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STORM

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BACKGROUND

Currently, Dr. Kyle Douglass, research scientist at EPFL, is developing high throughput methods in single molecule fluorescence microscopy by combining smart optical design, new camera technologies and efficient algorithms from machine learning and bioinformatics.

As part of his research, Douglass is trying to better understand the relationship between the structure of eukaryotic DNA and remodeling proteins, which is achieved by applying the single molecule localization microscopy known as STORM. More specifically, Douglass and his team are studying telomeres, which are the small regions at the end of chromosomes that protect the chromosome from degradation. These are accompanied by a set of regulatory proteins known as shelterin.

CHALLENGE

Telomeres are much smaller than the diffraction limit of light and too heterogeneous to easily visualize with electron microscopy. Furthermore, every telomere appears to differ from all the others. To successfully gather enough data to achieve good statistics, the research team must image a large number of telomeres and cells using STORM, which ultimately results in extremely large datasets that are cumbersome to manage.

After learning about the Prime sCMOS camera from Photometrics, Douglass decided to test it in his lab. He was interested in how well the camera performed and how its PrimeLocate™ feature would affect their work. PrimeLocate is one of the camera's intelligent computational features. It dynamically evaluates acquired images and reduces the data surplus that is generated during high speed imaging, which was of high interest. After testing the camera and this feature, the team found it solved many of their problems. As a result, they purchased two Prime cameras.

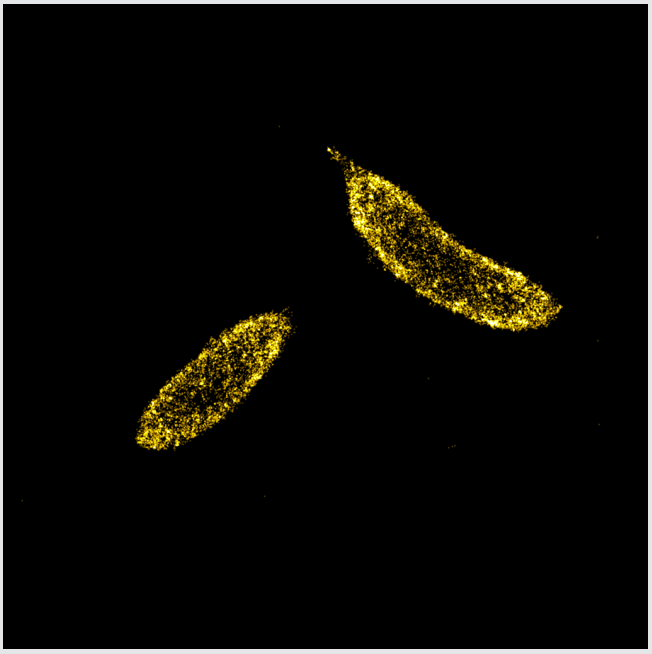
> "The real-time filtering and high frame rates of the Photometrics Prime sCMOS camera enables us to capture even more super-resolution microscopy data and better characterize variability in the structure of chromatin."

SOLUTION

Now using the cameras for their research, the team is experiencing the real benefits. They can now better manage large datasets because PrimeLocate's real-time filtering is automatically removing the regions that do not contain fluorescence signals. Douglass shares "We are capturing five to ten times more data before our storage reaches capacity."

Because this work relies heavily on the ability to quantify variability in biological structures, it cannot be done without acquiring large amounts of data. "The PrimeLocate feature allows us to capture more data because pixels that don't contain a signal no longer waste space in our computer storage," Douglass explains.

Douglass concludes. "The real-time filtering and high frame rates of the Photometrics Prime sCMOS camera enable us to capture even more super-resolution microscopy data and to better characterize variability in the structure of chromatin."



This STORM image was reconstructed from a data set that was acquired using the Prime sCMOS camera's PrimeLocate™ feature.

Learn more about the work of Dr. Douglass at EPFL:
https://people.epfl.ch/kyle.douglass?lang=en

Visit the Laboratory of Experimental Biophysics at EPFL:
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