A photograph of an older man with grey hair and a mustache, wearing a blue and white plaid shirt, looking intently at a sample tray. The tray contains several compartments, one of which has a dark, irregularly shaped sample. The background is a blurred laboratory setting with other trays and equipment.

# The AVENIO Millisect System

**EVERY SAMPLE  
TELLS A STORY**

## Tissue dissection reinvented

Current tissue dissection methods can prove either too crude or too complex. **The AVENIO Millisect System, a simple yet precise tissue dissection technology, breaks the mold.** Designed to meet the needs of clinical molecular pathology for formalin-fixed paraffin-embedded (FFPE) tissue dissection, the AVENIO Millisect System empowers you to extract the most clinically relevant information from every sample with less effort.



*“We can now **process cases that we couldn’t test before.**”*

*—The Ottawa Hospital, Ottawa, Canada*

### Uncover the whole story

Personalized medicine depends on a complete molecular diagnostic picture to identify the best course of treatment for each patient. The AVENIO Millisect System can help you **maximize the clinical utility of every tissue sample**. In head-to-head comparisons, dissection with the AVENIO Millisect System helped identify more gene mutations, including some missed with manual dissection.<sup>1,2</sup>

### Cleaner samples, clearer profiles

Accidental contamination with adjacent normal tissue can be difficult to avoid during manual dissection. Using laser capture microdissection (LCM) can risk sample loss. The AVENIO Millisect System allows you to optimize results and **increase dissection efficiency**, capturing only clinically relevant cells without sacrificing yield.<sup>3,4</sup>

### A simpler path to insight

The AVENIO Millisect System is designed to **improve laboratory workflow**, making it simple enough for routine clinical use. Its automated, digitally assisted tissue dissection process requires fewer hands-on steps, minimizing demands on staff and delivering greater precision and consistent results across users.<sup>3</sup>

# The AVENIO Millisect System advantage

From initial annotation through final report, the AVENIO Millisect System offers unparalleled simplicity and precision to help you unlock the molecular story within each tumor. A benchtop instrument optimized for tissue dissection from FFPE slides in the clinical laboratory setting, the AVENIO Millisect System uses a proprietary tissue-milling technology to help you recover the areas of interest (AOIs) consistently, while avoiding unwanted adjacent tissue.

## Step 1: Digital annotation

Digital annotations are made on a reference slide under magnification and are used to guide automated dissection of subsequent slides, up to 4 per run.

- **Versatile:** allows definition of multiple AOIs on a single slide
- **Consistent:** aligns subsequent slides automatically to reference slide

## Step 2: Automated milling

A disposable AVENIO Millisect Milling Tip is automatically loaded, filled with a user-defined buffer, and used to mill selected AOIs.

- **Precise:** consistent recovery of AOIs as small as 250  $\mu\text{m}$  in diameter (~20 cells)
- **Fast:** fewer steps and no prestaining
- **Flexible:** uses paraffinized or deparaffinized FFPE slides of various tissue thicknesses



## Step 3: Gentle recovery

Tissue from the dissected AOI is drawn into the tip via gentle capillary action and expelled into a collection tube.

- **Clean:** minimizes potential for contamination with a hands-free process
- **Complete:** reduces risk of burning or losing sample with gentle, non-laser optics



## Step 4: Comprehensive reporting

A report is automatically generated that includes annotations, pre- and post-dissection images, and notes.

- **Traceable:** sample ID capture on image plus optional barcode scanning
- **Lasting:** report exportable as a PDF

# Maximize clinical utility

Tissue samples are precious, and each has a unique story to tell. Developing a complete molecular portrait of a tumor can open new avenues of treatment to explore. In comparison studies, the AVENIO Millisect System has been shown to uncover more clinically actionable results than manual dissection.<sup>1,2</sup>

**“...digitally guided microdissection can enrich tumor content well beyond manual macrodissection...”**

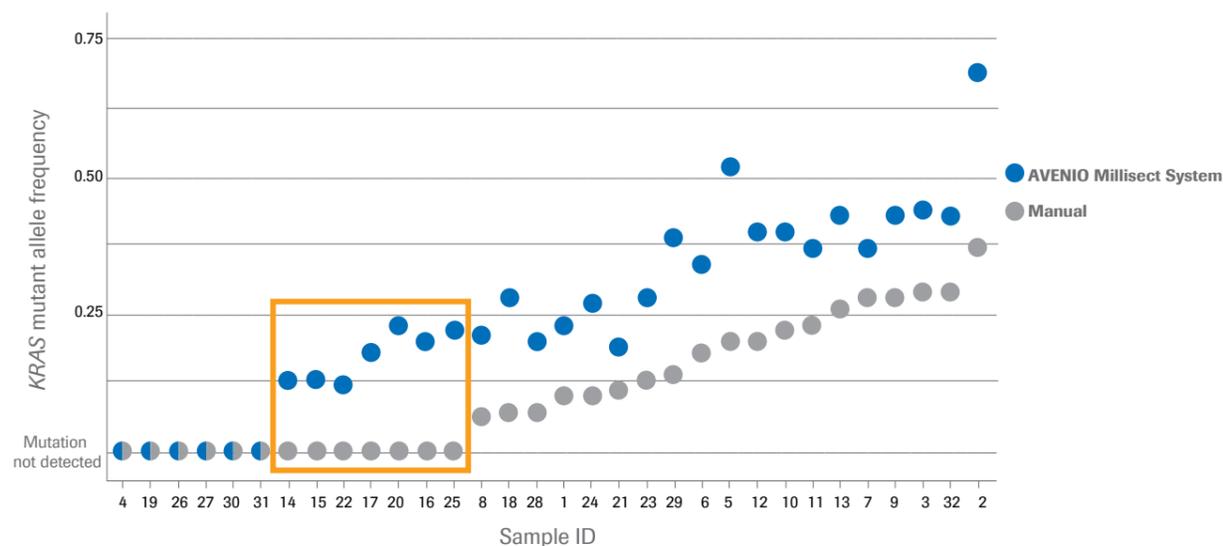
–ARUP Laboratories, an enterprise of the Department of Pathology, University of Utah



## Fewer false-negative results

Imprecise dissection can capture normal tissue along with tumor cells, leading to false-negative results in downstream molecular tests and missed opportunities for targeted treatments that might improve patient outcomes. In tests in pancreatic tumor samples, the AVENIO Millisect System enabled detection of KRAS mutations missed with manual dissection.<sup>1</sup>

### Reduce false-negative results

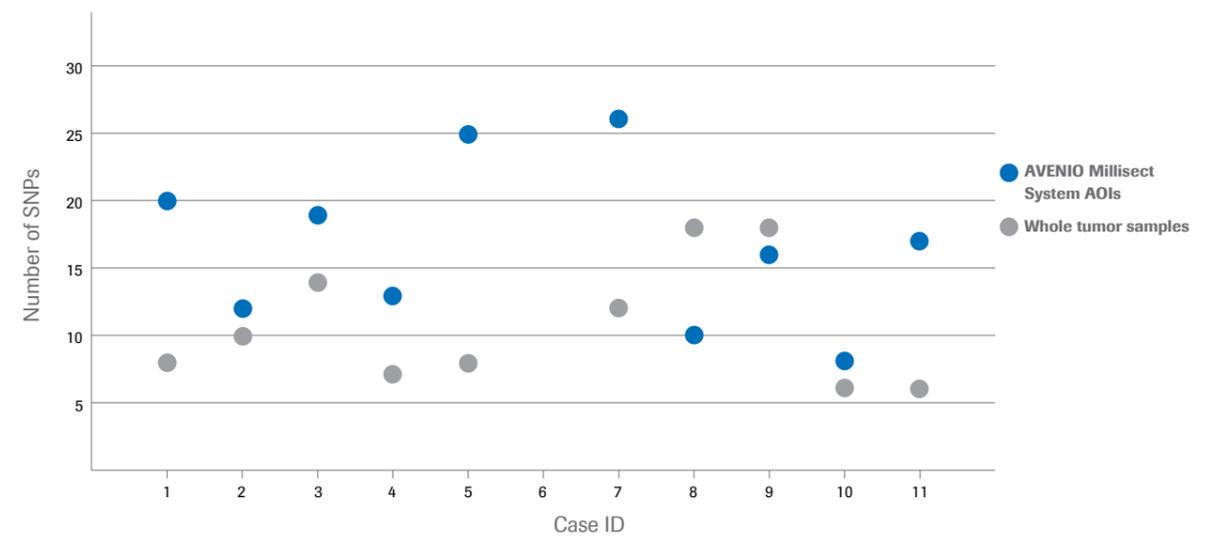


A total of 32 matched pairs of FFPE samples from 18 pancreatic adenocarcinoma cases were dissected using the AVENIO Millisect System or manual macrodissection and then tested using multiplex polymerase chain reaction (PCR) for KRAS mutations. In 22% of the samples (7/32; boxed data), the AVENIO Millisect System enabled detection of KRAS mutations missed with manual dissection.<sup>1</sup>

## More gene variants

The AVENIO Millisect System helps you isolate small regions from FFPE tissue sections that harbor suspected tumor cells. In sensitive downstream molecular testing, these enriched samples improve signal-to-noise ratios, allowing detection of more gene variants and a deeper understanding of each individual cancer. Tumor samples dissected with the AVENIO Millisect System yielded more single-nucleotide polymorphisms (SNPs), including clinically actionable variants, than whole tumor samples.

### Identify more clinically relevant gene variants



In 70% of tumor samples (7/10) from breast, colon, and prostate cancers, more clinically actionable SNPs were identified by next-generation sequencing when the AVENIO Millisect System was used to dissect AOs than were found with whole tumor samples. (Case #6 did not yield adequate DNA for sequencing.)<sup>2</sup>

## Increase dissection efficiency

The AVENIO Millisect System lets you tackle challenging samples with confidence. Tumor heterogeneity or low cellularity can make it difficult to isolate clinically relevant cells without contamination with normal adjacent tissue. The AVENIO Millisect System helps you consistently dissect even small AOIs, without sacrificing yield.<sup>1,4</sup>

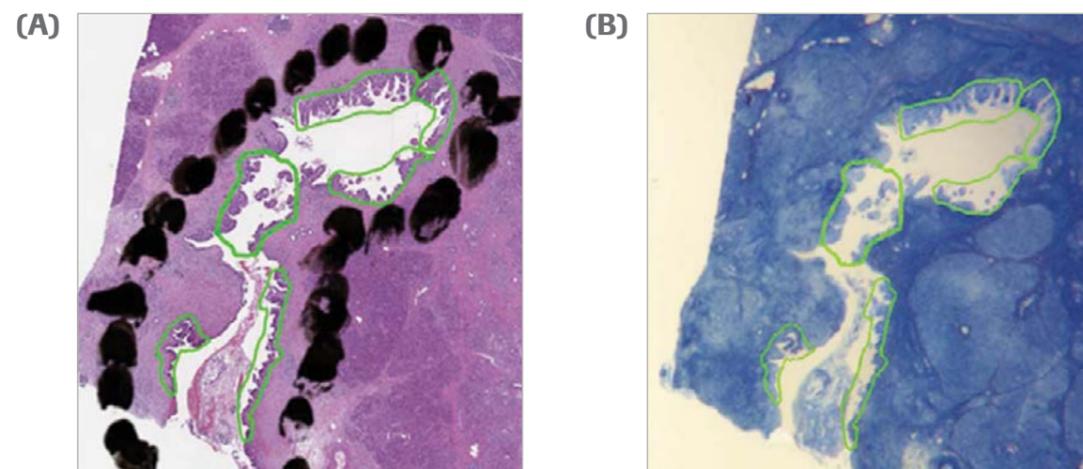
### Cleaner sample, same yield

Studies have shown that nucleic acid and protein recovery using the AVENIO Millisect System are similar to that seen with manual or LCM dissection for the same tissue area, allowing you to improve sample purity without sacrificing yield.<sup>1,4</sup>

### Reduce contamination

The AVENIO Millisect System allows users to capture areas as small as 250  $\mu\text{m}$  in diameter, or about 20 cells. This fine control allows users to increase the fraction of neoplastic cells captured in a sample relative to manual dissection.<sup>1</sup> Additional studies show that dissection is also consistent from user to user.<sup>3</sup>

#### Avoid contamination with normal tissue



Serial sections from a heterogeneous pancreatic adenocarcinoma sample with annotations for dissection with the AVENIO Millisect System (Figure A, green line) versus manual dissection (Figure A, black line). The indicated AOI in Figure B was judged to contain 70% to 80% neoplastic cells, while the area for dissection in Figure A, indicated in black, contained only 20% to 30% neoplastic cells, i.e. up to 4 times more contaminating normal adjacent tissue.<sup>1</sup>

## Improve laboratory workflow

The information contained in each tissue sample is complex, but the process of uncovering it shouldn't be. The AVENIO Millisect System was designed to meet the demands of routine clinical use. Users from around the world report that dissection requires significantly less time per case with the AVENIO Millisect System.<sup>1-3</sup> The digitally assisted process is flexible and intuitive and can readily be adapted to your laboratory workflow, helping you make the most of every sample.

*“One LCM case takes 1 to 2 hours to complete...  
With Millisect, one case takes 3 to 5 minutes.”*

*—Early Evaluation Program customer, USA*



## Product specifications

### Instrument

Instrument footprint (WxDxH)	48x33x57 cm (19x13x22 in)
Instrument input power requirements	100–240V ~1.5–0.75A 50–60Hz
Instrument weight	21 kg (46 lbs.)
PC footprint (WxDxH)	48x6x39 cm (19x2x13 in)
PC input power requirements	100–240V ~2.9A 50–60Hz
PC weight	4 kg (8 lbs.)
Safety and emission	ETL, EN
Regulatory	US-IVD FDA Class 1 (510K exempt), CE-IVD

### Optics

Camera resolution	14 MP
Optical zoom	6X
Digital zoom	4X
Total zoom	10X

### Dissection

Dissection resolution	≈300 μm
Recovery efficiency	Equivalent to manual dissection
Dissection time*	2 minutes for 1 slide Up to 7 minutes for 4 slides

\*Depending on number of annotations—estimated time based on current data

### Consumables

Millisect tip—small blade (yellow)	≈250 μm
Millisect tip—medium blade (green)	≈550 μm
Millisect tip—large blade (blue)	≈800 μm
Dissection fluid volume (ejected)	≈300 μL
Fill station volume	≈4 mL

## Catalog information

Roche Part Number	Description	Kit Size
08106550001	AVENIO Millisect Instrument, Head	
08106568001	AVENIO Millisect Instrument, Base	
08106495001	AVENIO Millisect PC	
08106509001	AVENIO Millisect Tips S	48 pack
08106517001	AVENIO Millisect Tips M	48 pack
08106525001	AVENIO Millisect Tips L	48 pack
08106533001	AVENIO Millisect Fill Station	16 pack
07171650001	VANTAGE BCR—Handheld—Honeywell*	
07171706001	VANTAGE BCR Stand Rigid—Honeywell*	
07171714001	VANTAGE BCR Stand Flexible—Honeywell*	

\*Optional Barcode Scanner for purchase

Ask your Roche representative how the AVENIO Millisect System can help your lab make the most of every sample. Visit [sequencing.roche.com/millisect](https://sequencing.roche.com/millisect)



**The AVENIO growing portfolio of next generation sequencing solutions by Roche will include instruments, assays, reagents and software that aim to make sequencing simple and accessible.**



References:

1. Geiersbach K et al. *Cancer Genet.* 2016;209(1-2):42-49.
2. Gustafson H, Theiss N, Hnatyszyn HJ. *Integr Cancer Sci Therap.* 2016;3(4):500-503.
3. Data on file.
4. Gong C et al. Poster presented at: Mass Spectrometry Applications to the Clinical Lab conference; February 21–25, 2016; Palm Springs, CA.

Published by:

**Roche Sequencing**  
4300 Hacienda Drive  
Pleasanton, CA 94588

[sequencing.roche.com](http://sequencing.roche.com)