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| Title: | ATP-dependent membrane remodeling links EHD1 functions to endocytic recycling |
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| Keywords: | Biochemical assays<br>Computational models<br>Membrane fission<br>EHD1 functions<br>endocytic recycling<br>ATP-dependent membrane |
| Issue Date: | 2018 |
| Publisher: | Nature Publishing Group |
| Citation: | Nature Communications, 9(1). |
| Abstract: | Endocytic and recycling pathways generate cargo-laden transport carriers by membrane fission. Classical dynamins, which generate transport carriers during endocytosis, constrict and cause fission of membrane tubes in response to GTP hydrolysis. Relatively, less is known about the ATP-binding Eps15-homology domain-containing protein1 (EHD1), a dynamin family member that functions at the endocytic-recycling compartment. Here, we show using cross complementation assays in C. elegans that EHD1's membrane binding and ATP hydrolysis activities are necessary for endocytic recycling. Further, we show that ATP-bound EHD1 forms membrane-active scaffolds that bulge tubular model membranes. ATP hydrolysis promotes scaffold self-assembly, causing the bulge to extend and thin down intermediate regions on the tube. On tubes below 25 nm in radius, such thinning leads to scission. Molecular dynamics simulations corroborate this scission pathway. Deletion of N-terminal residues causes defects in stable scaffolding, scission and endocytic recycling. Thus, ATP hydrolysis-dependent membrane remodeling links EHD1 functions to endocytic recycling. |
| Description: | Only IISERM authors are available in the record. |
| URI: | https://www.nature.com/articles/s41467-018-07586-z (https://www.nature.com/articles/s41467-018-07586-z)<br>http://hdl.handle.net/123456789/1669 (http://hdl.handle.net/123456789/1669) |
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