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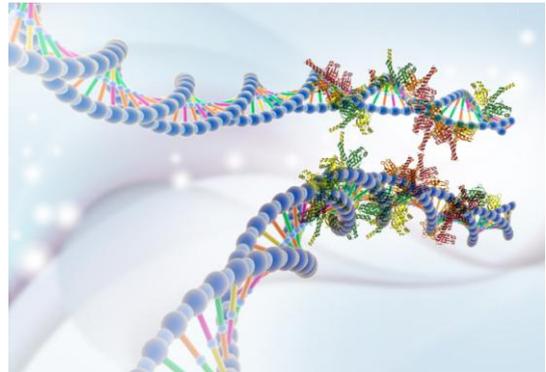
JPK's NanoTracker™ 2 optical tweezers system is used in the Modesti group at the Centre for Cancer Research, INSERM, to manipulate individual DNA molecules

Berlin, November 22th, 2016: JPK Instruments, a world-leading manufacturer of nanoanalytic instrumentation for research in life sciences and soft matter, reports on the use of their NanoTracker™ 2 Optical Tweezers system at the Centre for Cancer Research in Marseilles, a part of CNRS and INSERM located at the Aix-Marseille Université.

The research team lead by Dr Mauro Modesti at the [Centre for Cancer Research, Marseilles](#) (CRCM), focuses on the study and understanding of the molecular mechanisms that assure DNA repair and the maintain of genome integrity in human cells. Failure to detect and/or repair of DNA genotoxic lesions, such as double-strand breaks, can lead to the appearance of mutations, genomic instability and, eventually, cancer. In order to better understand the DNA-repair processes, Dr Modesti's team exploits and merges different techniques going from classical ensemble biochemical assays and cell biology to the use of "single-molecule" biophysical methods that allow visualization and monitoring of the dynamic behavior of repair proteins acting on DNA molecules. Given that tumor treatments by radiotherapy or chemotherapy rely on the induction of DNA double-strand breaks in cancer cells in order to kill them, targeting the factors involved in DNA repair is thus a sensible strategy to improve cancer therapy but still necessitates a deeper understanding at the fundamental level of the DNA repair mechanisms, which is the goal of the research group.

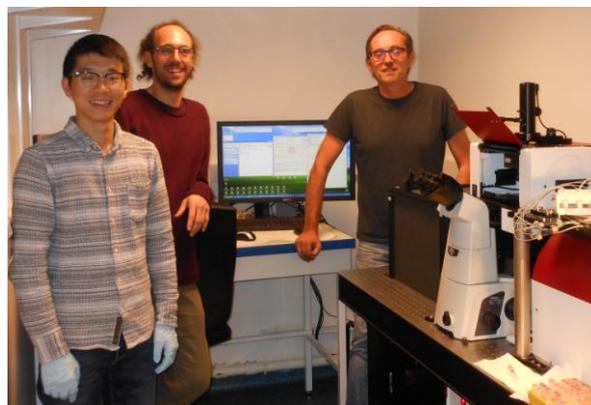
The group uses JPK's NanoTracker™ 2 optical tweezers system as a unique tool that enables the grabbing and manipulation of individual DNA molecules. This way, the researchers of the group are able to hold the DNA, like a wire between two handles, and study the action of different DNA-repair proteins. Optical tweezers are used to "feel" the mechanical action of the proteins on the DNA and are combined with fluorescence imaging in order to observe, in real time, the position of the (fluorescently labelled) proteins as they move along the DNA and interact between them and with the DNA substrate. In particular, the group has recently developed an assay where two DNA molecules are captured and used to test whether and how different DNA-repair complexes are able to bring and maintain together the two DNA molecules. This mimics the situation in which the DNA is broken in two pieces and the two pieces need to be held together and then reconnected, as illustrated in the schematics below.

Describing the system and its role in the group, research engineer, Davide Normanno, takes up the story. "We use the JPK NanoTracker™ 2 optical tweezers system in combination with a custom-built single-molecule epi-fluorescence microscope and a microfluidics system. This way we can catch and manipulate the DNA while precisely controlling the environmental conditions and observing the activity on the DNA of fluorescently labelled proteins. This enables us to perform, follow and study complex biochemical reactions in a highly controlled way. We especially like the software to control all the instrumentation, which is a crucial aspect to be actually able to perform such complicate experiments. Also, we appreciate the timely and positive interaction with all JPK engineers, application specialists, and software developers for their help and support when we have some issue or questions. Their efforts in continuing to implement and add new custom functionalities in the software enables us to really have fun and, hopefully, be creative and innovative in the use of the NanoTracker™ system. We also enjoy the versatility of the (new AOD-based) trap multiplexing, which gives us the possibility to have as many traps as we want, and more traps means more fun for us!"



For more details about JPK's NanoTracker™ 2 optical tweezers system and its applications for the bio & nano sciences, please contact JPK on +49 30726243 500. Alternatively, please visit the web site: www.jpk.com or see more on Facebook: www.jpk.com/facebook and on You Tube: <http://www.youtube.com/jpkinstruments>.

Attachment



The JPK NanoTracker™ 2 in the lab of Mauro Modesti (pictured right) with Hongshan Zhang (PhD student) and Davide Normanno (research engineer).

For high resolution copies of the images, either right click to download or contact Jezz Leckenby at Talking Science.

About JPK Instruments

JPK Instruments AG is a world-leading manufacturer of nanoanalytic instruments - particularly atomic force microscope (AFM) systems and optical tweezers - for a broad range of applications reaching from soft matter physics to nano-optics, from surface chemistry to cell and molecular biology. From its earliest days applying atomic force microscope (AFM) technology, JPK has recognized the opportunities provided by nanotechnology for transforming life sciences and soft matter research. This focus has driven JPK's success in uniting the worlds of nanotechnology tools and life science applications by offering cutting-edge technology and unique applications expertise. Headquartered in Berlin and with direct operations in Dresden, Cambridge (UK), Singapore, Tokyo, Shanghai (China), Paris (France) and Carpinteria (USA), JPK maintains a global network of distributors and support centers and provides on the spot applications and service support to an ever-growing community of researchers.

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