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New mitochondrial research offers hope to those suffering serious disease

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(Medical Xpress)—Queen's University professor Stephen Archer's (Department of Medicine) research has revealed that in serious human diseases (such as pulmonary hypertension, lung cancer, cardiac arrest and neurologic disease) the cell's power source, known as mitochondria, displays an abnormal structure.

Dr. Archer discussed his findings in a recent *New England Journal of Medicine* article.

"This explosion in the understanding of the once secret lives of mitochondria will almost certainly advance our understanding of an important mechanism for cell death and cell growth," says Dr. Archer. "This basic understanding offers new molecular targets for therapies of neurologic diseases, cancer and pulmonary hypertension."

Five original research papers from Dr. Archer's lab and other labs around the world have discovered the molecular basis for these structural changes in mitochondria. This new field of study is called mitochondrial dynamics and it reveals how abnormalities in the life cycle of mitochondria (including the ways mitochondria divide (fission), join together (fusion) and are eliminated) result in disease causing changes in cell growth and survival.

This rapidly evolving discipline has already identified several new targets for therapy for diseases ranging from Parkinsonism and pulmonary hypertension to cardiac arrest.

In the *NEJM* article, Dr. Archer advocates for research into new drugs that target fission and fusion. He is also working on new ways to image the bacteria-sized mitochondria, such as new "super resolution" light microscopes, which will allow researchers to see the organelles better and thereby better understand their function.

Provided by Queen's University