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Can fruit flies help treat stroke and transplant patients?

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Las Vegas NV. Reperfusion injury takes place when an animal or an organ is starved of oxygen, then exposed to oxygen again. This occurs in strokes and organ transplants and causes many deaths per year. Now scientists at UNLV, Sable Systems International and UCSD have discovered that reperfusion injury can be induced in fruit-flies, a convenient, cheap, well-characterized model animal. The research paper describing their results will be published in PLoS ONE.

“With this new model, researchers can explore the mechanisms of reperfusion injury with a classic animal model that’s much cheaper and easier to use than vertebrates such as mammals”, said Dr. John Lighton, an adjunct professor at UNLV, president of Sable Systems International (a Nevada based company that manufactures precision respirometry systems) and lead scientist.

Dr. Pablo Schilman, a physiologist at UCSD, co-authored the research. “Use of this method creates a window into the cells' mitochondria. Using Drosophila as a model may mean faster progress in mitigating the human toll of reperfusion injury, which we still don’t fully understand. And what we don’t fully understand, we can’t treat effectively.”

The study, which was funded by Sable Systems International’s Basic Research Initiative and took place in Sable Systems’ respirometry laboratory in Las Vegas, started out with the first detailed metabolic examination of the fruit-fly’s ability to survive a complete lack of oxygen for an hour or more. “By accident,” explains Dr. Lighton, “we

discovered that exposing fruit-flies to one or more brief bursts of oxygen while they were otherwise oxygen-starved, injured their respiratory systems irreversibly – classic reperfusion injury."

Dr. Lighton and Dr. Schilman tracked damage to the flies' respiratory systems by measuring the water vapor and carbon dioxide lost by individual flies weighing less than a thousandth of a gram. The carbon dioxide output provided an index of mitochondrial activity, while respiratory water loss tracked the functional state of the fly's neuromuscular system. When asked how such tiny signals were measured, Dr. Lighton said "Carefully. For more details, see the paper. But in any event, we now have ways of measuring reperfusion injury in Drosophila. So, it's possible both to improve our understanding of the process and to test strategies for mitigating it - using," continued Dr. Lighton, "an animal most people don't have an emotional reaction to, other than a desire to swat it. We hope that biomedical researchers will pick up on this opportunity."

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