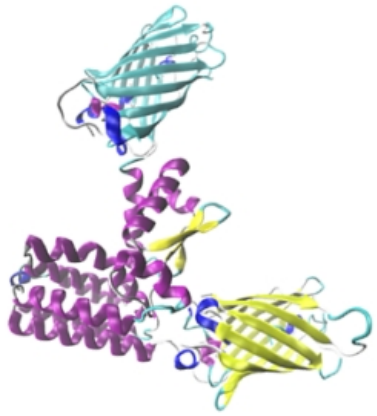
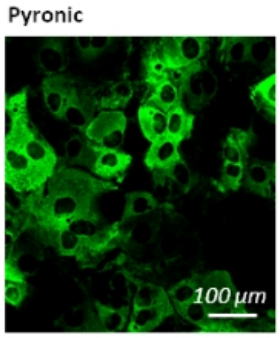
CECs researchers have developed a nanosensor that permits to measure the mitochondrial metabolism of individual cells for the first time and in real-time.



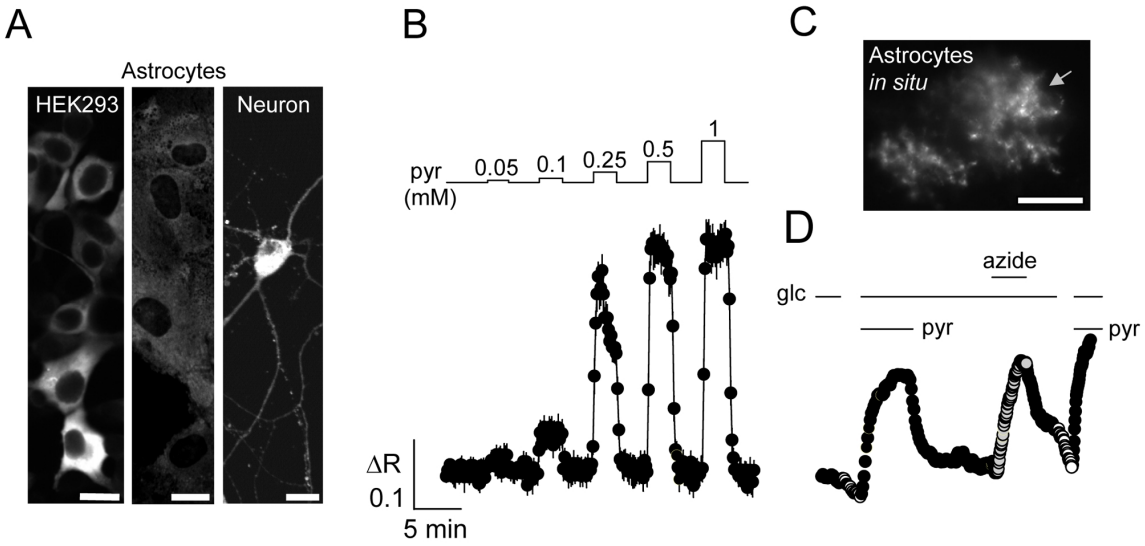
Pyronic
(PYRuvate Nano-Indicator from CECs)



Astrocytes

In the paper published in the journal *PLoS ONE* , researchers from Biological Laboratory of CECs presented a method for real-time estimation of mitochondrial flow in intact cells at the level of single cells, using fluorescence microscopy. This method is based on a new genetically encoded nanosensor for pyruvate, a pivotal molecule between oxidative and fermentative metabolism. The nanosensor, which was termed Pyronic (PYRuvate Nano-Indicator from CECs), also permits the estimation of pyruvate concentration, production rate and transport.

The team led by Felipe Barros , developed a method of high resolution that permits the evaluation of mitochondrial function in intact cells. Mitochondria are cellular organelles specialized in the production of energy using oxygen. Currently, mitochondrial function is estimated by respirometry, a technique of low resolution that require millions of cells. With the new method developed by CECs, it is now possible to measure mitochondrial metabolism in single cell.



An example of the potential of this new method may be found in cancer control: “About 70% of the cells within a malignant tumour are not cancerous, they are healthy cells that were recruited from the normal tissue, many of which are actively fighting against the tumour. Current oncology treatments may be compared to trawling, a damaging type of fishing that does not discriminate between types of fish, capturing those that can be fished together with those that are banned. With methods like ours, it will be possible to discriminate between malignant cells and those that should be protected, pointing to the development of more specific and effective treatments”, argues Barros.

In addition, the ability to measure energy consumption at the level of single cells will facilitate the development of drugs against other diseases. "One of the main challenges facing today's pharmaceutical industry is the toxicity presented by candidates. Allowing the detection of mitochondrial toxicity with high sensitivity, Pyronic will reduce the time to develop new drugs and reduce its selling price," says Alejandro San Martín , the first author of this paper.

Reference: San Martín A, Ceballo S, Baeza-Lehnert F, Lerchundi R, Valdebenito R, et al. (2014) Imaging Mitochondrial Flux in Single Cells with a FRET Sensor for Pyruvate. PLoS ONE 9(1): e85780. doi: 10.1371/journal.pone.0085780

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