**Supplementary Table / Supplementary File 3**

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| --- | --- | --- | --- | --- | --- | --- |
| **Mammalian Rabs** | ***S. cerevisiae* Rabs** | ***D. melanogaster* Rabs** | **Function** | **Subcellular localization** | **Mutant viability** | **References** |
| Rab1a | Ypt1 | DmRab1 (omelette) | **M**:anterograde melanosome transport  **Sc**: ER-Golgi, intra Golgi and ER-autophagosome transport  **Dm**:controls Golgi structure, cytokinesis, ER-to-Golgi transport, modulates insulin-like peptide secretion in IPCs | **M**:ER, Golgi, mature melanosomes  **Sc**: ER, Golgi  **Dm**:Golgi, ER exit sites | **M**: lethal  **Sc**: lethal  **Dm**: lethal | **Function**  **M**: (Ishida et al., 2012)  **Sc**: (Jedd et al., 1995; Lipatova et al., 2012; Segev et al., 1988)  **Dm**: (Cao et al., 2014; Ke et al., 2018; Sechi et al., 2017)  **Subcellular localization**  **M**: (Ishida et al., 2012; Plutner et al., 1991)  **Sc**: (Baker et al., 1990; Segev et al., 1988)  **Dm**: (Cao et al., 2014; Ke et al., 2018; Sechi et al., 2017)  **Viability**  **M:** International Mouse Phenotyping Consortium  **Sc**: (Giaever et al., 2002)  **Dm**: (Thibault et al., 2004) |
| Rab1b | **M**:vesicular transportER-Golgi | **M**:Er, Golgi | **M**: no KO model | **Function and subcellular localization**  **M**: (Plutner et al., 1991) |
| Rab2a |  | DmRab2 | **M**:ER-to-Golgi, maturation of pre-Golgi intermediates  **Dm**:ER-to-Golgi transport, endosome-lysosome fusion, endolysosome to autophagosome fusion | **M**:Pre-Golgi intermediates  **Dm**:Golgi, late endosomes, lysosomes | **M**: lethal  **Dm**: lethal | **Function**  **M**: (Tisdale and Balch, 1996; Tisdale et al., 1992)  **Dm**: (Ke et al., 2018; Lorincz et al., 2017; Lund et al., 2018)  **Subcellular localization**  **M**: (Tisdale and Balch, 1996; Tisdale et al., 1992)  **Dm**: (Gillingham et al., 2014; Lund et al., 2018)  **Viability**  **M**:International Mouse Phenotyping Consortium |
| Rab2b |  | **M**:ER-to-Golgi, maturation of pre-Golgi intermediates | **M**: Pre-Golgi intermediates | **M**: no KO model  **Dm**: lethal | **Function and subcellular localization**  **M**: (Tisdale and Balch, 1996; Tisdale et al., 1992) |
| Rab3a | - | DmRab3 | **M**:transport of synaptic vesicles to PM (regulated exocytosis)  **Dm**:regulation and maintenance of presynaptic active zone structure | **M**:synaptic and secretory vesicles, chromaffin granules  **Dm**:presynapticactive zone, synapse | **M**: viable  **Dm**: viable | **Function**  **M**: (Fischer von Mollard et al., 1991)  **Dm**: (Ehmann et al., 2014; Graf et al., 2009)  **Subcellular localization**  **M**: (Darchen et al., 1990; Fischer von Mollard et al., 1990; Schluter et al., 2002)  **Dm**: (Chan et al., 2011; Graf et al., 2009)  **Viability**  **M**: (Geppert et al., 1994)  **Dm**: (Graf et al., 2009) |
| Rab3b | - | **M**:exocytosis | **M**:synaptic and secretory vesicles | **M**: viable | **Function and subcellular localization**  **M**: (Schluter et al., 2002)  **Viability**  **M**: (Schluter et al., 2004) |
| Rab3c | - | **M**:exocytosis | **M**:synaptic and secretory vesicles | **M**: viable | **Function and subcellular localization**  **M**: (Schluter et al., 2002)  **Viability**  **M**: (Schluter et al., 2004) |
| Rab3d (Rab16) | - | **M**:exocytosis | **M**:secretory granules (in mast cells) | **M**: viable | **Function and subcellular localization**  **M**: (Tuvim et al., 1999)  **Viability**  **M**: (Riedel et al., 2002) |
| Rab4a |  | DmRab4 | **M**:controls early sorting event in endocytosis, protein recycling to PM  **Dm**:regulation of synapse organization, anterograde vesicle trafficking, trafficking of cell adhesion molecules to cell surface | **M**:early sorting endosomes, recycling endosomes  **Dm**:fast recycling endosomes, sorting endosomes, axon termini | **M**: viable  **Dm**: viable | **Function**  **M**: (Seachrist et al., 2000; van der Sluijs et al., 1992)  **Dm**: (de Madrid et al., 2015; Dey et al., 2017)  **Subcellular localization**  **M**: (Trischler et al., 1999; van der Sluijs et al., 1992)  **Dm**: (de Madrid et al., 2015; Dey et al., 2017; West et al., 2015)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab4b | - | **M**:controls early sorting event in endocytosis, protein recycling to PM | **M**:early sorting endosomes, recycling endosomes | **M**: viable | **Function**  **M**: (Seachrist et al., 2000; van der Sluijs et al., 1992)  **Subcellular localization**  **M**: (Trischler et al., 1999; van der Sluijs et al., 1992)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab5a | Ypt51, 52, 53 | DmRab5 | **M**:(lateral)early endosomes fusion (endocytosis)  **Sc**:endocytosis and vacuolar protein sorting,  Ypt51 and Ypt52: MVB biogenesis and sorting  **Dm**:synaptic vesicle recycling, formation of early endosomes, regulation of endocytosis | **M**:PM, early endosomes  **Sc**: early endosomes  **Dm**:early endosomes | **M**: viable  **Sc**: viable  **Dm**: lethal | **Function**  **M**: (Bucci et al., 1992; Gorvel et al., 1991)  **Sc**: (Nickerson et al., 2012; Singer-Kruger et al., 1994)  **Dm**: (Compagnon et al., 2009; Wucherpfennig et al., 2003)  **Subcellular localization**  **M**: (Bucci et al., 1992)  **Sc**: (Singer-Kruger et al., 1994)  **Dm**: (Wucherpfennig et al., 2003)  **Viability**  **M**: (Dickinson et al., 2016)  **Sc**: (Singer-Kruger et al., 1994)  **Dm**: (Wucherpfennig et al., 2003) |
| Rab5b | **M**:(lateral)early endosomes fusion (endocytosis) | **M**:PM, early endosomes | **M**: viable | **Function**  **M**: (Bucci et al., 1992; Gorvel et al., 1991)  **Subcellular localization**  **M**: (Bucci et al., 1992)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab5c | **M**:(lateral)early endosomes fusion (endocytosis) | **M**:PM, early endosomes | **M**: lethal | **Function**  **M**: (Bucci et al., 1992; Gorvel et al., 1991)  **Subcellular localization**  **M**: (Bucci et al., 1992)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab6a | Ypt6 | DmRab6 (warthog) | **M**:Golgi-to-ER recycling  **Sc**: Endosome-Golgi, intra Golgi and retrograde Golgi-ER transport, delivery of Atg9 to phagophore assembly site  **Dm**:regulates autophagy and insulin-TOR signaling, regulation of autolysosomal homeostasis, insulin signaling, axon guidance in R7 photoreceptors, apical transport pathway in photoreceptors | **M**:trans-Golgi cisternae, TGN  **Sc**:Golgi  **Dm**:Golgi, cytoplasmic vesicles, lysosomes and autophagosomes | **M**: lethal  **Sc**: viable  **Dm**: lethal | **Function**  **M**: (Young et al., 2005)  **Sc**: (Kawamura et al., 2014; Luo and Gallwitz, 2003; Suda et al., 2013; Yang and Rosenwald, 2016)  **Dm**: (Ayala et al., 2018; Iwanami et al., 2016; Tong et al., 2011)  **Subcellular localization**  **M**: (Antony et al., 1992; Goud et al., 1990; Sun et al., 2007)  **Sc**: (Kawamura et al., 2014)  **Dm**: (Ayala et al., 2018; Tong et al., 2011)  **Viability**  **M**: (Bardin et al., 2015)  **Sc**: (Giaever et al., 2002)  **Dm**: (Purcell and Artavanis-Tsakonas, 1999) |
| Rab6a’ | **M**:recycling/retrograde traffic endosome-to-Golgi, Golgi-to-ER recycling | **M**:trans-Golgi cisternae, TGN | **M**: lethal | **Function**  **M**: (Mallard et al., 2002; Young et al., 2005)  **Subcellular localization**  **M**: (Antony et al., 1992; Goud et al., 1990; Sun et al., 2007)  **Viability**  **M**: (Bardin et al., 2015) |
| Rab6b | **M**:Golgi-associated membrane trafficking | **M**:Golgi | **M**: viable | **Function and subcellular localization**  **M**: (Opdam et al., 2000)  **Viability**  **M**: (Nyitrai et al., 2020) |
| Rab6c\* | **M**:cell cycle progression | **M**:centrosome | **M**: no KO model | **Function and subcellular localization**  **M**: (Young et al., 2010) |
| Rab6d (Rab41) | **M**:Golgi ribbon formation, ER-to-Golgi trafficking | **M**:Golgi | **M**: no KO model | **Function**  **M**: (Liu et al., 2013; Liu et al., 2016)  **Subcellular localization**  **M**: (Liu et al., 2013) |
| Rab7a | Ypt7 | DmRab7 | **M**:maturation MVBs, fusion MVBs to lysosomes, late endocytic membrane trafficking  **Sc**:endocytosis, autophagy  **Dm**:targets endocytic cargo to late endosomes and lysosomes | **M**:late endosomes, lysosomes  **Sc**: late endosomes  **Dm**:late endosomes, maturing endosomes | **M**: lethal  **Sc**: viable  **Dm**: lethal | **Function**  **M**: (Guerra and Bucci, 2016; Meresse et al., 1995; Vitelli et al., 1997)  **Sc**: (Kirisako et al., 1999; Schimmoller and Riezman, 1993)  **Dm**: (Entchev et al., 2000)  **Subcellular localization**  **M**: (Meresse et al., 1995; Vitelli et al., 1997)  **Sc**: (Kirisako et al., 1999; Schimmoller and Riezman, 1993)  **Dm**: (Entchev et al., 2000; Yousefian et al., 2013)  **Viability**  **M**: (Kawamura et al., 2012)  **Sc**: (Giaever et al., 2002)  **Dm**: (Cherry et al., 2013) |
| Rab7b | **M**:maturation MVBs, fusion MVBs to lysosomes, late endocytic membrane trafficking | **M**:late endosomes, lysosomes | **M**: lethal | **Function**  **M**: (Guerra and Bucci, 2016; Meresse et al., 1995; Vitelli et al., 1997)  **Subcellular localization**  **M**: (Meresse et al., 1995; Vitelli et al., 1997)  **Viability**  **M**: (Kawamura et al., 2012) |
| Rab8a | Sec4 | DmRab8 | **M**:primary cilia formation (ciliogenesis), trafficking from TGN and recycling endosome to PM (exocytosis)  **Sc**:fusion of Golgi vesicles with PM, secretion, assembly of exocyst  **Dm**:synaptic growth responses in NMJ, regulates recycling endosome function, regulates furrow ingression, regulates exocytic trafficking | **M**:Golgi, early endosomes, vesicular structures, PM, recycling endosomes, primary clilia  **Sc**:Golgi secretory vesicles, PM  **Dm**:PM, Golgi, recycling endosomes | **M**: die prematurely  **Sc**: lethal  **Dm**: lethal | **Function**  **M**: (Ang et al., 2004; Huber et al., 1993; Yoshimura et al., 2007)  **Sc**: (Goud et al., 1988; Guo et al., 1999; Salminen and Novick, 1987)  **Dm**: (Mavor et al., 2016; West et al., 2015)  **Subcellular localization**  **M**: (Ang et al., 2004; Chen et al., 2001; Huber et al., 1993; Sato et al., 2007; Yoshimura et al., 2007)  **Sc**: (Goud et al., 1988; Salminen and Novick, 1987)  **Dm**: (Mavor et al., 2016; West et al., 2015)  **Viability**  **M**: (Sato et al., 2007)  **Sc**: (Giaever et al., 2002)  **Dm**: (Giagtzoglou et al., 2012) |
| Rab8b | **M**:traffic from TGN to PM (exocytosis), ciliogenesis and apical transport | **M**:Golgi, vesicular structures, PM, primary cilia | **M**: viable | **Function**  **M**: (Huber et al., 1993; Sato et al., 2014)  **Subcellular localization**  **M**: (Chen et al., 2001; Huber et al., 1993; Sato et al., 2014)  **Viability**  **M**: (Sato et al., 2014) |
| Rab8c (Rab13) | **M**:assemblyepithelial tight junctions, endocytic recycling to PM, trafficking between recycling endosomes and TGN | **M**: tight junctions, recycling endosomes, TGN | **M**: viable | **Function**  **M**: (Kohler et al., 2004; Nokes et al., 2008)  **Subcellular localization**  **M**: (Nokes et al., 2008; Zahraoui et al., 1994)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab9a | - | DmRab9 | **M**:traffic between late endosomes and TGN  **Dm**:retrograde trafficking from endosomes to TGN | **M**: late endosomes  **Dm**: early and late endosomes, TGN | **M**: viable  **Dm**: viable | **Function**  **M**: (Lombardi et al., 1993)  **Dm**: (Dong et al., 2013)  **Subcellular localization**  **M**: (Lombardi et al., 1993)  **Dm**: (Dong et al., 2013)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab9b | - | **M**:traffic between late endosomes and TGN | **M**: late endosomes | **M**: no KO model  **Dm**: viable | **Function and subcellular localization**  **M**: (Lombardi et al., 1993) |
| Rab10 | - | DmRab10 | **M**:transport from basolateral sorting endosomes to common endosomes, exocytosis of GLUT4 vesicles  **Dm**:regulation of basement membrane secretion/ organization | **M**:basolateral sorting endosome, GLUT4 vesicles  **Dm**: cytoplasm, basal follicle cell surface, lateral PM | **M**: lethal  **Dm**: viable | **Function**  **M**: (Babbey et al., 2006; Sano et al., 2007)  **Dm**: (Isabella and Horne-Badovinac, 2016; Lerner et al., 2013)  **Subcellular localization**  **M**: (Babbey et al., 2006; Larance et al., 2005; Sano et al., 2007)  **Dm**: (Isabella and Horne-Badovinac, 2016; Lerner et al., 2013)  **Viability**  **M**: (Lv et al., 2015) |
| Rab11a | Ypt31, 32 | DmRab11 | **M**:recycling from endosome to PM, traffic from TGN to PM  **Sc**:exit from trans Golgi, Golgi-PM transport, endosome-Golgi recycling  **Dm**:endocytic recycling | **M**:recycling endosomes, Golgi  **Sc**:transitional and late Golgi, endosomes  **Dm**:recycling endosomes | **M**: lethal  **Sc**: viable, double mutant lethal  **Dm**: lethal | **Function**  **M**: (Ullrich et al., 1996; Urbe et al., 1993)  **Sc**: (Benli et al., 1996; Chen et al., 2005; Jedd et al., 1997)  **Dm**: (Dollar et al., 2002)  **Subcellular localization**  **M**: (Ullrich et al., 1996; Urbe et al., 1993)  **Sc**: (Chen et al., 2005; Jedd et al., 1997)  **Dm**: (Dollar et al., 2002)  **Viability**  **M**: (Yu et al., 2014)  **Sc**: (Benli et al., 1996)  **Dm**: (Bellen et al., 2004) |
| Rab11b | **M**: recycling from endosome to PM, traffic from TGN to PM | **M**:recycling endosomes, Golgi | **M**: viable | **Function and subcellular localization**  **M**: (Ullrich et al., 1996; Urbe et al., 1993)  **Viability**  **M**: (D'Agostino et al., 2019) |
| Rab11c (Rab25) | **M**:apical recycling pathway | **M**:recycling endosomes | **M**: viable | **Function and subcellular localization**  **M**: (Casanova et al., 1999)  **Viability**  **M**: (Nam et al., 2010) |
| Rab12 | - | - | **M**:degradation of Transferrin receptor from recycling endosome to lysosome | **M**:recycling endosome | **M**: viable | **Function and subcellular localization**  **M**: (Matsui et al., 2011)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab13 (Rab8c) | Sec4 | DmRab8 | **M**:assemblyepithelial tight junctions, endocytic recycling to PM, trafficking between recycling endosomes and TGN  **Sc**:fusion of Golgi vesicles with PM, secretion, assembly of exocyst  **Dm**:synaptic growth responses in NMJ, regulates recycling endosome function, regulates furrow ingression, regulates exocytic trafficking | **M**: tight junctions, recycling endosomes, TGN  **Sc**:Golgi secretory vesicles, PM  **Dm**: PM, Golgi, recycling endosomes | **M**: viable  **Sc**: lethal  **Dm**: lethal | **Function**  **M**: (Kohler et al., 2004; Nokes et al., 2008)  **Sc**: (Goud et al., 1988; Guo et al., 1999; Salminen and Novick, 1987)  **Dm**: (Mavor et al., 2016; West et al., 2015)  **Subcellular localization**  **M**: (Nokes et al., 2008; Zahraoui et al., 1994)  **Sc**: (Goud et al., 1988; Salminen and Novick, 1987)  **Dm**: (Mavor et al., 2016; West et al., 2015)  **Viability**  **M**: International Mouse Phenotyping Consortium  **Sc**: (Giaever et al., 2002)  **Dm**: (Giagtzoglou et al., 2012) |
| Rab14 | - | DmRab14 | **M**:regulation ofcarrier membranes between ER/Golgi and endosomes  **Dm**:phagosome maturation /acidification, fusion of phagosomes with late endosomes and lysosomes | **M**:ER, TGN, early endosomes, GLUT4 vesicles  **Dm**:phagosomes,early andlate endosomes | **M**: no KO model  **Dm**: viable | **Function**  **M**: (Junutula et al., 2004)  **Dm**:(Garg and Wu, 2014)  **Subcellular localization**  **M**: (Junutula et al., 2004; Larance et al., 2005)  **Dm**: (Garg and Wu, 2014) |
| Rab15 | - | - | **M**:traffic fromearly/sorting endosome to recycling endosome | **M**:early/sorting endosomes, pericentriolar recycling endosomes | **M**: viable | **Function**  **M**: (Zuk and Elferink, 2000)  **Subcellular localization**  **M**: (Zuk and Elferink, 1999, 2000)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab16 (Rab3d) | - | DmRab3 | **M**:exocytosis  **Dm**:regulation and maintenance of presynaptic active zone structure | **M**:secretory granules (in mast cells)  **Dm**:presynapticactive zone, synapse | **M**: viable  **Dm**: viable | **Function**  **M**: (Tuvim et al., 1999)  **Dm**: (Ehmann et al., 2014; Graf et al., 2009)  **Subcellular localization**  **M**: (Tuvim et al., 1999)  **Dm**: (Chan et al., 2011; Graf et al., 2009)  **Viability**  **M**: (Riedel et al., 2002)  **Dm**: (Graf et al., 2009) |
| Rab17 | - | - | **M**:Transcytosis | **M**:recycling endosomes, basolateral PM, apical tubules | **M**: viable | **Function**  **M**: (Zacchi et al., 1998)  **Subcellular localization**  **M**: (Hunziker and Peters, 1998; Lutcke et al., 1993; Zacchi et al., 1998)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab18 | - | DmRab18 | **M**:lipid droplet formation  **Dm**:unknown | **M**: ER, Golgi, lipid droplets  **Dm**:ER, early Golgi, early endosomes | **M**: viable  **Dm**: viable | **Function**  **M**: (Ozeki et al., 2005)  **Subcellular localization**  **M**: (Dejgaard et al., 2008; Ozeki et al., 2005)  **Dm**: (Chan et al., 2011; Gillingham et al., 2014)  **Viability**  **M**: (Carpanini et al., 2014) |
| Rab19a | - | DmRab19 | **M**:unknown  **Dm**:promotes enteroendocrine cell differentiation (in cooperation with Atg16) | **M**:Golgi  **Dm**:Golgi, recycling endosomes | **M**: viable  **Dm**: viable | **Function**  **Dm**: (Nagy et al., 2017)  **Subcellular localization**  **M**: (Sinka et al., 2008)  **Dm**: (Chan et al., 2011; Gillingham et al., 2014; Sinka et al., 2008)  **Viability**  **M**: (Dickinson et al., 2016) |
| Rab19b (Rab43) | - | **M**:retrograde trafficking from endosomes to TGN, biogenesis and maintenance of Golgi structure, anterograde trafficking between ER-to-Golgi, through medial Golgi | **M**:ER, medial Golgi, TGN | **M**: viable  **Dm**: viable | **Function**  **M**: (Cox et al., 2016; Dejgaard et al., 2008; Fuchs et al., 2007; Haas et al., 2007)  **Subcellular localization**  **M**: (Cox et al., 2016; Dejgaard et al., 2008; Fuchs et al., 2007)  **Viability**  **M**: (Dickinson et al., 2016; Kretzer et al., 2016) |
| Rab20 | - | - | **M**:early to late macropinosome maturation | **M**:macropinosomes | **M**: viable | **Function**  **M**: (Egami and Araki, 2012a, b)  **Subcellular localization**  **M**: (Egami and Araki, 2012b)  **Viability**  **M**: (Dickinson et al., 2016) |
| Rab21 | - | DmRab21 | **M**:integrin endocytosis to regulate cell adhesion and cytokinesis  **Dm**:fusion of autophagosomes with lysosomes, autophagosome maturation | **M**:early endosomes  **Dm**:early and late endosomes | **M**: lethal  **Dm**: viable | **Function**  **M**: (Pellinen et al., 2006; Pellinen et al., 2008)  **Dm**: (Jean et al., 2015)  **Subcellular localization**  **M**: (Simpson et al., 2004)  **Dm**: (Jean et al., 2015; Jean et al., 2012)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab22a | - | - | **M**:endosomal trafficking to Golgi | **M**:early endosomes, TGN | **M**: viable | **Function and subcellular localization**  **M**: (Kauppi et al., 2002)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab22b (Rab31) | - | - | **M**:transport of mannose 6-phosphate receptors from TGN to endosomes, TGN organization | **M**:early and late endosomes, TGN | **M**: viable | **Function**  **M**: (Rodriguez-Gabin et al., 2009)  **Subcellular localization**  **M**: (Ng et al., 2007; Rodriguez-Gabin et al., 2001)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab23 | - | DmRab23 | **M**:negative regulator of mouse Sonic Hedgehog signaling pathway, left-right patterning in mouse embryo  **Dm**:restriction of actin accumulation in wing cells, localization of core PCP proteins, regulates PCP, regulates hedgehog ligand trafficking in germline stem cell niche | **M**:PM, early sorting endosomes  **Dm**:cytoplasm,PM | **M**: lethal  **Dm**: viable | **Function**  **M**: (Eggenschwiler et al., 2006; Eggenschwiler et al., 2001; Fuller et al., 2014)  **Dm**: (Cicek et al., 2016; Pataki et al., 2010)  **Subcellular localization**  **M**: (Evans et al., 2003)  **Dm**: (Pataki et al., 2010)  **Viability**  **M**: (Dickinson et al., 2016) |
| Rab24 | - | - | **M**:maturation and/or clearance of autophagic compartments | **M**:ER, cis-Golgi, late endosomes | **M**: viable | **Function**  **M**: (Yla-Anttila et al., 2015)  **Subcellular localization**  **M**: (Olkkonen et al., 1993)  **Viability**  **M**: (Dickinson et al., 2016) |
| Rab25 (Rab11c) | - | DmRab11 | **M**:apical recycling pathway  **Sc**:exit from trans Golgi, Golgi-PM transport, endosome-Golgi recycling  **Dm**:endocytic recycling | **M**:recycling endosomes  **Sc**:transitional and late Golgi, endosomes  **Dm**:recycling endosomes | **M**: viable  **Sc**: viable, double mutant lethal  **Dm**: lethal | **Function**  **M**: (Casanova et al., 1999)  **Sc**: (Benli et al., 1996; Chen et al., 2005; Jedd et al., 1997)  **Dm**: (Dollar et al., 2002)  **Subcellular localization**  **M**: (Casanova et al., 1999)  **Sc**: (Chen et al., 2005; Jedd et al., 1997)  **Dm**: (Dollar et al., 2002)  **Viability**  **M**: (Nam et al., 2010)  **Sc**: (Benli et al., 1996)  **Dm**: (Bellen et al., 2004) |
| Rab26a | - | DmRab26 | **M**:lysosomal traffic, secretion/exocytosis  **Dm**: stimulus-dependent membrane receptor turnover | **M**:secretory granules, lysosomes  **Dm**: synapse | **M**: viable  **Dm**: viable | **Function**  **M**: (Jin and Mills, 2014; Yoshie et al., 2000)  **Dm**: This study  **Subcellular localization**  **M**: (Jin and Mills, 2014; Yoshie et al., 2000)  **Dm**: (Chan et al., 2011)  **Viability**  **M**: (Dong et al., 2018) |
| Rab26b (Rab37) | - | **M**:mast cell degranulation/exocytosis of mast cell dense core granules, insulin exocytosis | **M**:(insulin-containing) secretory granules | **M**: no KO model  **Dm**: viable | **Function**  **M**: (Higashio et al., 2016; Ljubicic et al., 2013; Masuda et al., 2000)  **Subcellular localization**  **M**: (Ljubicic et al., 2013; Masuda et al., 2000) |
| Rab27a | - | DmRab27 | **M**:transport of melanosomes to PM/mast cell degranulation, exosome secretion  **Dm**:exosomal secretion | **M**:multivesicular endosomes, melanosomes, melanosome-resident proteins  **Dm**:synapses, synaptic vesicles | **M**: viable  **Dm**: viable | **Function**  **M**: (Hume et al., 2001; Ostrowski et al., 2010)  **Dm**: (Corrigan et al., 2014)  **Subcellular localization**  **M**: (Bahadoran et al., 2001; Hume et al., 2001; Ostrowski et al., 2010)  **Dm**: (Chan et al., 2011)  **Viability**  **M**: (Wilson et al., 2000)  **Dm**: (Chan et al., 2011) |
| Rab27b | - | **M**:transport of melanosomes, formation/maintenance of dendritic extensions in melanocytes, exosome secretion, platelet dense granule secretion | **M**:melanosomes, Golgi, TGN and multivesicular endosomes | **M**: viable | **Function**  **M**: (Chen et al., 2002; Ostrowski et al., 2010; Tolmachova et al., 2007)  **Subcellular localization**  **M**: (Chen et al., 2002; Ostrowski et al., 2010)  **Viability**  **M**: (Tolmachova et al., 2007) |
| Rab28 | - | - | **M**:phagocytosis of outer cone segment (in murine retinal pigmented epithelium) | **M**:basal body and ciliary rootlet of photoreceptors | **M**: viable | **Function**  **M**: (Ying et al., 2018)  **Subcellular localization**  **M**: (Roosing et al., 2013)  **Viability**  **M**: (Ying et al., 2018) |
| Rab29 | - | - | **M**:maintenance of TGN, integrity retrograde traffic of Mannose-6-Phosphate receptor, lysosomal trafficking (Golgi-to-lysosome), master regulator of LRRK2 | **M**:TGN | **M**: viable | **Function**  **M**: (MacLeod et al., 2013; Purlyte et al., 2018; Wang et al., 2014)  **Subcellular localization**  **M**: (Wang et al., 2014)  **Viability**  **M**: (Kuwahara et al., 2016) |
| Rab30 | - | DmRab30 | **M**: structural integrity of Golgi apparatus  **Dm**:embryonic and adult morphogenesis (JNK-dependent dorsal closure, embryonic head involution, thorax closure) | **M**:Golgi  **Dm**:Golgi, endosomes, trans-Golgi | **M**: no KO model  **Dm**: viable | **Function**  **M**: (Kelly et al., 2012)  **Dm**: (Thomas et al., 2009)  **Subcellular localization**  **M**: (Kelly et al., 2012)  **Dm**: (Gillingham et al., 2014; Sinka et al., 2008; Thomas et al., 2009) |
| Rab31 (Rab22b) | - | - | **M**:transport of mannose 6-phosphate receptors from TGN to endosomes, TGN organization | **M**: early and late endosomes, TGN | **M**: viable | **Function**  **M**: (Rodriguez-Gabin et al., 2009)  **Subcellular localization**  **M**: (Ng et al., 2007; Rodriguez-Gabin et al., 2001)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab32a | - | DmRab32 (lightoid) | **M**:intracellular sorting of Tyrp-1 and tyrosinase, sorting of melanogenic enzymes from TGN to melanosomes, synchronization of mitochondrial fission  **Dm**:eye pigmentgranule biosynthesis, maintenance of lipid droplet size, regulation of lipid storage, regulation of autophagy | **M**: mature melanosomes, perinuclear (Tyrp-1 containing) vesicles, mitochondria  **Dm**:lysosomes and autophagosomes | **M**: (sub)viable  **Dm**: viable | **Function**  **M**: (Alto et al., 2002; Wasmeier et al., 2006)  **Dm**: (Ma et al., 2004; Wang et al., 2012)  **Subcellular localization**  **M**: (Alto et al., 2002; Cohen-Solal et al., 2003; Wasmeier et al., 2006)  **Dm**: (Wang et al., 2012)  **Viability**  **M**: (Aguilar et al., 2019; Dickinson et al., 2016)  **Dm**: (Ma et al., 2004) |
| Rab32b (Rab38) | - | **M**:melanosome maturation, intracellular sorting of Tyrp-1 and tyrosinase, sorting of melanogenic enzymes from TGN to melanosomes | **M**:mature melanosomes, perinuclear (Tyrp-1 containing) vesicles, mitochondria | **M**: viable | **Function and subcellular localization**  **M**: (Wasmeier et al., 2006)  **Viability**  **M**: (Aguilar et al., 2019) |
| Rab33a | - | - | **M**:anterograde axonal transport of post-Golgi synaptophysin-pos. vesicles | **M**:Golgi, synaptophysin-pos. vesicles | **M**: no KO model | **Function and subcellular localization**  **M**: (Nakazawa et al., 2012) |
| Rab33b | - | - | **M**:modulation of autophagosome formation, retrograde transport Golgi-to-ER | **M**:Golgi apparatus (esp. medial Golgi cisternae) | **M**: viable | **Function**  **M**: (Itoh et al., 2008; Valsdottir et al., 2001)  **Subcellular localization**  **M**: (Zheng et al., 1998)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab34 | - | - | **M**:intracellular lysosomal positioning, macropinosome formation, ciliary vesicle formation | **M**:Golgi, macropinosomes, | **M**: lethal | **Function**  **M**: (Sun et al., 2003; Wang and Hong, 2002; Xu et al., 2018)  **Subcellular localization**  **M**: (Speight and Silverman, 2005; Sun et al., 2003; Wang and Hong, 2002)  **Viability**  **M**: (Dickinson et al., 2016; Xu et al., 2018) |
| Rab35 | - | DmRab35 | **M**:formation of phagosomes (phagocytosis), remodeling of actin cytoskeleton, cadherin-dependent adherens junction formation, controls fast endocytotic recycling pathway, cytokinesis  **Dm**:actin filament assembly during bristle development, vesicle transport during phagocytosis, trafficking from PM to early endosome, cytoskeletal remodeling at PM, endosomal trafficking to synaptic vesicles | **M**:PM, endocytic compartments, near to actin filaments  **Dm**:PM, NMJ boutons, synapses of VNC | **M**: lethal  **Dm**: semi-lethal | **Function**  **M**: (Charrasse et al., 2013; Chevallier et al., 2009; Egami et al., 2011; Kouranti et al., 2006)  **Dm**: (Jewett et al., 2017; Shim et al., 2010; Uytterhoeven et al., 2011; Zhang et al., 2009)  **Subcellular localization**  **M**: (Chevallier et al., 2009; Kouranti et al., 2006)  **Dm**: (Chan et al., 2011; Jewett et al., 2017; Shim et al., 2010; Uytterhoeven et al., 2011)  **Viability**  **M**: (Dickinson et al., 2016) |
| Rab36 | - | - | **M**:regulates spatial distribution of late endosomes and lysosomes, retrograde transport of melanosomes | **M**:Golgi | **M**: viable | **Function**  **M**: (Chen et al., 2010; Matsui et al., 2012)  **Subcellular localization**  **M**: (Chen et al., 2010)  **Viability**  **M**: (Dickinson et al., 2016) |
| Rab37 (Rab26b) | - | DmRab26 | **M**:mast cell degranulation/exocytosis of mast cell dense core granules, insulin exocytosis  **Dm**: stimulus-dependent membrane receptor turnover | **M**:(insulin-containing) secretory granules  **Dm**: synapse | **M**: no KO model  **Dm**: viable | **Function**  **M**: (Higashio et al., 2016; Ljubicic et al., 2013; Masuda et al., 2000)  **Dm**: This study  **Subcellular localization**  **M**: (Ljubicic et al., 2013; Masuda et al., 2000)  **Dm**: (Chan et al., 2011) |
| Rab38 (Rab32b) | - | DmRab32 | **M**:melanosome maturation, intracellular sorting of Tyrp-1 and tyrosinase, sorting of melanogenic enzymes from TGN to melanosomes  **Dm**:eye pigmentgranule biosynthesis, maintenance of lipid droplet size, regulation of lipid storage, regulation of autophagy | **M**: mature melanosomes, perinuclear (Tyrp-1 containing) vesicles, mitochondria  **Dm**:lysosomes and autophagosomes | **M**: viable  **Dm**: viable | **Function**  **M**: (Wasmeier et al., 2006)  **Dm**: (Ma et al., 2004; Wang et al., 2012)  **Subcellular localization**  **M**: (Wasmeier et al., 2006)  **Dm**: (Wang et al., 2012)  **Viability**  **M**: (Aguilar et al., 2019)  **Dm**: (Ma et al., 2004) |
| Rab39a | - | DmRab39 | **M**:secretion of pro-inflammatory cytokine, phagosome acidification, autophagosome formation  **Dm**: unknown | **M**:late endosomes, lysosomes  **Dm**:Golgi, late endosomes, synapse | **M**: viable  **Dm**: viable | **Function**  **M**: (Becker et al., 2009; Seto et al., 2013; Seto et al., 2011)  **Subcellular localization**  **M**: (Seto et al., 2013)  **Dm**: (Chan et al., 2011; Gillingham et al., 2014; Jin et al., 2012)  **Viability**  **M**: (Cruz et al., 2020) |
| Rab39b | - | **M**:function insynaptic activity/transmission, regulates traffic of glutamate receptor subunits to synaptic terminals | **M**:Golgi | **M**: viable | **Function**  **M**: (Mignogna et al., 2015)  **Subcellular localization**:  **M**: (Giannandrea et al., 2010)  **Viability**  **M**: (Gao et al., 2020) |
| Rab39c (Rab42) | - | **M**:unknown | **M**: unknown | **M**: no KO model |  |
| Rab40a\*\* | - | DmRab40 | **M**:unknown  **Dm**:unknown | **M**:unknown  **Dm**:synapse and neuronal cell body | **M**: no KO model  **Dm**: viable | **Subcellular localization**  **Dm**: (Jin et al., 2012) |
| Rab40b | - | **M**:transport ofMMP2/9 secretory vesicles during invadopodia formation, regulation of MMP secretion | **M**:TGN-derived secretory vesicles | **M**: viable | **Function and subcellular localization**  **M**: (Jacob et al., 2013)  **Viability**  **M**: International Mouse Phenotyping Consortium |
| Rab40c | - | **M**:modulates biogenesis of lipid droplets, receptor recycling in oligodendrocytes | **M**:lipid droplets, recycling endosomes | **M**: subviable | **Function and subcellular localization**  **M**: (Rodriguez-Gabin et al., 2004; Tan et al., 2013)  **Viability**  **M**: (Dickinson et al., 2016) |
| Rab40aL (RLGP)\*\* | - | **M**:unknown | **M**:mitochondria | **M**: no KO model | **Subcellular localization**  **M**: (Bedoyan et al., 2012; Saito-Ohara et al., 2002) |
| Rab41 (Rab6d)\*\*\* | Ypt6 | DmRab6 | **M**:Golgi ribbon formation, ER-to-Golgi trafficking  **Sc**: Endosome-Golgi, intra Golgi and retrograde Golgi-ER transport, delivery of Atg9 to phagophore assembly site  **Dm**:regulates autophagy and insulin-TOR signaling, regulation of autolysosomal homeostasis, insulin signaling, axon guidance in R7 photoreceptors, apical transport pathway in photoreceptors | **M**: Golgi  **Sc:** Golgi  **Dm**:Golgi, cytoplasmic vesicles, lysosomes and autophagosomes | **M**: no KO model  **Sc**: viable  **Dm**: lethal | **Function**  **M**: (Liu et al., 2013; Liu et al., 2016)  **Sc**: (Kawamura et al., 2014; Luo and Gallwitz, 2003; Suda et al., 2013; Yang and Rosenwald, 2016)  **Dm**: (Ayala et al., 2018; Iwanami et al., 2016; Tong et al., 2011)  **Subcellular localization**  **M**: (Liu et al., 2013)  **Sc**: (Kawamura et al., 2014)  **Dm**: (Ayala et al., 2018; Tong et al., 2011)  **Viability**  **Sc**: (Giaever et al., 2002)  **Dm**: (Purcell and Artavanis-Tsakonas, 1999) |
| Rab42 (Rab39c) | - | DmRab39 | **M**:unknown  **Dm**: unknown | **M**:unknown  **Dm**:Golgi, late endosomes, synapse | **M**: no KO model  **Dm**: viable | **Subcellular localization**  **Dm**: (Chan et al., 2011; Gillingham et al., 2014; Jin et al., 2012) |
| Rab43 (Rab19b) | - | DmRab19 | **M**:retrograde trafficking from endosomes to TGN, biogenesis and maintenance of Golgi structure, anterograde trafficking between ER-to-Golgi, through medial Golgi  **Dm**:promotes enteroendocrine cell differentiation (in cooperation with Atg16) | **M**:ER, medial Golgi, TGN  **Dm**:Golgi, recycling endosomes | **M**: viable  **Dm**: viable | **Function**  **M**: (Cox et al., 2016; Dejgaard et al., 2008; Fuchs et al., 2007; Haas et al., 2007)  **Dm**: (Nagy et al., 2017)  **Subcellular localization**  **M**: (Cox et al., 2016; Dejgaard et al., 2008; Fuchs et al., 2007)  **Dm**: (Chan et al., 2011; Gillingham et al., 2014; Sinka et al., 2008)  **Viability**  **M**: (Dickinson et al., 2016; Kretzer et al., 2016) |
| Rab44a | - | - | **M**:regulation of osteoclast differentiation, granule exocytosis in mast cells | **M**: Golgi, lysosomes | **M**: viable | **Function**  **M**: (Kadowaki et al., 2020; Yamaguchi et al., 2018)  **Subcellular localization**  **M**: (Tokuhisa et al., 2020; Yamaguchi et al., 2018)  **Viability**  **M**: (Kadowaki et al., 2020) |
| Rab44b | - | - | **M**:regulation of osteoclast differentiation, granule exocytosis in mast cells | **M**: Golgi, lysosomes | **M**: viable | **Function**  **M**: (Kadowaki et al., 2020; Yamaguchi et al., 2018)  **Subcellular localization**  **M**: (Tokuhisa et al., 2020; Yamaguchi et al., 2018)  **Viability**  **M**: (Kadowaki et al., 2020) |
| Rab45 | - | - | **M**:induction of apoptosis in CML progenitor cells | **M**:perinuclear region | **M**: no KO model | **Function**  **M**: (Nakamura et al., 2011)  **Subcellular localization**  **M**: (Shintani et al., 2007) |
| - | - | RabX1 (chrowded) | **Dm**:trafficking between early and late endosomes, formation of endolysosomes | **Dm**: recycling endosomes, late endosomes | **Dm**: viable | **Function**  **Dm**: (Laiouar et al., 2020; Woichansky et al., 2016)  **Subcellular localization**  **Dm**: (Chan et al., 2011; Laiouar et al., 2020) |
| - | - | RabX4 | **Dm**:unknown | **Dm**:synapses, recycling endosomes | **Dm**: viable | **Subcellular localization**  **Dm**: (Chan et al., 2011) |
| - | - | RabX6 | **Dm**:unknown | **Dm**:neuronal cell body | **Dm**: viable | **Subcellular localization**  **Dm**: (Jin et al., 2012) |

\* = Rab6c is specific to Hominidae; \*\* = Rab40a and Rab40aL are specific to primates; \*\*\* = Rab41 (Rab6d) is specific to primates and dolphins (Klopper et al., 2012)

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