

Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed
☐	☒ The exact sample size (<i>n</i>) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒ The statistical test(s) used AND whether they are one- or two-sided <i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i>
☒	☐ A description of all covariates tested
☒	☐ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒ For null hypothesis testing, the test statistic (e.g. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted <i>Give P values as exact values whenever suitable.</i>
☒	☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☐	☒ Estimates of effect sizes (e.g. Cohen's <i>d</i> , Pearson's <i>r</i>), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection	Volocity (Perkin-Elmer) Ver 6.3.1
Data analysis	Imaris (Oxford Instruments) Ver 10.1.1 Prism (GraphPad) Ver 9

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

Source data are provided with this paper

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender	The sex was determined as part of the clinical assessment of both patients. Sex is not considered personally identifiable information. Since the genes involved are autosomal, sex is not predicted to influence any findings.
Reporting on race, ethnicity, or other socially relevant groupings	We did not report on race or ethnicity or other socially relevant groupings for these 2 patients.
Population characteristics	The diagnosis of arthrogyriposis, renal dysfunction and cholestasis (ARC) syndrome is a rare condition that usually leads to a shortened lifespan.
Recruitment	The senior author of this manuscript was involved in the care of both patients.
Ethics oversight	The study was performed according to the guidelines of the Research Ethics Board at The Hospital for Sick Children, Toronto, and informed consent was provided according to the Declaration of Helsinki.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	Sample size is indicated in the figure legend for each experiment. Samples sizes were chosen based on common practice in the field.
Data exclusions	No data were excluded.
Replication	Experiments were performed at least 3 times with biological replicates.
Randomization	Not applicable
Blinding	Investigators were blinded during data analysis of microscopy studies when scoring was performed.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☐	☒ Antibodies
☐	☒ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Antibodies

Antibodies used	FLAG-M2 (Sigma, F1804) GAPDH (Millipore, MAB374)
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GOLPH4 (Santa Cruz, SC-101054)
 LAMP1 (Hybridoma, Ab_2296838)
 LAMP2 (Hybridoma, Ab_528129)
 M6PR (Calbiochem, 444105)
 VPS33B (Santa Cruz, SC-398322)
 GFP (Sigma, SAB4301138)
 Myc (Sigma, C3956)
 RAB7 (Cell Signaling Technology, D95F2)
 VIPAS39 (VPS16B) (Sigma, HPA003589)
 VPS53 (Sigma, HPA024446)
 TGN46 (MyBioSource, MBS223409)
 Calnexin (abcam, ab31290)
 Golgin-84 (BD Biosciences, 6122382)
 GS27 (BD Biosciences, 611035)
 GS28 (BD Biosciences, 6611184)
 p230 (BD Biosciences, 611280)
 STX6 (BD Biosciences, 610635)
 VT11A (BD Biosciences, 611220)
 RAB8 (BD Biosciences, 610844)
 EEA1 (R&D Systems, MAB8047)
 RAB11 (BD Biosciences, 610657)
 Golgin-97 (Cell signalling, D8P2K)
 GRASP55 (Proteintech, 10598-1-AP)
 GM130 (BD Biosciences, 610823)
 RAB4A (Thermo-Fisher, PA3-912)
 STX12 (Sysy, 110162)
 VPS35 (Invitrogen, PA5-18248)

Validation

Validation of the VPS16B (VIPAS39) antibody is provided in the manuscript (Figure S2). All other antibodies were validated on the manufacturers' websites.

Eukaryotic cell lines

Policy information about [cell lines and Sex and Gender in Research](#)

Cell line source(s)

Fibroblast (ATCC, CCL-110)
 HEK293 (ATCC, CRL-1573)
 Flp-In T-REX HEK293 (Invitrogen, R78007)

Authentication

No authentication was performed

Mycoplasma contamination

Cell lines were routinely tested for mycoplasma contamination

 Commonly misidentified lines
 (See [ICLAC](#) register)

Not applicable

Plants

Seed stocks

Not applicable

Novel plant genotypes

Not applicable

Authentication

Not applicable