

SciGene

Automating Cytogenetics



Jim Stanchfield, Ph.D.
Founder and CEO

About SciGene

- Founded in 2004
- Automate the benchwork in cytogenetics laboratories for chromosome and FISH analysis
- Reduce the cost and complexity of traditional cytogenetic testing

Automating the Cytogenetics Wet Lab

From Harvester to Microscope

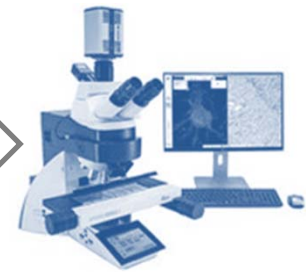


Chromosome Slides

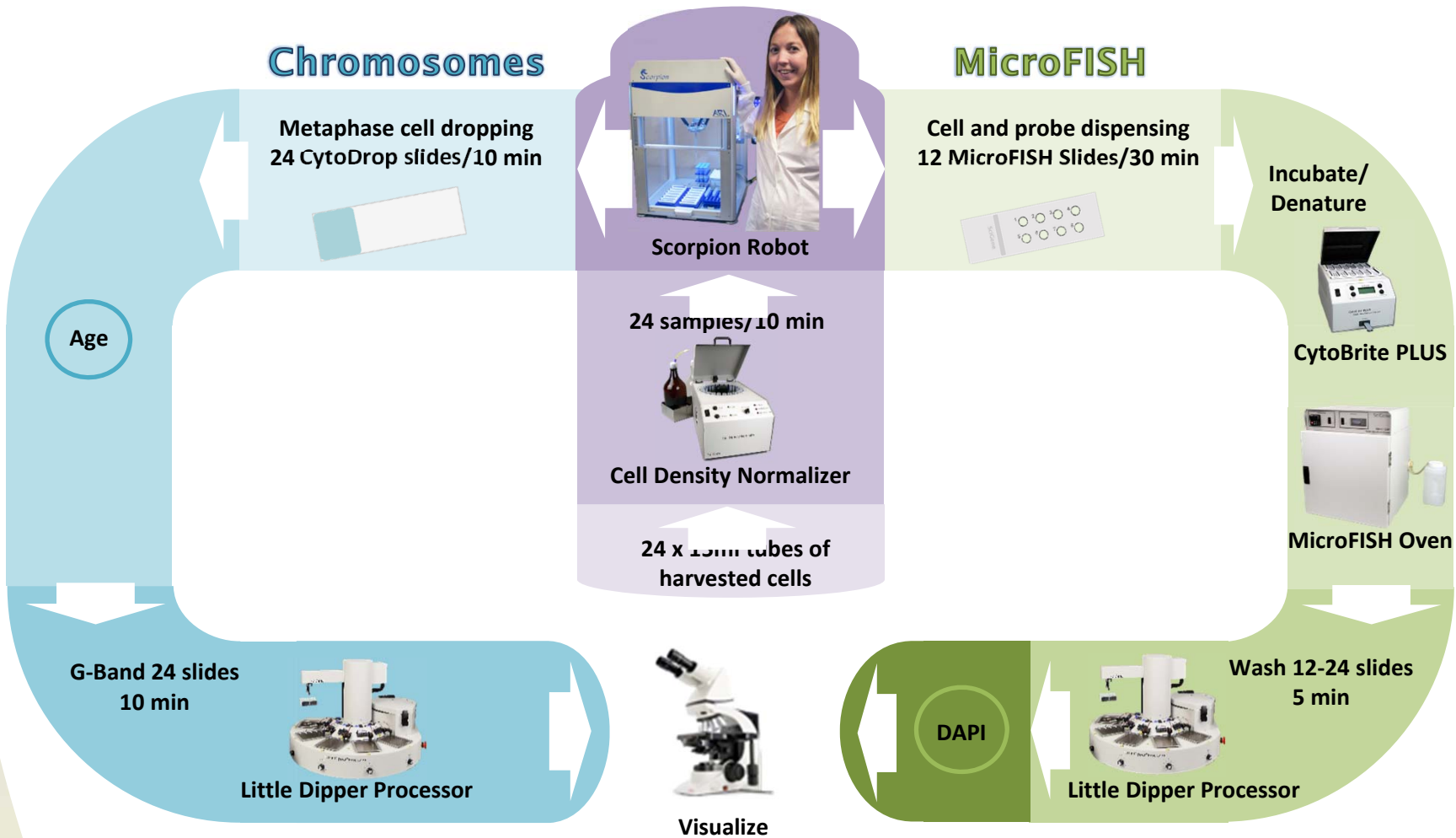
Automated cell dropping and banding

FISH Slides

Automated slide setup and post-hyb processing



Automating the Cytogenetics Wet Lab



MicroFISH[®] System

Most Labs Lose Money Running FISH



2018 reimbursement - **\$51** per hybridization
(CPT 88275 Interphase FISH 100-300 cells)

Setting up FISH Panels is a Lot of Work



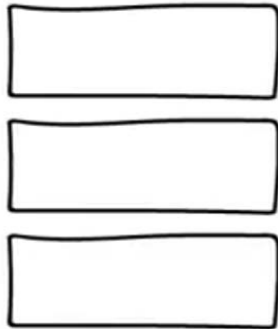
- Difficult to finish daily workload
- Requires multiple slides and coverslips per patient
- Tedious to seal coverslips with rubber cement

Cost of Typical Six Probe Panel

\$30 per hyb: \$180 per panel

Slides

3



Coverslips

6



Rubber
Cement



MicroFISH[®] Assay System

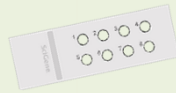
A simple system for performing cellular FISH panels that uses a single slide per patient and 1 μ l cell sample and 1 μ l probe solution per well.

MicroFISH® System

Manual Slide Preparation / Automated Processing

MicroFISH

Manually drop cells and probe



Incubate/
Denature



Cytobrite PLUS



MicroFISH Oven

Wash 12-24 slides
5 min



Little Dipper Processor

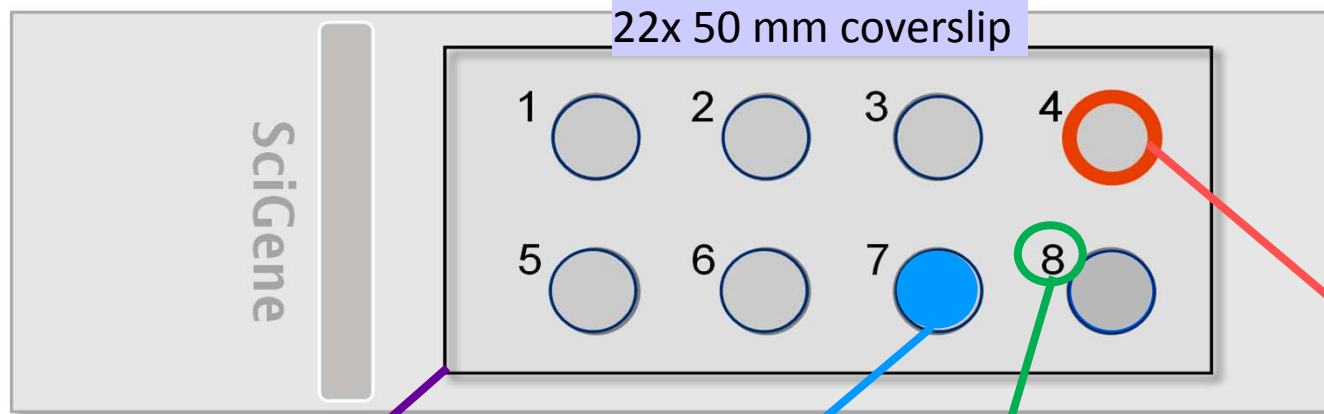
DAPI



Visualize

MicroFISH[®] Slide

Single Patient Slide for up to 8 Probes



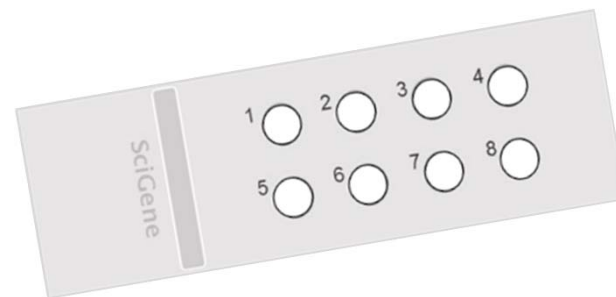
1 coverslip — No sealant.

1 μ l wells conserve samples.

Wells numbered individually.

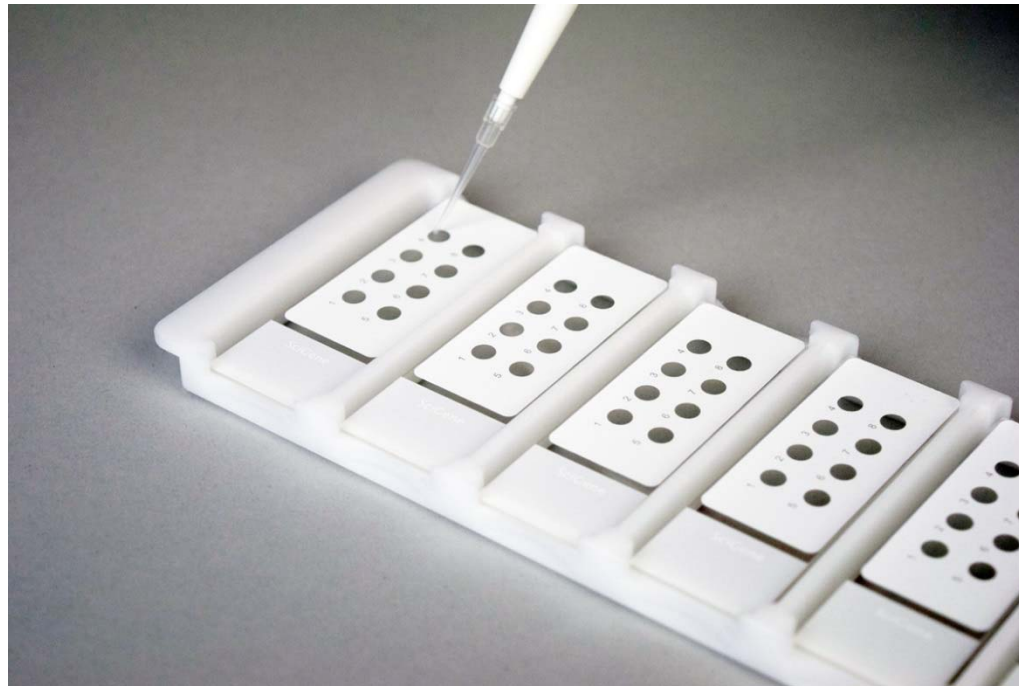
Coating retains samples in wells.

MicroFISH® Workflow



Simple and Fast MicroFISH® Workflow

Step 1: Add 1 µl cells / Air Dry / No Pretreatment



Simple and Fast MicroFISH® Workflow

Step 2: Add 1 µl Probe Reagent



Simple and Fast MicroFISH® Workflow

Step 3: Place Coverslip / No Rubber Cement



Simple and Fast MicroFISH® Workflow

Step 4: Denature on CytoBrite® PLUS



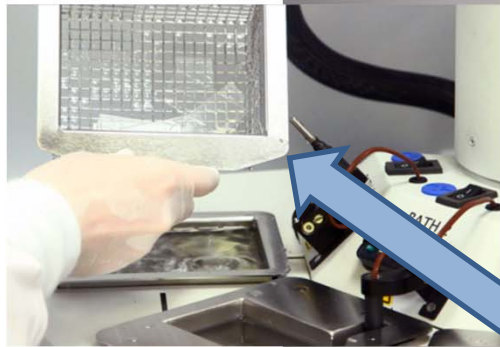
Simple and Fast MicroFISH® Workflow

Step 5: Incubate in MicroFISH® Oven

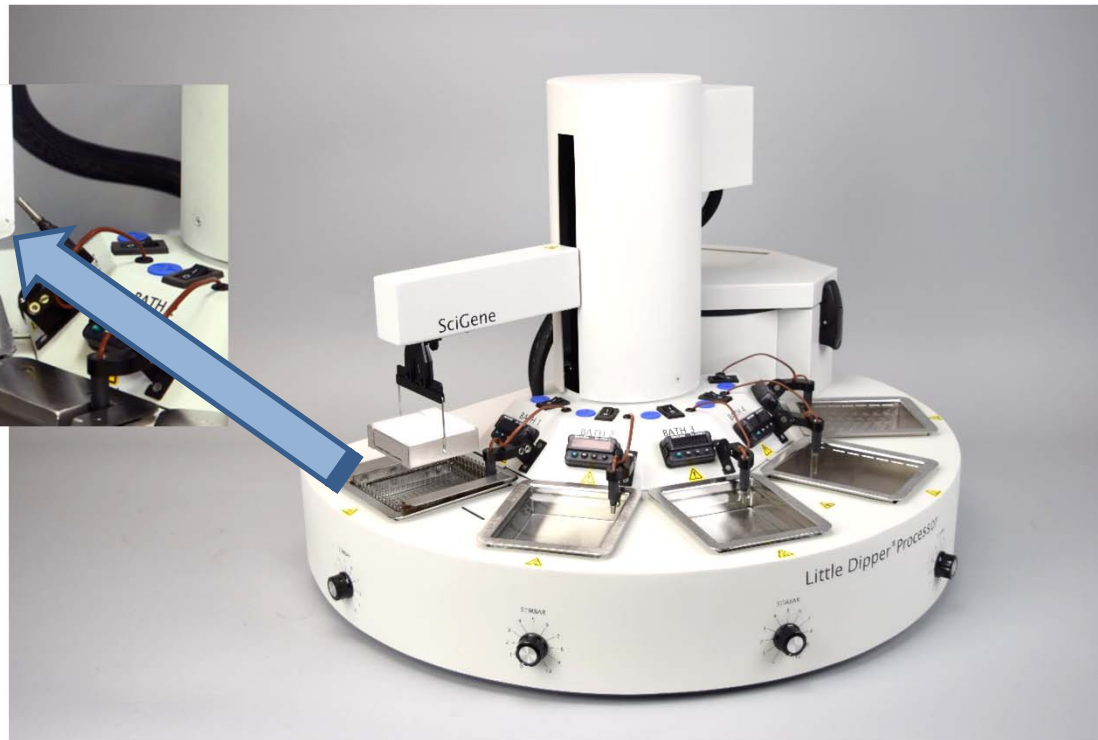


Simple and Fast MicroFISH® Workflow

Step 6: Shake Off Coverslips and Post-Hyb Wash on Little Dipper® Processor



**Coverslip
catcher**



MicroFISH[®] Instrumentation



CytoBrite® PLUS Slide Incubation System

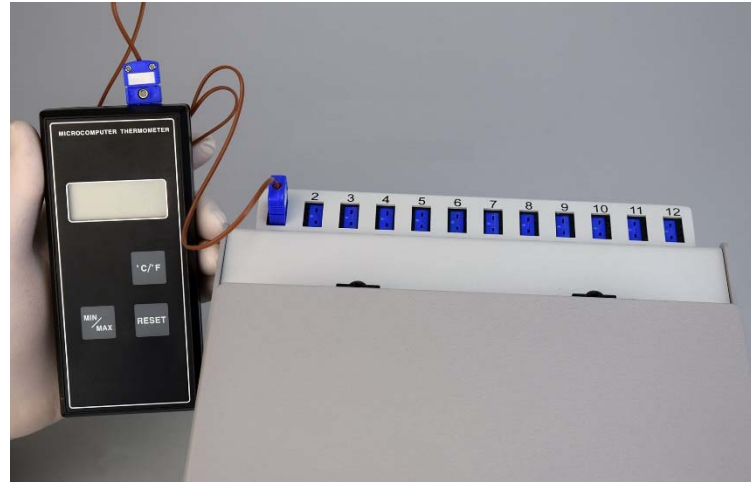
Monitors Temperature of Every Slide Position



- Meets new CAP Regulation CYG.33950 for checking slide position temperatures
- PCR Technology for rapid/uniform heating and cooling
- Removable slide trays streamline handling

CytoBrite® *PLUS* Slide Incubation System

Slide Temperature Verification



- Each slide position equipped with temperature sensor wired to a thermometer jack
- Connect the provided thermometer to view each slide position temperature

MicroFISH® Hybridization Oven

Enhances Probe Signals in MicroFISH® Slides

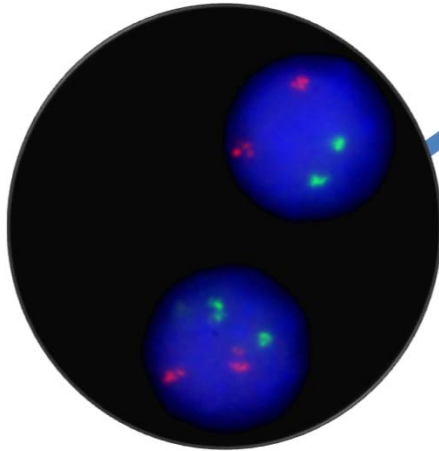


- For hybridizing MicroFISH® Slides
- Controls temperature and humidity
- Enhances signals by controlling probe volume
- Slide trays transferred directly from CytoBrite® PLUS

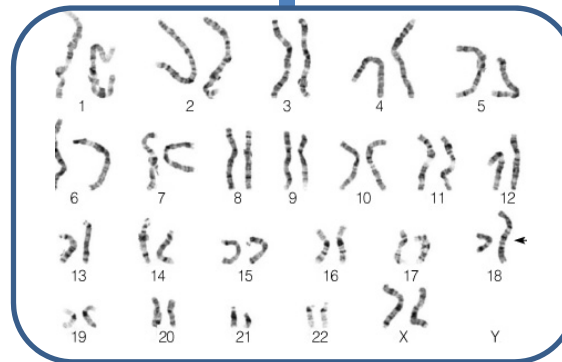
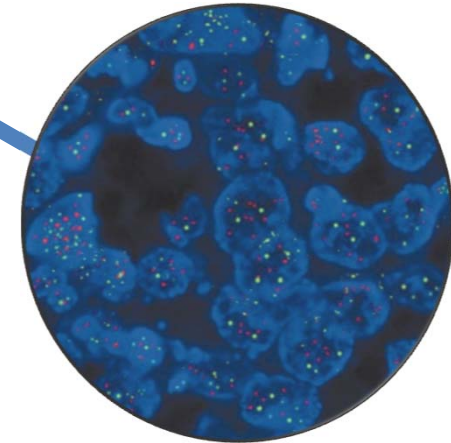
Little Dipper® Processor

Multipurpose Cytogenetic Slide Processor

Post-hyb
Processing



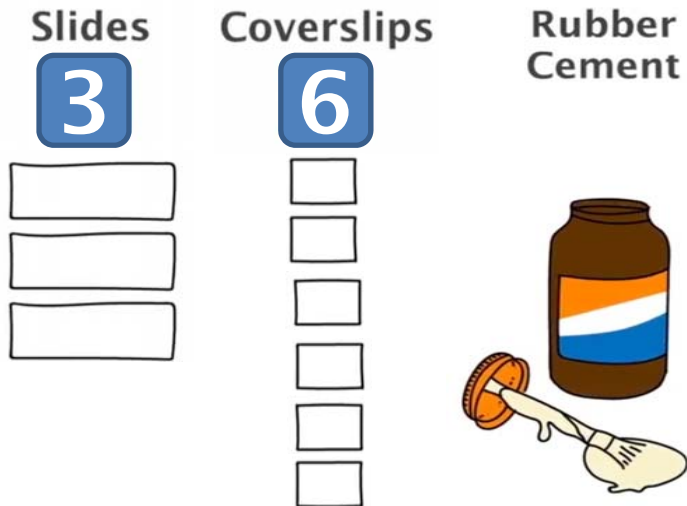
Tissue
Pretreatment



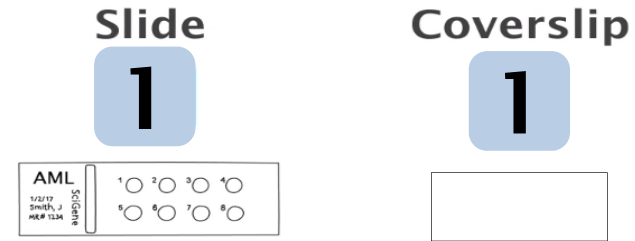
G Banding

MicroFISH® Reduces Probe Cost/Test > 80%

**Typical 6 Probe Panel
\$180 Probe Cost**



**MicroFISH Method
\$36**



MicroFISH® System is Probe Agnostic

All Suppliers / One Workflow



MicroFISH® is a Proven Technology

>250,000 Patient Samples Processed

AmeriPath®
A Quest Diagnostics Company



THE OHIO STATE
UNIVERSITY



UPMC
University of Pittsburgh
Medical Center

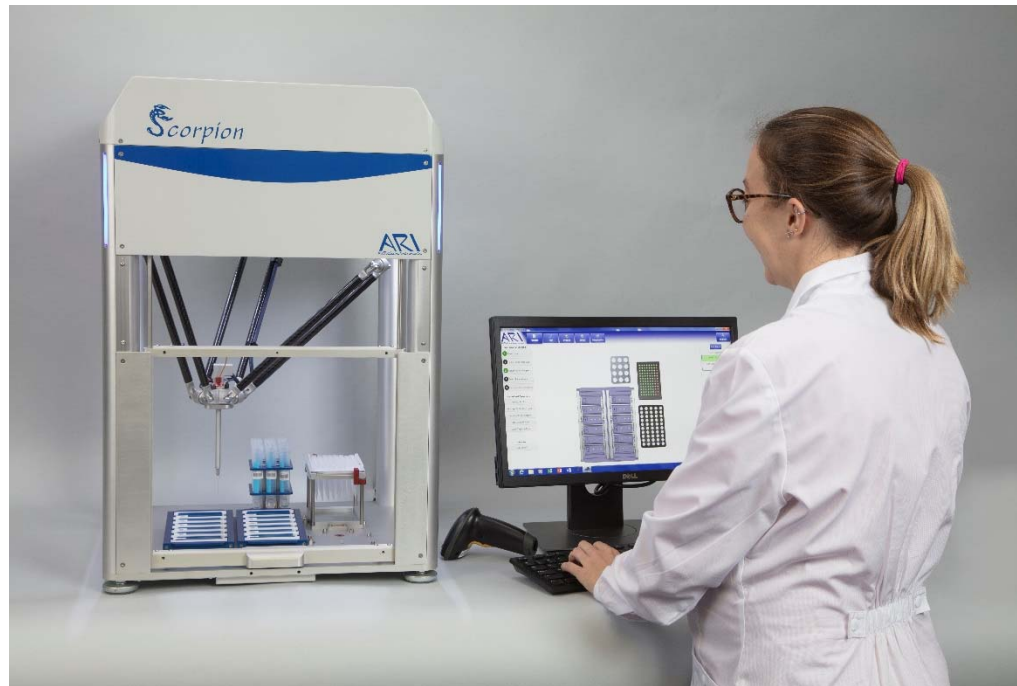


Stanford
HEALTH CARE
STANFORD MEDICINE



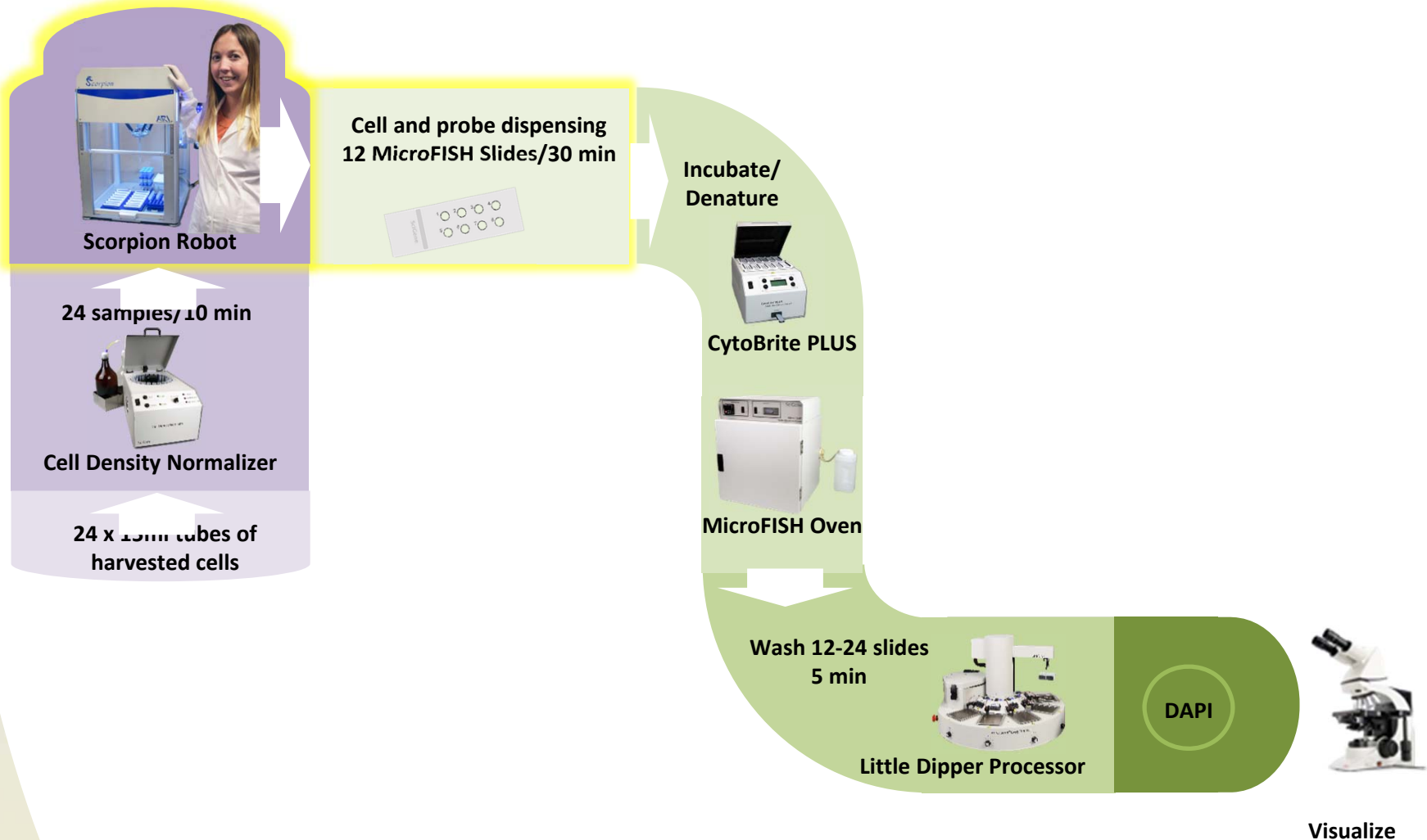
GENETICS
ASSOCIATES
INCORPORATED

Scorpion™ Robot Preparation of MicroFISH® Slides



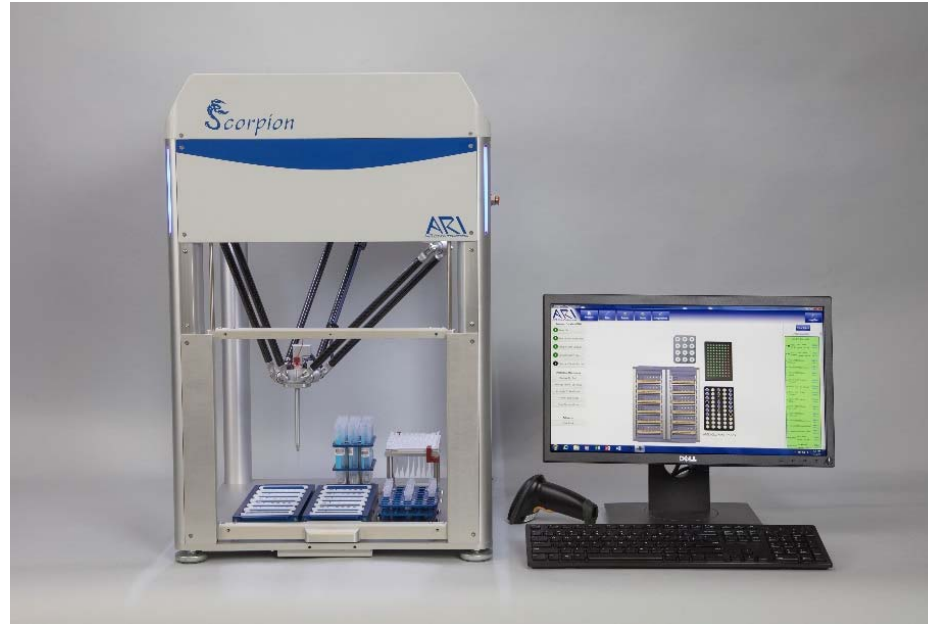
Scorpion™ Slide Preparation Robot

Automated Preparation of MicroFISH Slides



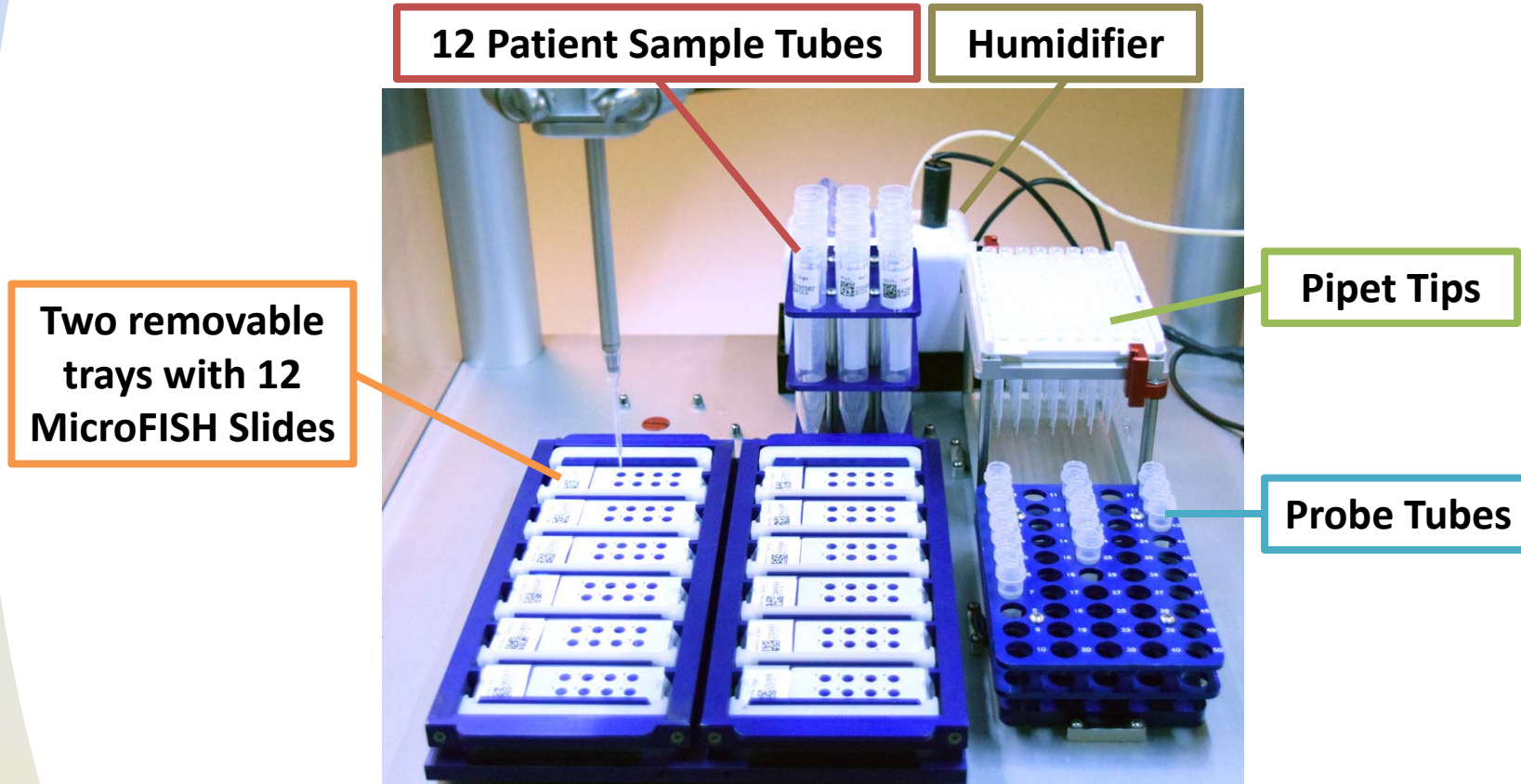
Scorpion™ Preparation of MicroFISH® Slides

Makes 12 MicroFISH Slides < 30 minutes



- Smaller than a lab incubator
- Automates cell and probe dispensing
- Barcode reader prevents sample, slide or probe mix-ups
- Each hybridization detailed in a patient report
- At-a-glance probe inventory reports

Scorpion™ Preparation of MicroFISH® Slides Deck Set Up



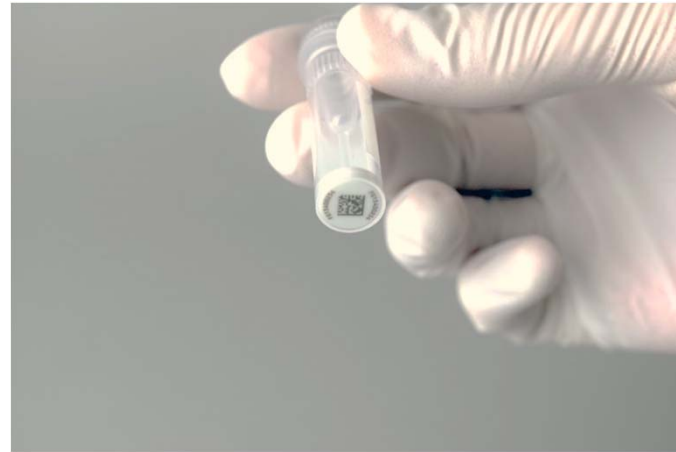
Scorpion™ Preparation of MicroFISH® Slides

Makes 12 Slides in < 30 Minutes

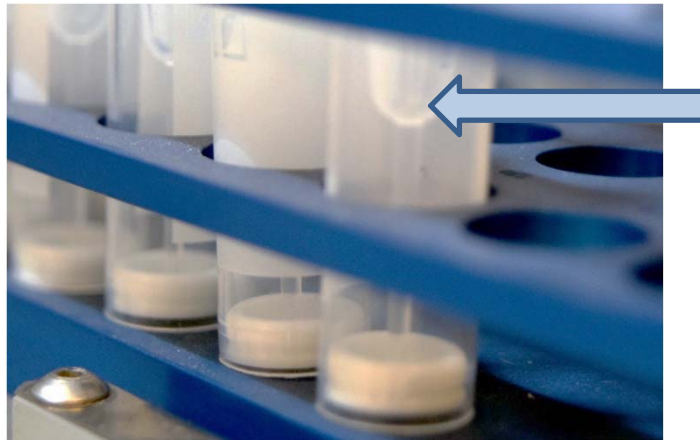
Robotic Steps	Time (min)
1. Dispenses 1 μ l cells from 12 patient tubes into wells	3
2. Pauses 3 minutes for cells to dry	3
3. Dispenses 1 μ l of probes into assigned wells	15
Elapsed Time:	21 min

Scorpion™ Preparation of MicroFISH® Slides

No Probe Waste / No Probe Mix-ups



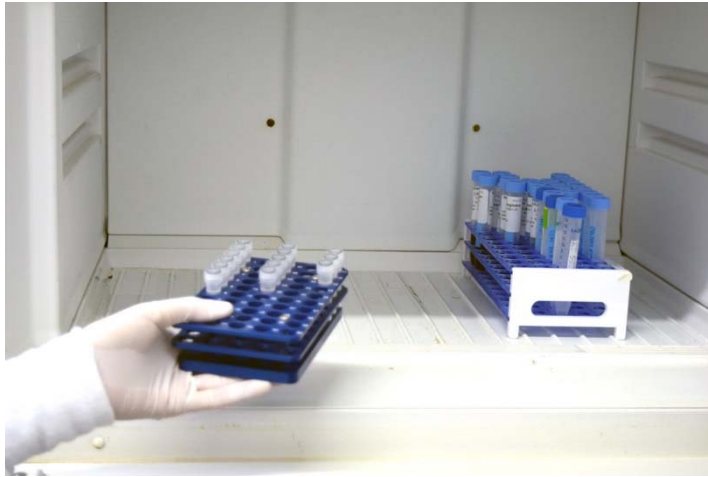
Free standing PCR-type tube with barcode



Robot draws from bottom / no dead volume

Scorpion™ Preparation of MicroFISH Slides

Probe Tube Rack System



Remove rack from freezer

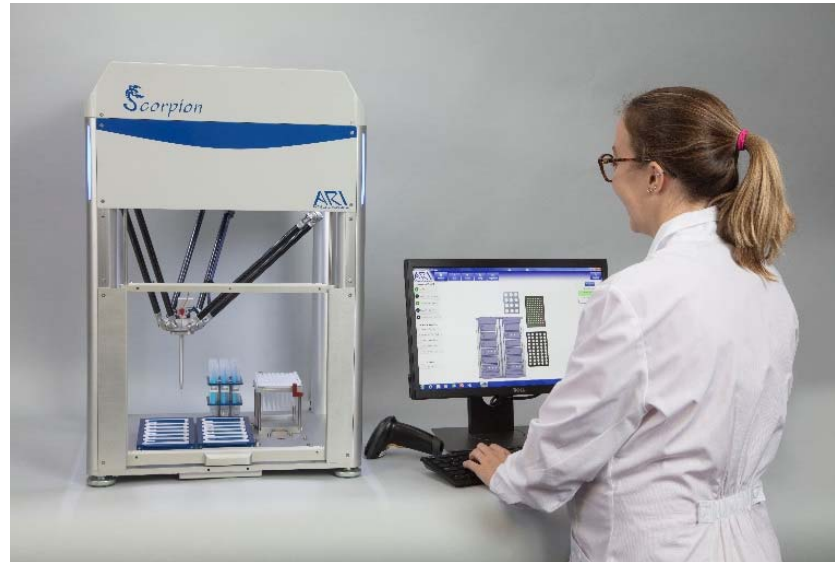


Place caps in organizer

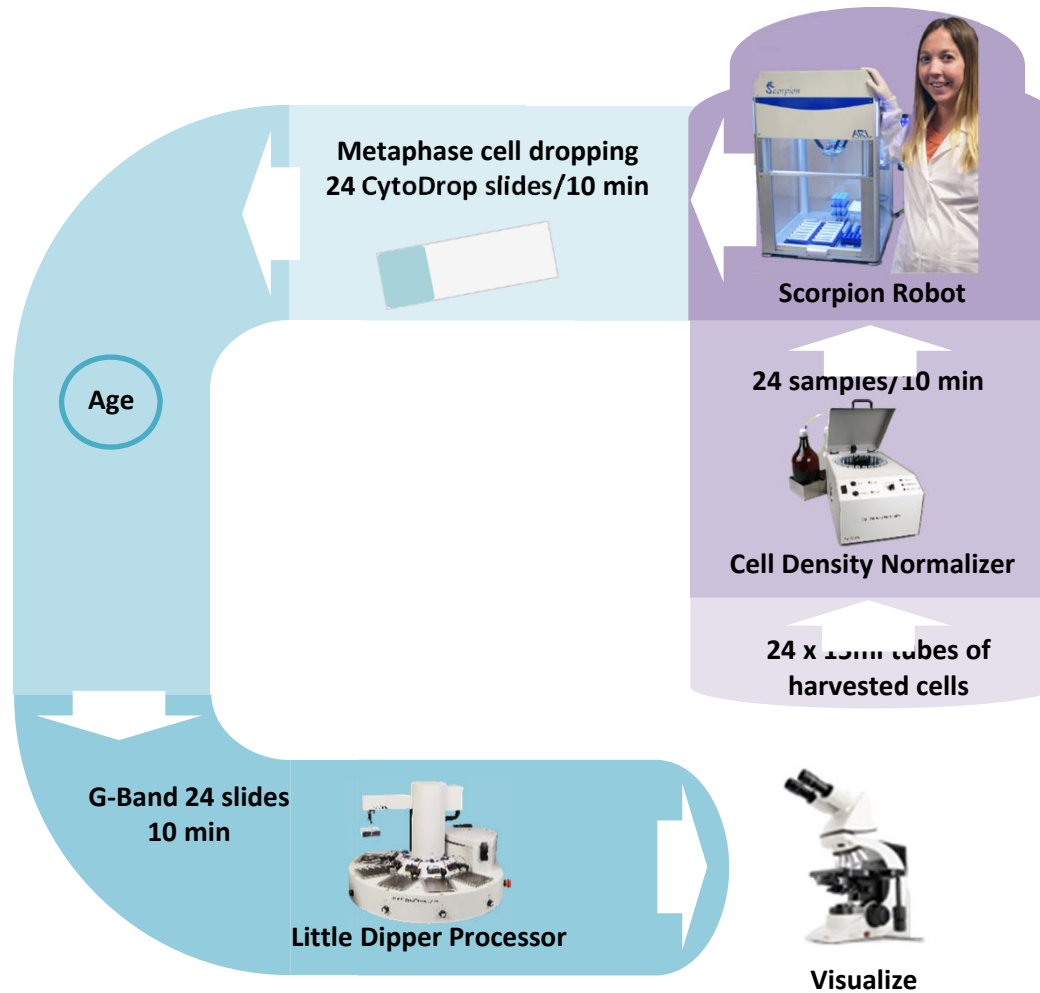


Place tube rack on deck

Scorpion™ Robot Preparation of Chromosome Slides



Scorpion™ Preparation of Chromosome Slides



Factors Affecting Metaphase Chromosome Slide Preparations

- 1. Slide dropping technique**
- 2. Slide drying conditions**
- 3. Slide wettability**
- 4. Density of cell sample**

Differences in Slide Dropping Technique Affect Results

Dropping height?

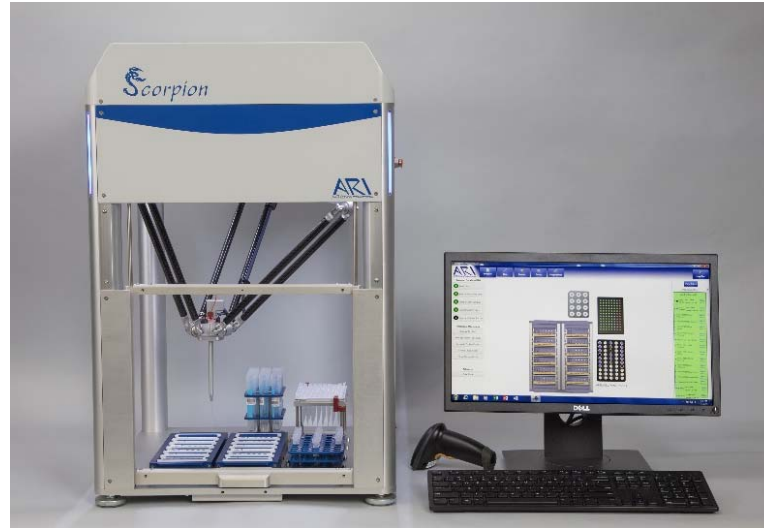
Wet or dry slide?



Dropping angle?

Wet paper towel?

Scorpion™ Preparation of Chromosome Slides Eliminates Variations in Technique



- User selectable drop volumes and patterns
- Makes 24 slides in < 10 minutes ready for aging
- Removable 24-slide tray speed processing
- Barcode reader matches samples and slides

Scorpion™ Preparation of Chromosome Slides

Deck Setup

Patient sample tubes

Humidifier

Pipet tips



Removable tray for 24 chromosome slides

Scorpion™ Preparation of Chromosome Slides

Saves > 3 Hours Labor per 96 Slides

Manual Preparation



4 hours

Scorpion Slide Prep



20 minutes

Factors Affecting Metaphase Chromosome Slide Preparations

1. Slide dropping technique
2. Slide drying conditions
3. Slide wettability
4. Density of cell sample

Variations in Slide Drying Conditions Affect Metaphase Spreading



Low Humidity



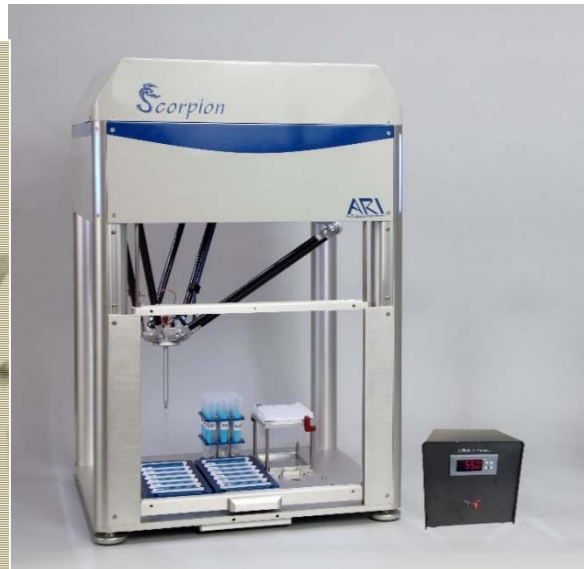
High Humidity

Variations in Slide Drying Conditions Affect Metaphase Spreading

Optimal Humidity



Scorpion™ Controls Slide Drying Conditions for Optimal Metaphase Spreading



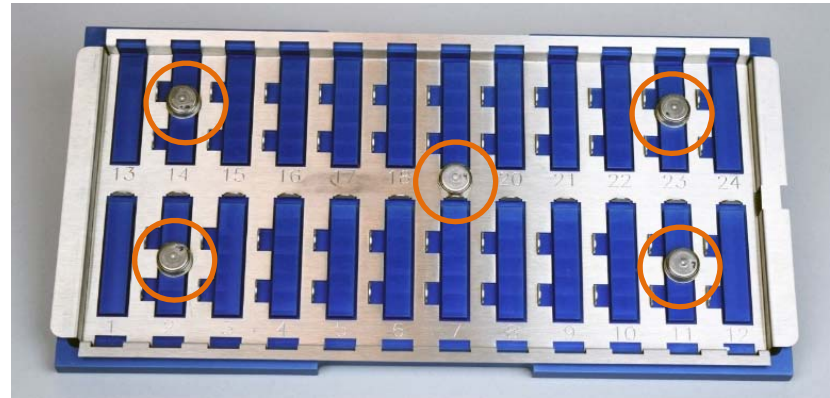
- Precisely controls slide drying conditions
- Regulates humidity to $\pm 1\%$ RH
- Change humidity levels in under 2 minutes
- Provides uniform humidity for all slides

Scorpion™ Preparation of Chromosome Slides

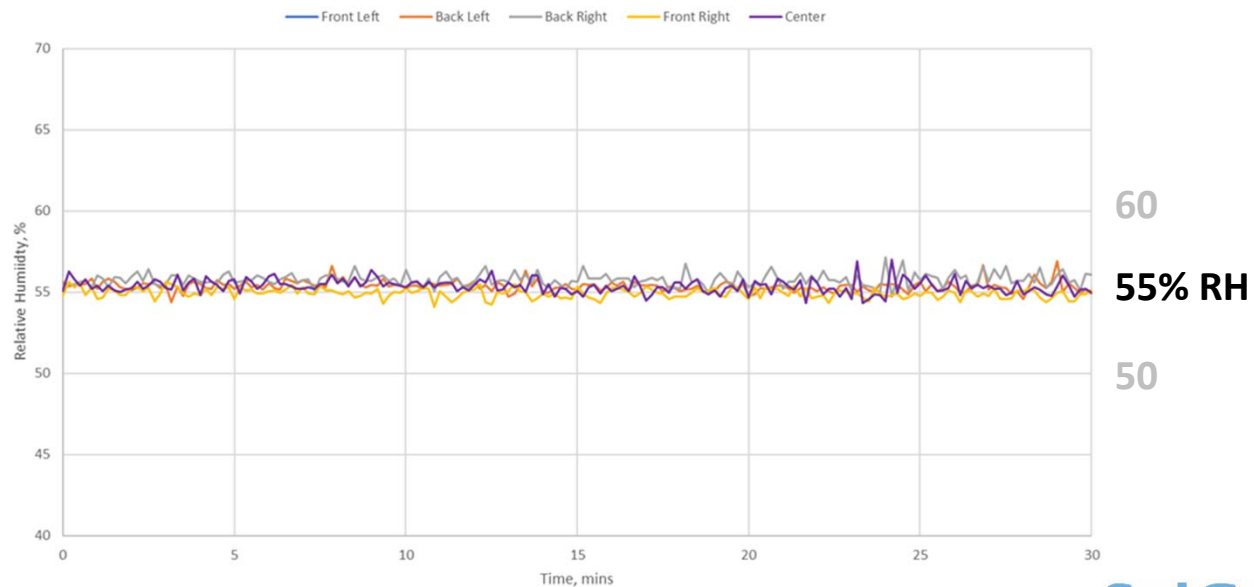
Well Regulated and Uniform Humidity



iButton humidity datalogger



5x iButtons placed on chromosome slide tray



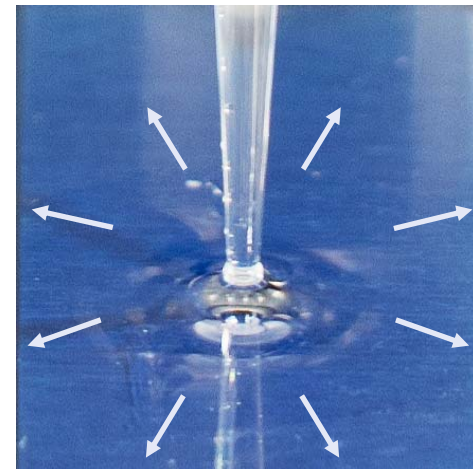
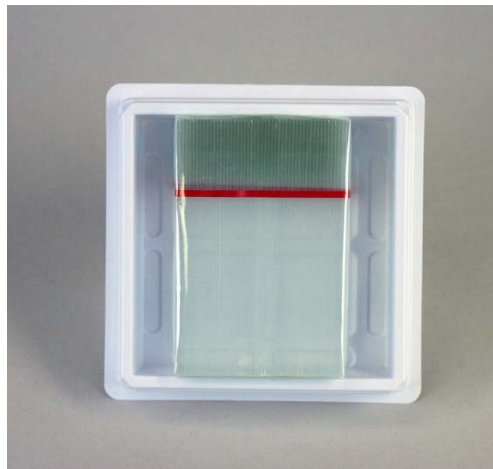
Factors Affecting Metaphase Chromosome Slide Preparations

1. Slide dropping technique
2. Slide drying conditions
3. Slide wettability
4. Density of cell sample



CytoDrop™ Slides

Reliable Wettability / Reliable Sample Spreading



- Each lot statistically tested for surface wettability
- Each slide “brick” sealed with desiccant
- Provided ready to use – no cleaning or treatment needed
- Certified for use on the **Scorpion™ Slide Preparation Robot**

Factors Affecting Metaphase Chromosome Slide Preparations

1. Slide dropping technique
2. Slide drying conditions
3. Slide wettability
4. **Density of cell sample**



Cell Density Normalizer

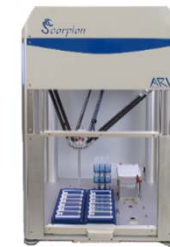
Eliminates Cell Density Variations for Consistent Metaphase Spreading



Insert 1-24 tubes



Cell Density Normalizer



Place tubes in Scorpion

- Adjusts cell densities of up to 24 samples
- Uses any 15 ml conical tube
- After processing, place tubes directly into Scorpion

Cell Density Normalizer

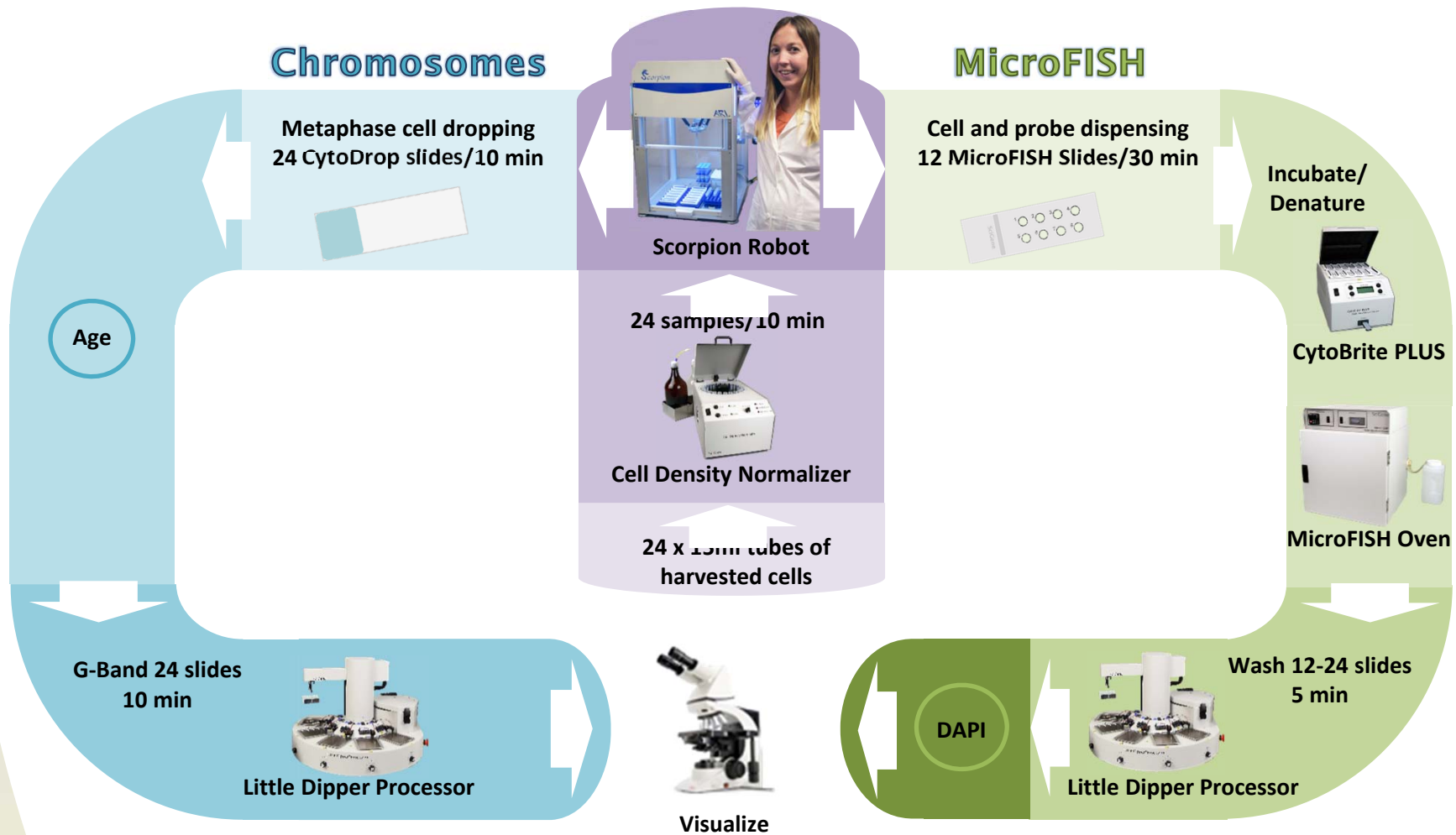
Processes 24 samples < 10 minutes



1. Place 15 ml tubes with pellets into carousel / press start
2. Instrument resuspends pellets, analyzes suspensions and adds fix to the selected cell density
3. Makes fix fresh from refillable methanol and acetic acid bottles.
4. No sample consumed or wasted

Wrap Up

Automating the Cytogenetics Wet Lab



**Want to evaluate the system
in your laboratory?**

See Gary Henderson
SciGene Booth 614
sales@scigene.com

SciGene

Automating Cytogenetics