

# Aperio Rare Event Algorithm

## Automatic Micrometastasis Quantification

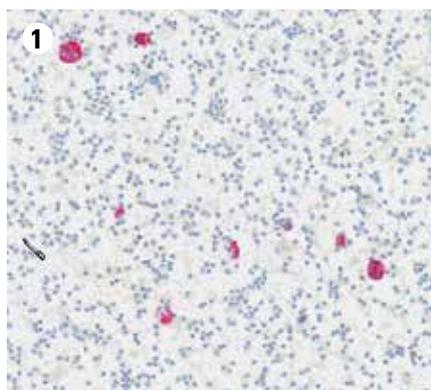
Detection of rare events plays an important role in various biomedical disciplines. In oncology research, it is used to detect and quantify minimal residual disease in tissues or those tumor cells circulating in peripheral blood. In radiation research, the rare number of mutant cells may be counted as a parameter related to the mutagenic effect *in vivo*. Similarly, virus-infected cells circulating in low frequencies in peripheral blood may provide useful research information such as the early detection of cytomegalovirus (CMV) reactivation in transplantation.

Visual inspection of such samples is a laborious task and rare cells can be easily missed, even with the help of antibodies directed to characteristic cellular constituents within the cells of interest. The Aperio Rare Event Algorithm will automatically detect and quantify stained rare cells, and can be tuned to detect the various color, size and forms that micrometastatic structures can assume.

### STANDARDIZATION AND REPRODUCIBILITY THROUGH AUTOMATION

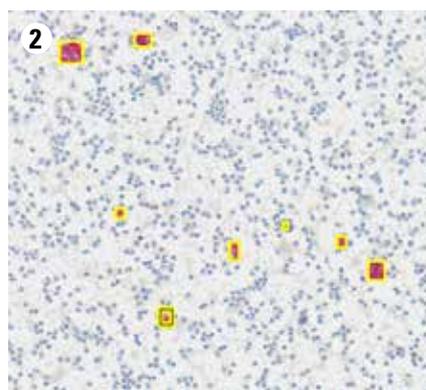
- » Identify & quantify structures positive for micrometastasis stain
- » Each event listed and characterized
- » Optimized for red chromogen but tunable to any stain type
- » Quantitative and semi-quantitative outputs
- » Compatible with Aperio eSlide Manager and Aperio Image Analysis Workstation
- » Optimized for Aperio scanners
- » Use with 20X or 40X whole slide images and regions of interest (identified by annotations or suitable GENIE classifier)

ORIGINAL TISSUE



Original tissue showing negative (Hematoxylin only, **blue**) and positive **red** chromogen micrometastatic events.

ANALYSIS MASKS



Markup shows Aperio Rare Event Algorithm performance where **yellow** boxes highlight positive events.

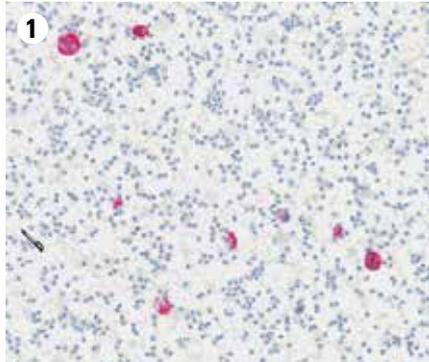
# Aperio Rare Event Algorithm

Fast • Quantitative • Reproducible

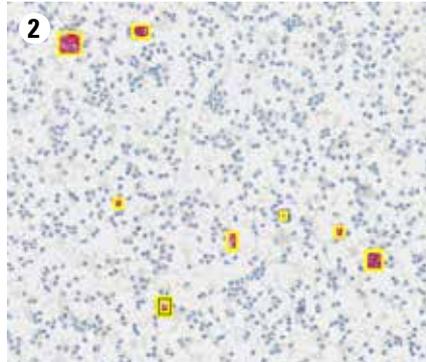
## ADJUSTABLE ALGORITHM INPUT PARAMETERS

Rigorously tested default parameters enable the Aperio Rare Event Algorithm to be used in a highly automated, one-click mode. In addition, tunable parameters enable rapid algorithm optimization, while the intuitive Algorithm Tuning interface provides real-time feedback on adjusted settings.

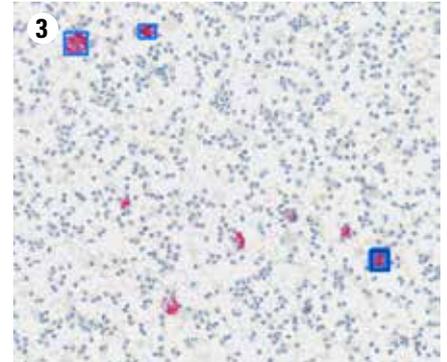
## TUNING STEPS IN APERIO RARE EVENT ALGORITHM:



(1) Original tissue with **blue** counter-stain and **red** positive metastatic stain.



(2) Tuning set to include all **red** events, boxed in **yellow**.



(3) Tuning set to include only large sized **red** events using the size filter, boxed in **blue**.

## COMPREHENSIVE RESULTS OUTPUT

The outputs of the Rare Event algorithm, namely, the total number of objects and number of object pixels are the typical information needed for such application(s). Overall results in Layer Attributes and each event is characterized in the 'Layer Regions' list. Each event is visited as the user clicks through the list of cells found. A list of the output parameters is available to choose from. Results are easily exported in .csv format for rapid integration into 3rd party statistical or data analysis package. In addition, the algorithm results mark-up adds a box around positive events detected which is easy to visualize.

Layer Regions									
Region	Length (um)	Area (um2)	Text	x	y	xmin	xmax	ymin	ymax
1	117.60	860.88		19415	12562	19381	19448	12536	12599
2	167.07	1743.09		19126	12615	19082	19174	12569	12699
3	136.27	1157.05		20351	13486	20318	20387	13448	13522

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