

SI Table 1 | List of stable cell lines used

| Cell Lines | | |
|------------------|----------------|--------------|
| Descriptor | Base cell line | resistance |
| A549-ssGFP-KDEL | A549 | puromycin |
| A549-ATL1 KO | A549 | puromycin |
| A549-ATL2 KO | A549 | blasticidin |
| A549-ATL3 KO | A549 | puromycin |
| A549-HA-empty | A549 | puromycin |
| A549-HA-ATL2 | A549 | puromycin |
| A549-HA-ATL3 | A549 | puromycin |
| A549-HA-CANX | A549 | puromycin |
| A549-ATL3-ET-GFP | A549 | Blasticidine |
| A549-CD4-furin | A549 | puromycin |
| Huh7-Lunet/T7 | Huh7-Lunet- | Zeocin |

SI Table 2 | qPCR and cloning primers

| qPCR primers | | |
|---|---|--|
| Name | Forward primer | Reverse primer |
| Atlastin 1 | 5'-ccctgtgcacttggccatat-3' | 5'-ttgtacaaagcctggcccac-3' |
| Atlastin 2 | 5'-ttgccacatcctgttctaaa-3' | 5'-gcagcaatggaaccagattt-3' |
| Atlastin 3 | 5'-acaagccctgactttgatgg-3' | 5'-tgcagctgctaagttgttg-3' |
| HPRT | 5'-cctggcgtcgtgattatg-3' | 5'-acacccttccaatcctcag-3' |
| DENV | 5'-gcccttctgtcacaccatt-3' | 5'-ccacattggcgtaagact-3' |
| ZIKV | 5'-agatgaactgattggccggc-3' | 5'-aggctctctgtggaata-3' |
| WNV | 5'-gggccttctgtcgtgtctg-3' | 5'-ctggcatgctgatctggctg-3' |
| ARF4 | 5'-cttctgcttgcacctac-3' | 5'-aatgcgcatctgcttctg-3' |
| ARF5 | 5'-gaactactaggcctcatct-3' | 5'-gtcctctgcagcatcttct-3' |
| Lunapark | 5'-tggcatggcttgaaggaaga-3' | 5'-ggaagtctggagcctgagg-3' |
| RTN3 | 5'-tcctggctcttctctgtca-3' | 5'-tgaatggatggccttctt-3' |
| Expression constructs and cloning primers | | |
| Expression Plasmid | Forward primer | Reverse primer |
| pWPI-nHA-ATL2 | 5'-ggggacaagttgtacaaaaagcaggcttagcgg agggggacgaggca-3' | 5'-ggggaccactttgtacaagaaagctggtaattttctt ctgttattgttga-3' |
| pWPI-nHA-ATL3 | 5'-ggggacaagttgtacaaaaagcaggcttagaga gcagcaagcctggcc-3' | 5'-ggggaccactttgtacaagaaagctgggtactattga gctttttatccat-3' |
| pWPI-rosa26-ATL2 | 5'-ggggacaagttgtacaaaaagcaggcttaattggcg gagggggacgaggca-3' | 5'-ggggaccactttgtacaagaaagctggtaattttctt ctgttattgttga-3' |
| pWPI-rosa26-ATL3 | 5'-ggggacaagttgtacaaaaagcaggcttaattggag agcagcaagcctgggt-3' | 5'-ggggaccactttgtacaagaaagctgggtactattgagc tttttatccat-3' |
| pWPI-rosa26-ATL2ΔN | 5'-ggggacaagttgtacaaaaagcaggcttagctcatg aagatgaccata-3' | 5'-ggggaccactttgtacaagaaagctggtaattttctt ctgttattgttga-3' |
| pWPI-rosa26-ATL2ΔC | 5'-ggggacaagttgtacaaaaagcaggcttaattggcg gagggggacgaggca-3' | 5'-ggggaccactttgtacaagaaagctgggtattagaca tatcccaagtacaaa-3' |
| pWPI-rosa26-cyATL2 | 5'-ggggacaagttgtacaaaaagcaggcttaattggc ggagggggacgaggca-3' | 5'-ggggaccactttgtacaagaaagctggtaaacgagc agcatagaagatatt-3' |
| pWPI-rosa26-ATL2K107A | 5'-tccgtaaggGCGctccttactag-3' | 5'-ctagtaggaatgacGCCccttacgga-3' |
| pWPI-rosa26-ATL2/3N | 5'-ggggacaagttgtacaaaaagcaggcttaattgga gagcagcaagcctgt-3' | 5'-ggggaccactttgtacaagaaagctggtaattttctt ctgttattgttga-3' |
| pWPI-rosa26-ATL2/3C | 5'-ggggacaagttgtacaaaaagcaggcttaattggc ggagggggacgaggca-3' | 5'-ggggaccactttgtacaagaaagctgggtactattga gctttttatccat-3' |
| pWPI-rosa26-ATL3ΔN | 5'-ggggacaagttgtacaaaaagcaggcttaattgtt ggtcagaagatcaa-3' | 5'-ggggaccactttgtacaagaaagctgggtactattga gctttttatccat-3' |
| pWPI-rosa26-ATL3ΔC | 5'-ggggacaagttgtacaaaaagcaggcttaattg gagagcagcaagcctgt-3' | 5'-ggggaccactttgtacaagaaagctgggtattagat gtagccccagtgaggag-3' |
| pWPI-rosa26-cyATL3 | 5'-ggggacaagttgtacaaaaagcaggcttaattg agagcagcaagcctgt-3' | 5'-ggggaccactttgtacaagaaagctgggtataca acctcaagacctatgaa-3' |
| pWPI-rosa26-ATL3K55A | 5'-ccgaaagggGCGctccttactctg-3' | 5'-cagaatgaaggacGCCccttctcg-3' |

SI Table 3 | shRNA constructs

| GENE | Product type | Clone 1 | Clone 2 | Clone 3 |
|-------------|------------------|----------------|----------------|----------------|
| ATL1 | SHCLNG-NM_015915 | TRCN0000118754 | | |
| ATL2 | SHCLNG-NM_022374 | TRCN0000156356 | TRCN0000150557 | |
| ATL3 | SHCLNG-NM_015459 | TRCN0000135012 | TRCN0000134347 | |
| PDCD6 | SHCLNV-NM_013232 | TRCN0000303757 | TRCN0000303818 | TRCN0000310504 |
| PTGS2 | SHCLNV-NM_000963 | TRCN0000045533 | TRCN0000045537 | TRCN0000045534 |
| SLC25A10 | SHCLNV-NM_012140 | TRCN0000038584 | TRCN0000038588 | TRCN0000038585 |
| STAU1 | SHCLNV-NM_004602 | TRCN0000166217 | TRCN0000164920 | TRCN0000161773 |
| CHP1 | SHCLNV-NM_007236 | TRCN0000236441 | TRCN0000236437 | TRCN0000236440 |
| OXA1L | SHCLNV-NM_005015 | TRCN0000298236 | TRCN0000293903 | TRCN0000286466 |
| SFXN1 | SHCLNV-NM_022754 | TRCN0000296550 | TRCN0000290347 | TRCN0000290346 |
| GPD2 | SHCLNV-NM_000408 | TRCN0000028595 | TRCN0000028650 | TRCN0000028579 |
| ALG2 | SHCLNV-NM_033087 | TRCN0000306888 | TRCN0000286733 | TRCN0000294130 |
| STAU2 | SHCLNV-NM_014393 | TRCN0000157149 | TRCN0000178809 | TRCN0000152870 |
| ATAT1 | SHCLNV-NM_024909 | TRCN0000282709 | TRCN0000263597 | TRCN0000263599 |
| FIP1L1 | SHCLNV-NM_030917 | TRCN0000074420 | TRCN0000074419 | TRCN0000074422 |
| GHSR | SHCLNV-NM_004122 | TRCN0000368671 | TRCN0000368456 | TRCN0000357083 |
| MYH9 | SHCLNV-NM_002473 | TRCN0000285480 | TRCN0000276055 | TRCN0000276070 |
| TPM1 | SHCLNV-NM_000366 | TRCN0000062149 | TRCN0000062152 | TRCN0000062148 |
| DSTN | SHCLNV-NM_006870 | TRCN0000116878 | TRCN0000116881 | TRCN0000116879 |
| GADD45GIP1 | SHCLNV-NM_052850 | TRCN0000241878 | TRCN0000241882 | TRCN0000241881 |
| HTATIP2 | SHCLNV-NM_006410 | TRCN0000280407 | TRCN0000280399 | TRCN0000280451 |
| SCD1 | SHCLNV-NM_005063 | TRCN0000327814 | TRCN0000312672 | TRCN0000327889 |
| OSTC | SHCLNV-NM_021227 | TRCN0000134823 | TRCN0000133728 | TRCN0000134376 |
| APOBEC3C | SHCLNV-NM_014508 | TRCN0000299560 | TRCN0000299626 | TRCN0000299627 |
| PSME2 | SHCLNV-NM_002818 | TRCN0000365036 | TRCN0000377438 | TRCN0000365083 |
| MRPL49 | SHCLNV-NM_004927 | TRCN0000276508 | TRCN0000276564 | TRCN0000276509 |
| PTGES | SHCLNV-NM_004878 | TRCN0000290184 | TRCN0000290183 | TRCN0000290182 |
| OS9 | SHCLNV-NM_006812 | TRCN0000157242 | TRCN0000156713 | TRCN0000152720 |
| ARF4 | SHCLNV-NM_001660 | TRCN0000298174 | TRCN0000293758 | TRCN0000293699 |
| USMG5 | SHCLNV-NM_032747 | TRCN0000161079 | TRCN0000162046 | TRCN0000165243 |
| VKORC1 | SHCLNV-NM_206824 | TRCN0000300146 | TRCN0000300212 | TRCN0000300209 |
| UQCRH | SHCLNV-NM_006004 | TRCN0000437224 | TRCN0000437184 | TRCN0000435536 |
| ATP5O | SHCLNV-NM_001697 | TRCN0000300165 | TRCN0000300164 | TRCN0000310584 |
| TRC1.5 ctrl | | SHC016V | SHC002V | |
| TRC2 Ctrl | | SHC216V | SHC202V | |
| ARF5 | SHCLNG-NM_001662 | TRCN0000381461 | | |
| RTN3 | SHCLNG-NM_006054 | TRCN0000203633 | | |
| Lunapark | SHCLNG-NM_030650 | TRCN0000279672 | | |

SI Table 4 | CRISPR/Cas9 Knock out guide sequences

| GENE | Expression construct | Guide RNA |
|------|----------------------|----------------------------|
| ATL1 | pATL1KO-1 | 5'-GAGGAGCCAGTGAAAAAGGC-3' |
| ATL1 | pATL1KO-2 | 5'-GTTGAGATACATGTACAACC-3' |
| ATL2 | pATL2KO-1 | 5'-GCAACTTTAAGACCAGGATG-3' |
| ATL2 | pATL2KO-2 | 5'-TTCAATCTCCCATCAAAACT-3' |
| ATL3 | pATL3KO-1 | 5'-GTGGTCCTGCAAGAGGATGC-3' |
| ATL3 | pATL3KO-2 | 5'-ACTCCAGATTTGAATCCCAG-3' |

SI Table 5 | List of primary antibodies used in this study

| Primary antibodies | | |
|--------------------|----------------------------|------------------|
| Antibody target | Company or reference | Catalogue number |
| GFP | Roche | 11814460001 |
| HA epitope | Sigma Aldrich | H3663 |
| HA epitope | ThermoFisher | PA1-985 |
| ARF4 | Proteintech | 11673-1-AP |
| GAPDH | Santacruz | sc365062 |
| Alpha Tubulin | Hözel | A01410 |
| Beta Actin | Sigma Aldrich | A5441 |
| TGN46 | Biorad | AHP500G |
| furin | ThermoFisher | PA1-062 |
| RTN3 | Santacruz | sc374599 |
| Climp63 | Enyo | LX-804-604-C100 |
| FLAG epitope | Sigma Aldrich | F1804 |
| PDI | ThermoFisher | P7496 |
| ATL2 | Biomol | A303-332A-M |
| ATL3 | Abcam | ab117819 |
| ATP5B | Abcam | ab14730 |
| RAB5 | Cell Signalling Technology | 3547S |
| RAB7 | Santa Cruz | sc-376362 |
| DENV NS3 | Genetex | GTX629477 |
| DENV Envelope | Gentex | GTX127277 |
| DENV Capsid | Gentex | GTX103343 |
| DENV NS4B | Genetex | GTX133311 |
| DENV prM | Abcam | AB41473-1 |
| dsRNA | Scicons | 10010500 |
| DENV Capsid | Gift from John Aaskov | NA |
| DENV Envelope | (Miller et al., 2006) | NA |
| DENV prM | (Welsch et al. 2009) | NA |
| DENV NS1 | (Welsch et al. 2009) | NA |
| DENV NS2B | (Welsch et al. 2009) | NA |
| DENV NS3 | (Miller et al., 2006) | NA |
| DENV NS4B | (Miller et al., 2006) | NA |
| DENV NS5 | (Miller et al., 2006) | NA |
| CD4-647 | Novus | NBP2-52706AF647 |

SI Table 6 | List of secondary antibodies used in this study

| Secondary Antibodies | | |
|---|---------------------------------------|------------------|
| Antibody target | Company | Catalogue number |
| Goat anti-rabbit IgG-HRP | Sigma Aldrich | A6154 |
| Goat anti-mouse IgG-HRP | Sigma Aldrich | A4416 |
| Alexa Fluor 488 donkey anti-rabbit IgG | Thermofisher | A-21206 |
| Alexa Fluor 488 donkey anti-mouse IgG | Thermofisher | A-21202 |
| Alexa Fluor 488 donkey anti-mouse IgG2a | Thermofisher | A-21131 |
| Alexa Fluor 568 donkey anti-rabbit IgG | Thermofisher | A-10042 |
| Alexa Fluor 568 donkey anti-mouse IgG | Thermofisher | A-10037 |
| Alexa Fluor 568 donkey anti-mouse IgG1 | Thermofisher | A-21124 |
| Alexa Fluor 647 donkey anti-rabbit IgG | Thermofisher | A -31573 |
| Alexa Fluor 647 donkey anti-mouse IgG | Thermofisher | A-31571 |
| Alexa Fluor 647 donkey anti-mouse IgG2b | Thermofisher | A-21242 |
| STAR RED Goat anti-Rabbit IgG | Sigma Aldrich | 41699 |
| Atto 594 Goat anti-mouse IgG | Sigma Aldrich | 76085 |
| Protein A-Gold, 10 nm | Utrecht Cell Microscopy Core Facility | NA |

SI Table 7 | shRNA constructs

| Accession | Species | Atlastin |
|----------------|--------------------------------------|----------|
| XP_019849134.1 | <i>Amphimedon queenslandica</i> | AtI |
| XP_001635066.1 | <i>Nematostella vectensis</i> | AtI |
| NP_651274.1 | <i>Drosophila melanogaster</i> | AtI |
| XP_002127593.1 | <i>Ciona intestinalis</i> | AtI |
| XP_004997008.1 | <i>Salpingoeca rosetta</i> | AtI |
| XP_019627448.1 | <i>Branchiostoma belcheri</i> | AtI |
| CBY20949.1 | <i>Oikopleura dioica</i> | AtI |
| XP_002730796.1 | <i>Saccoglossus kowalevskii</i> | AtI |
| XP_001744281.1 | <i>Monosiga brevicollis</i> | AtI |
| XP_001663157.1 | <i>Aedes aegypti</i> | AtI |
| NP_001023492.1 | <i>Caenorhabditis elegans</i> | AtI-A |
| XP_002115752.1 | <i>Trichoplax adhaerens</i> | AtI-A |
| XP_781017.3 | <i>Strongylocentrotus purpuratus</i> | AtI-A |
| XP_002116209.1 | <i>Trichoplax adhaerens</i> | AtI-B |
| NP_502809.2 | <i>Caenorhabditis elegans</i> | AtI-B |
| XP_011666775.1 | <i>Strongylocentrotus purpuratus</i> | AtI-B |
| NP_056999.2 | <i>Homo sapiens</i> | AtI1 |
| XP_015132233.1 | <i>Gallus gallus</i> | AtI1 |
| XP_016280549.1 | <i>Monodelphis domestica</i> | AtI1 |
| NP_001139172.1 | <i>Danio rerio</i> | AtI1 |
| XP_007439467.1 | <i>Python bivittatus</i> | AtI1 |
| NP_848743.1 | <i>Mus musculus</i> | AtI1 |
| XP_001515152.2 | <i>Ornithorhynchus anatinus</i> | AtI1 |
| NP_001072222.1 | <i>Xenopus tropicalis</i> | AtI1 |
| XP_020370135.1 | <i>Rhincodon typus</i> | AtI1 |
| XP_007886393.1 | <i>Callorhynchus milii</i> | AtI1 |
| NP_071769.2 | <i>Homo sapiens</i> | AtI2 |
| XP_007431746.1 | <i>Python bivittatus</i> | AtI2 |
| XP_015139056.1 | <i>Gallus gallus</i> | AtI2 |
| XP_007477079.1 | <i>Monodelphis domestica</i> | AtI2 |
| NP_001103492.1 | <i>Danio rerio</i> | AtI2 |
| NP_062691.3 | <i>Mus musculus</i> | AtI2 |
| XP_004914749.1 | <i>Xenopus tropicalis</i> | AtI2 |
| XP_007659666.1 | <i>Ornithorhynchus anatinus</i> | AtI2 |
| XP_007892554.1 | <i>Callorhynchus milii</i> | AtI2 |
| XP_020365818.1 | <i>Rhincodon typus</i> | AtI2 |
| NP_056274.3 | <i>Homo sapiens</i> | AtI3 |
| XP_007442555.1 | <i>Python bivittatus</i> | AtI3 |
| NP_001006016.1 | <i>Danio rerio</i> | AtI3 |
| XP_007497801.1 | <i>Monodelphis domestica</i> | AtI3 |
| NP_001016595.1 | <i>Xenopus tropicalis</i> | AtI3 |
| NP_001156977.1 | <i>Mus musculus</i> | AtI3 |
| XP_007656076.1 | <i>Ornithorhynchus anatinus</i> | AtI3 |