**Table S2. Granule Phenotypes of Screen Hits, Related to Figure 1**

| Phenotypes | Strong | Moderate | Weak |
|---|---|---|---|
| **Stress granules: P-body co-localized** | *ATG11, CHO2, ERG2, INO2, ISW1, KCS1, PGD1, RLF2, RTC2, SHE10, SSH1, TGS1, VMA11, VMA16, VMA2, VMA3, VMA4, XRN1, YBR225W* | *ADO1, ASH1, ATG8*, CDC73, CIN8, GCN5, KTR1, MDS3, MRPL22, MTM1, NSG2, PFK2, RIM15, RPL42A, SWD3, TAT2, VHS2, VMA21, YIP3, YMD8, YMR262W, YNL200C* | *AAT1, ATC1, ATG18, BCK1, CDH1, CMK1, ERP5, SIR2, GSH2, HST1, ICE2, IKI3, IRC14, MON1, NFT1, NRM1, PCL1, PGC1, PHO86, PRE9, PSD1, RIM21, RNH70, RPL39, SET2, SDL1, SQS1, STO1, STE3, SWC5, SWH1, TRM12, UBX2, WSS1, YIL024C, YJR115W, YLR050C, YMR259C, YPL205C, ZWF1* |
| **Stress granules: P-body distinct** | *HPR1*, MFT1*, THO2*, THP1*, THP2** | *EOS1, EST1, HEL2, SAC3*, YLR169W* | *GGA1, LAT1, LSM6, MEH1, PAP2, POC4, SAM37, SWR1, YDL124W, YLR236C* |
| **P-bodies increased** | *KCS1, PGD1, RPL42A, SWD3, SWH1, TAT2, XRN1* | *ADO1, ASH1, CMK1, ERG2, HEL2, HST1, KTR1, NSG2, PCL9, PHO86, RLF2, RPL35B, SDL1, VHS2, YBR225W, YMD8* | *ATC1, ERP5, MDS3, MFT1*, PFK2, RPL39, SHE10, STO1, YIL001W, YLR050C, YLR169W, YOR338W, YNL200C, ZWF1* |
| **P-bodies decreased** | *BIO4, MLP1, PFD1, RPS28B, SAM37, TCM62, TIF3, VMS1, YMR086W, YSW1* | *EDC2, GGA1, GIM4, PAP2, YSW1* | *EGD1, GSP2, GIM5, HNT3, MSN5, SRO9, STE5, YIL014C-A* |
| **Intra-vacuolar accumulation** | *ATG15* | | |

Several gene deletions were quantified as hits in more than one category, hence duplicate entries above. In addition, *-marked gene deletions exhibited protein mis-localization phenotypes as follows: Nuclear/nuclear peripheral accumulation of Pab1-GFP: *HPR1*, *MFT1*, *THO2*, *THP1*, *THP2*, *SAC3*.

## Table S4. Experimental Quantitation, Related to Figures 2, 3, and 4

| **Midlog Cdc48/Ufd1/Npl4 ts alleles (Fig 2B)** | | |
|---|---|---|
| **Strain/conditions** | **Stress granule size ($\mu m_2$ +/- st dev.)** | **Stress granule foci/cell (+/- st. dev.)** |
| WT (W303) | 0.11 +/- 0.07 | 0.02 +/- 0.03 |
| WT – 39°C 1hr | 0.20 +/- 0.03 | 0.46 +/- 0.16 |
| Cdc48-3 | 0.14 +/- 0.07 | 0.05 +/- 0.02 |
| Cdc48-3 – 39°C 1hr | 0.35 +/- 0.09 | 2.03 +/- 1.13 |
| Npl4-1 | 0.18 +/- 0.13 | 0.06 +/- 0.05 |
| Npl4-1 – 39°C 1hr | 0.31 +/- 0.04 | 0.91 +/- 0.29 |
| Ufd1-2 | 0.07 +/- 0.03 | 0.02 +/- 0.02 |
| Ufd1-2 – 39°C 1hr | 0.26 +/- 0.00 | 0.99 +/- 0.40 |
| | | |
| **Stationary phase IVC quantitation (Fig 3 and 4)** | | |
| **Strain/conditions** | **Cells with Pab1-GFP IVCs (% +/- st. dev.)** | **Significance (2-tailed T-test) relative to *atg15Δ*** |
| *atg15*Δ (BY background) | 54.79 +/- 13.35 | |
| *atg8*Δ *atg15*Δ | 22.74 +/- 6.28 | 0.011 |
| *atg11*Δ *atg15*Δ | 9.47 +/- 7.18 | 0.0025 |
| *mon1*Δ *atg15*Δ | 1.06 +/- 0.73 | $6.1x10^{-4}$ |
| | | |
| *atg15*Δ (W303 background) – *27°C* | 48.25 +/- 4.78 | |
| *atg15*Δ – *34°C 1hr* | 58.56 +/- 1.81 | |
| *atg15*Δ – *34°C 2hr* | 58.64 +/- 5.73 | |
| *cdc48-3 atg15*Δ - *27°C* | 33.82 +/- 1.28 | 0.007 (27°C) |
| *cdc48-3 atg15*Δ - *34°C 1hr* | 23.08 +/- 3.53 | $9.6x10^{-5}$ (34°C 1hr) |
| *cdc48-3 atg15*Δ - *34°C 2hr* | 11.00 +/- 1.79 | $1.6x10^{-4}$ (34°C 2hr) |
| | | |
| *atg15*Δ (RP840 background) | 33.08 +/- 9.75 | |
| *atg15*Δ (RP840 background) – 37°C 1hr | 37.93 +/- 11.92 | |
| *dcp2-7 atg15*Δ | 59.26 +/- 3.93 | $8.5x10^{-5}$ |
| *dcp2-7 atg15*Δ - 37°C 1hr | 70.02 +/- 7.94 | $8.5x10^{-5}$ |
| *xrn1*Δ *atg15*Δ | 69.46 +/- 8.44 | $8.6x10^{-4}$ |
| | | |
| **Atg19/11-GFP co-localization (Figure S5)** | **Cells with Edc3-mCh foci overlap (% +/- st. dev)** | |
| Atg11-GFP (BY background, early stationary phase) | 5.64 +/-0.73 | |
| Atg19-GFP (BY background, early stationary phase) | 5.99 +/- 1.49 | |
| | **Cells with Pub1-mCh foci overlap (% +/- st. dev)** | |
| **GFP-Atg19 co-localization (Figure S6)** | | |
| GFP-Atg19 - *mon1*Δ (BY background, early stationary phase) | 7.6 +/- 2.42 | |
| GFP-Atg19 - *mon1*Δ (BY background, early stationary phase) | 16.03 +/- 3.69 | |
| | **Cells with Pub1-mCh/GFP-Atg19 IVC overlap** | |
| GFP-Atg19 – *atg15*Δ (BY background, early stationary phase) | 71.19 +/- 6.85 | |
| | | |
| **HeLa Cell quantitation (Figure S7)** | **Cells with SGs (% +/- st. dev.)** | **Cells with PBs (% +/- st. dev)** |
| Unstressed | 0.00 +/- 0 | 38.70 +/- 7.60 |
| Arsenite 1mM – 1hr | 100 +/- 0 | 90.31 +/- 6.28 |
| Bafilomycin A1 0.5μM – 1hr | 12.18 +/- 6.35 | 30.98 +/- 11.18 |
| | | |
| Arsenite 1mM – 20 min recovery | 98.24 +/- 2.14 | 95.83 +/- 8.33 |
| Arsenite 1mM – 1hr recovery | 96.95 +/- 2.83 | 96.90 +/- 5.37 |
| Arsenite 1mM – 2hr recovery | 68.79 +/- 18.52 | 85.48 +/- 11.67 |
| Arsenite 1mM – 3hr recovery | 11.13 +/- 9.11 | 65.93 +/- 23.11 |
| Arsenite 1mM – 3-MA (10μM) 20 min recovery | 92.39 +/- 9.75 | 82.95 +/- 29.54 |
| Arsenite 1mM – 3-MA (10μM) 1hr recovery | 73.60 +/- 11.81 | 71.85 +/- 25.95 |
| Arsenite 1mM – 3-MA (10μM) 2hr recovery | 36.08 +/- 15.17 | 84.79 +/- 5.24 |
| Arsenite 1mM – 3-MA (10μM) 3hr recovery | 4.84 +/- 5.31 | 61.01 +/- 22.19 |
| Arsenite 1mM – Rapamycin (10nM) 20 min recovery | 84.01 +/- 0.96 | 70.03 +/- 10.64 |
| Arsenite 1mM – Rapamycin (10nM) 1hr recovery | 71.15 +/- 19.42 | 57.18 +/- 10.15 |
| Arsenite 1mM – Rapamycin (10nM) 2hr recovery | 73.05 +/- 4.93 | 60.85 +/- 9.19 |
| Arsenite 1mM – Rapamycin (10nM) 3hr recovery | 4.55 +/- 4.66 | 48.82 +/- 44.09 |
| Arsenite 1mM – Wortmannin (1.5μM) 20 min recovery | 100 +/- 0 | 97.56 +/- 6.35 |
| Arsenite 1mM – Wortmannin (1.5μM) 1hr recovery | 97.56 +/- 3.45 | 97.56 +/- 3.45 |
| Arsenite 1mM – Wortmannin (1.5μM) 2hr recovery | 77.16 +/- 15.85 | 73.97 +/- 20.36 |
| Arsenite 1mM – Wortmannin (1.5μM) 3hr recovery | 42.89 +/- 20.77 | 66.26 +/- 28.43 |

Details of quantitation methods presented in experimental procedures.

## Table S5. Strains and Plasmids Used in This Study, Related to Experimental Procedures

| **Yeast strains** | | |
|---|---|---|
| **Name** | **Properties** | **Reference** |
| yRP840 | *MATa leu2-3,112 trp1 ura3-52 his4-539 cup1::LEU2/PGK1pG/MFA2pG* | Hatfield et al., 1996 |
| yRP1501 | *MATa leu2-3112 lys2-201 trp1 ura3-52 dcp2-7::URA3* | Dunckley et al, 2001 |
| yRP2065 | *MATa his3Δ0 leu2Δ0 met15Δ0 ura3Δ0 ('BY4741')* | Coller and Parker, 2005 |
| yRP2882 | *MATa ade2-1 can1-100 his3-11,15 leu2-3,112 trp1-1 ura3-1 bar1D cdc48-3::HIS3* | Hsieh and Chen, 2011 (RHC677) |
| yRP2883 | *MATa ade2-1 can1-100 his3-11,15 leu2-3,112 trp1-1 ura3-1 bar1D ufd1-2* | Hsieh and Chen, 2011 (RHC1122) |
| yRP2884 | *MATa ade2-1 can1-100 his3-11,15 leu2-3,112 trp1-1 ura3-1 bar1D npl4-1* | Hsieh and Chen, 2011 (RHC1126) |
| yRP2893 | *MATa ade2-1 can1-100 his3-11,15 leu2-3,112 trp1-1 ura3-1 bar1D ('W303')* | Hsieh and Chen, 2011 |
| yRP2894 | *MATa his4-619 leu2-3,112 ura3-52 atg15::HYGB* | This study |
| yRP2896 | *MATa leu2-3,112 trp1 ura3-52 his4-539 cup1::LEU2/PGK1pG/MFA2pG atg15::HYGB* | This study |
| yRP2897 | *MATa his4-539 leu2-3,112 trp1-Δ1 ura3-52 xrn1::URA3 atg15::HYGB* | This study |
| yRP2898 | *MATa leu2-3112 lys2-201 trp1 ura3-52 dcp2-7::URA3 atg15::HYGB* | This study |
| yRP2899 | *MATa his3Δ0 leu2Δ0 met15Δ0 ura3Δ0 atg15::KANMX* | Invitrogen/Resgen collection |
| yRP2900 | *MATa his3Δ0 leu2Δ0 met15Δ0 ura3Δ0 atg8::KANMX atg15::HYGB* | This study |
| yRP2901 | *MATa his3Δ0 leu2Δ0 met15Δ0 ura3Δ0 atg11::KANMX atg15::HYGB* | This study |
| yRP2902 | *MATa his3Δ0 leu2Δ0 met15Δ0 ura3Δ0 mon1::KANMX atg15::HYGB* | This study |
| yRP2903 | *MATa leu2 ura3 his3 met15 VMA2-GFP (HIS)* | Huh et al., 2003 |
| yRP2916 | *MATa ade2-1 can1-100 his3-11,15 leu2-3,112 trp1-1 ura3-1 bar1D atg15::HYGB* | This study |
| yRP2917 | *MATa ade2-1 can1-100 his3-11,15 leu2-3,112 trp1-1 ura3-1 bar1D cdc48-3::HIS3 atg15::HYGB* | This study |
| | | |
| **Plasmids** | | |
| **Name** | **Properties** | **Reference** |
| pRP1574 | Edc3-mCh; Cen; URA3 marker | Buchan et al, 2008 |
| pRP1657 | Pab1-GFP, Edc3-mCh; Cen; URA3 marker | Buchan et al, 2008 |
| pRP1659 | Pab1-GFP, Edc3-mCh; Cen; TRP1 marker | Buchan et al, 2008 |
| pRP1661 | Pub1-mCh; Cen; URA3 marker | Buchan et al, 2008 |
| pRP2150 | Pub1-mCh; Cen; LEU2 marker | Buchan et al, 2010 |
| pRP1944 | Edc3-mCh; Pbp1-GFP; Cen; TRP1 marker | Swisher and Parker, 2010 |
| pRP2447 | GFP-Atg19 (truncated ORF); Cen; URA3 marker | Shintani et al, 2002 |
| | | |
| | | |