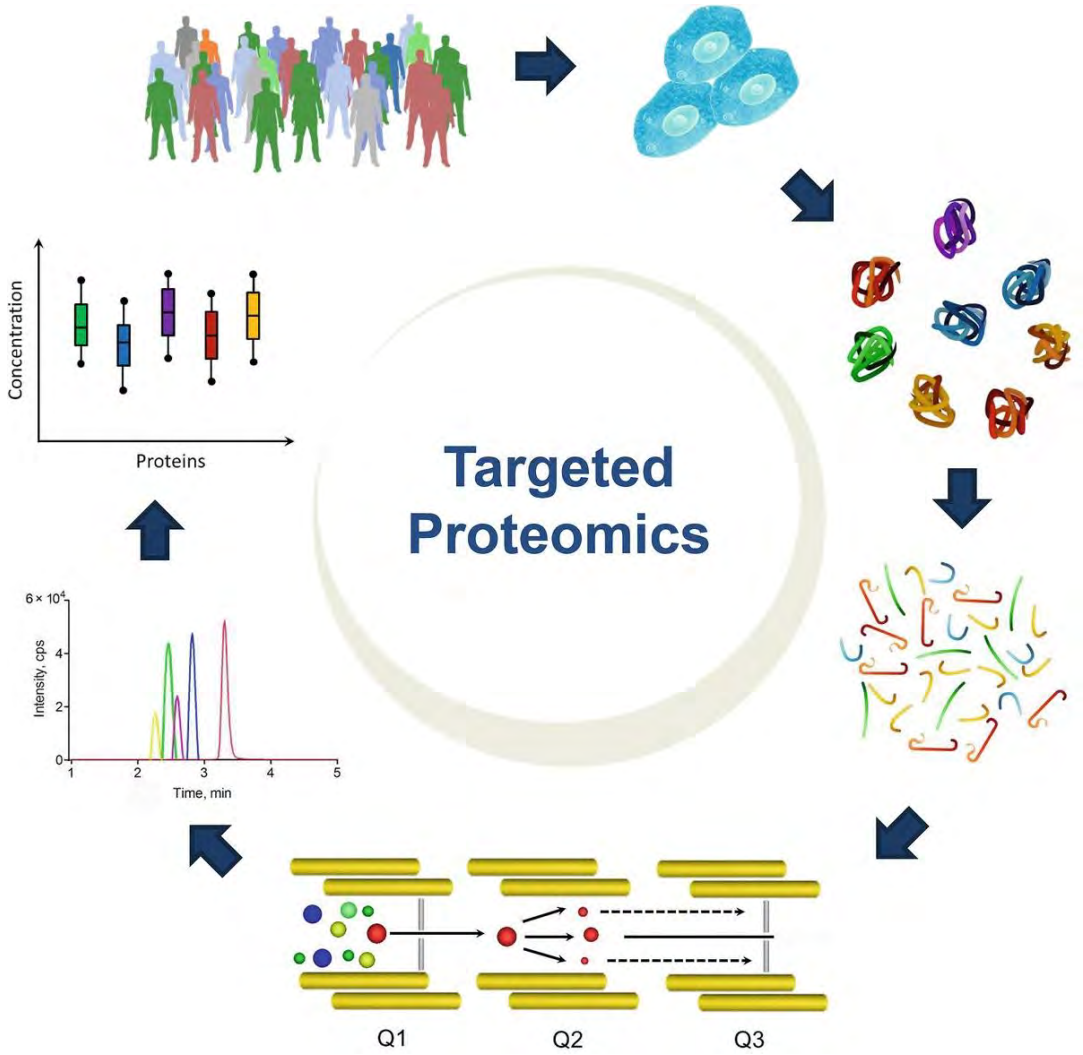
Label free quantification



Data acquisition

Identification

◆ Targeted proteomics



Proteomics data evaluation (quality control)

Latest in-house data, very good quality with (almost) final protocol

(in-house data)

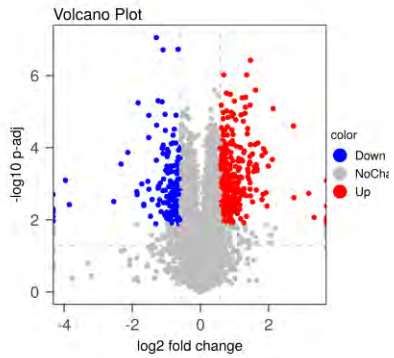
- **Expected alkylation on C (higher the better, up to 100%)**
- **Non-specific cleavage (lower the better, <5% is good)**
- **Missed K/R per peptide (lower the better, <30% is good)**

9-Pep-2	89.1%	4.6%	37.1%
10-Pep-2	88.1%	4.8%	38.2%
12-Pep-2	87.9%	5.5%	32.3%
13-Pep-2	87.3%	5.7%	29.4%
14-Pep-2	88.0%	5.8%	30.8%
15-Pep-2	88.0%	5.6%	32.7%
Test-final-A549-1-1	92.3%	3.5%	28.0%
Test-final-A549-1-2	92.3%	3.4%	28.7%
Test-final-A549-2-1	92.1%	3.6%	28.3%
Test-final-A549-2-2	92.0%	3.3%	29.5%
Test-final-A549-3-1	92.2%	3.4%	30.1%
Test-final-A549-3-2	92.4%	3.4%	31.0%
Test-final-A549-4-1	92.3%	3.2%	27.4%
Test-final-A549-4-2	91.5%	3.5%	28.1%

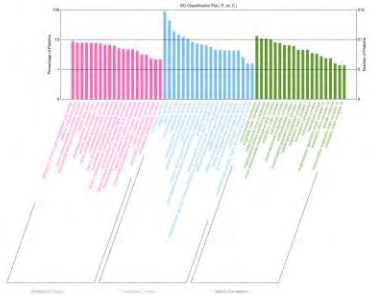
- **9/10/12 - A549 with Influenza B Y16 infection, 13/14/15 – A549 control (Sample prep method in optimization)**
- **Test final – A549 sample prep using (almost) final protocol**

Data analysis

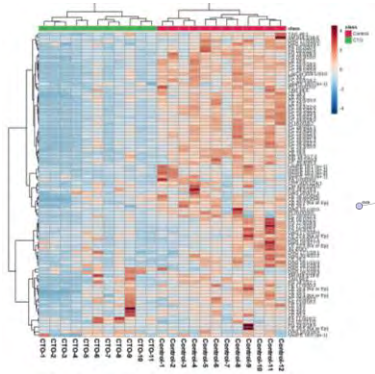
QC **(Project QC results)**	Proteomic qualitative and quantitative data quality assessment results
Diff_Expression **(Results of statistical analysis of differential proteins)**	Comparative sample-to-sample PCA analysis
	Comparison of sample-to-sample PLS-DA analyses
	Differential protein volcano map
	Heatmap of differential protein clustering analysis
Diff_Bioinformatics **(Differential protein function annotation and enrichment analysis results)**	Results of differential protein GO enrichment analysis
	Differential protein KEGG enrichment analysis results
	Differential Protein Protein Interaction Network Analysis



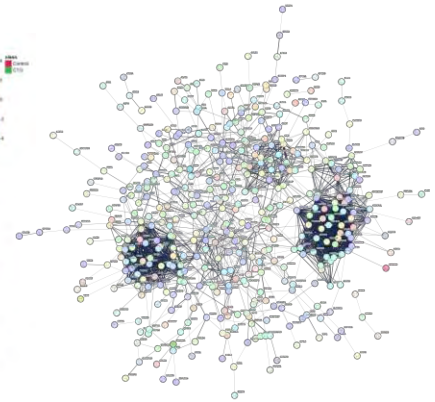
Volcano



GO



Heatmap



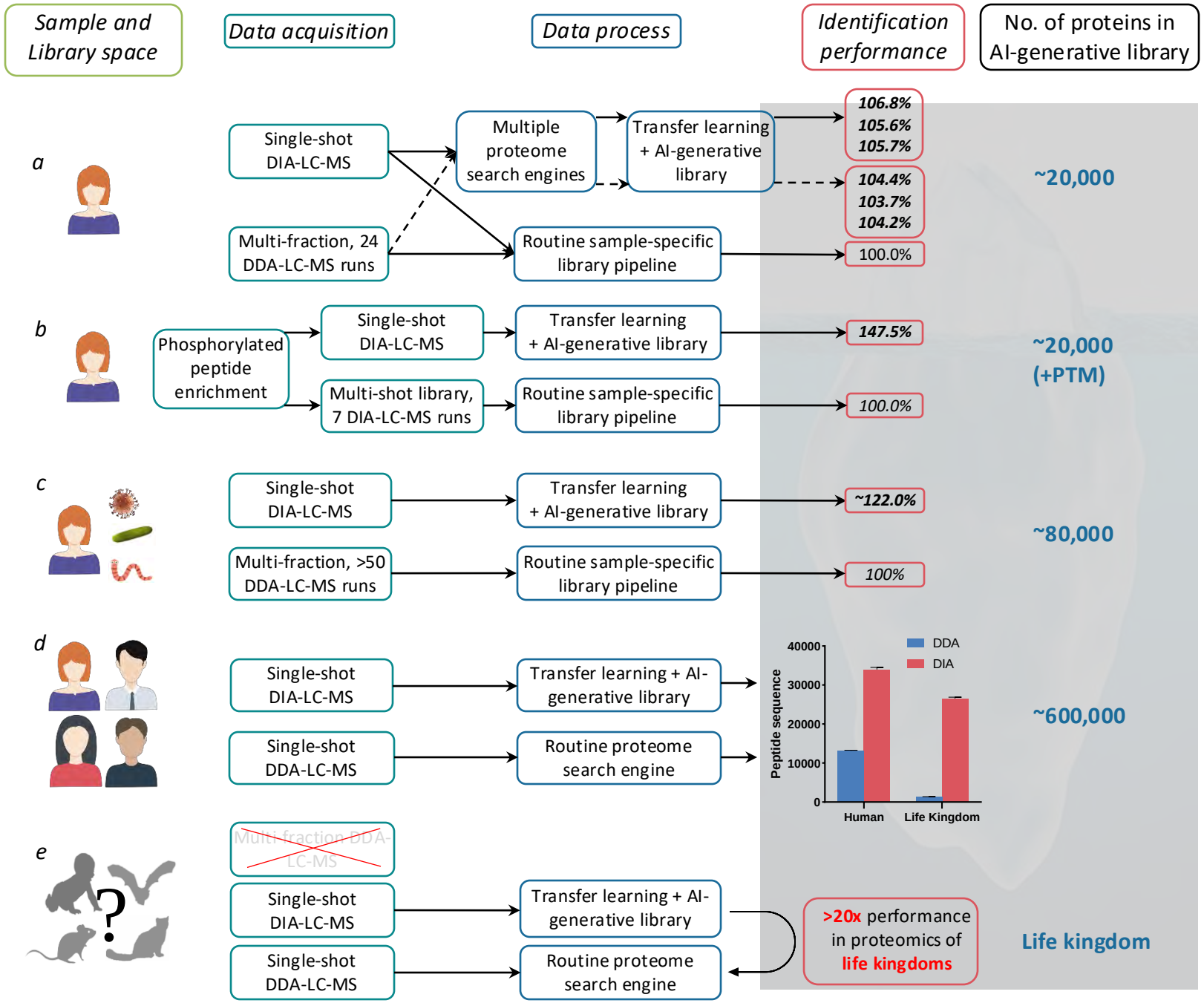
STRING

03

Future Plan

- AI based DIA

AI based DIA



Revised back to CELL

Thank you for your time!

Questions?

Center for Advanced Neuroimaging Core

Center for Advanced Neuroimaging

Who we are

- Xiaoping Hu, PhD
  - Director
- Chelsea Evelyn
  - MRI Technologist
- Xu (Jerry) Chen, PhD
  - Research Scientist
- Jason Langley
  - MRI Physicist

- We provide expertise for protocol development, task design for functional MRI scans, data acquisition, creation of data processing pipelines, and grant preparation

Our Equipment

- Siemens 3T Prisma MRI scanner
  - 20-channel, 32-channel, and 64-channel head coils
  - Two 4 channel cardiac coils
  - 18 channel flex body coil
- 64-channel MRI compatible EEG system
- Stimulus projection and response system made by Vpixx Technologies
  - 2 button, 4 button, and 5 button response boxes
- MRI compatible eye tracking system made by Vpixx Technologies

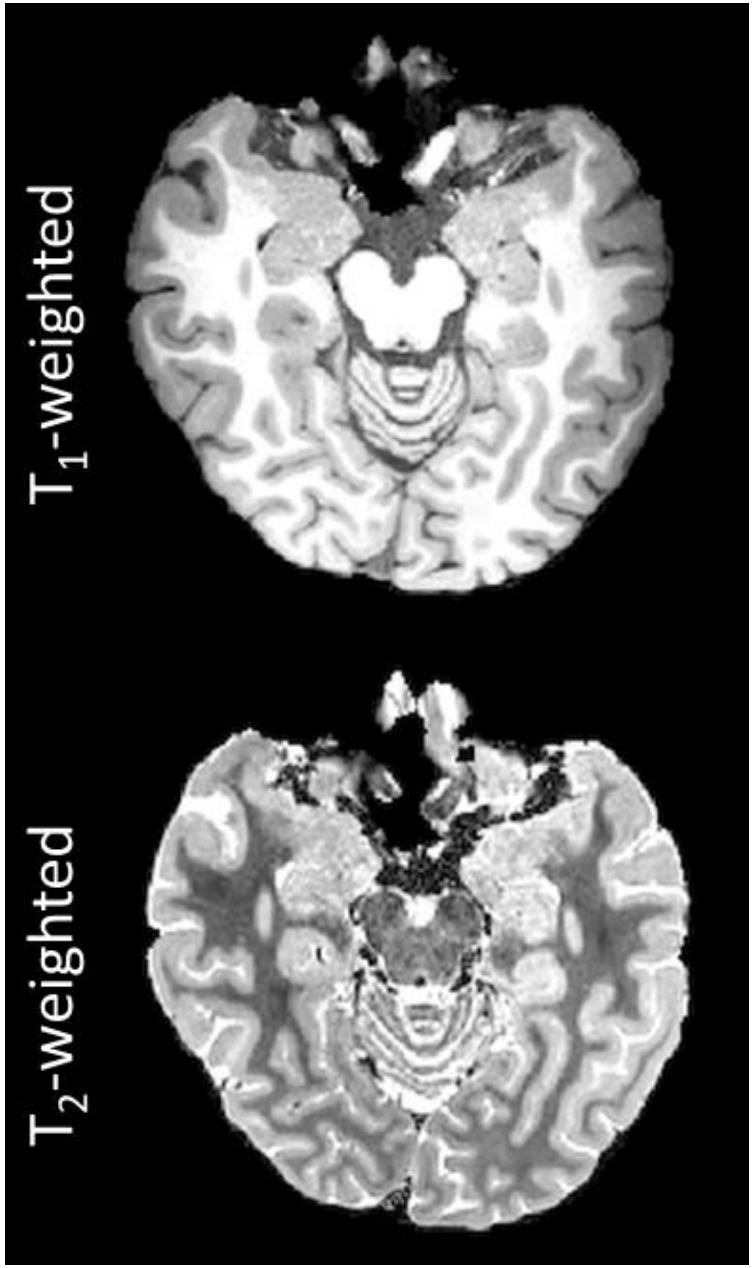
32 Channel

64 Channel

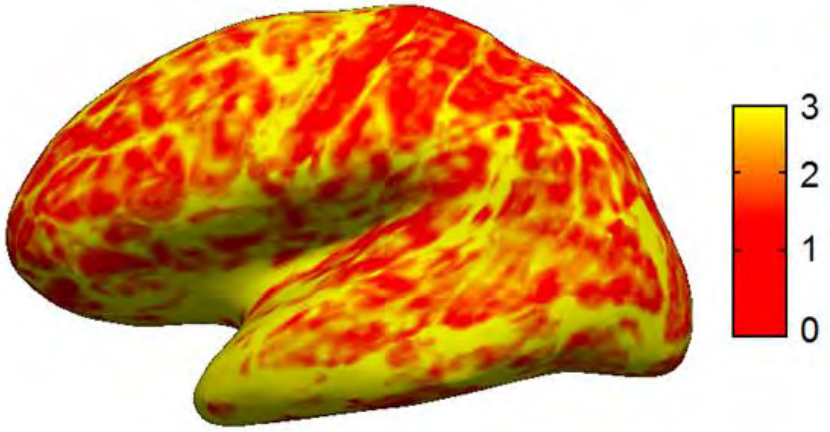
Structural Imaging

- Adjusting acquisition parameters can make images sensitive to fat or to water content.
  - Fats are bright in T_1-weighted images
  - Liquids are bright in T_2-weighted images

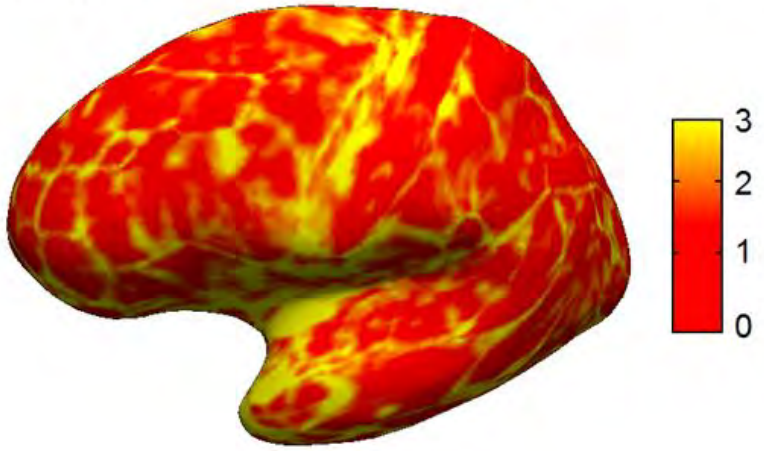
- MRI is able detect structural abnormalities
  - tumor identification
  - grey matter volume loss



Healthy Subject



Subject with Alzheimer's Disease

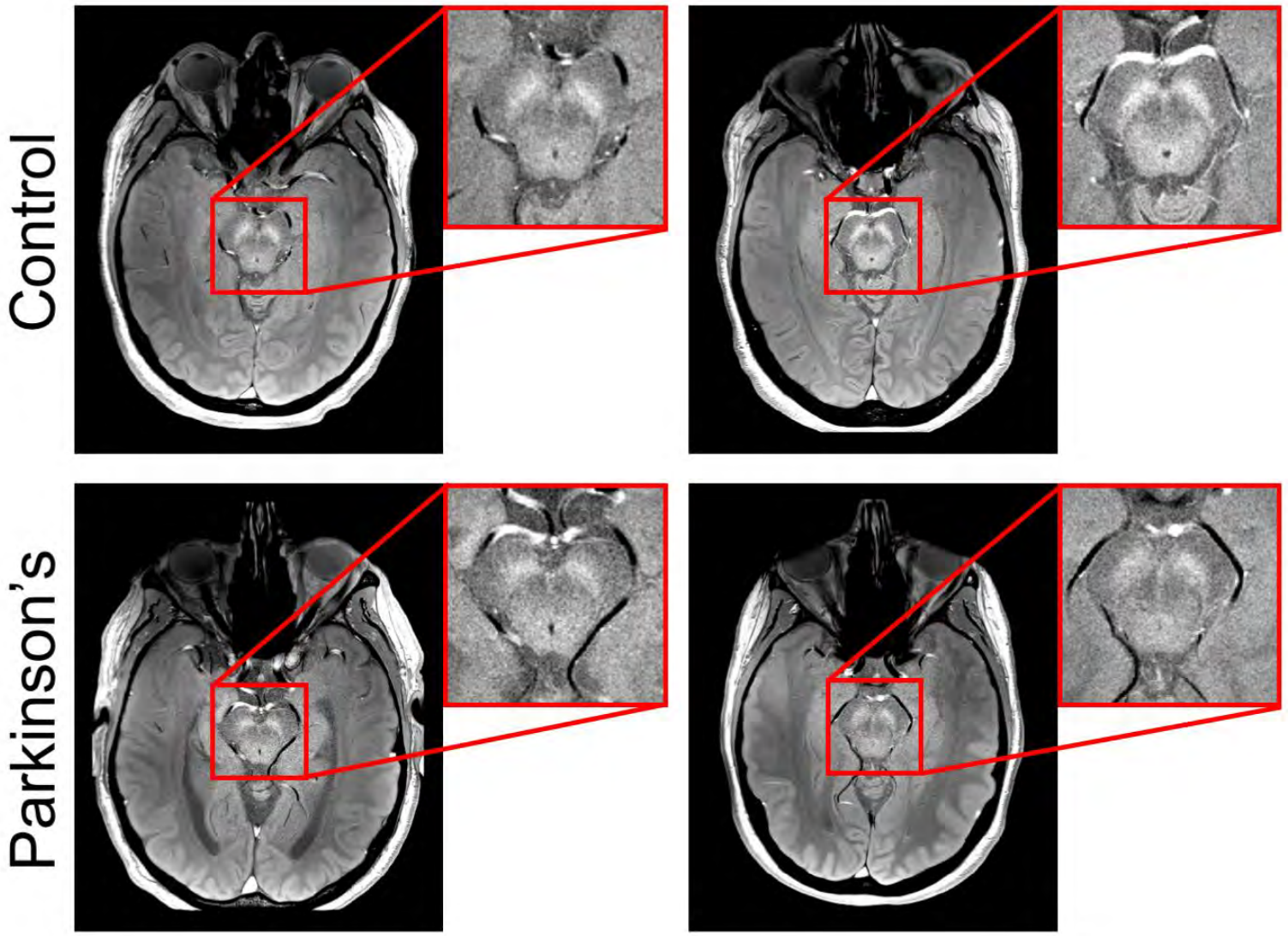


Structural Imaging

- Other techniques can be used to generate structural images that are sensitive to different tissues or structures

- A comparison of the substantia nigra in healthy older adults and Parkinson's disease patients is shown to the right
  - Parkinson's patients have reduced volume and contrast

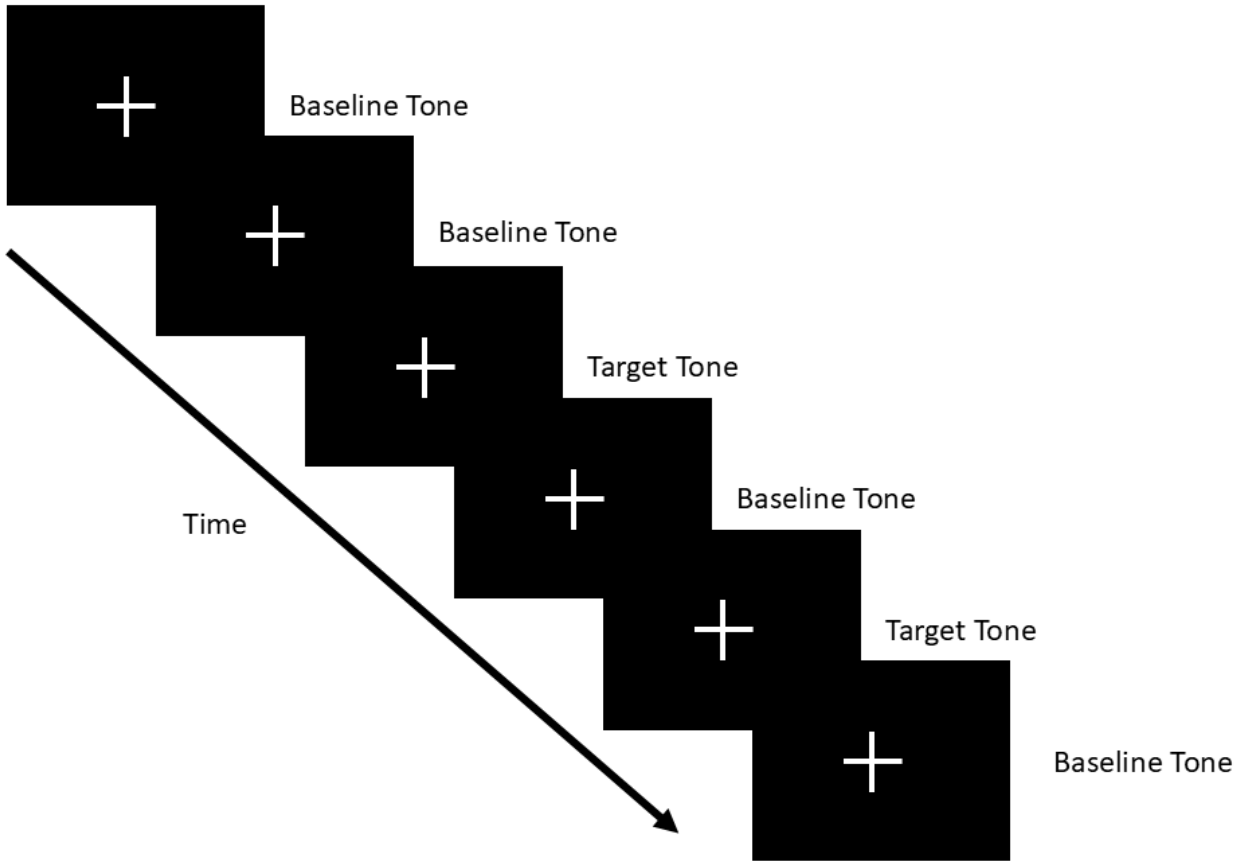
- Nigral abnormalities are also seen in schizophrenia and addiction



Langley, *et al. Parkinsonism and Related Disorders*

Task-based Functional MRI

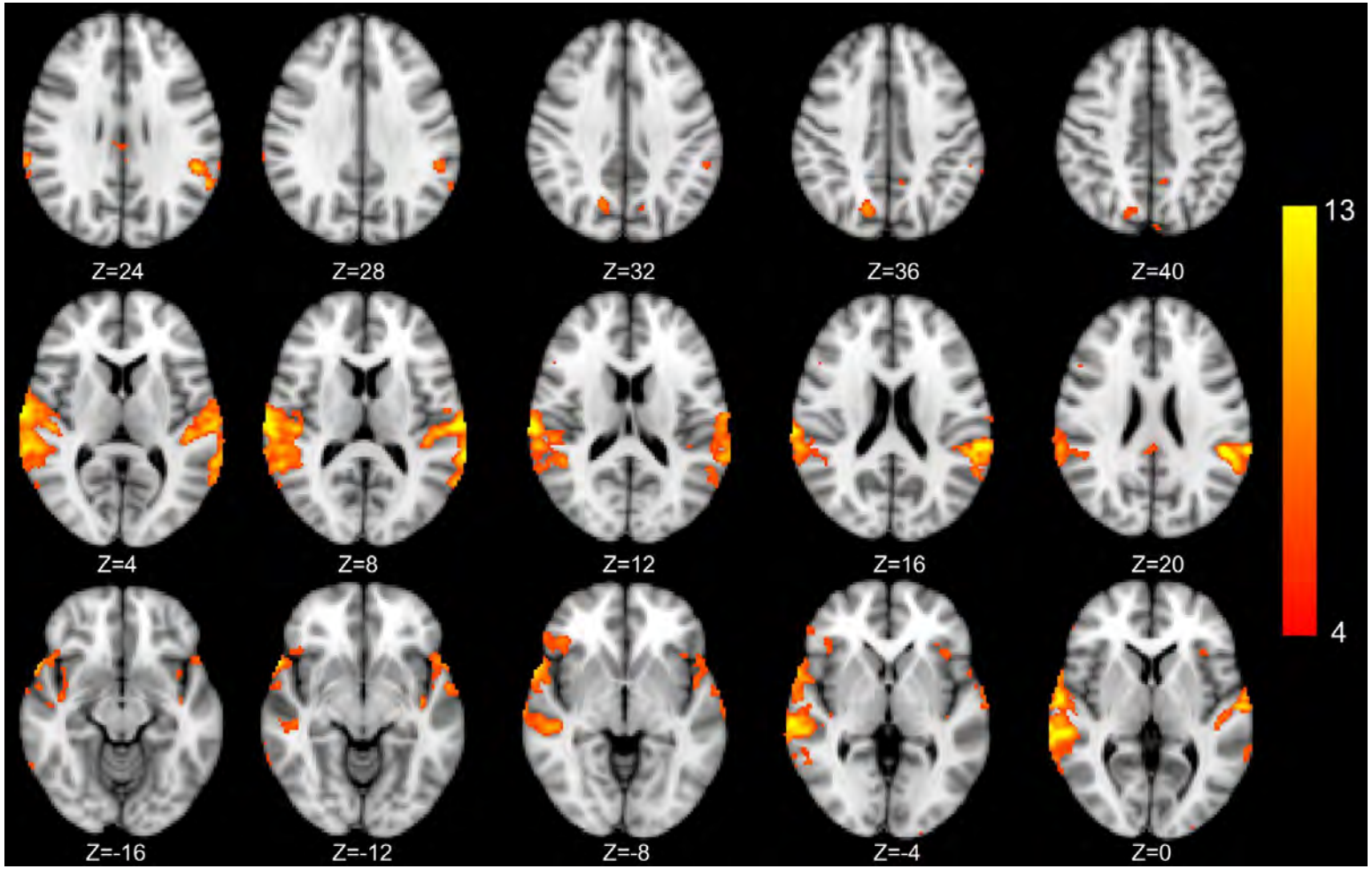
- Structural images typically take several minutes to acquire
- Image acquisition can be sped up to acquire in 1-3 s
- This rapid acquisition allows for brain function to be examined while participants are performing a task
- A diagram for an auditory oddball task is shown to right
  - A baseline tone is played and a target tone is played at random
  - Expect changes in signal in regions associated with hearing



Task-based Functional MRI

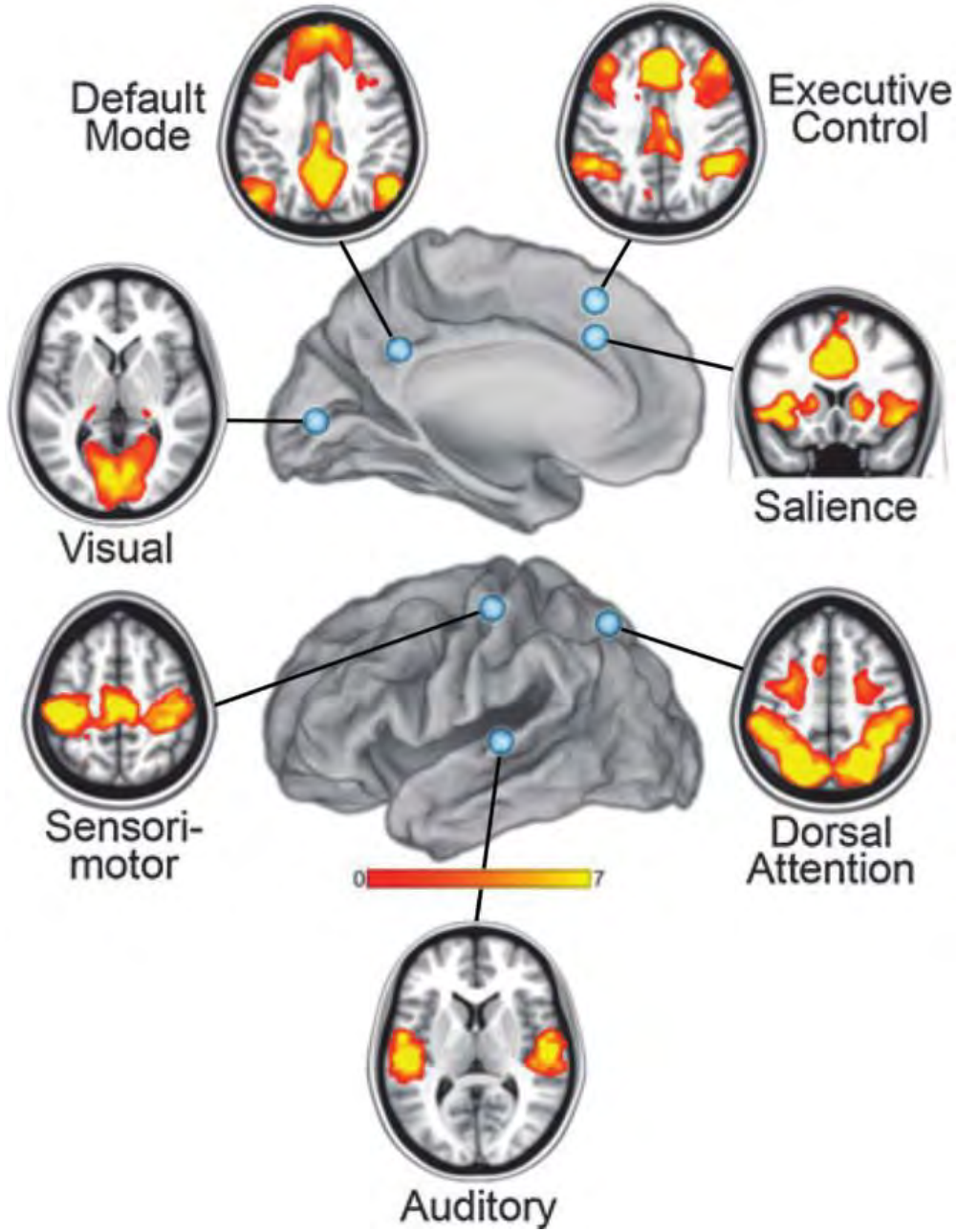
- Changes in signal are seen in the temporal lobe
  - These regions are associated with hearing

- More complicated functional tasks can be used to examine other brain functions
  - Memory
  - Motor
  - Emotion



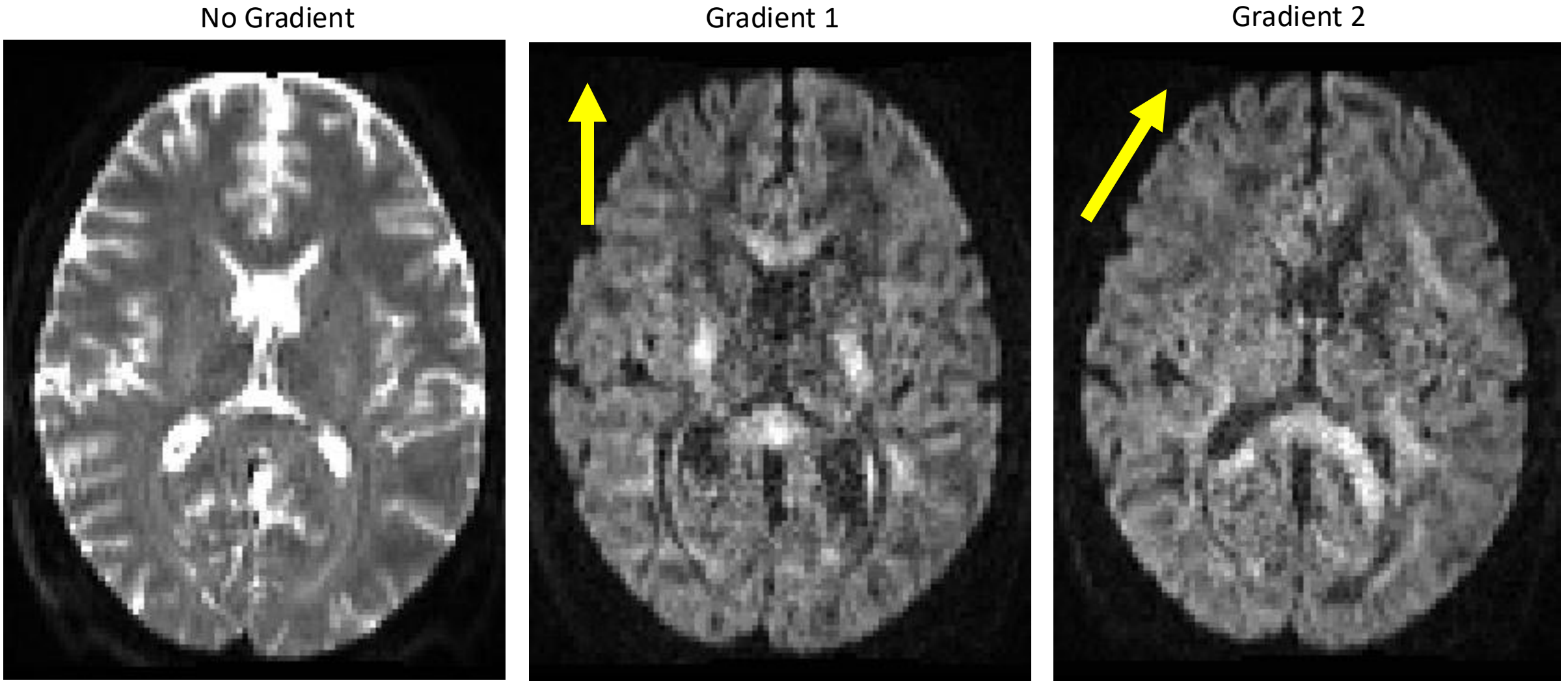
Resting-State fMRI

- Resting-state fMRI is another type of functional imaging
  - Participants do not perform a task during this procedure
- Functional time series from different regions across the brain are then correlated
- Regions are grouped into different resting-state networks
  - Several networks are shown to the right
- Changes in connectivity (correlation strength) can be used as a diagnostic marker for different conditions



Diffusion Tensor Imaging

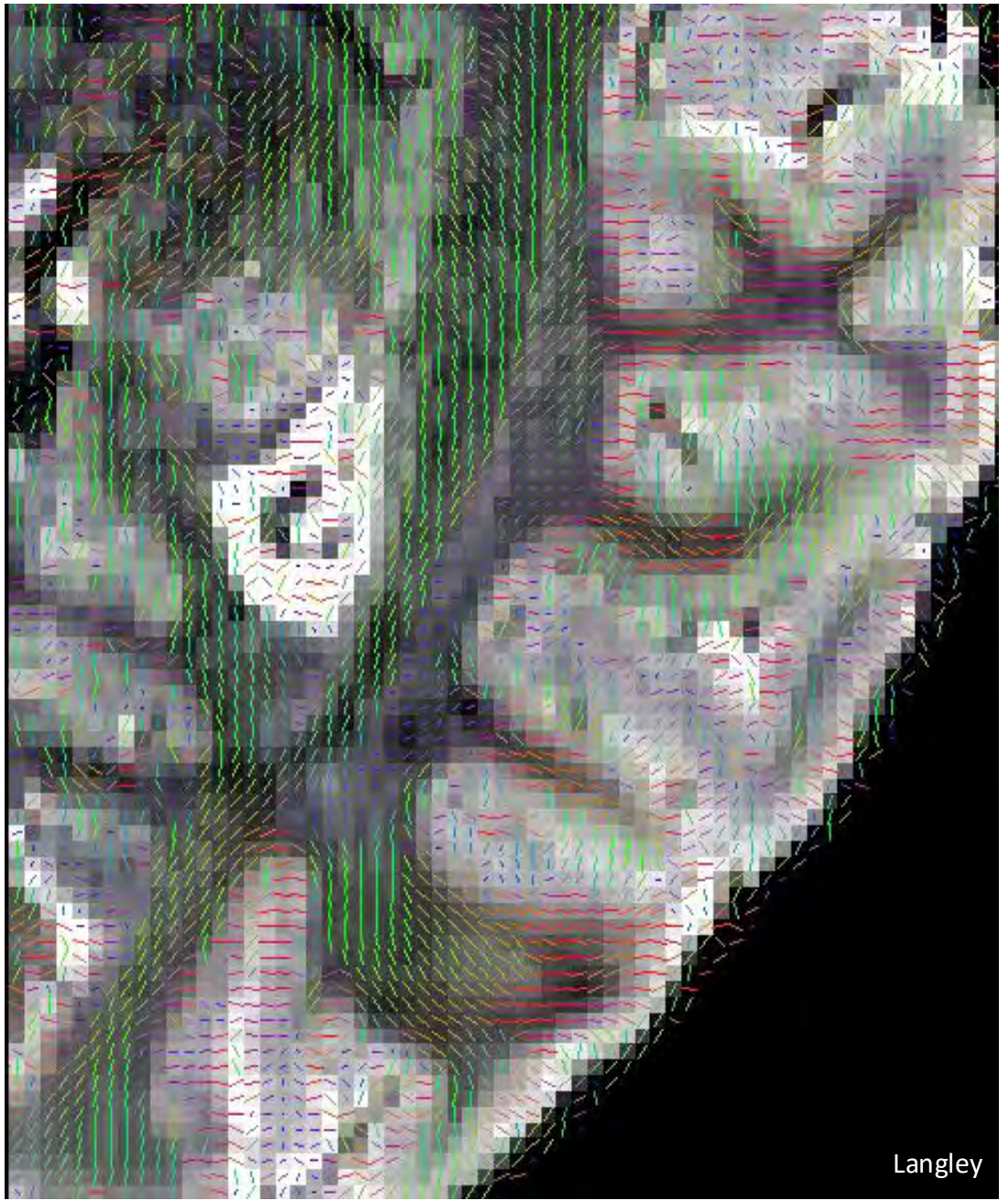
- The addition of extra magnetic fields can encode sensitivity to diffusion of water molecules
  - This sensitivity is dependent on the direction of the extra magnetic fields



Langley

Diffusion Tensor Imaging

- The sensitivity to directionality allows us to reconstruct the principal direction of diffusion
  - Provided we have six or more acquisitions with different diffusion directions
- An image with principal diffusion directions is shown to the right
  - Green: Diffusion in Front-Back direction
  - Blue: Diffusion through the imaging plane
  - Red: Diffusion in Left-Right direction
- Neurons in white matter are covered with a fatty sheath called myelin
  - This sheath will restrict water diffusion
  - Water will diffuse along white matter rather than across

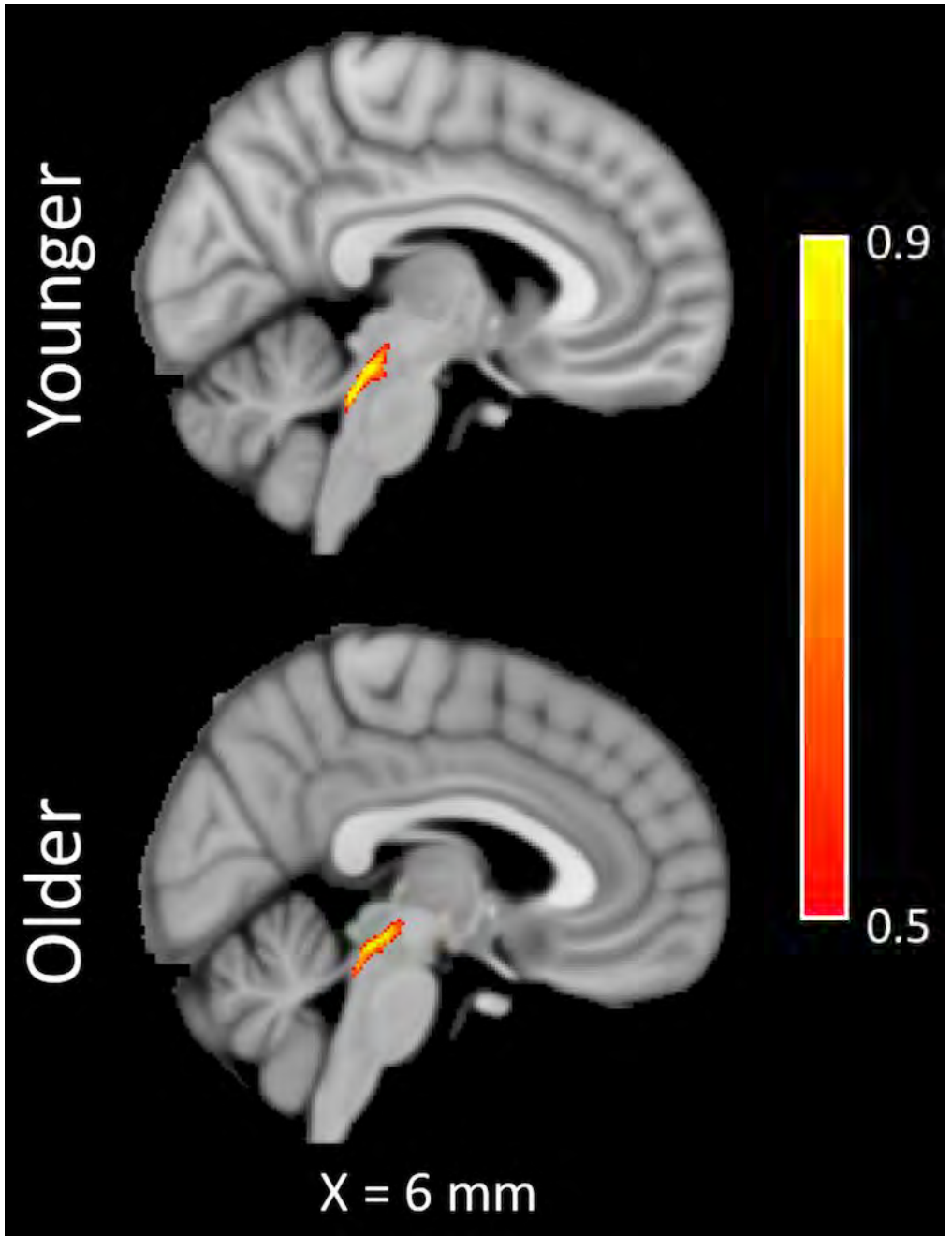


DTI Tractography

- Directional dependence allows us to reconstruct white matter fiber pathways through a procedure called DTI tractography

- Allows for pathways to be studied in neurodegenerative diseases and in normal aging

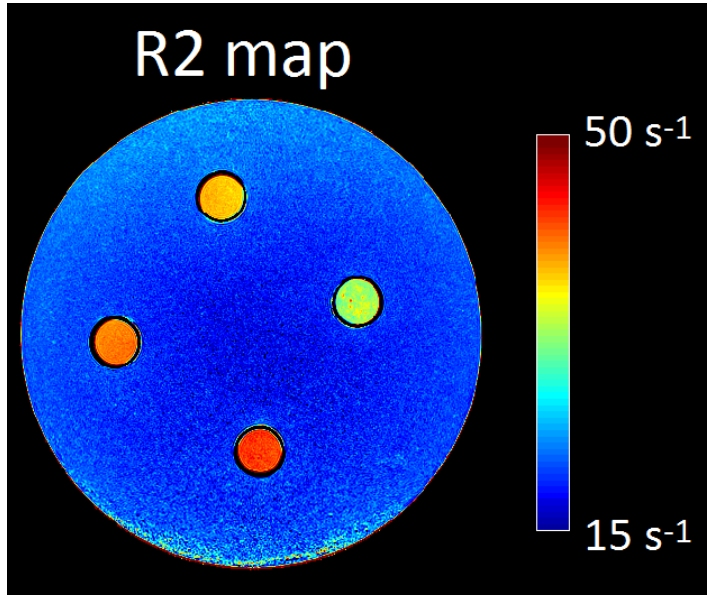
- Image on the right shows a comparison of the central tegmental tract in older and younger adults

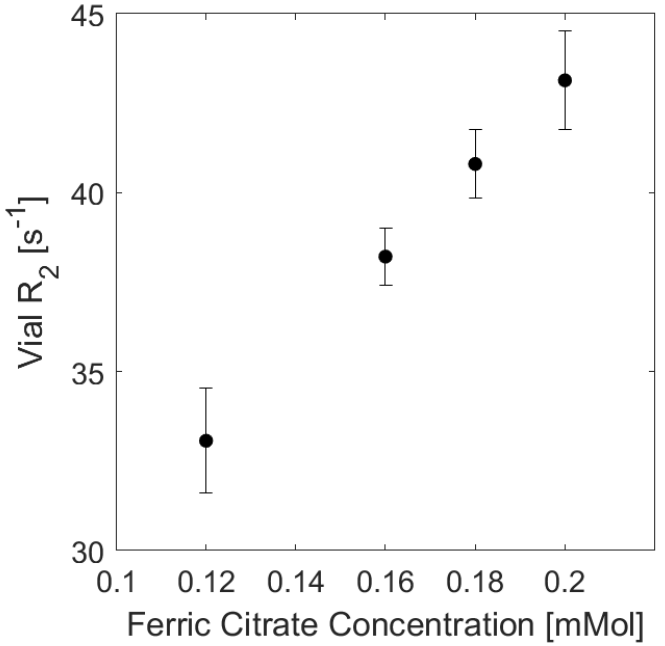


Langley, *et al. Brain Connectivity*

Iron Quantification with MRI

- Iron is deposited in normal aging and in neurodegenerative disorders
- Iron will alter the MRI signal in a way that is detectable in MRI images
- Higher iron concentrations give higher relaxation rates
- Images to the right show this relationship
  - Agarose phantom created with 4 vials containing different concentrations of ferric citrate
  - Vials with larger ferric citrate concentrations have higher relaxation rates



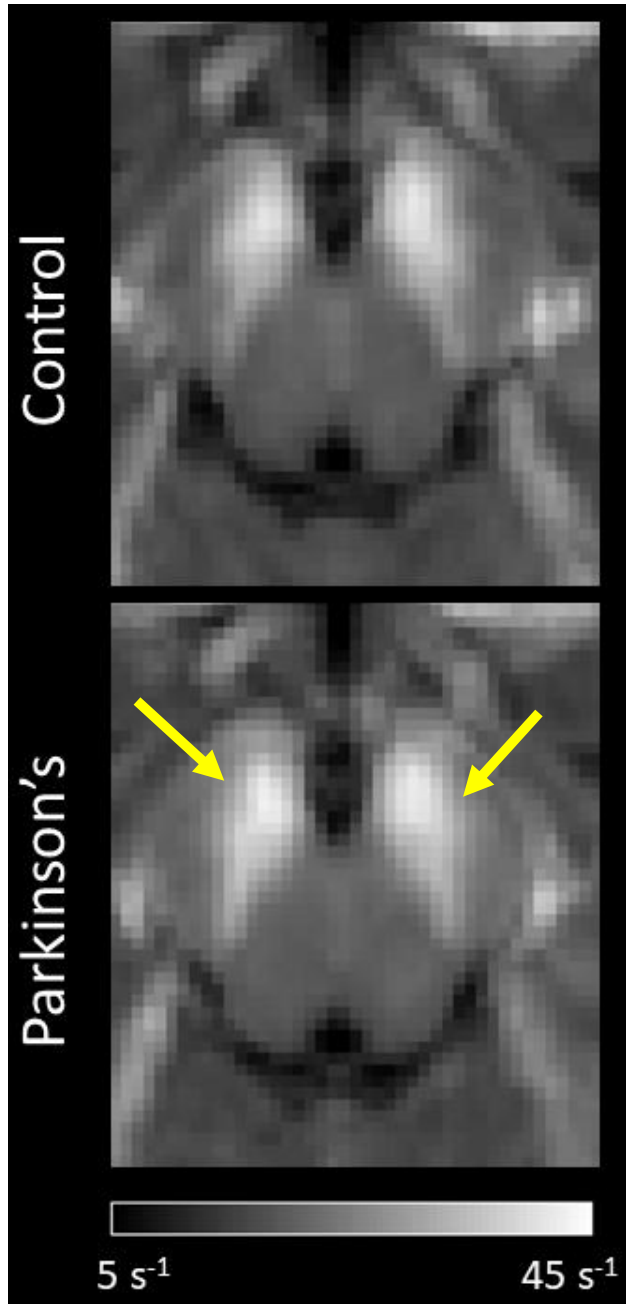


Iron Quantification with MRI

- Iron content can be used as a biomarker for different neurological disorders
  - Parkinson's disease
  - Alzheimer's disease
  - Huntington's disease

- Image to the right shows the mean relaxation rates for a control group and a Parkinson's group in the substantia nigra
  - There is an increase in brightness in the Parkinson's group indicating higher iron concentrations in this brain structure

- We are also able to map iron content in the body
  - Kidney
  - Liver



Langley, *et al. Movement Disorders*

Stem Cell Core

From Cryovial to Paper:
You Can Do it All in the Stem Cell Core Facility

A comprehensive laboratory space for the analysis and culture of cells and organoids

Shane Kennedy, Academic Coordinator

Stem Cell Center
Research for Better Health

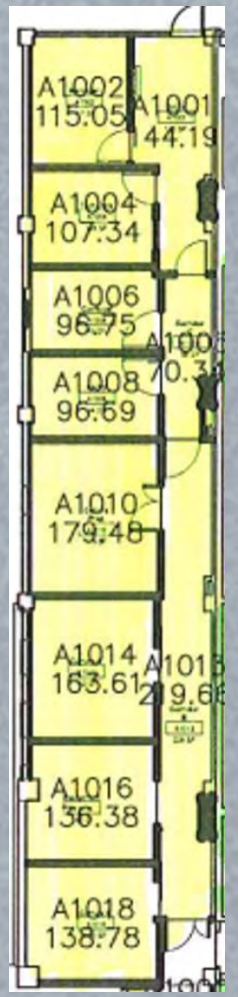
CIRM
CALIFORNIA'S STEM CELL AGENCY

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Overview

- Located in Keen Hall
- Specialized lab space optimized for culturing cells without antibiotics
  - Air going to rooms with biosafety cabinets is double HEPA-filtered
- Additional measures
  - Additional isolation of instruments and culture rooms
  - Dust controls pads
  - Foot coverings



Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Overview

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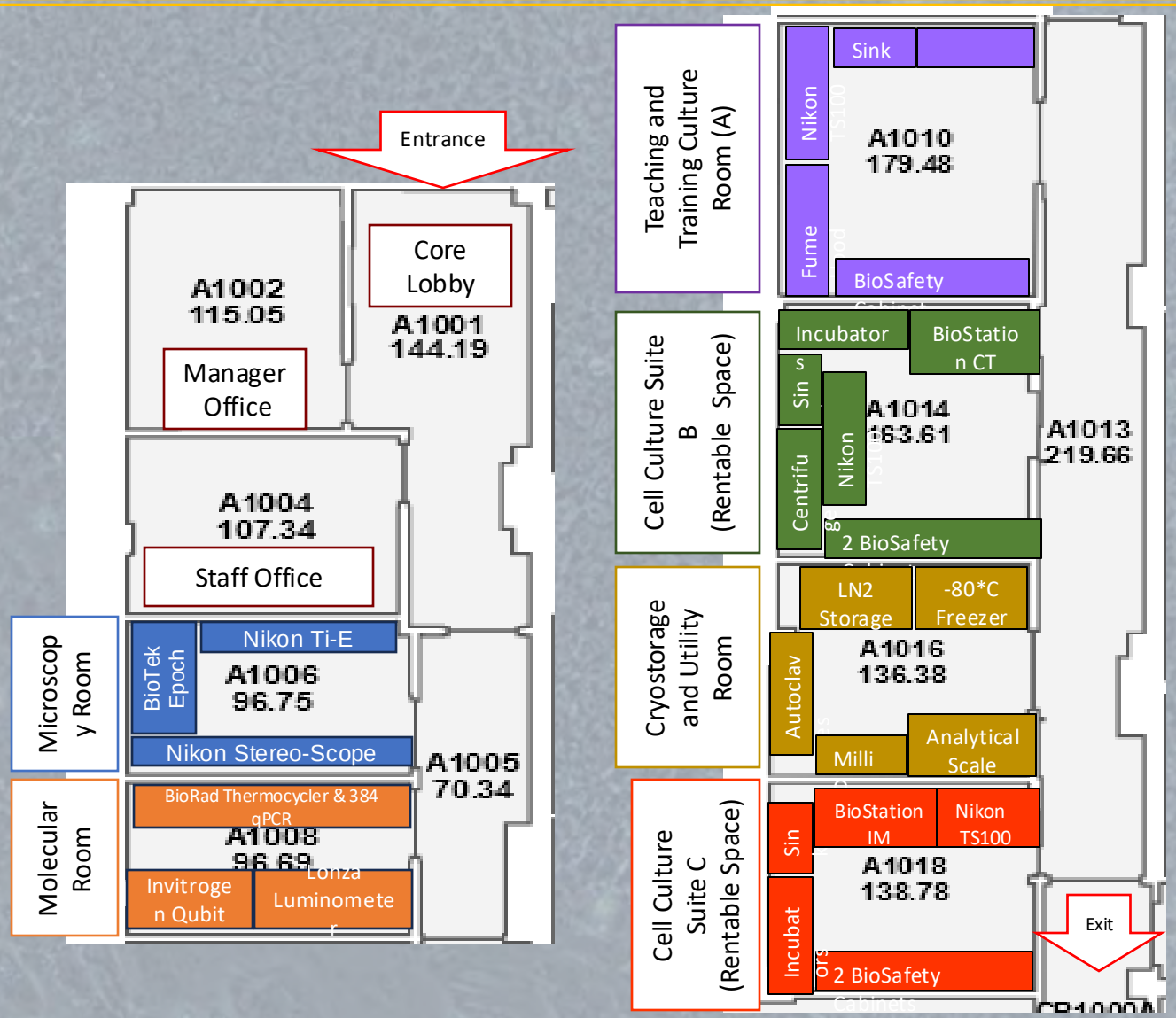

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Cell culture and support

- LN_2 dewar, -80 Freezer
- Can have cells delivered directly to core, stored in LN_2
- Four biosafety cabinets in two rooms
- Incubators
  - Hypoxia capability
- Fluorescent microscope in each culture room
- Other support equipment
  - Water bath, microscope, centrifuge, 4 degree and -20 cold storage
- Biosafety cabinets can be rented on hourly, daily, weekly, or monthly basis
- $5/30min, $20/Day, $100/Week, $300/Month

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Cell culture support: Electroporation

- Amaxa Nucleofector II
  - $10.00/Hr
- Super Electroporator NEPA21 Type II
  - Optimized for primary cell and stem cells
  - Cells can be transfected in an adherent state
  - No need for special buffers
  - $20.00/Hr

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

BioStation IM

- Fluorescent and bright-field live cell imager
- Located in culture room
- Maintains cells in culture conditions
  - CO_2
  - Humidity
  - Temperature
- Takes images at desired intervals
  - Bright-field
  - Fluorescent (GFP, TXR)
- $10.00/Day

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Cell culture support

- Countess cell counter
  - Count live and dead cells
  - Disposable Slide included and contains 2 chambers that allow for 2 samples or 2 replicates
  - $3.00/Slide
- Mycoplasma testing
  - Signed letter indicating presence/absence of mycoplasma in sample
    - $30/Test
  - Lonza luminometer
    - $10.00/Hr

UC RIVERSIDE

Stem Cell Core Facility
900 University Avenue
501A Keen Hall
University of California
Riverside, CA, 92521
Phone: 951-827-4954
E-Mail: stemcells@ucr.edu

October 13th, 2026

Linda Labcoat
University of California, Riverside
John Smith Lab

Linda Labcoat:

Below are the results for your submitted samples that were tested for mycoplasma contamination. All samples tested were found to be negative for contamination.

	Result Ratio	Interpretation
Sample #1: Labeled 1.) WT N2A	0.462	Negative
Sample #2: Labeled 6.) PDKO F9	0.489	Negative
Sample #3: Labeled 7.) PDKO C4	0.435	Negative
Sample #4: Negative Control	0.130	Negative

Interpretive Criteria

< 0.9	Negative for mycoplasma
0.9 - 1.2	Borderline: quarantine cells & retest in 24 h
> 1.2	Mycoplasma contamination

Sincerely,

Shane Kennedy, Ph.D.
Academic Coordinator

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Nikon Eclipse Ti

- Color camera
  - Good for histology, H&E staining

Filter cubes optimized for:

- **DAPI**
- **FITC**
- **Spectrum Orange**
- **DsRED**
- **CY5**

- Motorized stage
- LED fluorescence
- 60x water immersion lens
- $10.00/Hr.

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Nikon Stereoscope

- Fluorescent stereoscope
- Ideal for dissecting or imaging organoid or organisms
- $10.00/Hr

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Stem Cell Core Facility

Nucleic Acid Isolation and Analysis

Possible to isolate DNA/RNA in core, quantify, analyze in core. For example:

Isolate RNA using kit of choice

Quantify using Qubit fluorometer
$10.00/Hr

Convert to cDNA using **My**Cycler™ Thermocycler
$10.00/Run

Analyze using CFX 100 384 well qPCR thermocycler
$10.00/Run

Stem Cell Center
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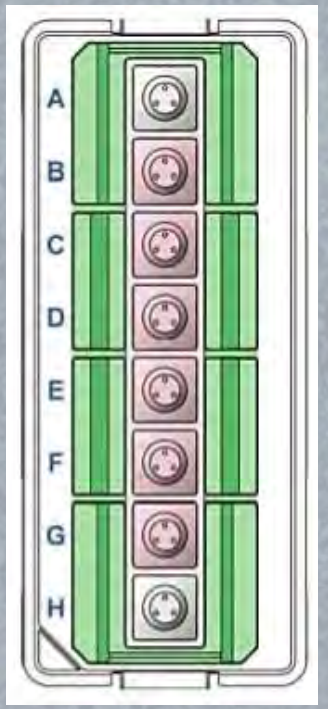
Seahorse XFp

- Measures Mitochondrial performance
- 8-well “miniplate”
  - Cell Mito Stress Test: Oxygen consumption devoted to ATP production, proton leak, spare capacity, non-mitochondrial oxygen consumption
  - ATP Rate Assay: Total picomoles ATP and ratio, glycolysis versus Oxidative phosphorylation
- Other assays
  - Glycolytic rate assay – precise measurement of glycolysis
  - Glycolysis Stress Test
  - T Cell Metabolic Profiling Kit
- $40/4 hour session



Stem Cell Center
Research for Better Health

Stem Cell Core Facility

NovoCyte 2100YB Flow Cytometer

- Two-lasers:
  - **Blue, 488 nm**
  - **Yellow-green, 561 nm**
- $40.00/Hr

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

BioTek Epoch plate reader

- Reads absorbance
- 6 well to 384 well plate
- Good for MTT assays
- ELISA assays
- Other absorbance assays
- $10.00/Hr

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Other equipment

- Two autoclaves
- Fume hood
- Analytical balance
- MilliQ water
- Sinks
- Pipettes, glassware
- RNA gel imager
- Computational analysis

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Teaching and Training

- We provide comprehensive training on all of the equipment and instruments described here
- Individual Stem Cell Culture Training
- Open to all on campus researchers
- Classes on stem cell culture
  - CMDB 211 – Stem Cell Culture class
  - Organoid culture class

Consumables

- Serological and micropipette tips
- Cell Culture plates
- Cuvettes
- Filters
- Tubes
- Cryovials
- Cell culture scrapers
- Cell culture reagents

Stem Cell Center
Research for Better Health

Stem Cell Core Facility

Other notes

- Other core facilities are located in Keen Hall
- Core staff can help:
- Perform experiments
- Maintain cells
  - $45/Hour
- Design experiments
- Complete paperwork for using human embryonic stem cells
- Provide lecture on core facilitates and instruments

Makers Lab
CreatR Lab

Research and Maker Services

UCR Library Research Services

Research Services

Research Services

Dr. Ray Uzwyshyn

Director of Research Services

Dr. Jing Han

Digital Scholarship Librarian

Brendon Wheeler

Maker Services Coordinator

Dr. Barbara Martinez Neda

Research Data Scientist

Andrew Morales

Research Services Assistant

Elisa Cortez

Medical Education and Clinical Outreach Librarian

Alvaro Alvarez

Innovative Media Librarian

Janet Reyes

Geospatial Information Librarian

Research Services

- **Services Include:**
  - **Personalized Research Assistance**
  - **Research Data Support**
  - **Digital Scholarship Support**
  - **Geospatial Information Support**
  - **Scholarly Communication: publishing, author rights, open access, and more**
  - **Prototyping & Multimedia Development**

RESEARCH DATA SUPPORT

Planning and Management

- Develop Data Management Plans (DMPs)
- Organize files and folders effectively

Analysis and Visualization

- Clean and preprocess data
- Apply machine learning (ML) methods
- Create clear visualizations

Data Sharing & Repositories

- Deposit data into Dryad
- Ensure data is findable and reusable
- Meet journal and funder requirements

HOW TO ACCESS THESE SERVICES

Consultations

- Get one-on-one support for your data questions and needs

Workshops

- Build practical skills with data and ML tools

Collaborations

- Partner with us to support your research group's data needs

Digital Scholarship Certificate

Want to learn how to use digital tools in your research? The UCR Library Digital Scholarship Certificate shows you how to integrate digital tools, methods, and technologies into your research, teaching, learning, and publishing.

Click the link or scan the QR code to self enroll on Canvas.

Research Specialty Labs

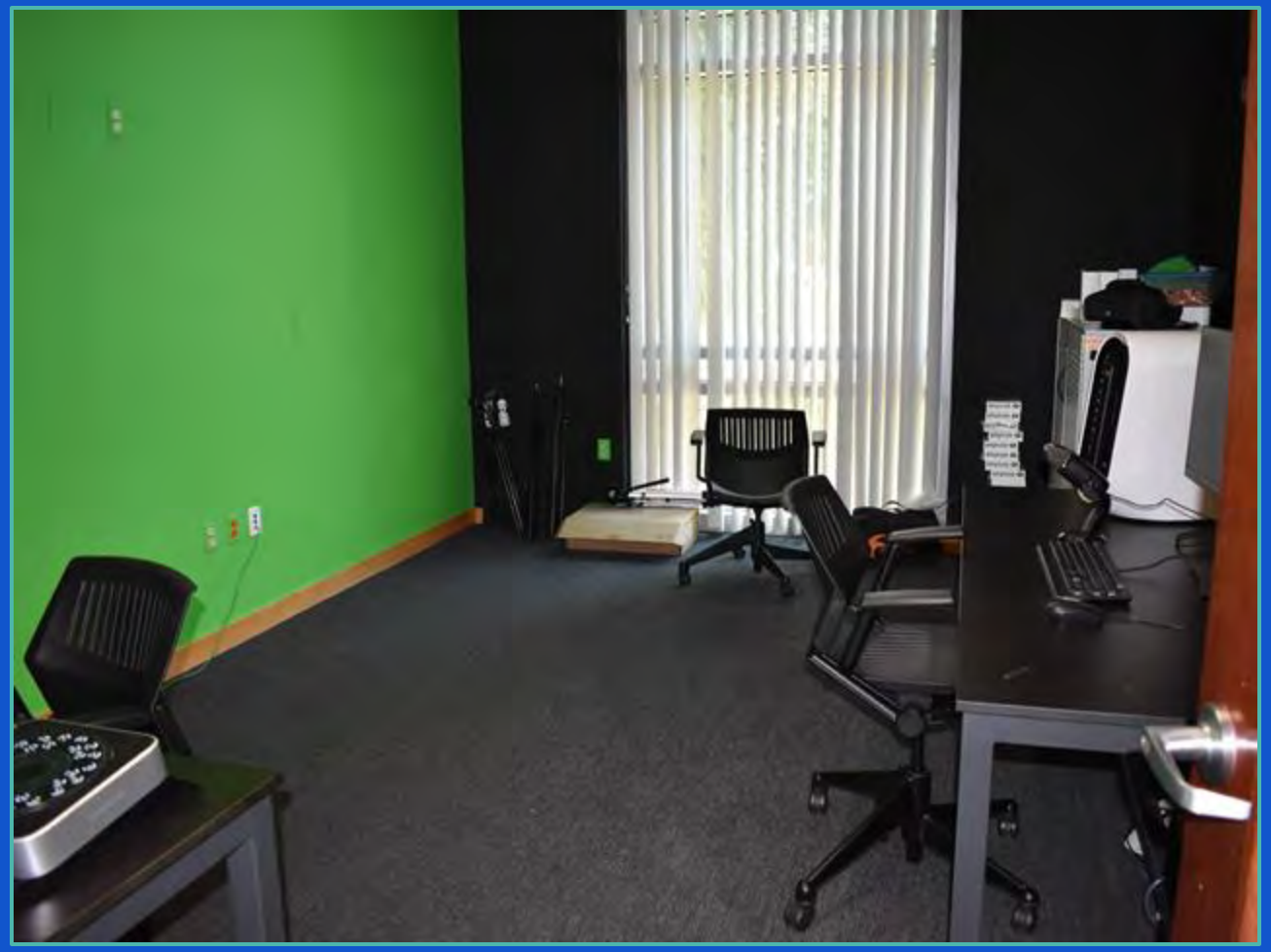
CreatR Lab

- **Offers research support through skills and equipment in the lab**
- **Lab maintains 3D printers, textile equipment, laser engraver, workbench, tools and button makers**
- **Student assistants and staff can help with projects**

Robotics Lab

- **Offers research support through skills and equipment in the lab**
- **Lab maintains microcontrollers, sensors and microcomputers**
- **Students and staff available to assist with research**

3DXP Lab



- **Offers research support through skills and equipment in the lab**
- **Lab maintains cameras, lighting and high performance computers**
- **Student assistants and staff can help with projects**

STAR Lab

- **High-performance PC with specialized software and one Epson Photo Scanner.**
- **Software include:**
  - **Qualitative Data Analysis Tool (QDA)**
  - **Quantitative Data Analysis and Visualization**
  - **CAD**
  - **GIS**
  - **Multimedia Editing**
  - **And More**

Upcoming Events

Events and Workshops

International Open Access Week

Open Access Week 2025

Monday, October 20- Friday, October 24

RSVP/Learn More: library.ucr.edu/OpenAccessWeek2025

Join the UCR Library and GradSuccess for a week of activities celebrating Open Access Week 2025! Explore FREE workshops, events, and resources designed to help you learn about open access publishing, open data, open source projects and tools, and more.

Workshops

Throughout the week, we will host a variety of workshops and discussions in Orbach Library, Room 122 and via Zoom on open access topics. Light refreshments will be provided!

Daily Raffle Prizes

Every workshop you attend earns you a raffle ticket! Enter for a chance to win:

- Free poster prints
- Free 3D prints
- Barnes & Noble gift cards (courtesy of GradSuccess)

Tabling/Resource Station

We will be in Orbach Library near the Info Desk from Noon - 4 p.m. Monday - Friday (Oct. 20 - Oct. 24). Stop by to pick up your Open Access Week Passport, collect flyers and swag, and learn about UCR Library and GradSuccess services.

Passport Challenge

Pick up your Open Access Week Passport at our daily Tabling Sessions/Resource Station near the Orbach Library Info Desk from 12 p.m. - 4 p.m. or at any workshop. Collect 4 stamps during the week to qualify for:

- An official 2025 UCR Open Access Week digital badge
- A physical badge available on the spot

UCR Library

Grad Success

UCR Library

International Open Access Week

Grad Success

Open Access Week 2025

October 20-24, 2025

Monday Oct. 20	Tuesday Oct. 21	Wednesday Oct. 22	Thursday Oct. 23	Friday Oct. 24
Tabling Session/Resource Station (12 PM - 4 PM, Orbach Near Info Desk)				
Open Access Publishing and eScholarship 1:30 PM - 2:30 PM *Orbach 122 or Zoom*	**Live Streaming: Introduction to Scholarly Publishing** 12 PM - 1:30 PM Orbach 122 or Zoom	**Open Trustworthy Consumer Health Resources** 1:30 PM - 2:30 PM *Orbach 122 or Zoom*	**Watch Party: Intro to OpenAlex** 1:30 PM - 2:30 PM *Orbach 122 or Zoom*	**Panel Discussion: The Future of Open Knowledge** 1:30 PM - 2:30 PM *Orbach 122 or Zoom*
Navigate UC Transformative Open Access Agreements: Don't Get Stuck with an Expensive Bill 2:45 PM - 3:45 PM *Orbach 122 or Zoom*	**Creative Commons and Copyright** 1:30 PM - 2:30 PM *Orbach 122 or Zoom*	**Watch Party: Distant Viewing: Open-Source AI Toolkit for Analyzing Visual and Multimodal Collections** 2:45 PM - 3:45 PM *Orbach 122 or Zoom*	**Open Data Management** 2:45 PM - 3:45 PM *Orbach 122 or Zoom*	
UC Open Access Policy and Publication Management System 4 PM - 5 PM *Orbach 122 or Zoom*	**Introduction to OER** 2:45 PM - 3:45 PM *Orbach 122 or Zoom*	**Blender: The Power of Open-Source 3D Creation** 4 PM - 5 PM *Orbach 122 or Zoom*	**Open Data Publishing with Dryad** 4 PM - 5 PM *Orbach 122 or Zoom*	
	Where to Find OER 4 PM - 5 PM *Orbach 122 or Zoom*			

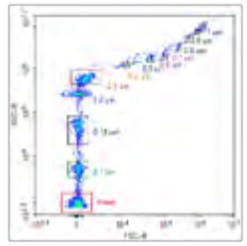
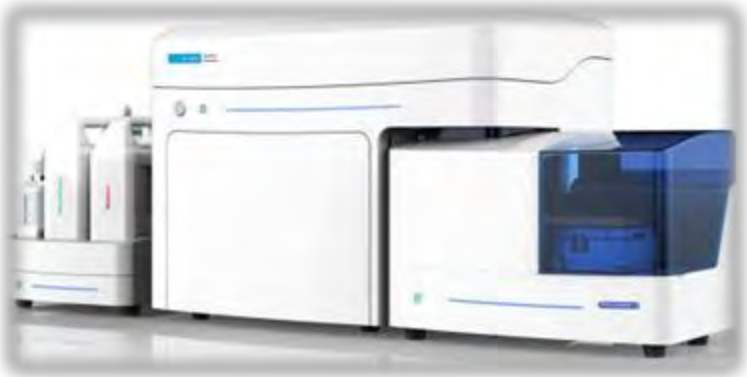
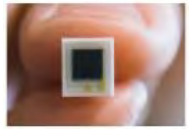
RSVP: library.ucr.edu/OpenAccessWeek2025

Agilent Novocyte

Agilent
Trusted Answers

NovoCyte Flow Cytometer

Next Generation Workhorse for Discovery

Lisa Salow
Flow Cytometry Product Specialist
Lisa.Salow@Agilent.com
Tel: 747-308-1180

Jame Ongaro
Cell Analysis Account Manager
James.Ongaro@Agilent.com
Tel: 818-404-4590

Agilent
Trusted Answers

Agilent Flow Cytometers - Advancing Discovery Through Innovation

April 2014 NovoCyte

August 2016
NovoCyte systems with 561nm laser

April 2018
NovoCyte Quanteon

June 2019
NovoCyte Advanteon

June 2024
NovoCyte Opteon

Agilent

NEW!

December 2015
NovoSampler Pro

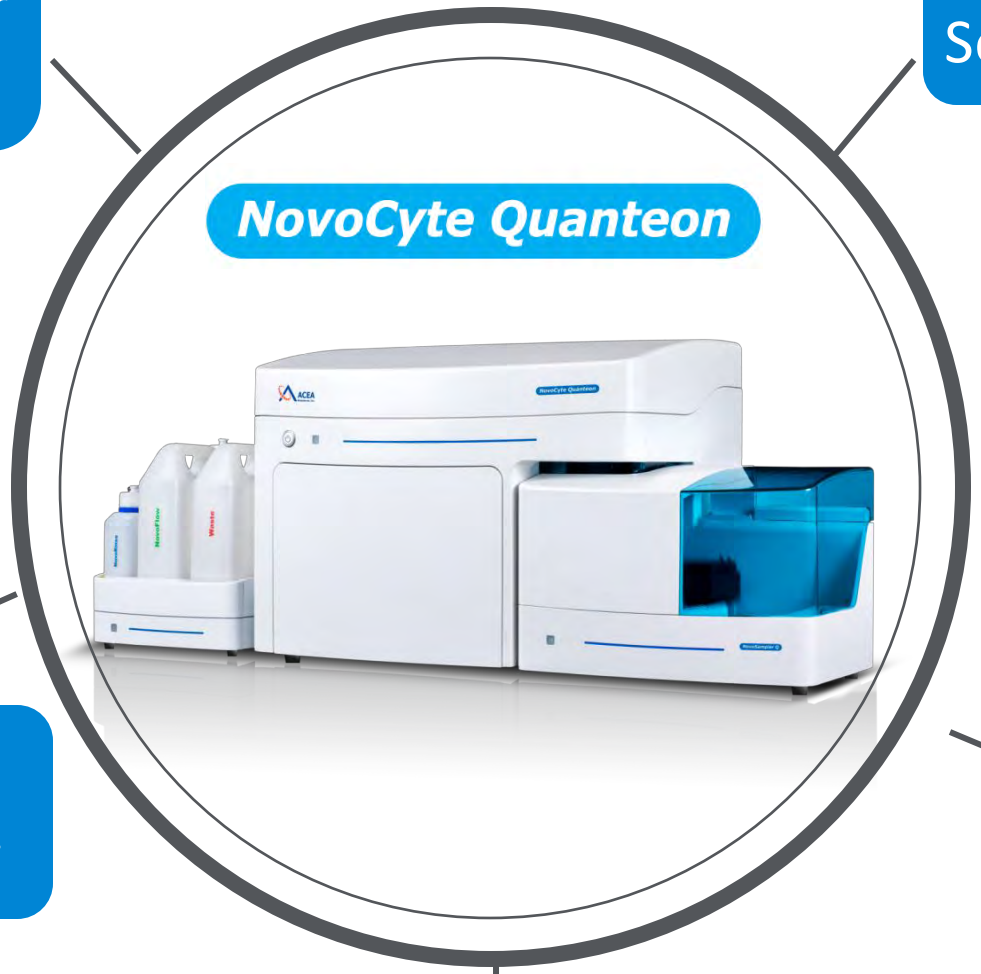
May 2017
Flexible optical configurations

April 2019 Robotic Automation

July 2020
NovoCyte Penteon

25-Parameter Flexibility

Superior Sensitivity



Automated and High Throughput Sampling

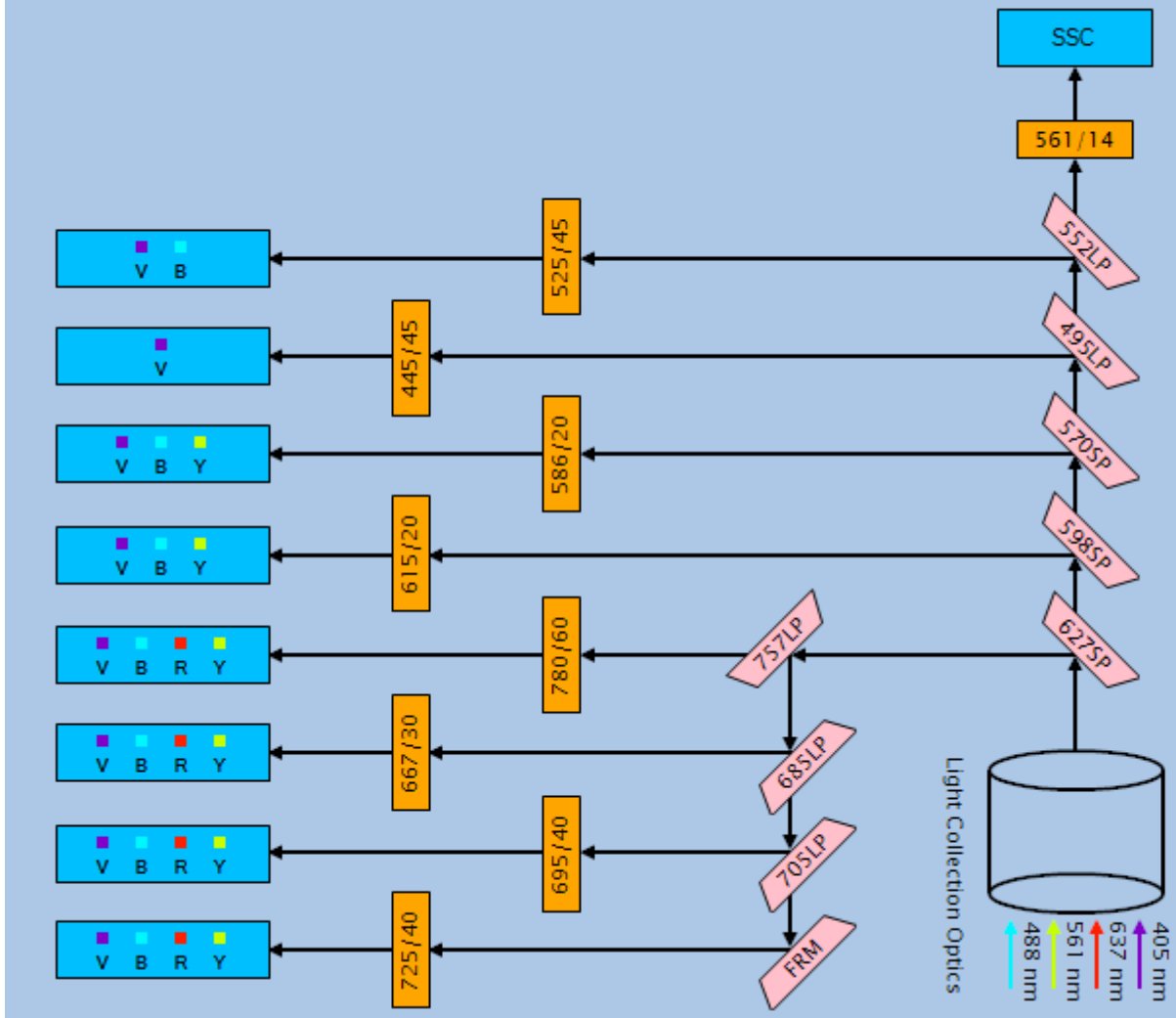
Consistent and Reliable

Intuitive Software

High Multi-Parameter Flexibility

Quanteon V8B7Y6R4 Optical Configuration

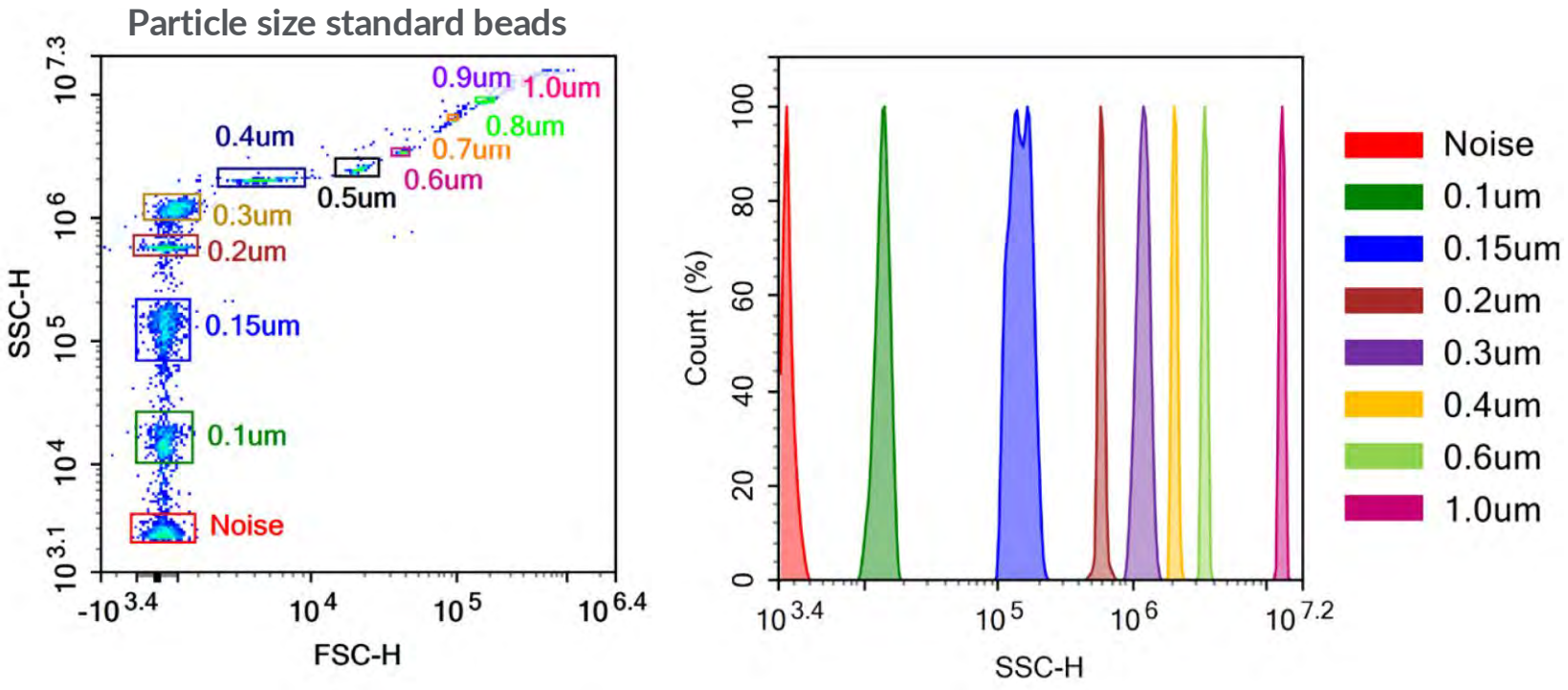
Instrument: NovoCyte Quanteon Optical Configuration: 4025 Default



Par...	Excit...	Detectio...	Default Alias
B525	488	525/45	FITC
B586	488	586/20	EYFP
B615	488	615/20	PI
B667	488	667/30	PerCP
B695	488	695/40	PerCP-Cy5.5
B725	488	725/40	PerCP-eFluor 7...
B780	488	780/60	PE-Cy7 (B)
R667	637	667/30	APC
R695	637	695/40	Alexa Fluor 680
R725	637	725/40	Alexa Fluor 700
R780	637	780/60	APC-Cy7
V445	405	445/45	Pacific Blue
V525	405	525/45	AmCyan
V586	405	586/20	Pacific Orange
V615	405	615/20	Qdot 605
V667	405	667/30	Qdot 655
V695	405	695/40	Qdot 705
V725	405	725/40	BV711
V780	405	780/60	Qdot 800
Y586	561	586/20	PE
Y615	561	615/20	PE-Texas Red
Y667	561	667/30	PE-Cy5
Y695	561	695/40	PE-Cy5.5
Y725	561	725/40	PE-Alexa Fluor...
Y780	561	780/60	PE-Cy7 (Y)

Superior Sensitivity

Ultra-sensitive detection with NovoCyte Advanteon, Quanteon and Penteon



Resolution - FSC: 0.4µm SSC: 0.1µm

An APD detector on the SSC allows ultra sensitive detection necessary for small particle detection

Automated and High Throughput Sampling

NovoSampler Q

NovoSampler Q:

- 40 tube rack
- 96 well plates
- 384 well plates
- Integrated barcode reader
- Efficient mixing and rinsing
- Walk-away functionality

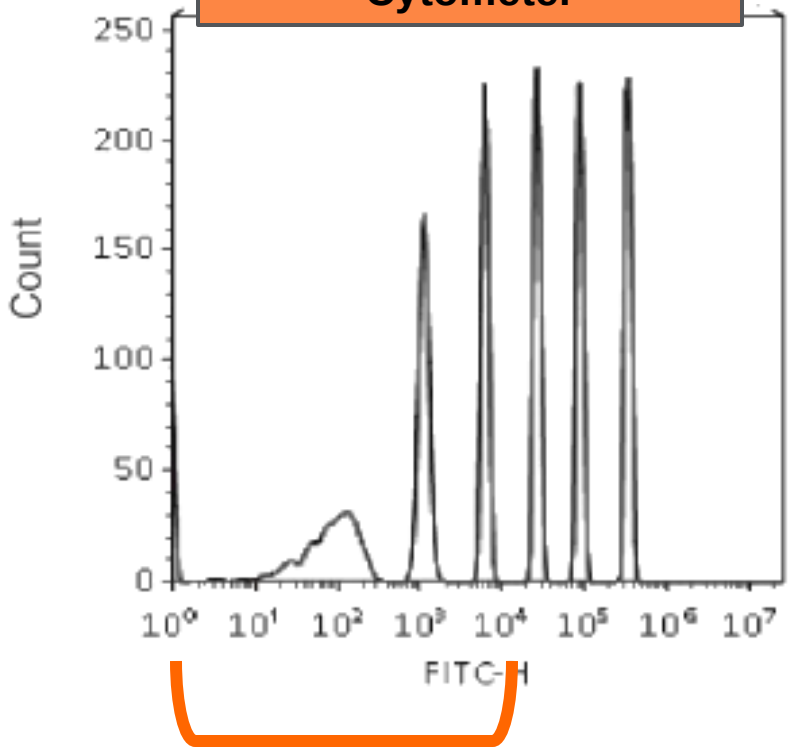
Automation Ready

Optional large fluidic cart

Consistent and Reliable

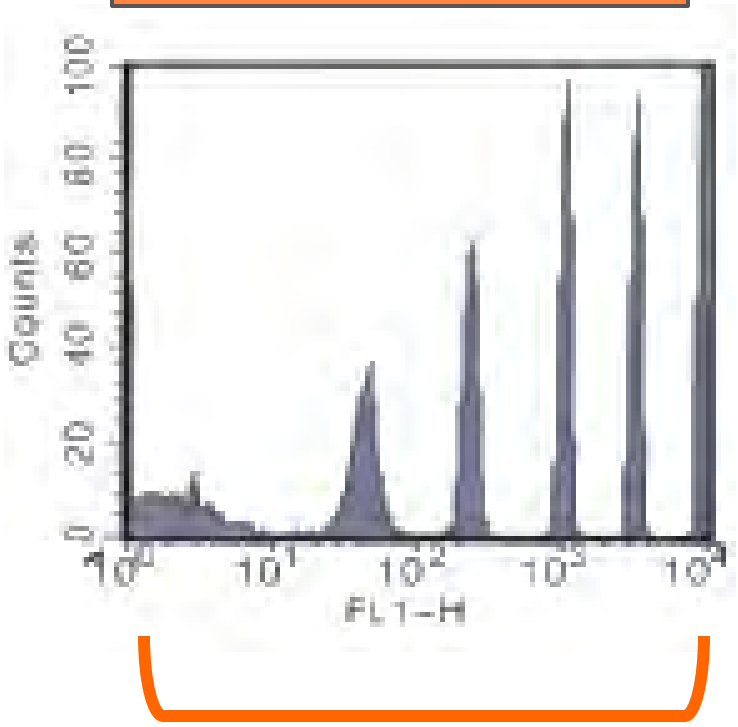
Wide Dynamic Range

NovoCyte Flow Cytometer



Dynamic Range: 7.2-log

Competitor's Flow Cytometer



Dynamic Range: 4-log

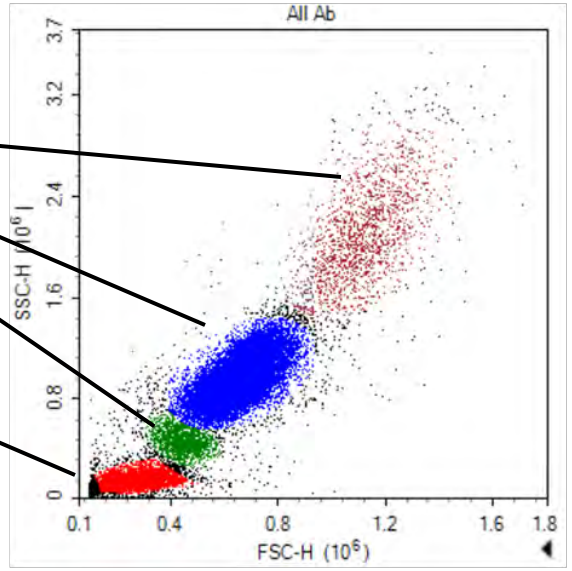
Dynamic Range & Sensitivity

Eosinophils

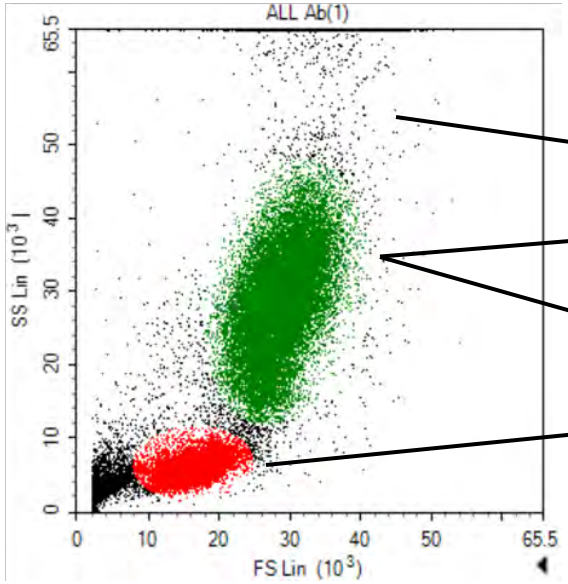
Granulocytes

Monocytes

Lymphocytes



NovoCyte



Eosinophils

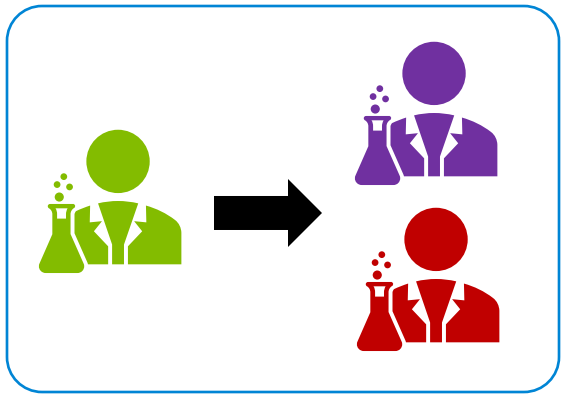
Granulocytes

Monocytes

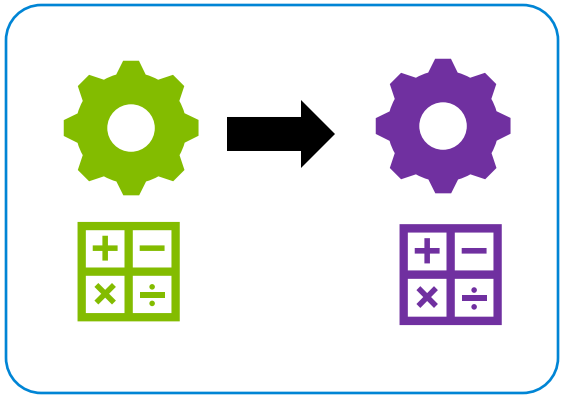
Lymphocytes

Competitor's

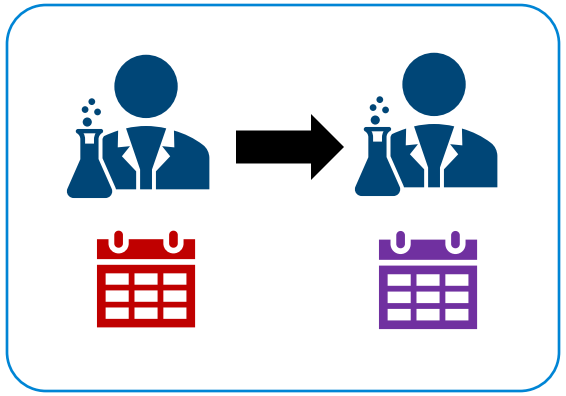
Benefits of stable voltage gains:



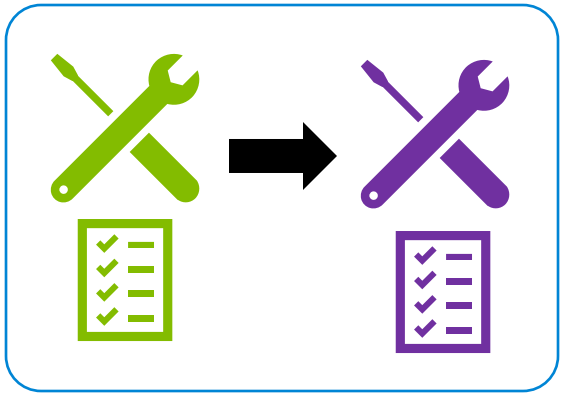
User to user variation method transfer, data reproducibility



Method/Template transfer



Longitudinal variation, method reproducibility



Robust, consistent maintenance

Intuitive Software

NovoExpress Software Operational Structure

Workstation PC

User’s personal PC
One license key per PC

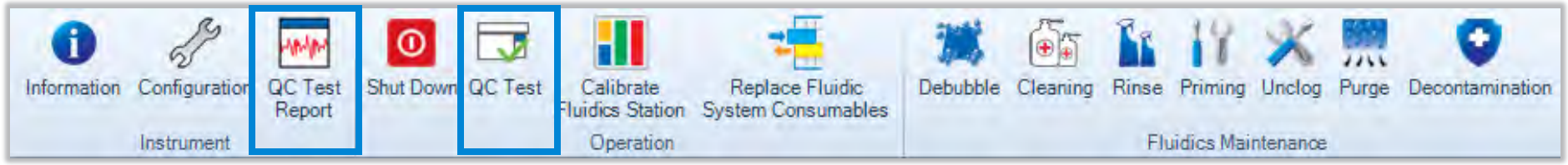
On-line mode

- Connected with instrument;
- Can open multiple Off-line copies to analyze while acquiring data;
- Automatic FCS data export;
- Automatic data backup.

Off-line mode

- Not connected with instrument;
- Three licenses come with instrument purchase.
- Can open .NCF, .FCS files exported from Workstation PC;
- Site license with 10 seats is available.

NovoExpress® software
Improved versatility and ease of operation



QC Test Report

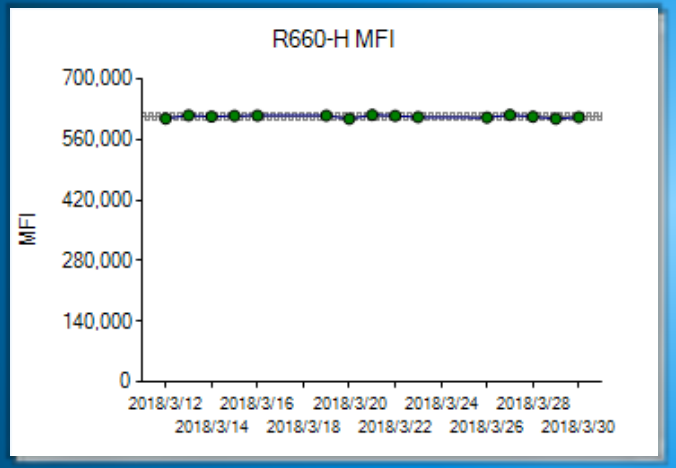
Operator: administrator
QC Particles Lot ID: SS000259
Instrument Serial Number: 621171210045

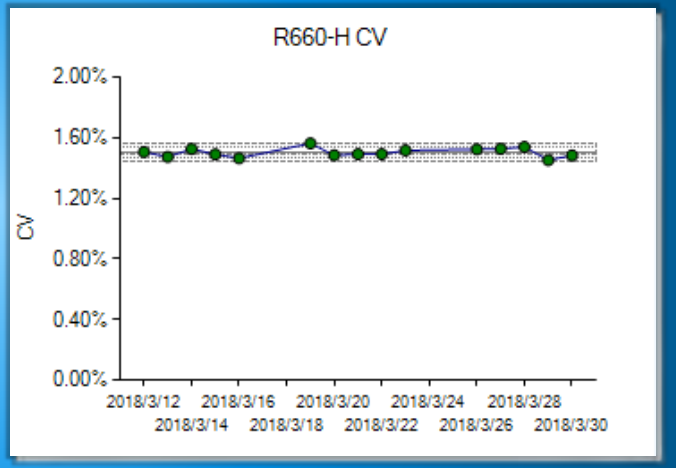
Testing Date: 2018/3/30 16:12:28
Software Version: 1.3.0
Optical Configuration: Default

Laser	Parameter	CV	Linearity	MFI	MFI Target	MFI Target Difference	Electronic Noise	Optical Noise	Result
561nm	FSC-H	1.58%	N/A	196,635	-	-	-	-	Pass
561nm	SSC-H	1.40%	N/A	594,802	-	-	246	248	Pass
488nm	B530-H	1.92%	0.9999	1,099,111	1,109,225	0.91%	162	302	Pass
488nm	B586-H	1.86%	-	2,888,807	2,922,920	1.17%	79	362	Pass
488nm	B615-H	1.83%	-	1,684,846	1,697,968	0.77%	111	123	Pass
488nm	B660-H	1.78%	-	757,808	772,601	1.91%	82	91	Pass
488nm	B695-H	1.90%	-	342,658	346,155	1.01%	99	133	Pass
488nm	B725-H	1.93%	-	2,067,711	2,103,673	1.71%	87	615	Pass
488nm	B780-H	1.99%	-	970,379	987,259	1.71%	96	333	Pass
637nm	R660-H	1.48%	0.9988	611,123	619,015	1.27%	77	101	Pass
637nm	R695-H	1.30%	-	515,517	520,026	0.87%	86	285	Pass
637nm	R725-H	1.34%	-	4,144,591	4,175,775	0.75%	81	731	Pass
637nm	R780-H	1.34%	-	1,856,417	1,893,828	1.98%	89	1,051	Pass
405nm	V445-H	1.78%	1.0000	4,521,121	4,571,641	1.11%	79	353	Pass
405nm	V530-H	1.58%	-	3,306,248	3,346,481	1.20%	89	108	Pass
405nm	V586-H	1.57%	-	1,481,195	1,485,526	0.29%	73	77	Pass
405nm	V615-H	1.56%	-	856,255	870,967	1.69%	84	84	Pass
405nm	V660-H	1.56%	-	545,415	550,685	0.96%	77	81	Pass
405nm	V695-H	1.80%	-	242,811	246,562	1.52%	81	112	Pass
405nm	V725-H	1.60%	-	3,137,417	3,138,423	0.03%	84	1,054	Pass
405nm	V780-H	1.02%	-	325,310	331,011	1.72%	89	187	Pass
561nm	Y586-H	1.89%	0.9998	1,497,717	1,523,357	1.68%	74	85	Pass
561nm	Y615-H	1.79%	1.0000	3,066,569	3,087,878	0.69%	78	84	Pass
561nm	Y660-H	1.75%	-	1,216,104	1,216,239	0.01%	77	84	Pass
561nm	Y695-H	1.77%	-	662,336	672,134	1.46%	78	184	Pass
561nm	Y725-H	1.77%	-	5,432,336	5,439,279	0.13%	87	373	Pass
561nm	Y780-H	1.90%	-	923,972	940,822	1.79%	84	140	Pass

QC Particles Count: 10820
Result: Pass

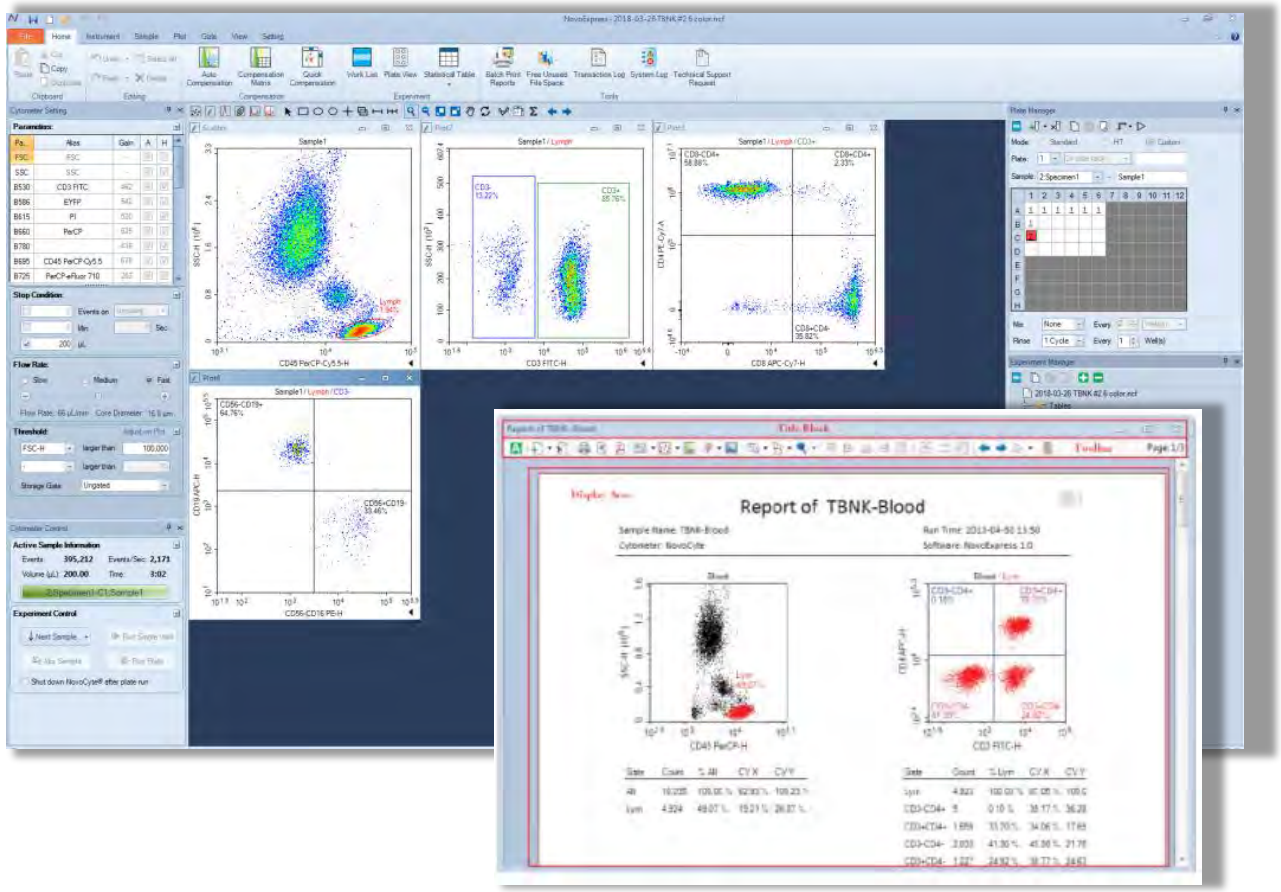
Automatic Levey-Jennings tracking

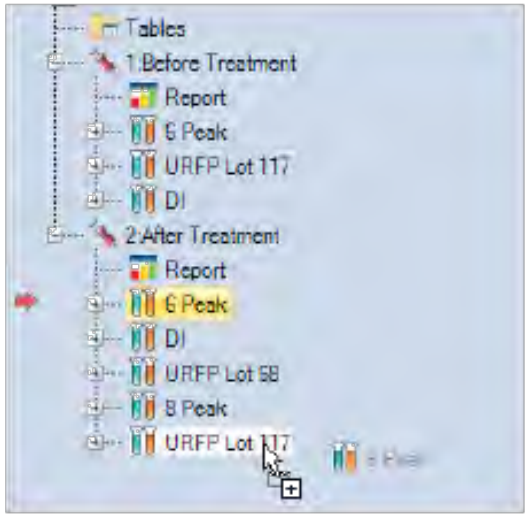




NovoExpress® software
Improved versatility and ease of operation

Streamlined layout, easy report functions, drag and drop functionality





Drag-and-drop functionality to copy settings/analysis

Reporting:

- Fully customized
- Automated
- Batch reporting

Summary of Top Features of Hardware Components – Quanteon

Hamamatsu SiPM detectors

- Superior photon detection sensitivity - qNORM
- Small particle size resolution down to 0.1µm
- 7.2 log dynamic range

Coherent OBIS® lasers

- 4 **lasers** (405, 488, 561, 637 nm)
- 25 **fluorescence channels**

SEMROCK filter

- **"Smart" optical filters** for easy filter swapping
- Ensure data collected from specific filter

Syringe Pump Fluidics

- Exceptional fluidic stability
- From 5 µl/min to 120 µl/min flow rate delivers consistent result
- Direct absolute cell counts

Automations Capabilities

- **Automated** Startup, Shutdown,
- Fluidic maintenance

Latest improvement

- **100,000** events/sec
- **Sample recovery**

15 L sheath and waste tanks

Automation Ready

NovoSampler Q

- tube rack, 24-, 48-, 96-, 384-well plates
- 20 mins for 96- well (HT);
- <84 mins for 384 well
- Integrated barcode reader
- Efficient mixing and rinsing
- Walk-away functionality

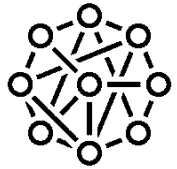
NovoCyte Opteon Spectral Flow Cytometer

Data with high sensitivity and high resolution

Syringe Pump Fluidics

- Exceptional fluidic stability consistent results, fast or slow
- Direct absolute cell counts
- **100,000 events/sec**
- Sample recovery
- 80nm small particle spec with dual side scatter

- **Coherent OBIS® lasers**
- **3-5 lasers** (349, 405, 488, 561, 637 nm)
- Up to 73 fluorescence channels



- Demonstrated panel of 45 colors
- **SEMROCK** optical filters
- Ensure data collected from specific filter

NovoSampler S

- tube rack, 24-, 48-, 96-, 384-well plates
- 20 mins for 96- well (HT);
- <84 mins for 384 well
- Integrated barcode reader
- **Efficient mixing and rinsing**
- Walk-away functionality

High instrument reliability

Hamamatsu Avalanche photodiode (APD) detecto

- Superior photon detection sensitivity - qNORM
- Resolve down to 0.08µm
- **7.2 log dynamic range**

Powerful and intuitive NovoExpress software

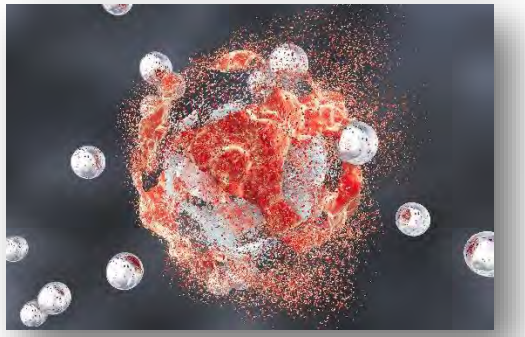
- **Data Analysis**
- Acquisition
- Reports (all at the same time)


15 L sheath and waste tanks

Automation ready

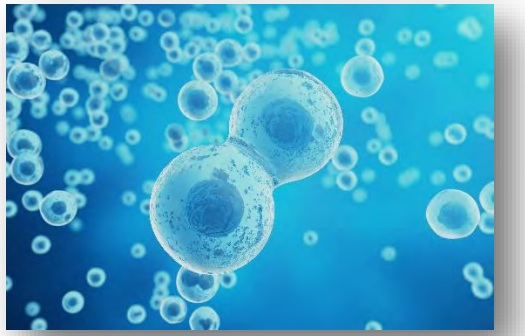
- Automated **Startup, Shutdown,**
- Fluidic maintenance

NovoCyte™ – Key Applications

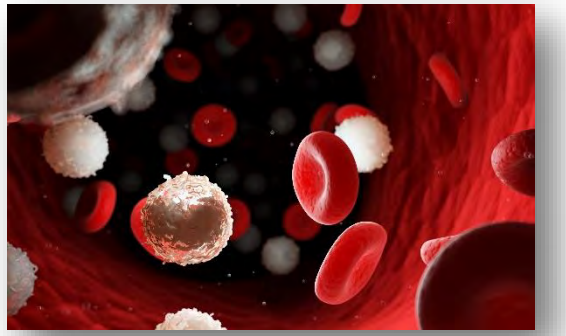


Basic Cellular Analysis

- Apoptosis
- Proliferation

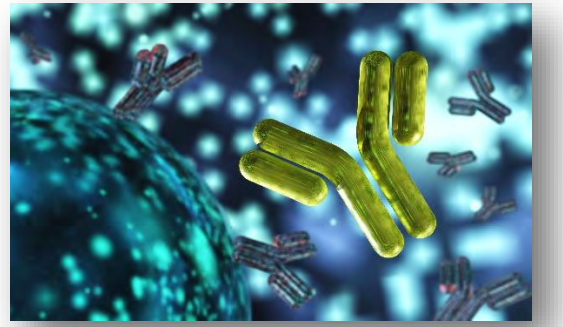


Cell Cycle Analysis

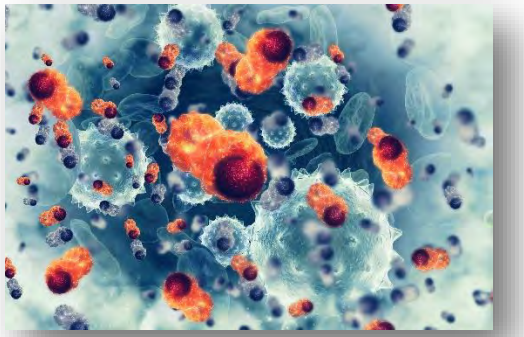


Immunophenotyping

- Up to 30 parameters
- FACS tubes to 96-well plates



Antibody Binding



Bead-based Multiplex Assay

- Bead-based ELISA
- Cell & bead together
- Cell or analyte barcoding

Small Particle Analysis

- Bacteria detection
- Sub-micron particles*

Clinical Tests

- HIV – absolute T-cell counts
- HSCT – CD34+ analysis

Thank you!

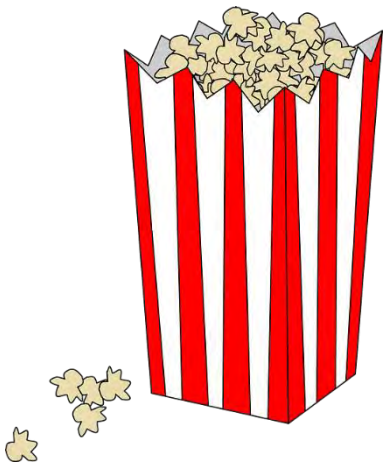
Technical Support:
T: 1-800-227-9770 | option 3, 8, 1
E: cellanalysis.support@agilent.com

More popcorn – Please!!!

20 NovoCyte Videos available at
www.Agilent.com

Support and resources>literature and Videos>Novocyte

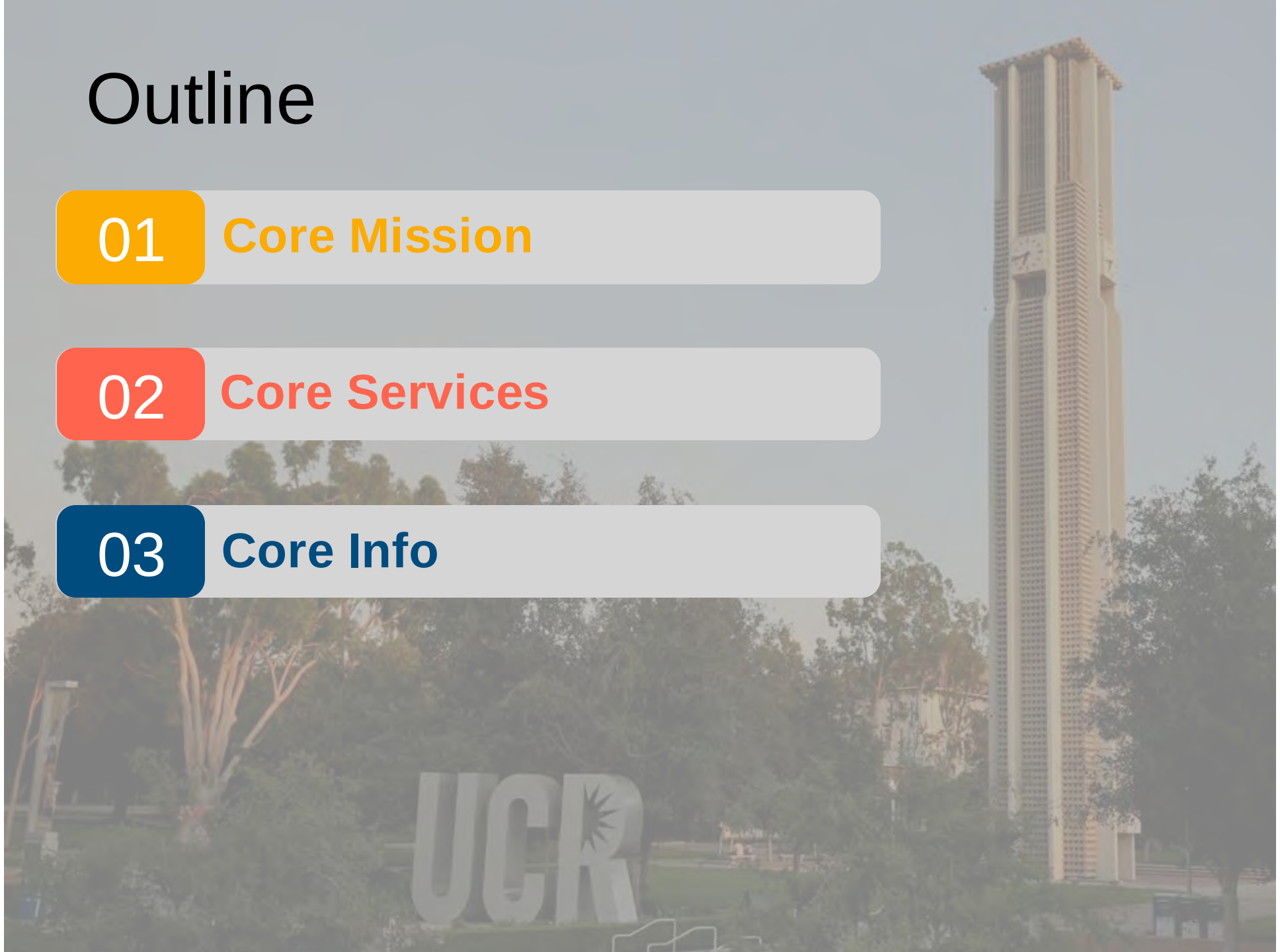
Search | Agilent



Bioinformatics Core

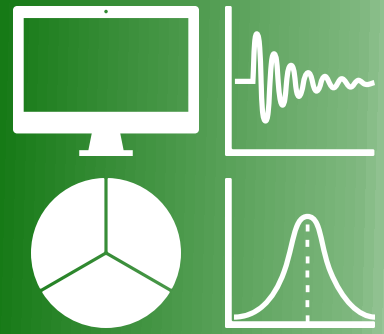

UC RIVERSIDE
Institute for Integrative Genome Biology
Bioinformatics Core
Bioinformatics Service, Training, and Partnership at UCR
IIGB Bioinformatics Core
October 13, 2025
Brandon Le

Outline



01 Core Mission

Provide exceptional service in reproducible computational data analysis

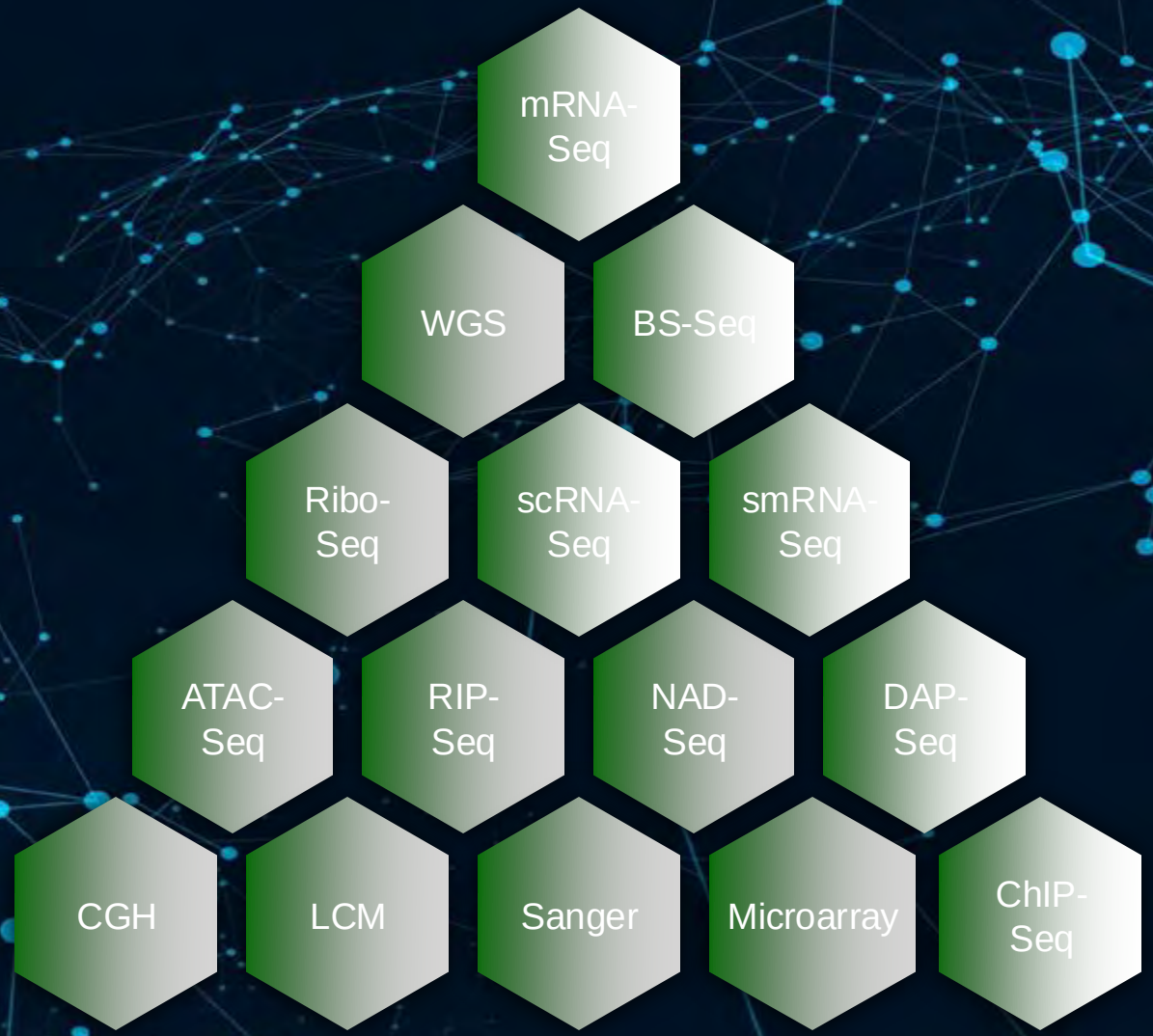


Provide training to the research community on current bioinformatics tools and techniques

Foster long term collaborations within the UCR research community

02 Core Services

Computational Data Analysis



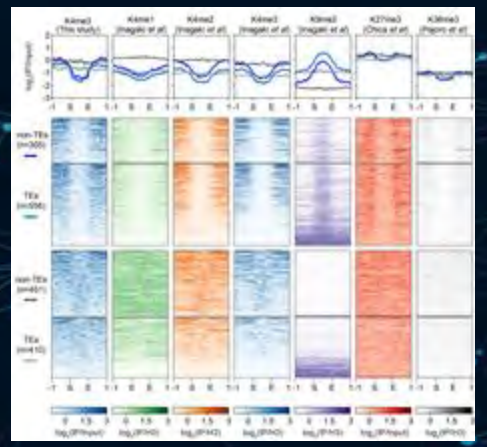
Custom Analysis

Image: freepik.com

02 Core Services

Computational Data Analysis

Wang and Le, et al. (2022) (PMID: 36427317)



ChIP-Seq

scRNA-Seq

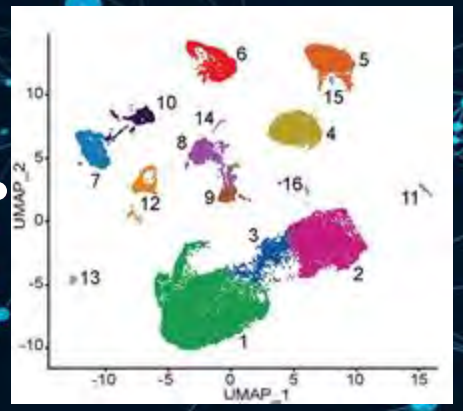
sRNA-Seq

mRNA-Seq

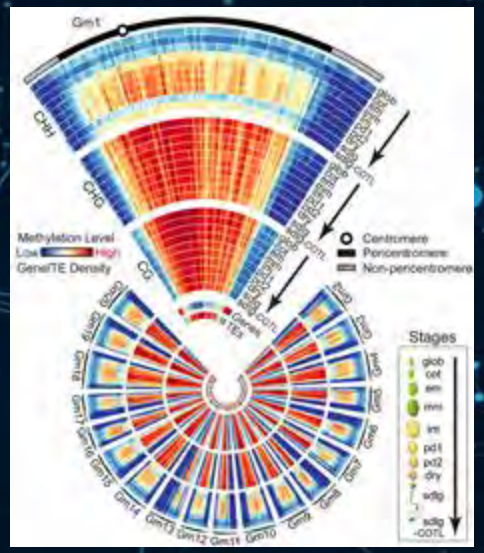
BS-Seq

Custom Analysis

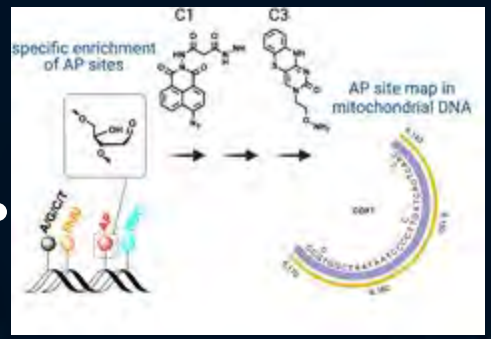
Ribo-Seq



Ruggiero-Ruff, Le, et al. (2023) (PMID: 38146776)



Lin and Le, et al. (2017) (PMID: 29078418)



Liu et al. (2023) (PMID: 37293974)

Image: freepik.com

Computational Infrastructure

High Performance Computing Center (http://hpcc.ucr.edu)

- > 6,500 CPUs
- 512 - 1024 GB RAM Nodes
- Two PB Storage
- Hundreds of tools installed

Bioinformatics Mac Pro

- 16-Core
- 192 GB RAM
- 36 TB Storage
- Hundreds of tools installed

Image: freepik.com

02 Core Services

Bioinformatics Training

https://github.com/bioinformatics-workshop

Tentative Topics	Tentative Dates
R and RStudio (Ondemand)	10/30/2025
Data Tidying with the Tidyverse	11/06/2025
Data Visualization with EsquisseR	11/20/2025
RNA-seq Data Analysis	12/11/2025

Image: freepik.com

02 Core Services

Office Hours

https://calendly.com/ucr_iigb_bioinfocore

- Daily from 2-3 PM
- Via appt (preferred) or drop in
- 1207G Genomics Building
- Zoom Session Available

- Code troubleshooting
- Data analysis issues
- Project consultation

Image: freepik.com

Summary

- Free project consultations
- Computational data analysis services
- Bioinformatics training workshops
- Open office hours daily (2 -3PM)

Make appts on Calendly
https://calendly.com/ucr_iigb_bioinfocore

Image: freepik.com

03 Core Info

UCR Bioinformatics

ucr-bioinformatics

bioinformatics@ucr.edu

https://facility.bioinformatics.ucr.edu

951-827-7990

1207G Genomics Building

Brandon Le

Bioinformatics Coordinator

brandon.le@ucr.edu

bhtle

Genomics Core

Genomics Core

Wei Zhang

Genomics Core, IIGB

UC RIVERSIDE | UNIVERSITY OF CALIFORNIA | Institute for Integrative Genome Biology

Location & Services

2nd Floor of Keen Hall Central Facility

Keen Hall Central Facility (10,000 ft^2)

Genomics Core

https://genomics.iigb.ucr.edu/

gencore@ucr.edu

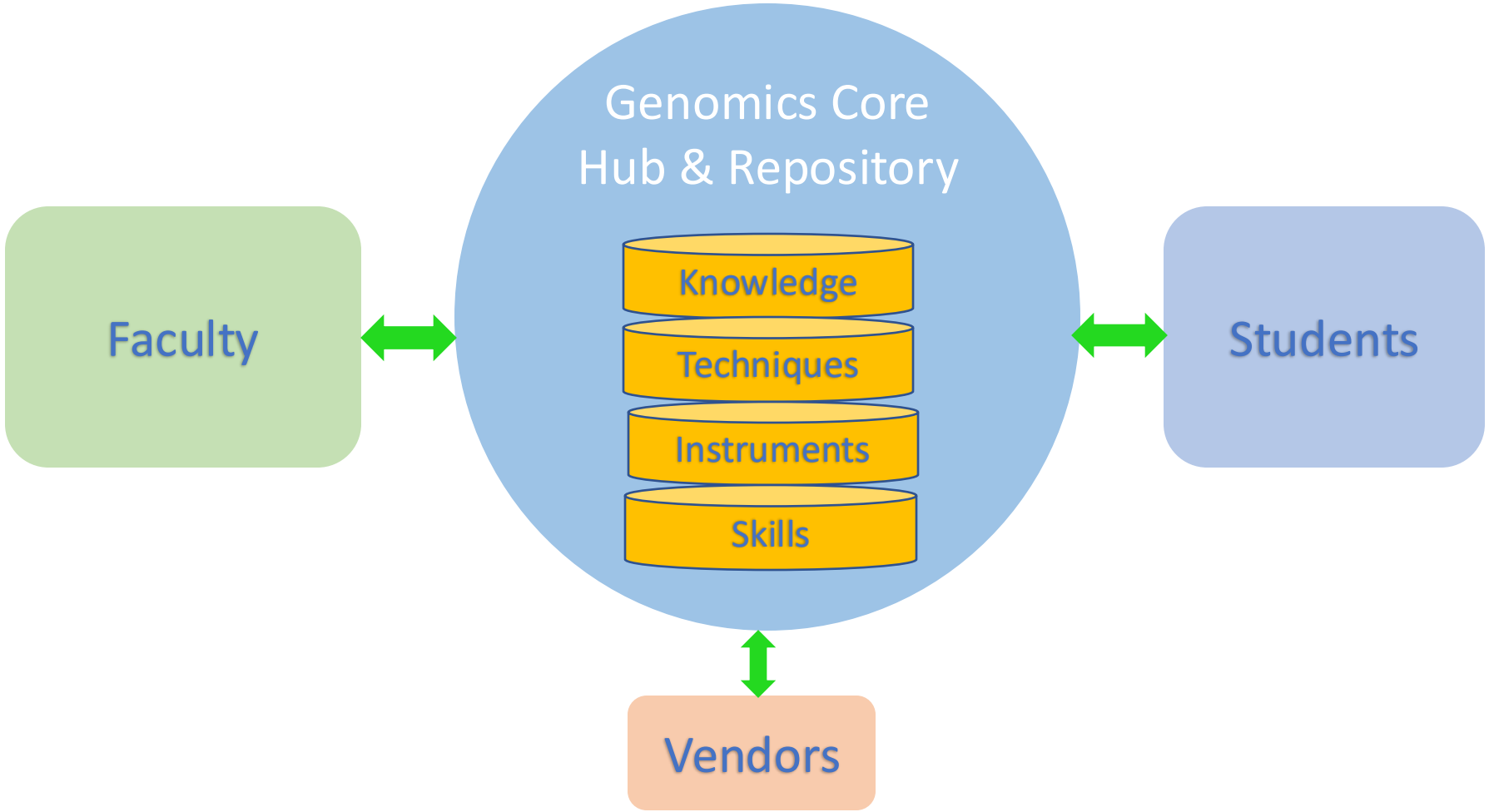
Technical Personnel

Wei Zhang
Coordinator

Holly Clark
Research Staff

Clay Clark
Research Staff

Vision and Mission



Sequencing Facility

Sanger sequencer

Applied Biosystems®
3730 XL Genetic Analyzer

- 200-1000 bp
- Accuracy
- Affordability for single gene studies
- Low-throughput

Sequencing Facility

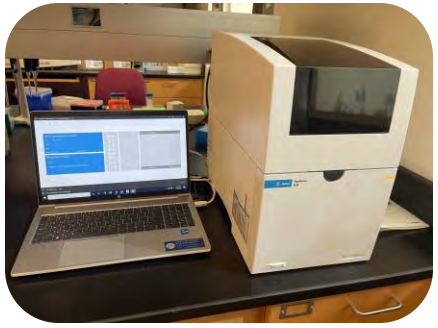
Next-generation sequencing (NGS)

Illumina®
MiSeq

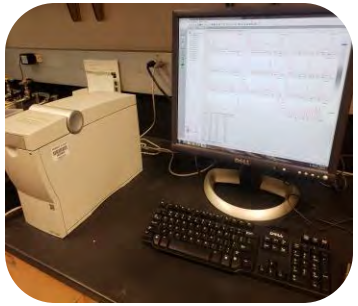
Illumina®
NextSeq 500

Illumina®
NextSeq 2000

- High-throughput
- Affordability
- Flexibility
- Scalability



TapeStation



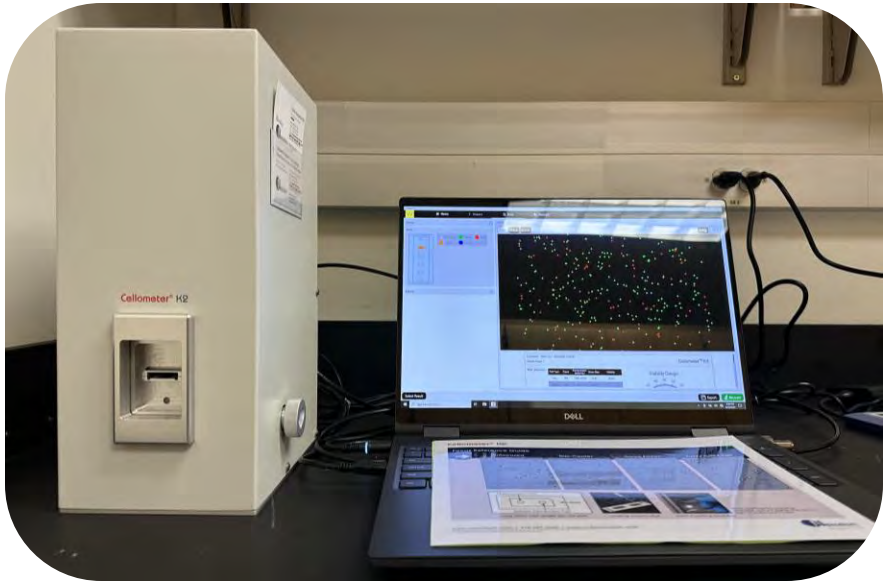
BioAnalyzer

Sequencing Facility

Single-cell sequencing

- Microfluidic instrument-based approach by 10x Genomics
- Split-pool approach by Parse Bioscience
- PIPseq by Illumina

10x Genomics®
Chromium X



Revvity®
Cellometer K2

Sequencing Facility

Long-read sequencing

PacBio®
Revio
Collaboration with UC Core facilities

- HiFi DNA sequencing
- IsoSeq
- Single-cell IsoSeq

LightBench®Discover

- High Molecular Weight DNA QC
- HMW DNA size selection
- Long-read DNA library QC & size selection

Sequencing Facility

Long-read sequencing

Oxford Nanopore Technology®
Flongle, MinION, PromethION P2 Solo, PromethION24

- Long-read DNA/RNA sequencing
- Direct RNA sequencing
- DNA methylation detection
- RNA modification detection

Services

IIGB Genomics Core Sales and Service Rate Schedule FY 2024-2025

SERVICES	FY25 Internal (UC) Rate	Unit Type
10X Cell/Nuclei counting & Viability Analysis	$ 111.00	/ slide
10X Genomics Chromium Instrument Use (per ChIP)	$ 325.00	/ chip
10X Genomics Single Cell Library Prep 3' GEX Add On	$ 2,009.00	/ library
10X Genomics Single Cell Library Prep 5' GEX Add On	$ 2,032.00	/ library
Advanced Analytics Fragment Analyzer (per 12 samples)	$ 61.78	/ per 12 sample
AVITI 300 cycle flow cell	$ 2,000.00	/ flowcell
AVITI 600 cycle-High	$ 3,300.00	/ flowcell
AVITI 600 cycle-Medium	$ 2,200.00	/ flowcell
Bioanalyzer - DNA HS	$ 90.00	/run
Bioanalyzer per Sample DNA HS	$ 9.00	/ sample
Bioinformatics Data Analysis	$ 90.00	/ hour
Biorad Gel Doc EZ	$ 6.00	/ hour
Bioruptor (sonicator for DNA shearing)	$ 20.00	/ hour
Blue Pippin(DNA/RNA size selection)	$ 29.00	/ hour
Cell/Nuclei counting	$ 20.00	/sample
Centrifuge	$ 10.00	/hour
ChIP Seq library Prep	$ 98.00	/library
Consultation Charge	$ 90.00	/ hour
Corvaris Ultra Sonicator	$ 15.00	/ usage
ddPCR (Per 8 Samples)	$ 49.00	/8 samples
DNase Treatment	$ 20.00	/ hour
Genomics Entry key FOBs	$ 25.00	/ fob
HMW DNA Cleanup & QC	$ 193.00	/ library
HMW DNA Isolation & QC	$ 824.00	/ library
HMW DNA shearing by g-TUBE	$ 50.00	/ library
HMW DNA Size Selection & QC	$ 50.00	/ library
Illumina 10 Gb/35M reads Additional Data	$ 75.00	/ unit
Illumina MiSeq 150bp (75 bp paired end)	$ 1,388.00	/ lane
Illumina MiSeq 300bp (150 bp paired end)	$ 1,545.00	/ lane
Illumina MiSeq 500bp (250 bp paired end)	$ 1,702.00	/ lane
Illumina MiSeq 600bp (300 bp paired end)	$ 2,234.00	/ lane
Illumina MiSeq Nano V2 (300 cycles)	$ 560.00	/ lane
Illumina MiSeq Nano v2 (500 cycles)	$ 660.00	/ lane
Illumina NextSeq 2000 - P1 100 cycle (50 PE or 100 SR)	$ 1,102.00	/ lane
Illumina NextSeq 2000 - P1 300 cycle (150 PE)	$ 1,404.00	/ lane
Illumina NextSeq 2000 - P1 600 cycle (300 PE)	$ 1,965.00	/ lane
Illumina NextSeq 2000 - P2 100 cycle (50 PE or 100 SR)	$ 1,504.00	/ lane
Illumina NextSeq 2000 - P2 200 cycle (100 PE)	$ 2,539.00	/ lane
Illumina NextSeq 2000 - P2 300 cycle (150 PE)	$ 3,262.00	/ lane
Illumina NextSeq 2000 - P2 600 cycle (300 PE)	$ 3,522.00	/ lane
Illumina NextSeq 2000 - P3 100 cycle (50 PE or 100 SR)	$ 2,841.00	/ lane
Illumina NextSeq 2000 - P3 200 cycle (100 PE)	$ 3,809.00	/ lane
Illumina NextSeq 2000 - P3 300 cycle (150 PE)	$ 4,970.00	/ lane
Illumina NextSeq 2000 - P3 50 cycle (25 PE or 50 SR)	$ 2,813.00	/ lane
Illumina NextSeq 2000 - P4 100 cycles (50 PE or 100 SR)	$ 3,238.00	/ flowcell
Illumina NextSeq 2000 - P4 200 cycles (100 PE)	$ 4,444.00	/ flowcell
Illumina NextSeq 2000 - P4 300 cycles (150 PE)	$ 5,568.00	/ flowcell
Illumina NextSeq 2000 - P4 50 cycles (25 PE or 50 SR)	$ 2,267.00	/ flowcell
Illumina NextSeq High Output 150bp Paired End	$ 5,984.16	/ lane
Illumina NextSeq High Output 150bp Single End/ 75bp Paired End	$ 3,833.94	/ lane
Illumina NextSeq High Output 75bp Single End	$ 2,134.22	/ lane
Illumina NextSeq Mid Output 150bp Paired End	$ 2,476.48	/ lane
Illumina NextSeq Mid Output 150bp Single End/75bp Paired End	$ 1,643.76	/ lane
Library Amplicon	$ 24.00	/ library
Library Bead Clean Up	$ 12.00	/ library
Library Pooling	$ 6.00	/ library
Library Prep - DNA	$ 66.00	/ library
Library Prep - RNASeq polyA	$ 72.00	/ library
Library Prep - RNASeq Ribo-deletion	$ 148.00	/ library
Library QIASeq miRNA	$ 223.00	/ library
Library RNA/DNA Extraction	$ 28.00	/ sample
Low input RNA Seq liberary Prep (Takara Kit)	$ 228.00	/ library
Luminometer - Promega Multi+ Reader w/ dual injectors	$ 11.00	/ hour
Luminometer Turner	$ 7.00	/ hour
Nanodrop spectrophotometer	$ 0.50	/ sample
Nanopore Barcoded cDNA-Seq Library Prep (<= 6 samples)	$ 2,145.00	/ library
Nanopore Barcoded Library Prep & Sequencing (<= 6 samples)	$ 2,145.00	/ library
Nanopore Library prep & Sequencing - 1 sample	$ 1,320.00	/ library
Nanopore Library Prep & Sequencing - Flongle	$ 350.00	/ library
PacBio Amplicon Library Pool (or <10 Kb)	$ 327.00	/ library
PacBio HiFi Library Prep	$ 550.00	/ library
PacBio IsoSeq Library Prep	$ 394.00	/ library
PacBio Kinnex Array Prep	$ 653.00	/ reaction
PacBio Revio Sequencing (Formerly: PacBio Sequel II Sequencing *NEV	$ 1,500.00	/ flowcell
Parse Bio sc Library Prep (Fixed cell, per 10k cells) Add On	$ 1,513.00	/ library
Phosphor Screen Rental	$ 2.00	/day
PicoGreen Quantification (Per Plate)	$ 126.00	/ plate
PicoGreen Quantification (Per Half Plate)	$ 72.00	/ half plate
Plasmid Seq - Plate (> 48 samples)	$ 14.00	/ sample
Plasmid Seq - Sample	$ 16.00	/ sample
PlateReader-SpectraMax iD5	$ 15.00	/ hour
Q-PCR	$ 8.00	/ hour
qPCR Library Quantification	$ 10.00	/ sample
qPCR optical sealers	$ 13.00	/ order (10 min)
qPCR plate	$ 16.00	/ order (5 min)
qPCR reagent (SYBR SM)	$ 12.00	/ order (10 min)
Qubit Fluorometer(nucleic acid/ protein quantification)	$ 1.50	/ sample
Robot Opentrons	$ 30.00	/ hour
Sanger Seq. - Plate - Seq reaction + DNA Seq., 48 or more	$ 3.80	/ sample
Sanger Seq. - Tube - Seq reaction + DNA Seq	$ 4.80	/ sample
TapeStation - DNA HS	$ 9.00	/ sample
TapeStation - gDNA	$ 11.00	/ sample
TapeStation - RNA	$ 9.00	/ sample
Typhoon Fluorescence imager	$ 10.00	/ hour

Microscopy and Imaging Core

Microscopy and Imaging

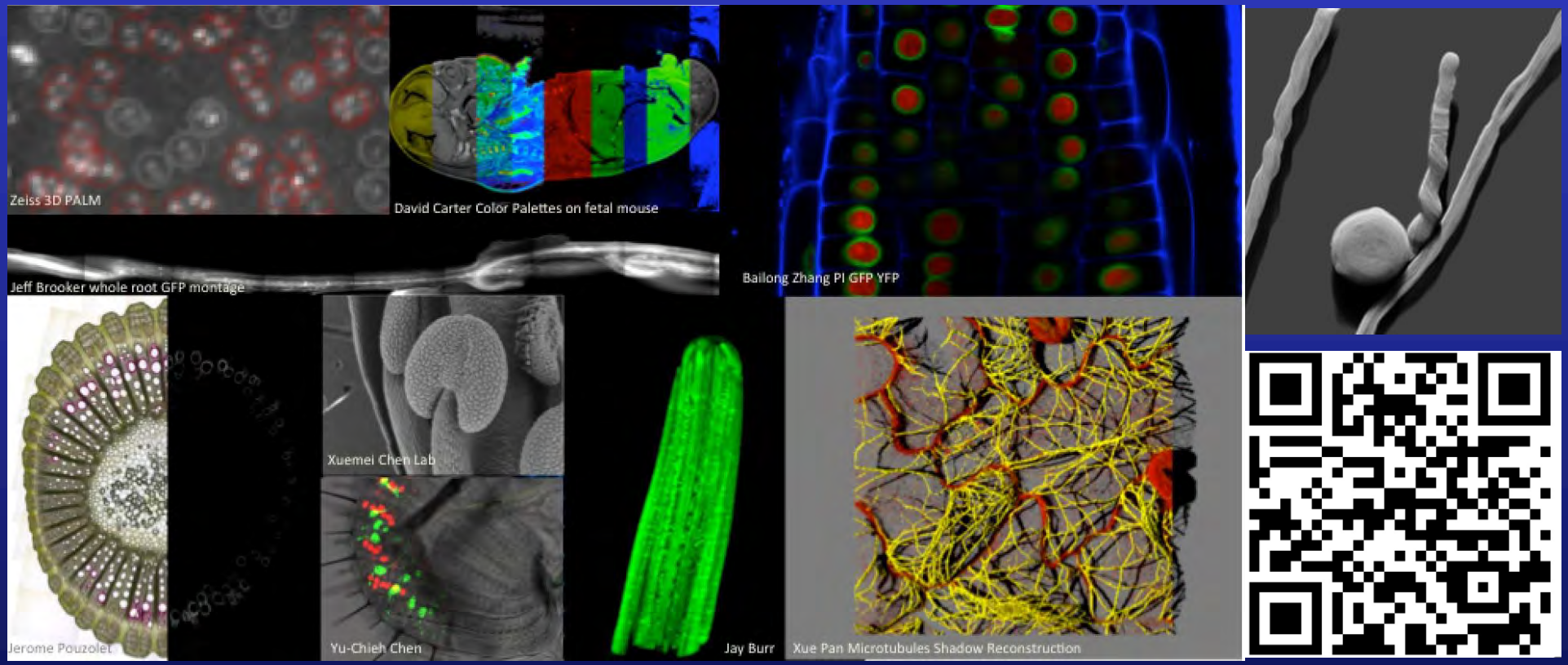
- Fluorescence Microscopes
- Confocal Microscopes
- Scanning Electron Microscope
- Macro Imaging

David Carter, M.A., Ph.D.

2025 Keen Hall. dcarter@ucr.edu

o.951 827 2694; c.951 850 2559

Microscopycore.ucr.edu



Dark Box

Keyence VHX-7000 3D Imager

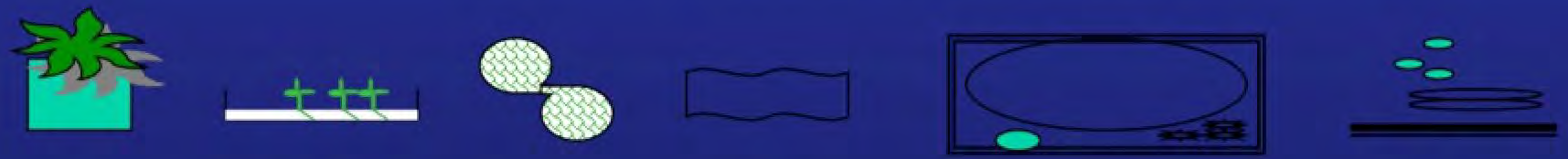
Dissection Microscope

Keyence BZ-X710 & Incubator

Leica SP5, Zeiss 880

Zeiss 880 Airyscan

Hitachi TM4000PlusII Scanning Electron Microscope

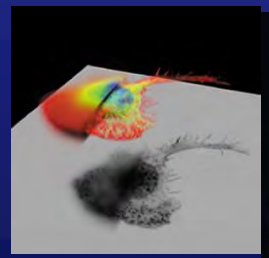


Microscopy Resources

- Confocal Microscopes
  - Zeiss 880 Airyscan Upright & Inverted with incubator & spectral sensor
  - Leica SP5 confocal
- Non-Confocal Microscopes
  - Stereo Microscope w/ Fluorescence
  - Keyence all-in-one inverted microscope
- Macro Imaging
  - Nightsea Fluorescence light source & filters
  - Luminescence Dark Box
  - Keyence VHX-7000 Upright 3D imager
- Scanning Electron Microscope
  - Hitachi TM4000 with critical point dryer and sputter coater
- Supporting Hardware
  - Ultramicrotome, Vibratome
  - Analysis Software, Imaris Bitplane
  - Micromanipulator
  - Growth Chamber
  - Gene Gun





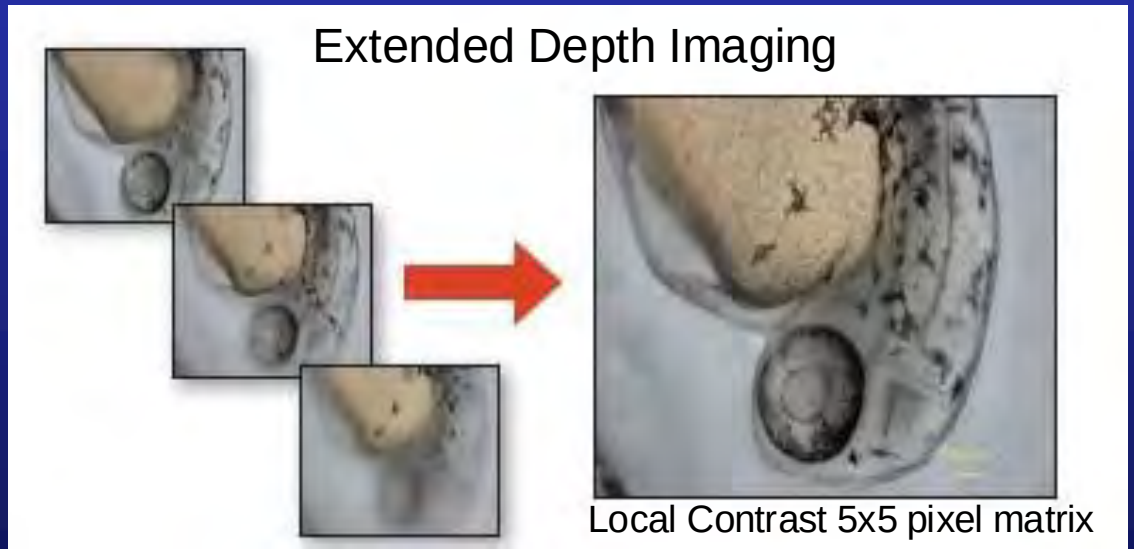



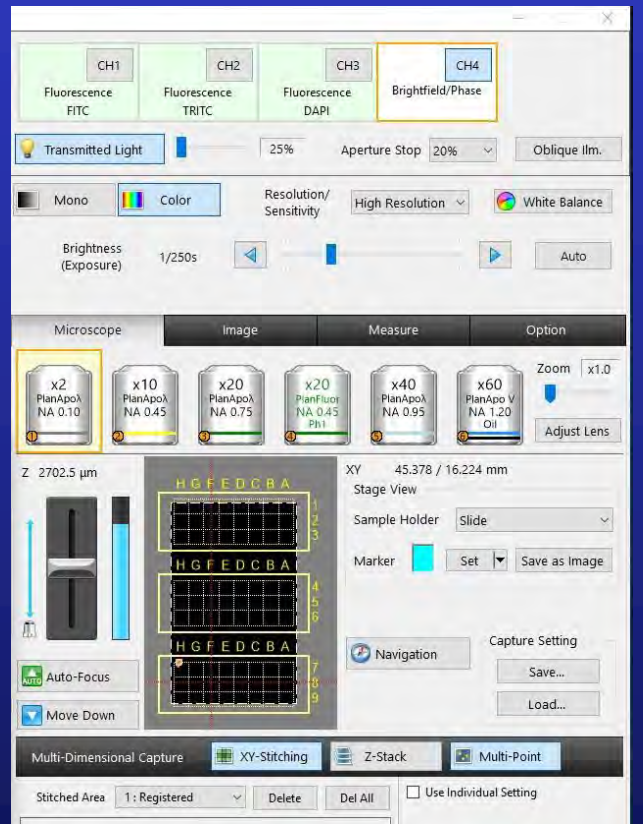

Ease of Use v. Performance

Any kid can do it v. World-beating Performance

Keyence BZ-X710 All-In-One

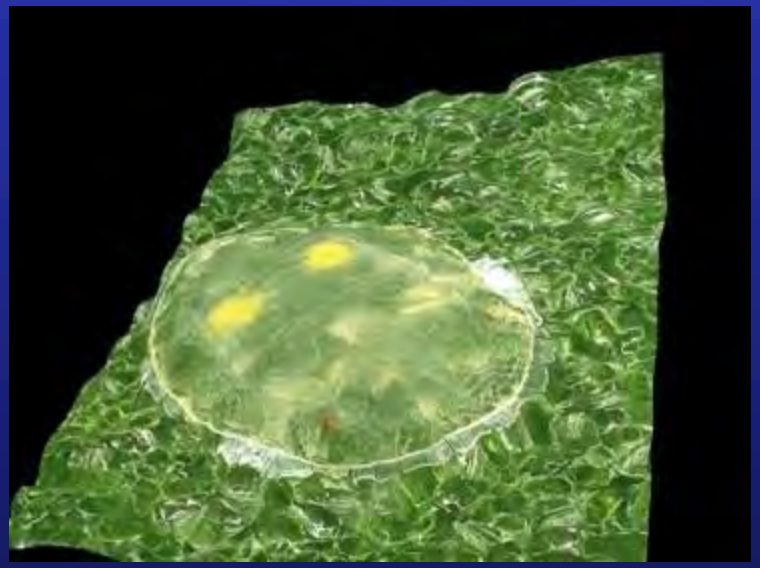
- Simple to operate inverted microscope
  - Climate controlled stage incubator
  - Dry and (for us) water lenses; 2x-60x
  - built-in color and b/w camera
  - Tiling, kinetics, video capable



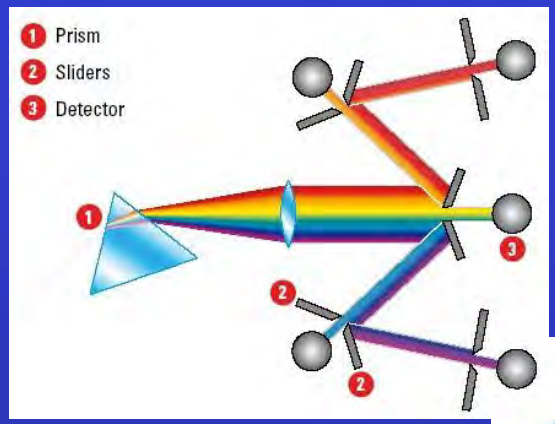


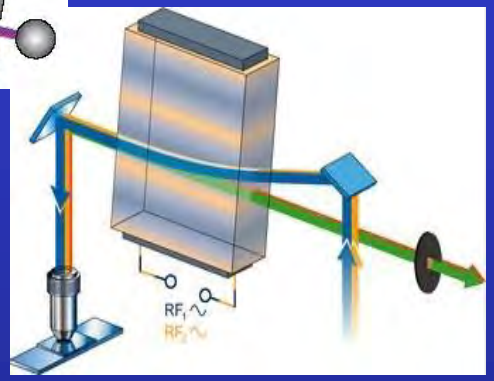
Keyence VHX-7000 Stereo Scope

- Camera-Based 20x-2500x
  - Topographic Projection
  - Extreme Pixel Tiling to 40mm
  - Nightsea Fluorescence Option



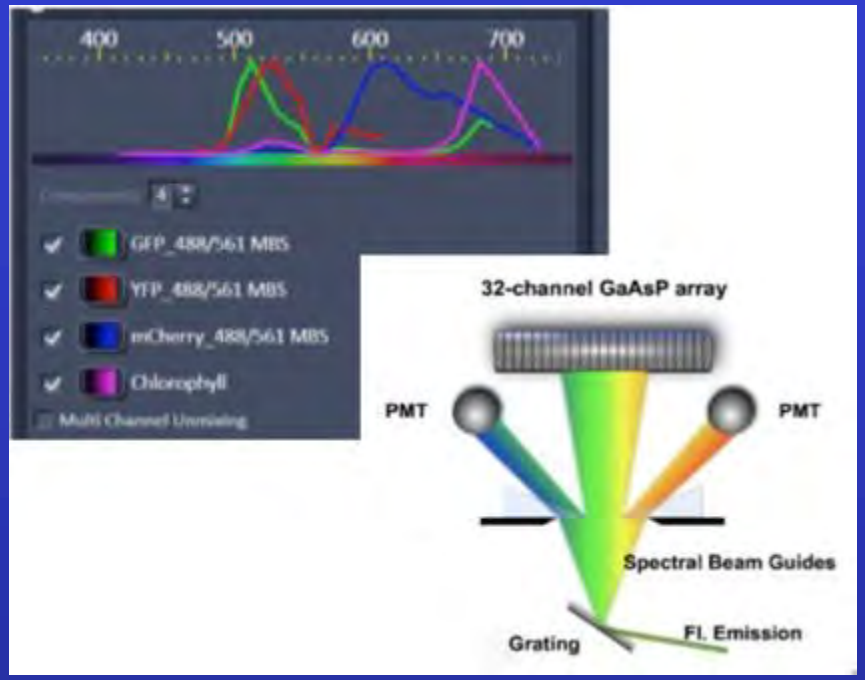
Leica SP5 Confocal



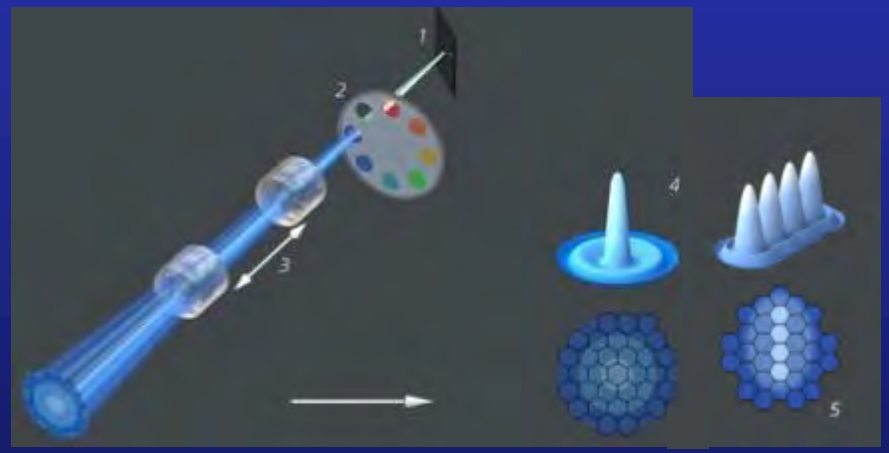


- Any laser line - any emission range scanner
- AOBS only reflects exact laser lines
  - Standing sound wave diffracts laser color
  - Different frequency for each line

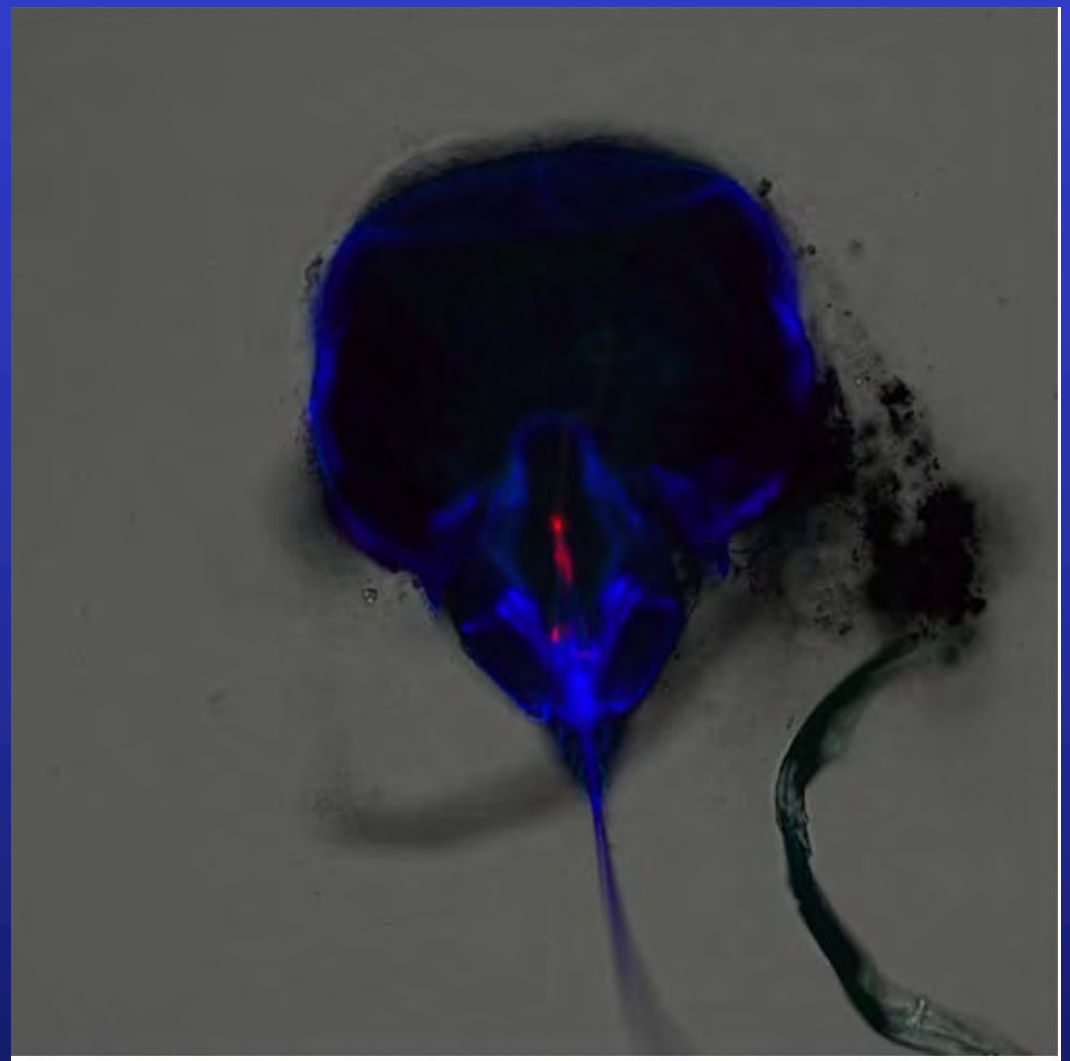
Zeiss 880 Airyscan Fast Confocals



- Spectral imaging
  - Collects 32 colors simultaneously
  - Auto-unmixes overlapping dyes
- Airyscan 70% higher resolution
  - Collects 32 facets simultaneously
- AiryFast 50% sharper 10x faster



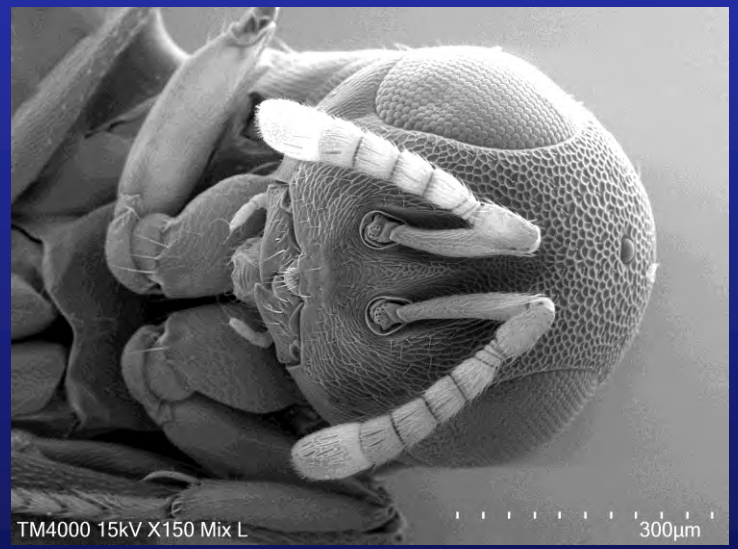
Lambda Mode / Spectral Unmix Example

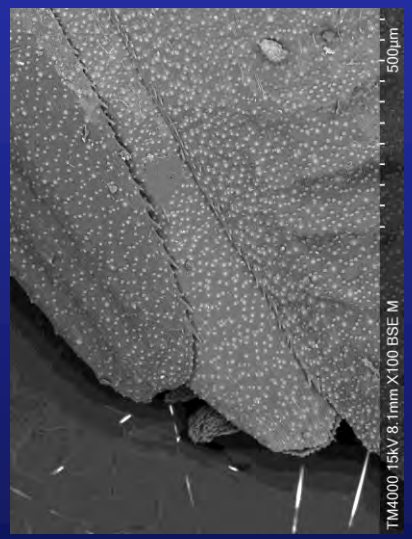


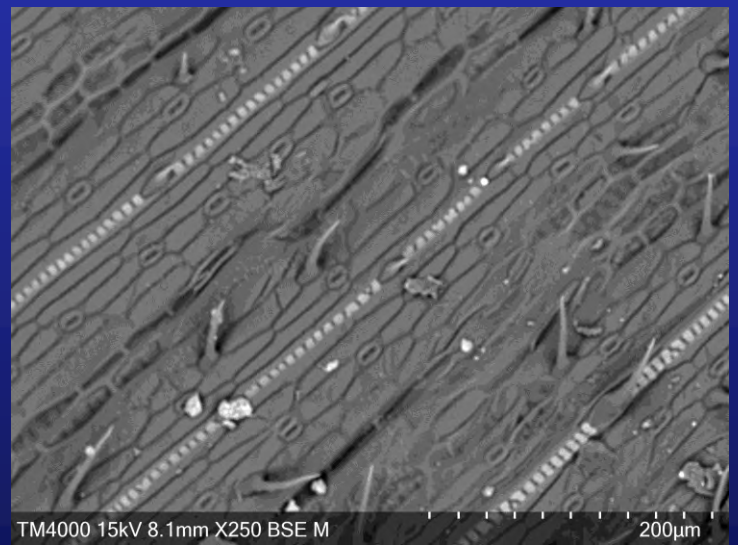
Spectral Unmix separation of Whitefly autofluorescence (Blue) to reveal red labeled virus in pharynx

Hitachi TM4000Plus-E II SEM

- Optical Navigation
- Fresh, Frozen, Au coated sample
- 10x-100,000x
- BSE, SE, CL, and STEM
- Variable Vacuum, Current, Volts
- 5, 10, 15, 20 kV

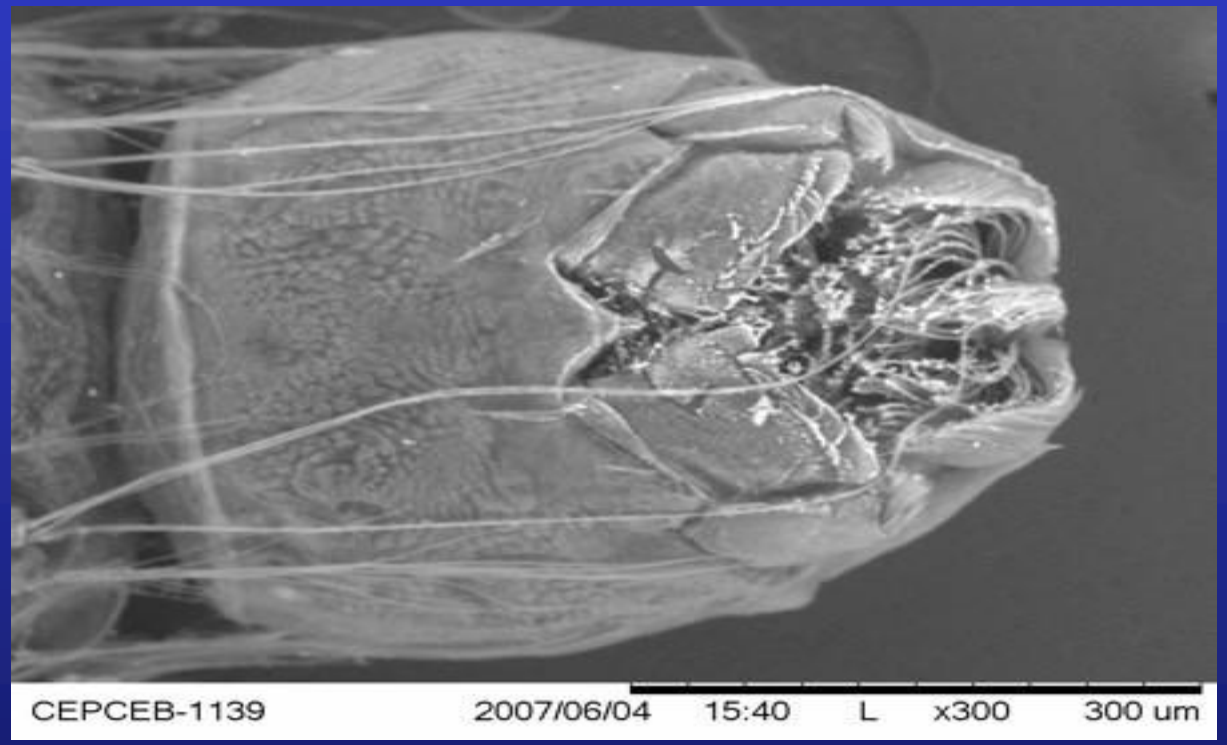






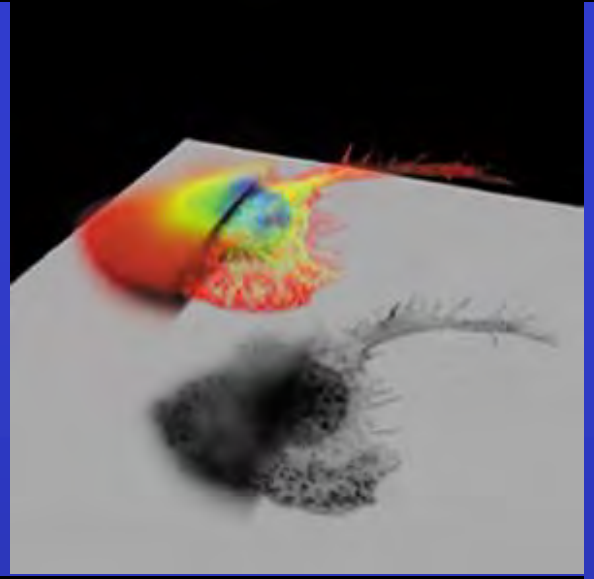
Hitachi TM4000PlusE II SEM

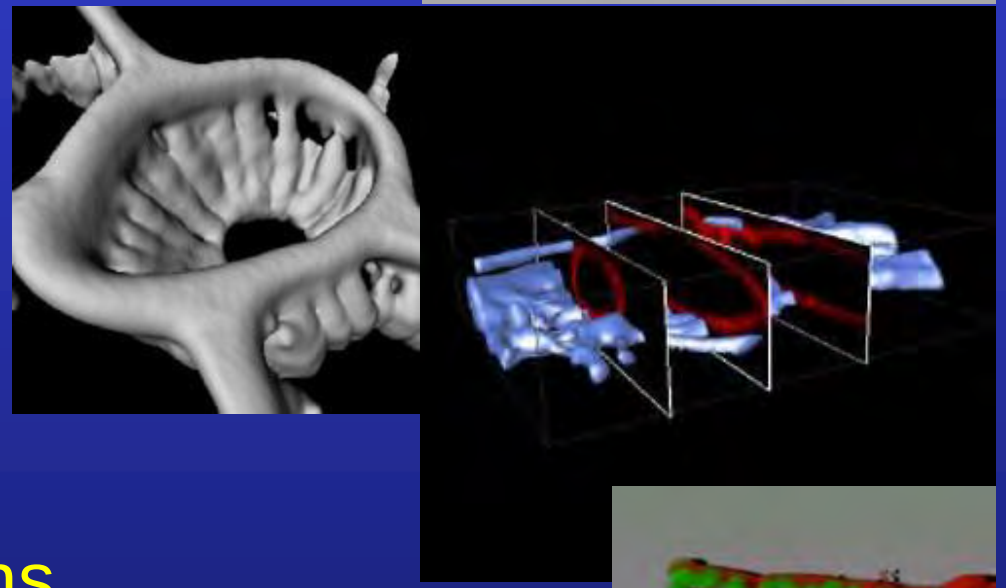
Can see musculature inside head capsule of 1st instar; parasites under skin

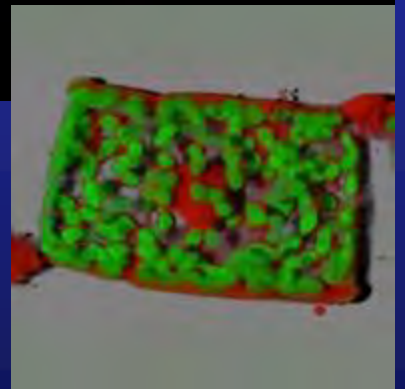


Bitplane 3D Software

- Accepts Leica & Zeiss files
- Accepts stacks of TIFFs, not Jpegs



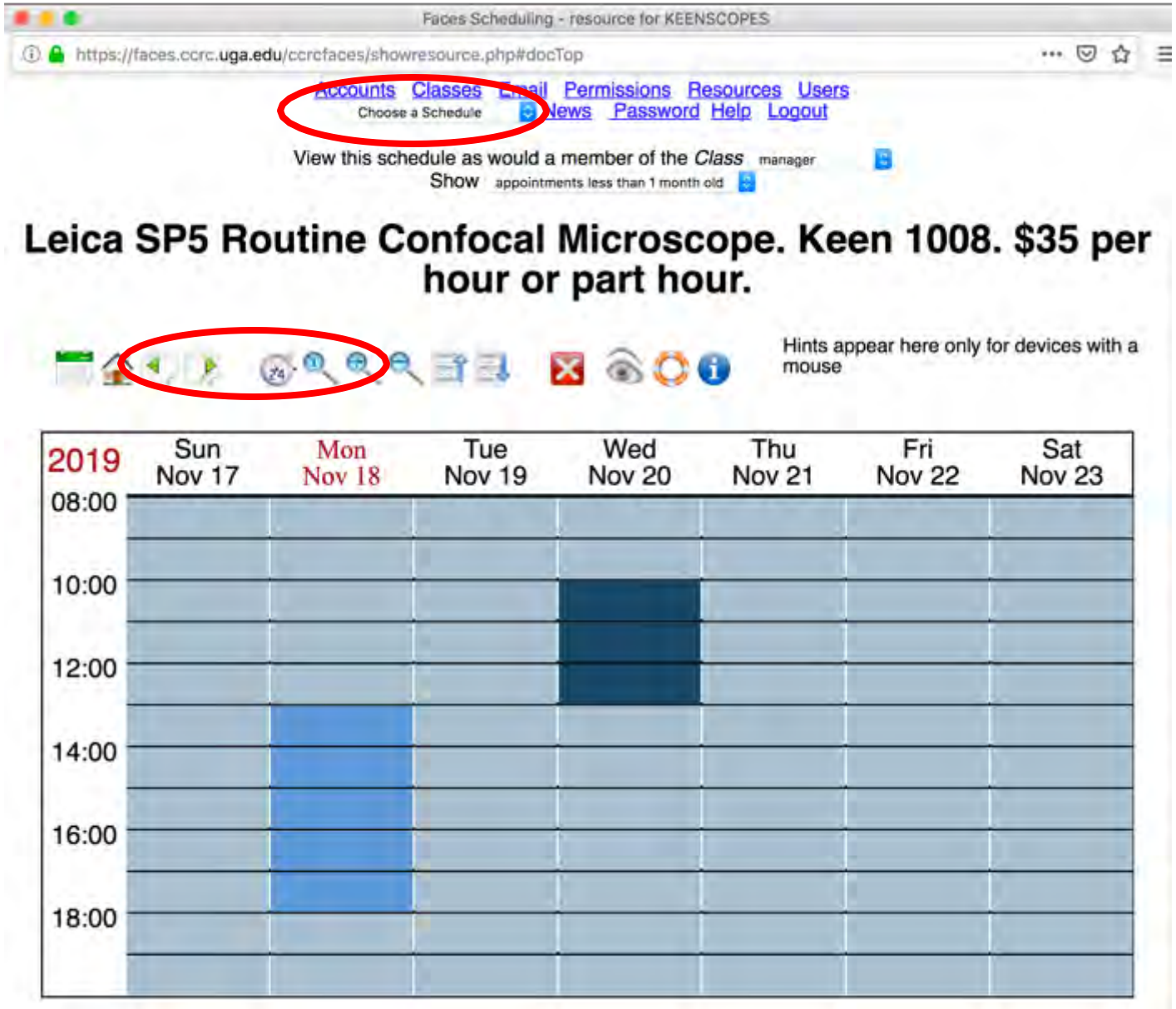




- Interactive 3D rendering
- Plug-in Code Modules
- Surface Rendering
- Tumbling movie loops & fly-throughs
- Quantitiation, including colocalization

Booking Site: faces.ccrc.uga.edu

- Choose schedule
- Page over to week; click (-) or (24) to see more hours
- Click on start hour, then end hour
- Click OK OK to save booking
- Confocal bookings are firm within 24h
- Other resources are unrestricted



Plant Transformation Research Core

Plant Transformation Research Center
Services, Training and Research

Presented by

William Hsu, Assistant Specialist and
Martha L. Orozco-Cárdenas, Ph.D.
Director - PTRC

October 13, 2025

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PTRC's Mission

- Facilitates the research of scientists investigating gene function
- Provide cost-effective access to cellular, biochemical and molecular methods utilized in the production and analysis of genetically modified plants
- Serve as a resource in training students, post docs, and staff
- Research on efficient procedures for transforming plants of interest to UCR researchers and the plant biotechnology industry

Space Tomatoes

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Services

- Provide centralized facilities, state-of-art equipment, materials and expertise in plant transformation to multiple research groups at UCR and abroad
- Consultation and training in the application of different technologies in genetic transformation and molecular analyses of both monocot and dicot plant species
- Provide assistance in the transformation process
- Carry out contract transformation and tissue culture services from gene to seed

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Types of Services

1. Contract Service (Established protocols)

- Rate/hour (duration depends on the species)

2. Quarterly registration (Students and postdocs)

- Fix rate/quarter
- Provide access to facilities and equipment
- Training

3. Research Collaborations (Basic and applied research/recalcitrant species)

- Academia
- Industry

Visit https://ptrc.ucr.edu/

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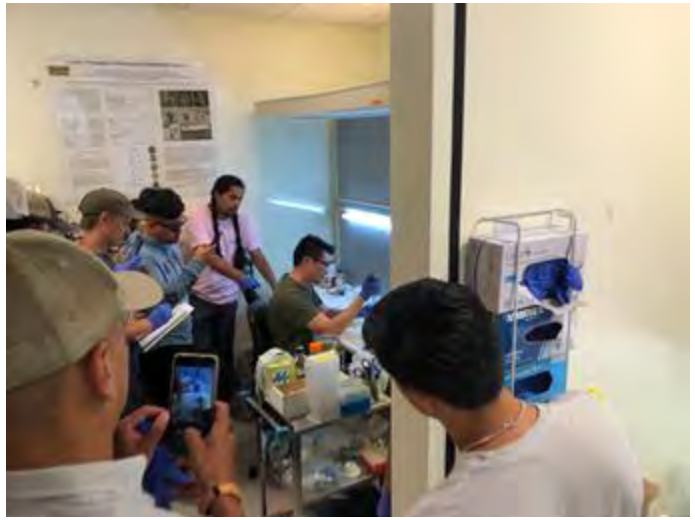
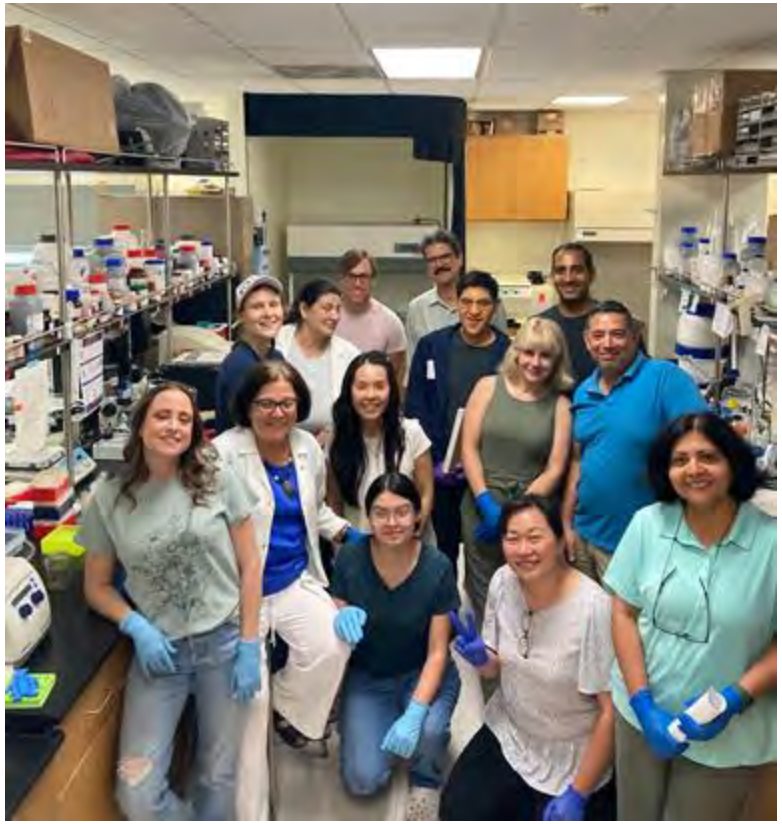
Training

- Individual mentorship and group training in plant cell biology, transformation and gene editing technologies
- Workshops, tours and community outreach activities
- With UCR technology partnerships fostered innovation beyond research and education in modern agriculture





PTRC's plant cell biology courses for the "Zero-to-Entrepreneur Certificate Program in Modern Agriculture" organized with UCR technology partnerships and Extension.

PTRC Available Resources

- Expert personnel support
- Tissue culture lines for instruction and experimentation
- Plasmid DNA and bacterial strain collection useful in plant transformation
- Computer controlled growth facility
- Seven laminar flow hoods
- Particle delivery system
- Tissue culture, plant transformation, and molecular biology documentation and techniques.
- Two tissue culture rooms, one large growth room, and two Bl-2 greenhouses
- Growth chambers
- Imaging room with Epifluorescence optical microscopes equipped for GFP analysis of cells and tissues

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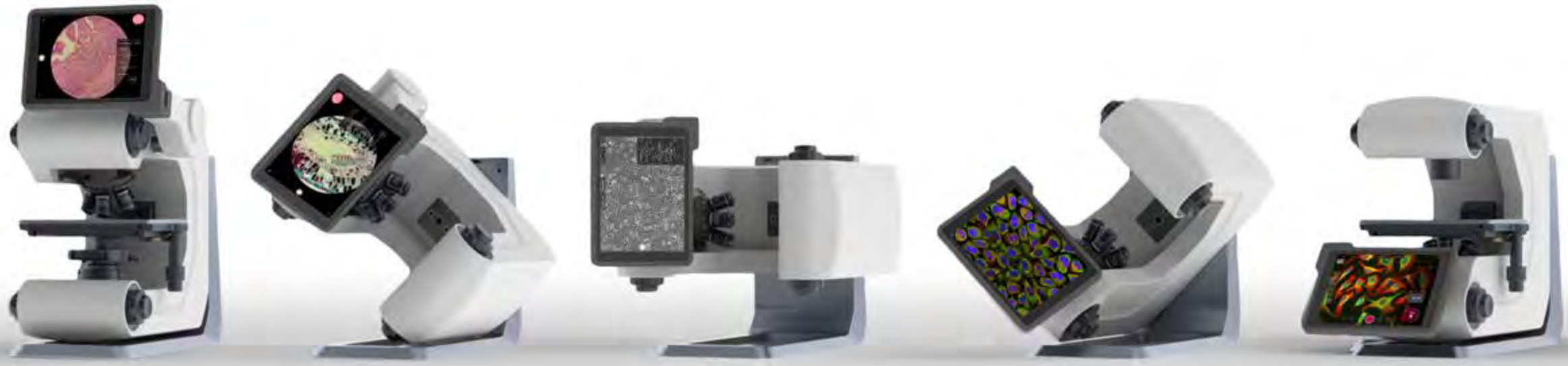
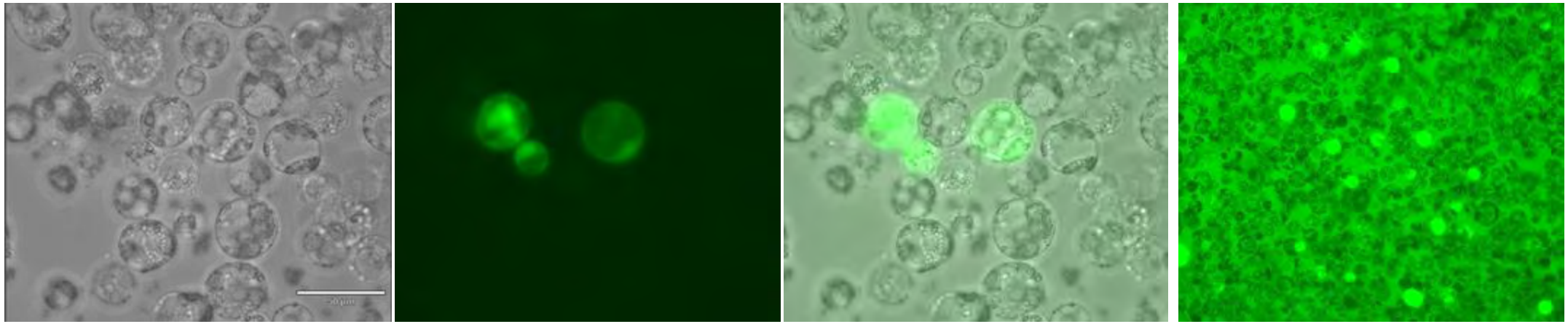
ECHO Rebel Hybrid Microscope



Quickly switch from upright to inverted.
Z-stacking: capture multiple focal planes with ease
Cameras: Brightfield and fluorescence (red, blue, and green)



Expression of the green fluorescent protein gene in transfected protoplasts

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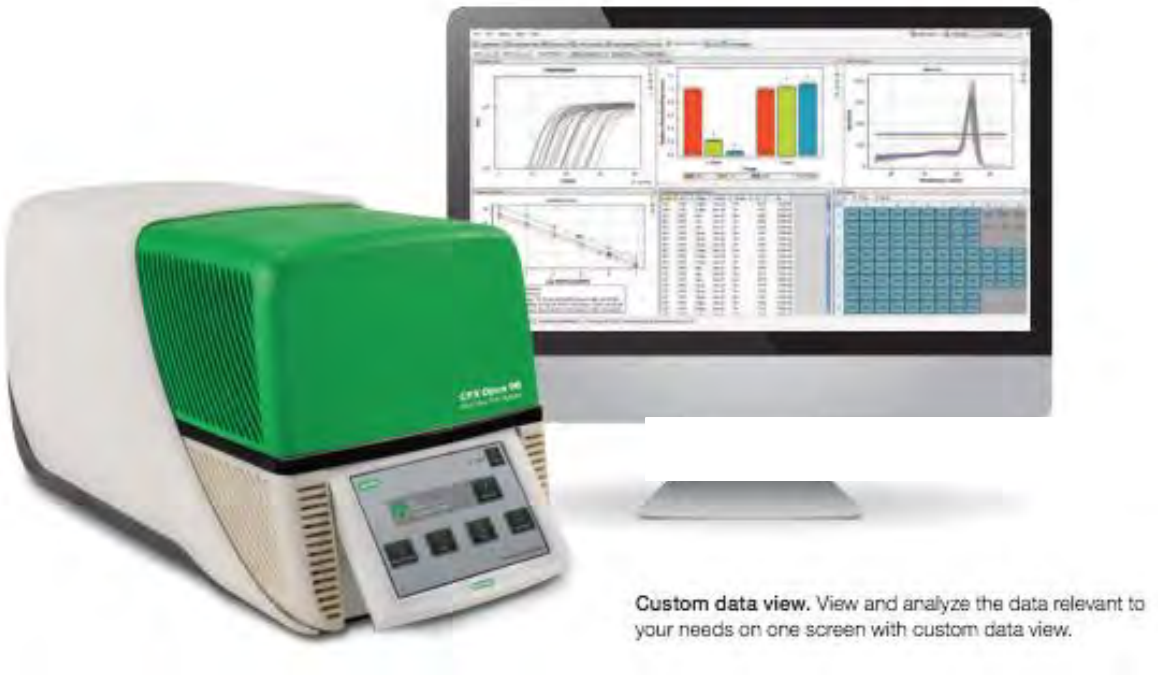
Available Resources



Real-time PCR, software, and iMac (Retina 5k; 27-inch) workstation for data analysis.

State of the art growth chambers.
Used to grow plants *in vitro* or *ex vitro*.

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Plant Transformation Systems

DNA Transfer Systems

Agrobacterium

Biolistics

Polyethylene glycol (protoplasts)

In planta (floral dip)

Target Tissue

Seedling explants

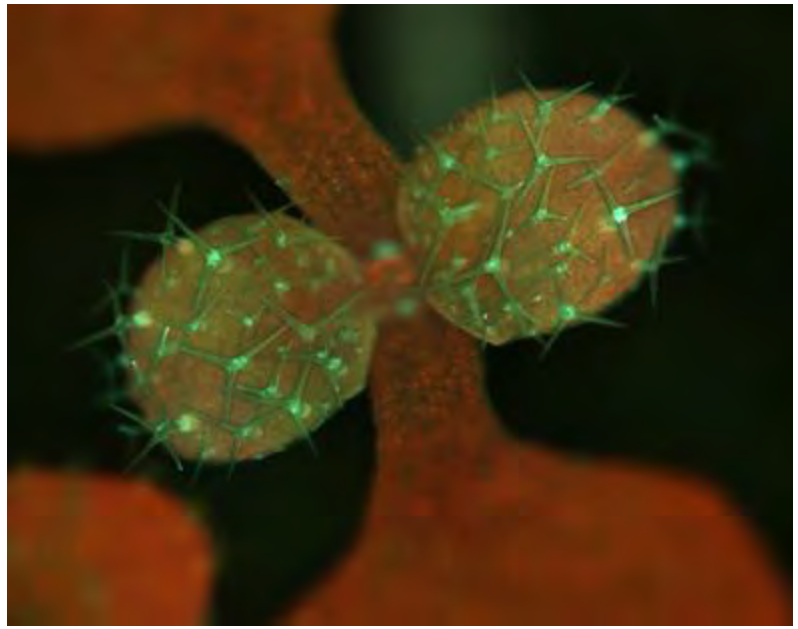
Inflorescences

Meristem/Shoots

Embryos (zygotic/somatic)

Cell cultures/Calli

Protoplasts



Plant Species Transformed at the PTRC

- Tomato (*Solanum lycopersicum*)
- Tomatillo (*Physallis* spp.)
- Arabidopsis (*A. thaliana*)
- Potato (*Solanum tuberosum*)
- Citrus (*Citrus spp.*)
- Tobacco (*Nicotiana tabacum and N. benthamiana*)
- Canola (*Brassica napus*)
- Alfalfa (*Medicago sativa*)
- Lettuce (*Lactuca sativa*)
- Rice (*Oryza sativa*)
- Poplar (*Populus spp*.)
- Nightshade (*Solanum nigrum*)
- Camelina (*C. sativa*)

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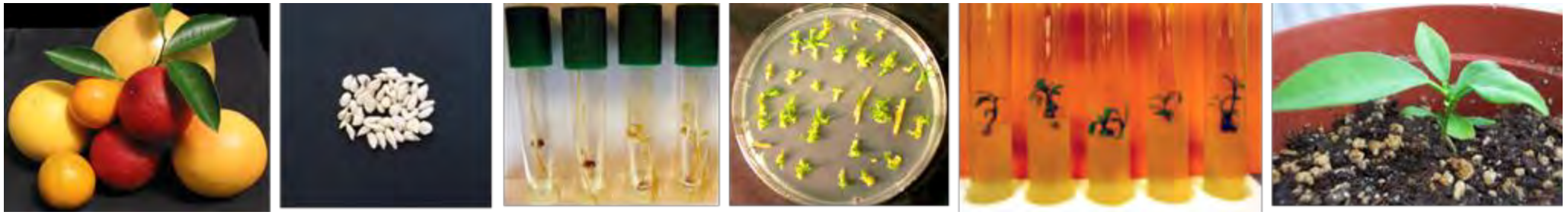
Research Topics in Plant Transformation

- AGRO-TRANSFORMATION OF RECALCITRANT CROP SPECIES
- GENOME EDITING USING CRISPR/CAS TECHNOLOGIES
- DELIVERY OF CRISPR RIBONUCLEOPROTEIN COMPLEXES (RNPS) TO PROTOPLASTS
- APPLICATION OF TRANSFORMATION SYSTEMS TO ELITE CULTIVARS
- UNDERSTANDING AND CONTROL OF TRANSGENE INTEGRATION AND EXPRESSION (copy number, levels and stability of expression)
- APPLICATION OF NEW GENE-DELIVERY TECHNOLOGIES
- ESTABLISHMENT OF TRANSFORMATION SYSTEMS USING MINIMAL TISSUE CULTURE



Citrus transformation

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Current Research

- **Production of Small Plants for Agriculture in Controlled Environments (SPACE Tomatoes*/NASA)**
- **Generation of non-transgenic HLB-resistant varieties using novel CRISPR/Cas gene-editing technologies (USDA-NIFA)**
- **Metabolic modeling to improve growth and transformation of Citrus tissue cultures (CDFA)**
- **Production of homozygous *Camelina* transgenic plants (ISCA, Inc.)**

* SPACE Tomatoes growing in our greenhouse

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Prior Collaborators and Customers

DOMESTIC			INTERNATIONAL
ACADEMIC	**FEDERAL**	**PRIVATE**	
Iowa State University	USDA	Dow-Agro Sciences	Stellembosch University – Africa Kuwait Institute for Scientific Research, Kuwait
UC Berkeley UC Davis	Los Alamos National Laboratory	Jone Farms Van Drunen Farms	Moldova State University, Moldova
Oklahoma state University	NASA	Altman Plants Living Carbon	CIIDIR-IPN, Universidad de Guadalajara, CINVESTAV, Mexico
John Hopkins University Southern Illinois University	United States Department of Energy	Southwest consortium ePlant.Bio Unfold/BASF	Universidad Nacional, Universidad Tecnologica, CENICAÑA, Colombia
Montana State University	United State Forest Services	California Asparagus Commission ISCA, Inc.	EMBRAPA - Brazil Vietnam Education Foundation, Vietnam

Visiting Collaborators From Makere University, Kampala, Uganda

Closing Remarks