Researchers Find Tools Needed To Build a Cellular Shredder

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(PhysOrg.com) -- Yale University researchers have discovered a set of cellular chaperones needed to assemble a proteasome, the cellular workhorse that recycles proteins and is crucial for the existence of all eukaryotic cells.

Even though proteasomes are a target of new generation of cancer drugs and their malfunction contributes to neurodegenerative diseases such as Alzheimer's disease, little is known about how this complex machine assembles itself within cells.

Working with yeast, a team led by Mark Hochstrasser, Eugene Higgins Professor of Molecular Biophysics & Biochemistry, discovered four factors called assembly chaperones that are crucial to the construction of a key part of the proteasome complex. Their findings are reported in Friday's edition of the journal Cell.

"Our discovery of these factors and their initial characterization is just the first step toward understanding how they operate," Hochstrasser said. "A lot of different proteins have to come together to makes a full proteasome."

Proteasomes are a sort of cellular shredder, taking specific proteins within the cell and breaking them apart so they will not block cell proliferation or accumulate to toxic levels. A single mammalian cell might have as many as 800,000 proteasomes.

Sometimes, however, proteasomes can shred proteins that would otherwise cause cancer cells to die. A drug that inhibits proteasomes has been approved as a therapy against cancer. Conversely, malfunctions of the proteasome can lead to aggregation of harmful proteins such as those associated with Alzheimer's disease. Understanding how proteasomes are constructed will help researchers identify mechanisms to intervene in these diseases processes, Hochstrasser said.

Provided by Yale University (news : web)