

# Unraveling Batten disease

November 2 2011

---

Waste management is a big issue anywhere, but at the cellular level it can be a matter of life and death. A Weizmann Institute study, published in the *Journal of Cell Biology*, has revealed what causes a molecular waste container in the cell to overflow in Batten disease, a rare but fatal neurodegenerative disorder that begins in childhood. The findings may form the basis for a therapy for this disorder.

In Batten disease, an insoluble yellow pigment accumulates in the brain's [neurons](#), causing these cells to degenerate and ultimately die. Patients gradually become disabled, losing their vision and motor skills and suffering mental impairment; they rarely survive beyond their early twenties. It's been known for a while that the disorder is caused by a mutation in the gene referred to as CLN3, but the role of this gene in the cell was unknown. This role has now been discovered in the Weizmann Institute study, explaining the molecular dysfunction in Batten disease.

The research was conducted in the laboratory of Prof. Jeffrey Gerst of the Molecular Genetics Department by Rachel Kama and postdoctoral fellow Dr. Vydehi Kanneganti, in collaboration with Prof. Christian Ungermann of the University of Osnabrueck in Germany. All the studies were performed in yeast: The yeast equivalent of the mammalian CLN3 gene has been conserved almost intact in the course of evolution, making them ideal models for study. In fact, so similar are the yeast and the mammalian genes that when the researchers replaced a missing copy of the [yeast gene](#) with a working copy of mammalian CLN3, normal functioning of the yeast cell was restored.

The experiments showed that the yeast equivalent of CLN3 is involved in moving proteins about the cell – the scientific term is "protein trafficking." The gene activates an enzyme of the kinase family, which, in turn, launches a series of molecular events regulating the trafficking. When the yeast CLN3 is mutated, this trafficking is disrupted. As a result, certain proteins accumulate abnormally in the lysosome, the cell's waste-recycling machine, instead of being transported to another destination. At some point the lysosome is filled beyond capacity; it then interferes with molecular signaling and other vital processes in the neuron, eventually killing the cell.

A great deal of research must still be performed before this finding benefits humans, but the clarification of the CLN3 function is precisely what might help develop a new therapy. Replacing the defective CLN3 in all the brain's neurons is a daunting challenge, but replacing its function – for example, by activating the relevant kinase by means of a drug – should be much more feasible.

Provided by Weizmann Institute of Science

Citation: Unraveling Batten disease (2011, November 2) retrieved 24 April 2024 from <https://phys.org/news/2011-11-unraveling-batten-disease.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.