Workings of molecular motor revealed

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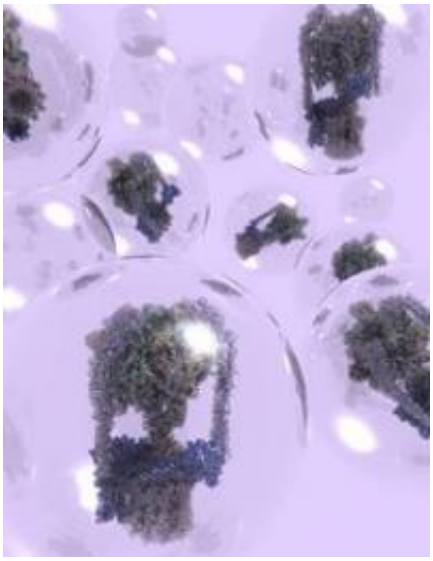

ATPase protected during its flight into a mass spectrometer by a detergent bubble. Credit: Karl Harrison

(Medical Xpress) -- The structure and function of a 'molecular motor' critical to the functioning of human organs and, when malfunctioning, implicated in cancer, kidney failure, and osteoporosis, has been revealed in unprecedented detail.

An international team, led by chemists from Oxford University, has used highly sensitive mass-spectrometry to piece together a picture of how the motor, the energy-converting protein adenosine triphosphate (ATP) synthase, interacts with the fatty acids that form the membranes around our cells.

The team publish a report of the research in this week's Science.

"ATP synthase is found in every cell in our bodies and generates the energy necessary to keep our organs working," said Professor Carol Robinson of Oxford University's Department of Chemistry, an author of the paper. "Our team were able to effectively 'weigh' this molecular motor and calculate the exact weight of the fatty acids – that act rather like a 'lubricant' for the motor – that are attached to it."

The researchers probed ATP synthase and its various component parts by stimulating it with high pH and different levels of ATP and Adenosine diphosphate (ADP). They were then able to watch how the different parts of this molecular motor responded and interacted in the kind of detail nobody has seen before

The team believe their discovery will be extremely important for future research into a wide range of diseases in which defects in such energy-converting machinery plays a part.

Professor Robinson said: "Overall this research has not only contributed to our understanding of this cellular motor but also highlights opportunities to explore the effects of inhibitors that could one day help in the treatment of many conditions."

More information: A report of the research, 'Mass Spectrometry of Intact V-Type ATPases Reveals Bound Lipids and the Effects of Nucleotide Binding', is published in the 21 October issue of *Science*.

Provided by Oxford University