

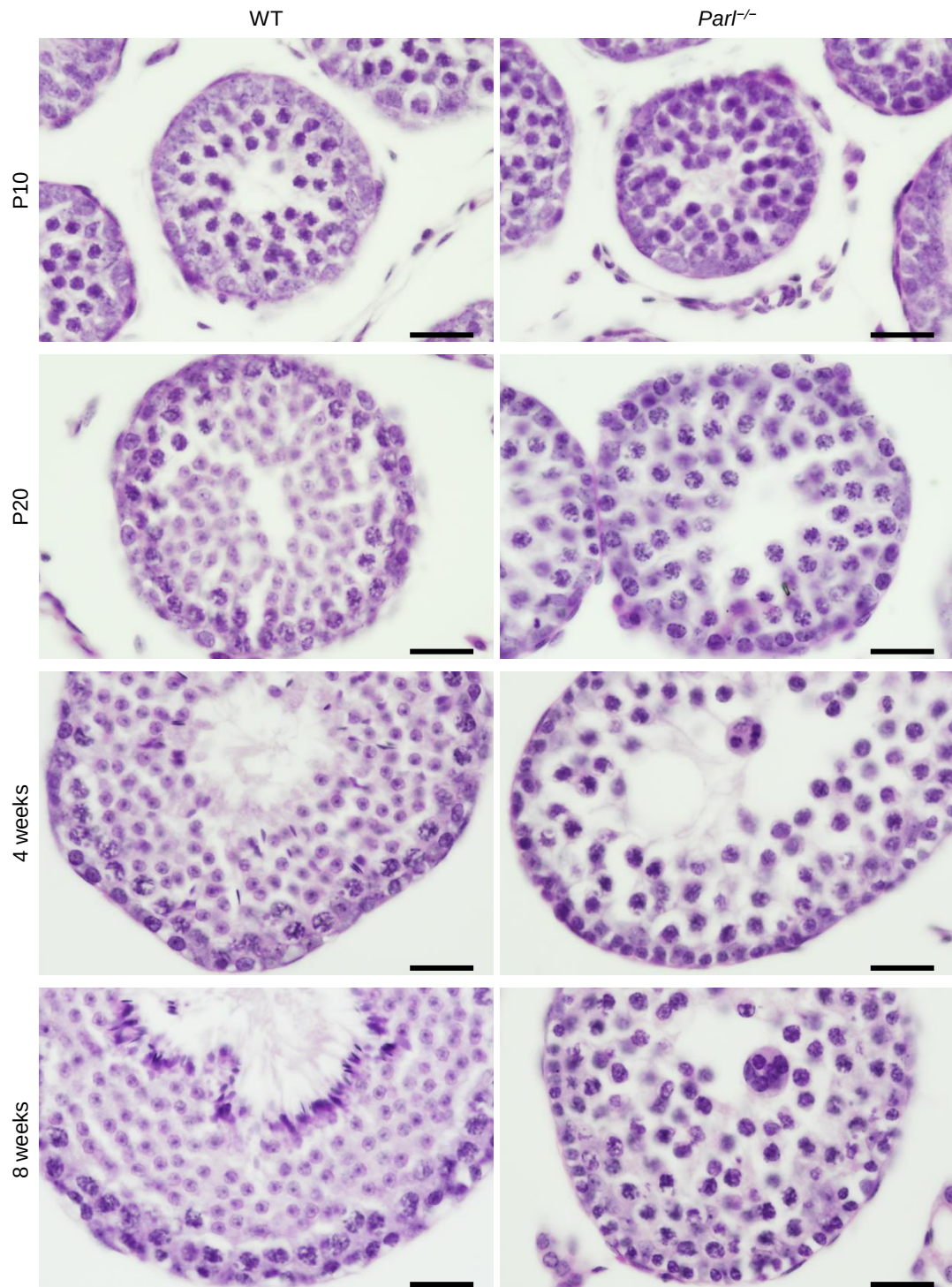


Fig. S1: Histological overview of the effect of PARL deficiency on spermatogenesis.

PAS staining of seminiferous tubules at the age of 10 days, 20 days, 4 weeks and 8 weeks of WT and *Parl*^{-/-} mice (scale bar: 25 μ m).

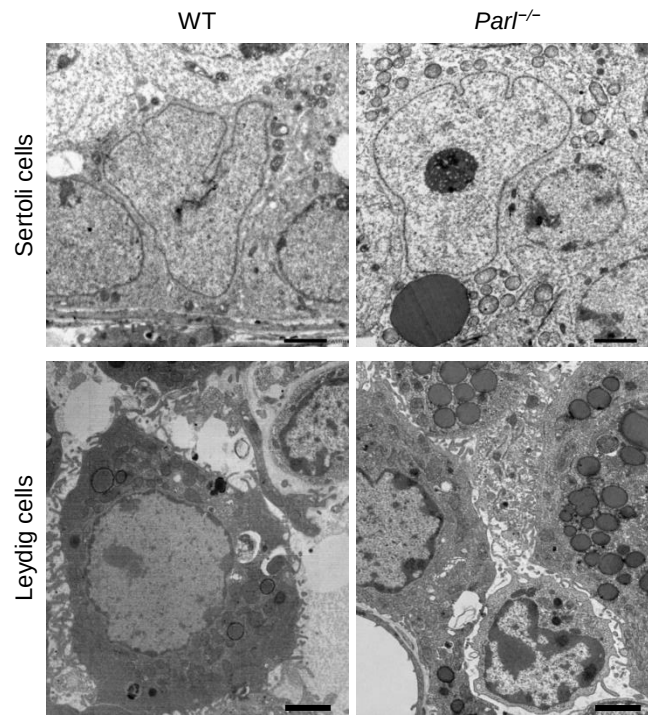


Fig. S2: Examples of Sertoli and Leydig cells

TEM pictures of Sertoli cells and Leydig cells of 8-week-old WT and *Parl*^{-/-} mice (scale bars: 2 μm).

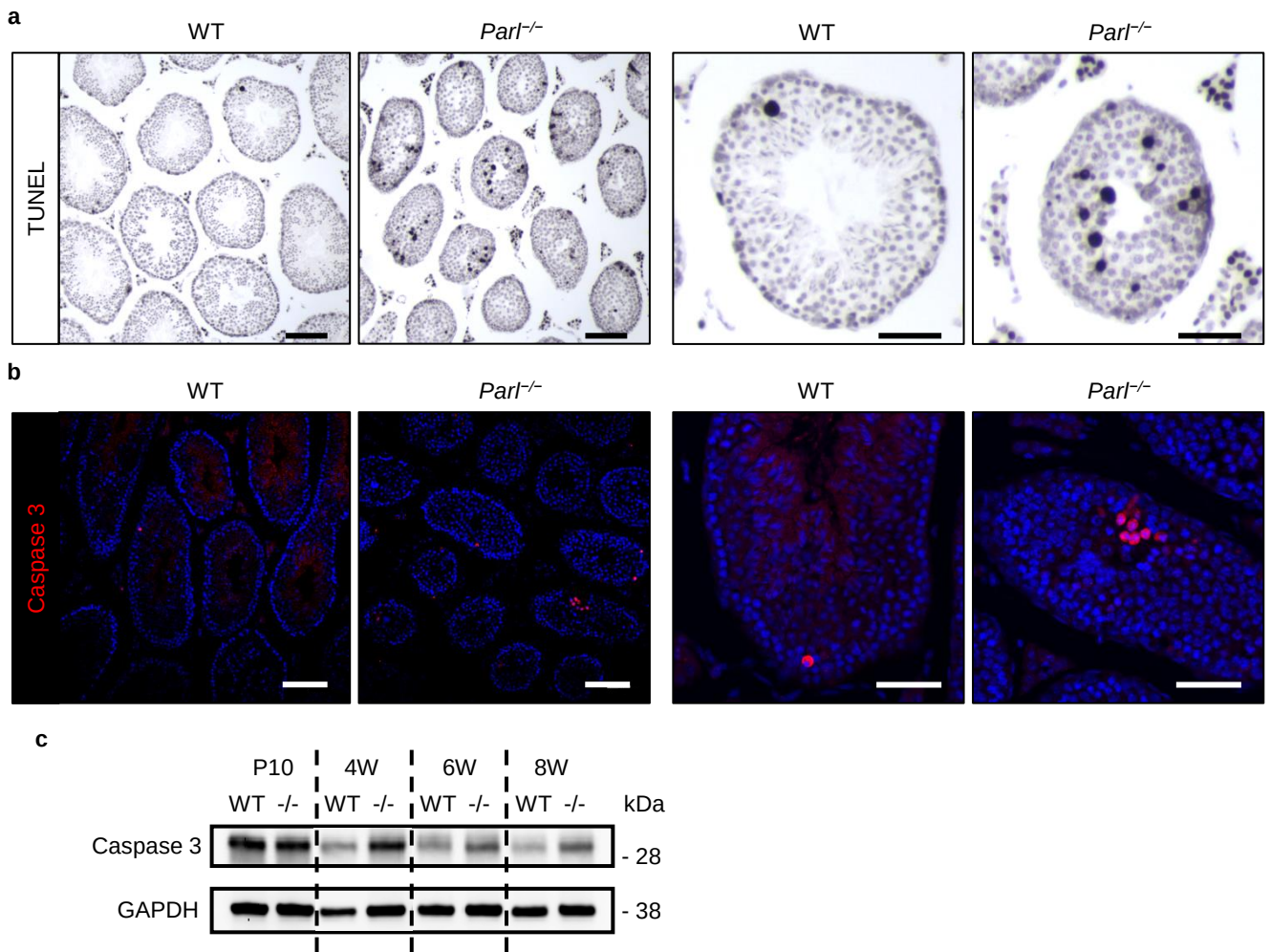


Fig. S3: PARL deficiency leads to an increased number of apoptotic germ cells.

a TUNEL assay of *Parl*^{-/-} testes in comparison to WT litter mates at the age of 8 weeks. The black-stained cells indicate apoptotic cells (scale bars; left: 100 μ m, right: 50 μ m). **b** Immunohistological staining of WT and *Parl*^{-/-} testes of 8-week-old mice with caspase 3, marking apoptotic cells (scale bars; left: 100 μ m, right: 50 μ m). **(c)** Western blot of testes of WT and *Parl*^{-/-} mice at the age of 10 days, 4 weeks, 6 weeks, and 8 weeks for caspase 3. GAPDH was used as an internal loading control.

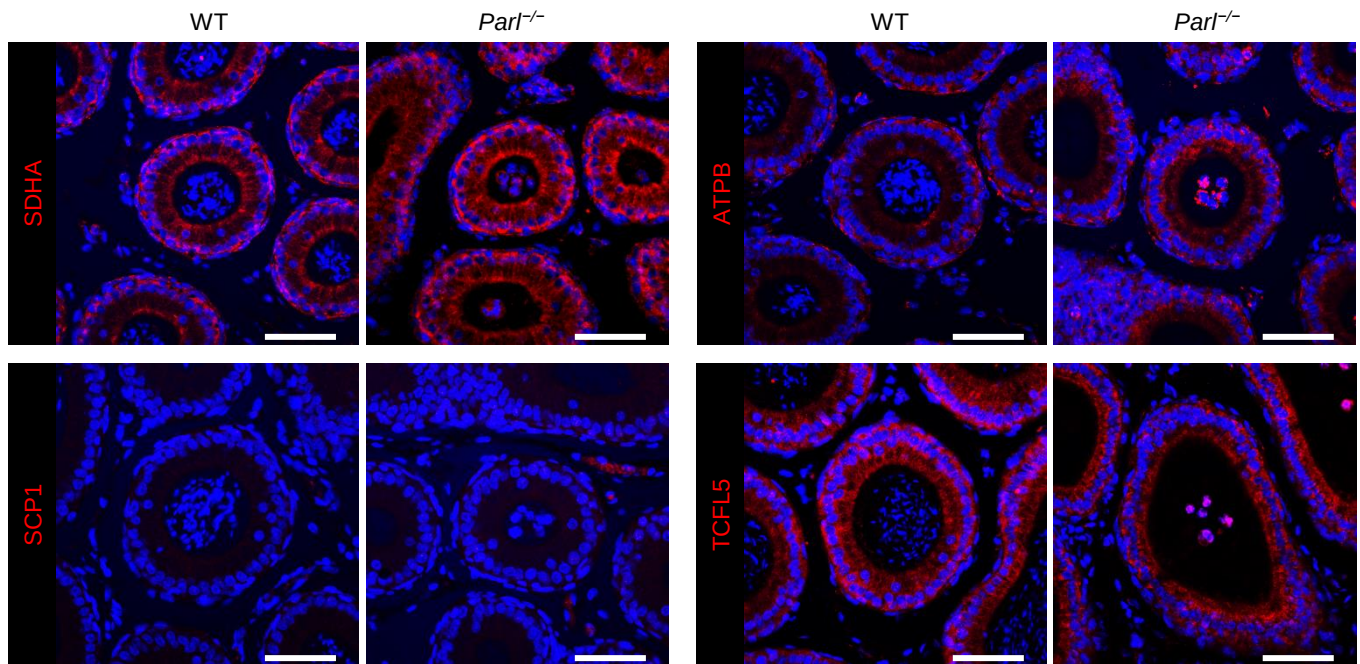


Fig. S4: Diplotene spermatocytes were found in the epididymides of PARL-deficient mice.

Immunohistological fluorescence staining of WT and *Parl*^{-/-} epididymides at the age of 8 weeks with SDHA and ATPB (mitochondrion markers), SCP1 (zygotene / early diplotene spermatocytes), and TCFL5 (diplotene spermatocytes) (scale bars: 50 μ m).

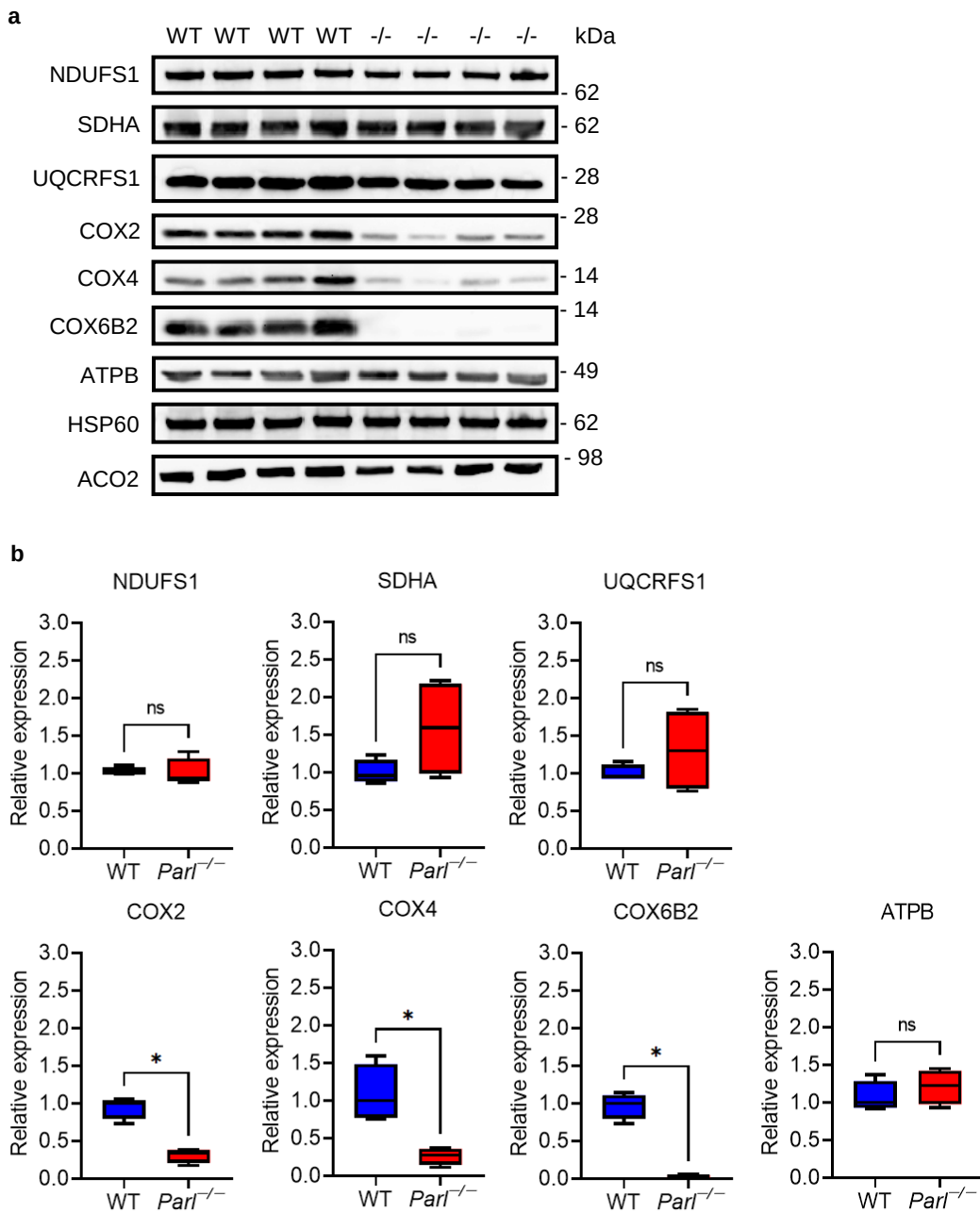


Fig. S5: Expression of proteins of respiratory chain complex I-V

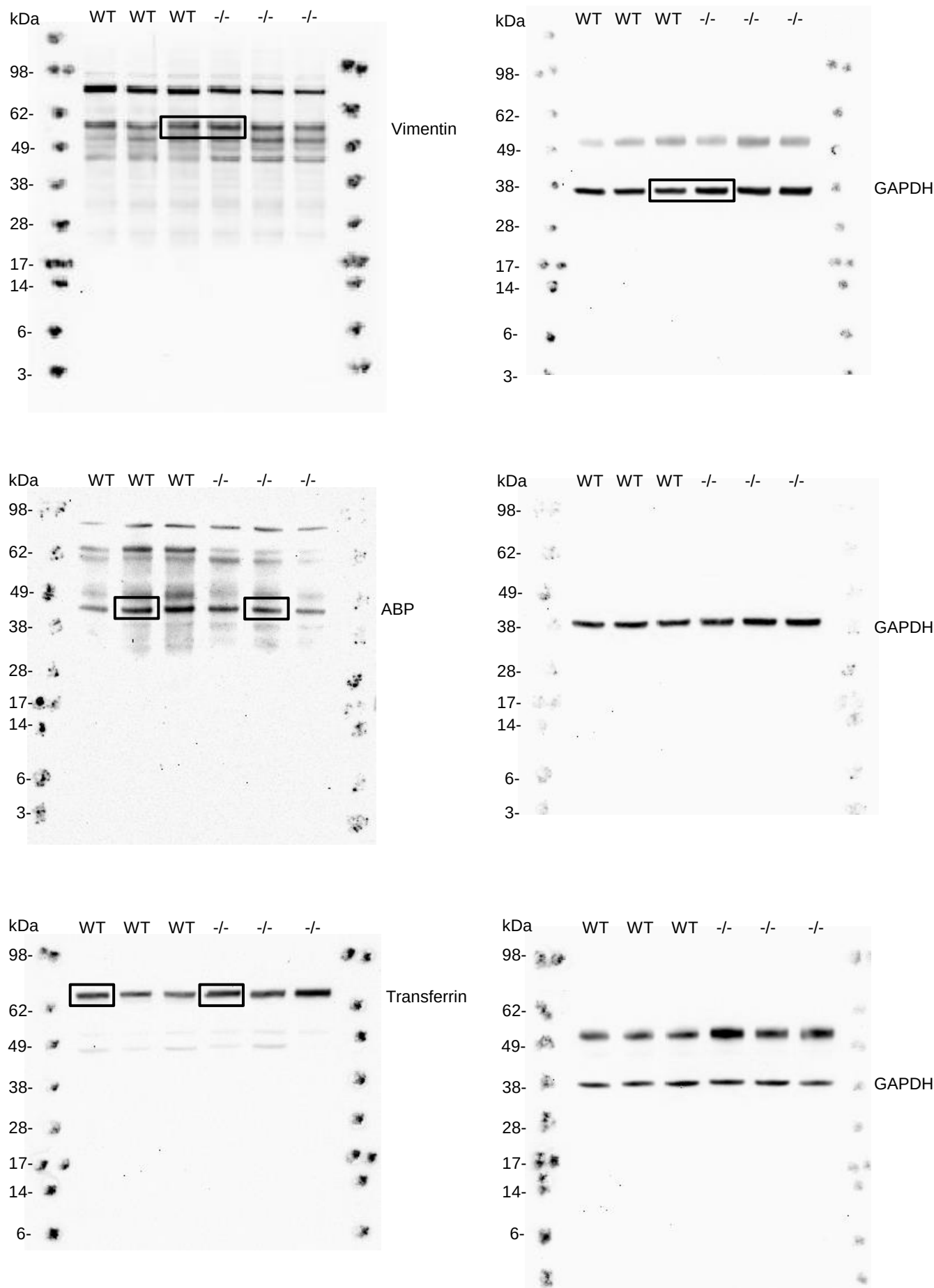
a Western blots of proteins of respiratory chain complexes of isolated mitochondria of 8-week-old WT and *Parl*^{-/-} mice. HSP60 or ACO2 was used as a loading control (for the membrane with SDHA and UQCRCF1 ACO2 was used as loading control because SDHA are too close in molecular weight).

b Relative expression of respiratory chain complex proteins based on the western blots. Graphical density values of the target protein were divided by the values of the loading control (HSP60 or ACO2) and then divided by the median value of the WT control group. Statistics: Mann–Whitney U test: NDUF51: $p = 0.3429$, SDHA: $p = 0.3429$, UQCRCF1: $p > 0.9999$, COX2: $p = 0.0286$, COX4: $p = 0.0286$, COX6B2: $p = 0.0286$, ATPB: $p = 0.4857$.

Table S1: List of antibodies used in this study.

Protein	Company	Catalog no.	Concentrations IHC	Concentrations WB
ABP	Abcam	ab126617	-	1:1000
ACO2	Abcam	Ab129069	1:100	1:25,000
ACRV1	Proteintech	14040-1-AP	1:100	1:2000
ATPB	Proteintech	17247-1-AP	1:100	1:4000
BHMT	Novous Bio	NBP1-00161	1:50	1:2000
Caspase3	Cellsignaling	9662	1:50	1:500
Claudin11	Abcam	Ab53041	1:100	-
COQ4	Proteintech	16654-1-AP	-	1:1000
COX2 (MTCO2)	Proteintech	55070-1-AP	1:50	1:2500
COX4	Proteintech	11242-1-AP	1:100	1:5000
COX6B2	Proteintech	11437-1-AP	1:100	1:500
CYP11A1	Proteintech	13363-1-AP	1:100	1:1000
Cyp17A1	Proteintech	14447-1-AP	1:100	1:2000
DDX4	Abcam	Ab13840	1:100	1:1000
Diablo(SMAC)	Proteintech	10434-1-AP	1:50	1:2000
GAPDH	HyTest	HyTest 5G4	-	1:10,000
HSD17B3	Biorbyt	BYT-ORB5476	1:50	1:250
HSD17B12	Invitrogen	PA5-69454	-	1:1000
HSP60	Proteintech	66041-1-Ig	-	1:25,000
INHBA	Proteintech	17524-1-AP	-	1:500
MFN1	Proteintech	13798-1-AP	1:100	1:10,000
MFN2	Proteintech	12186-1-AP	1:100	1:10,000
NDUFS1	Proteintech	12444-1-AP	1:50	1:2000
PCNA	Abcam	Ab18197	1:100	1:1000
PGAM5	Abcam	Ab126534	-	1:500
SCP1	Novus Bio	NB300-229SS	1:200	1:1000
SDHA	Abcam	Ab14715	1:100	1:1000
SQRDL	Novus Bio	NBP1-84510	-	1:1000
StAR	Proteintech	12225-1-AP	1:100	1:1000
STARD7	Proteintech	15689-1-AP	-	1:500
SULT1E1	Proteintech	12522-1-AP	1:50	1:500
TCFL5	Proteintech	29404-1-AP	1:50	1:1000
Transferrin	Proteintech	17435-1-AP	-	1:1000
TTC19	SigmaAldrich	HPA052380	-	1:1000
UQCRRFS1	Proteintech	18443-1-AP	1:50	1:4000
Vimentin	Abcam	Ab92547	1:100	1:1000

Fig. S6: Uncropped images of Western Blots Fig. 2c



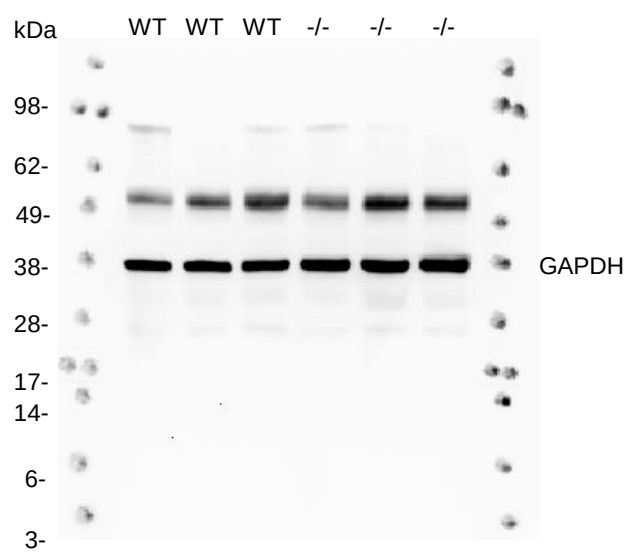
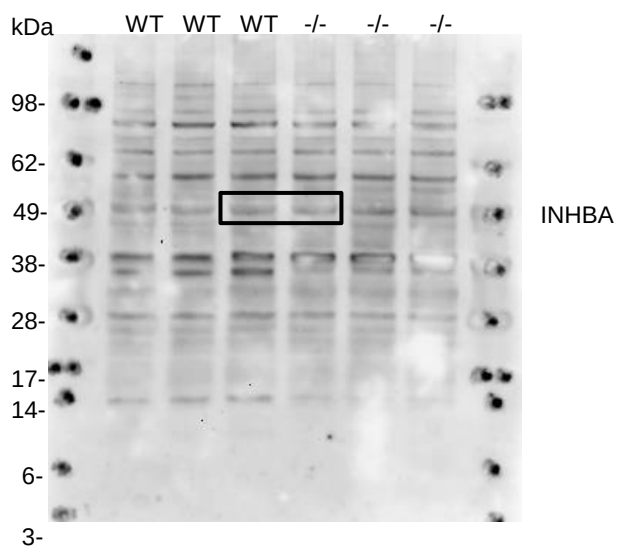
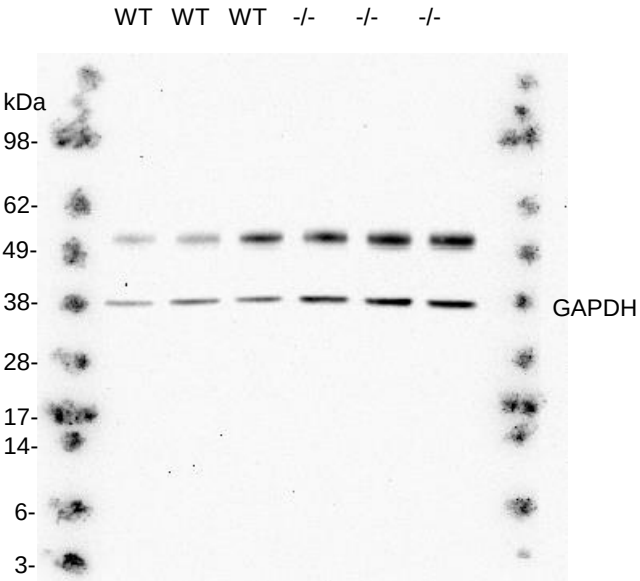
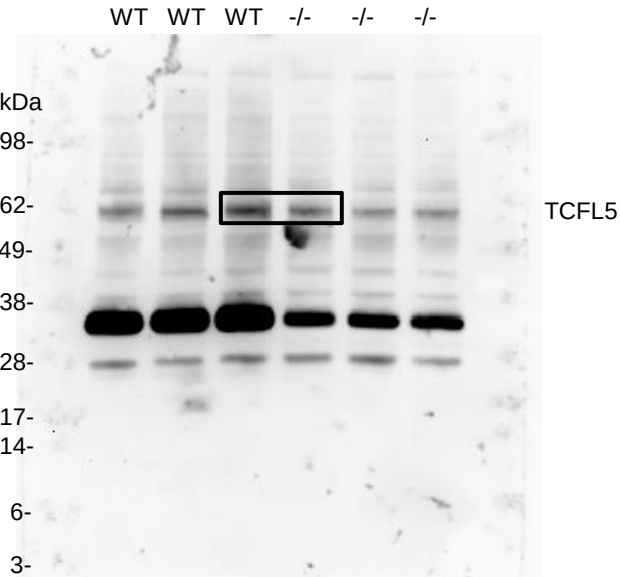
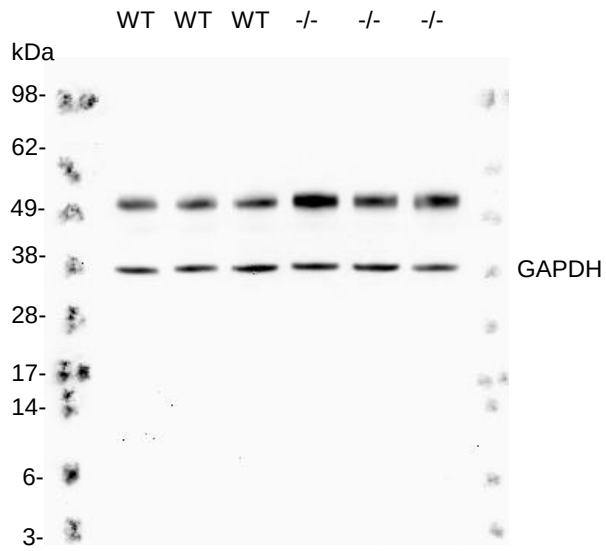
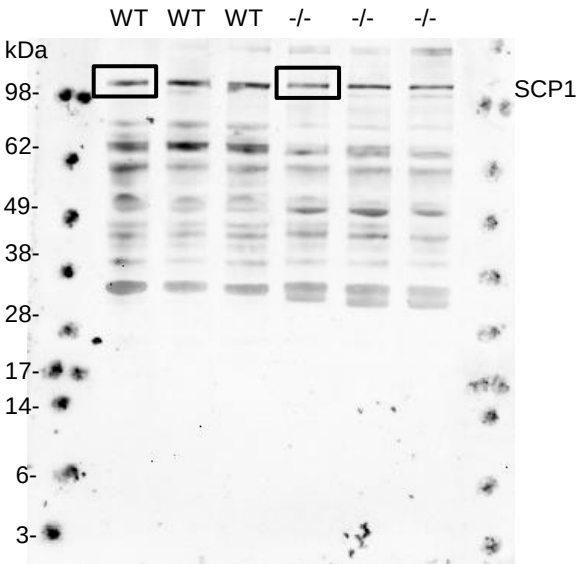
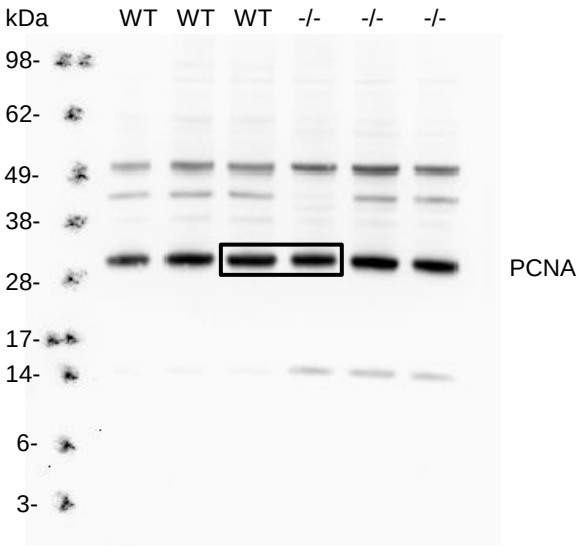


Fig. S7: Uncropped images of Western Blots Fig. 2d



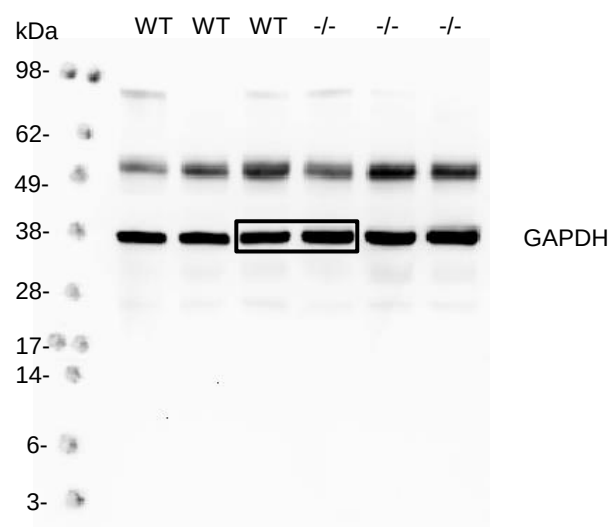
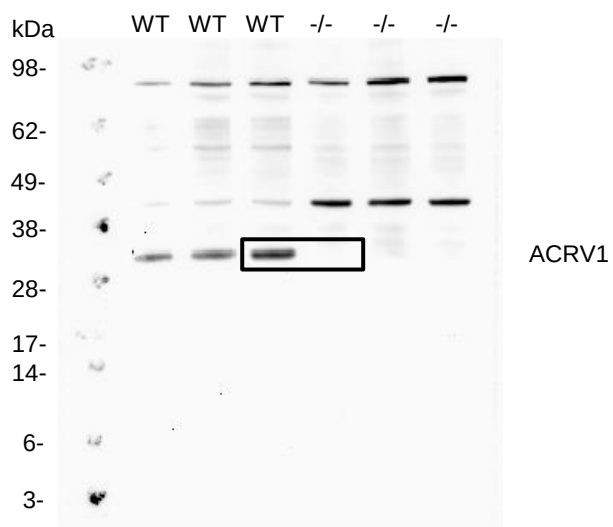
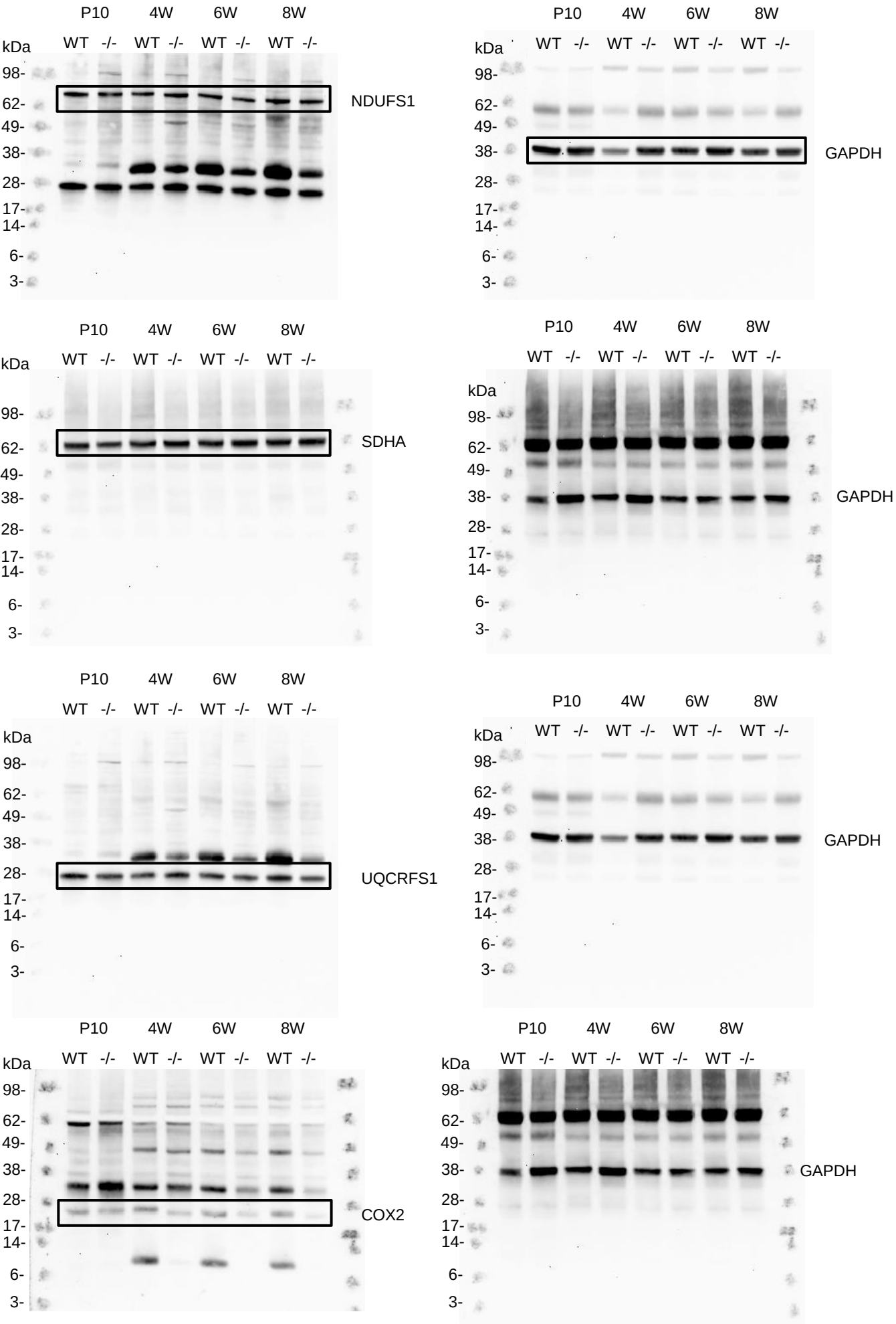


Fig. S8: Uncropped images of Western Blots Fig. 4a



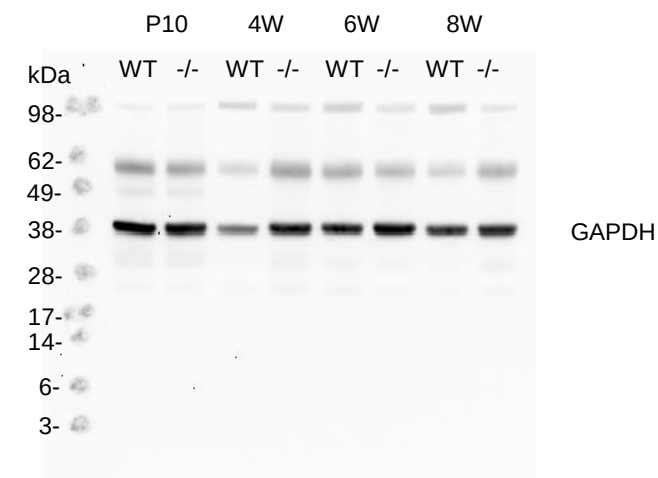
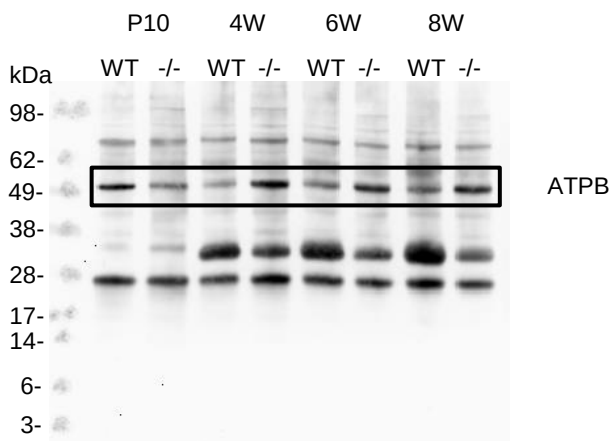
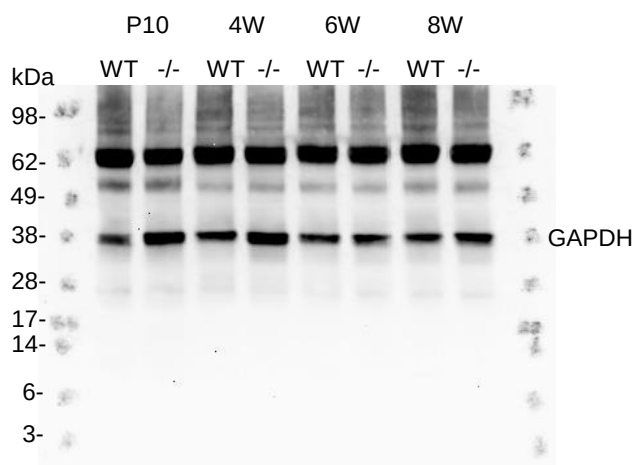
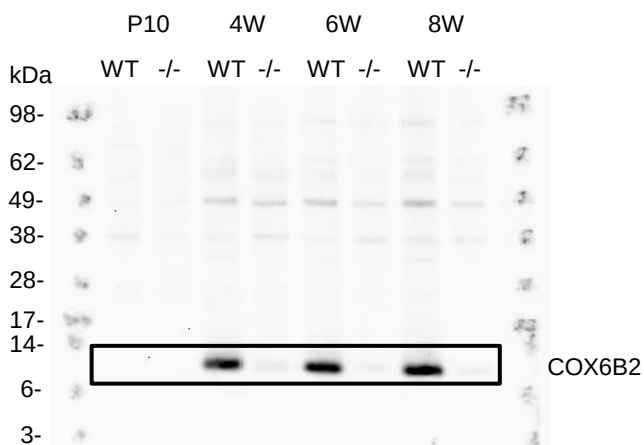
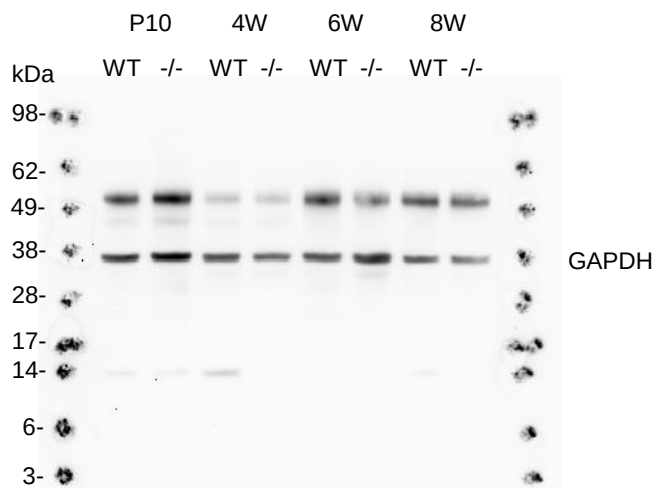
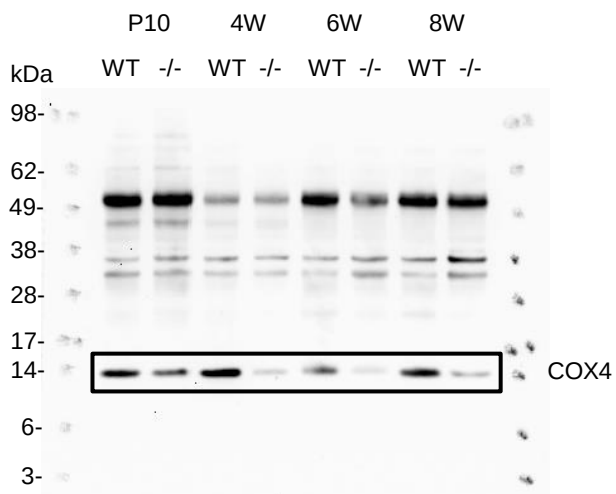
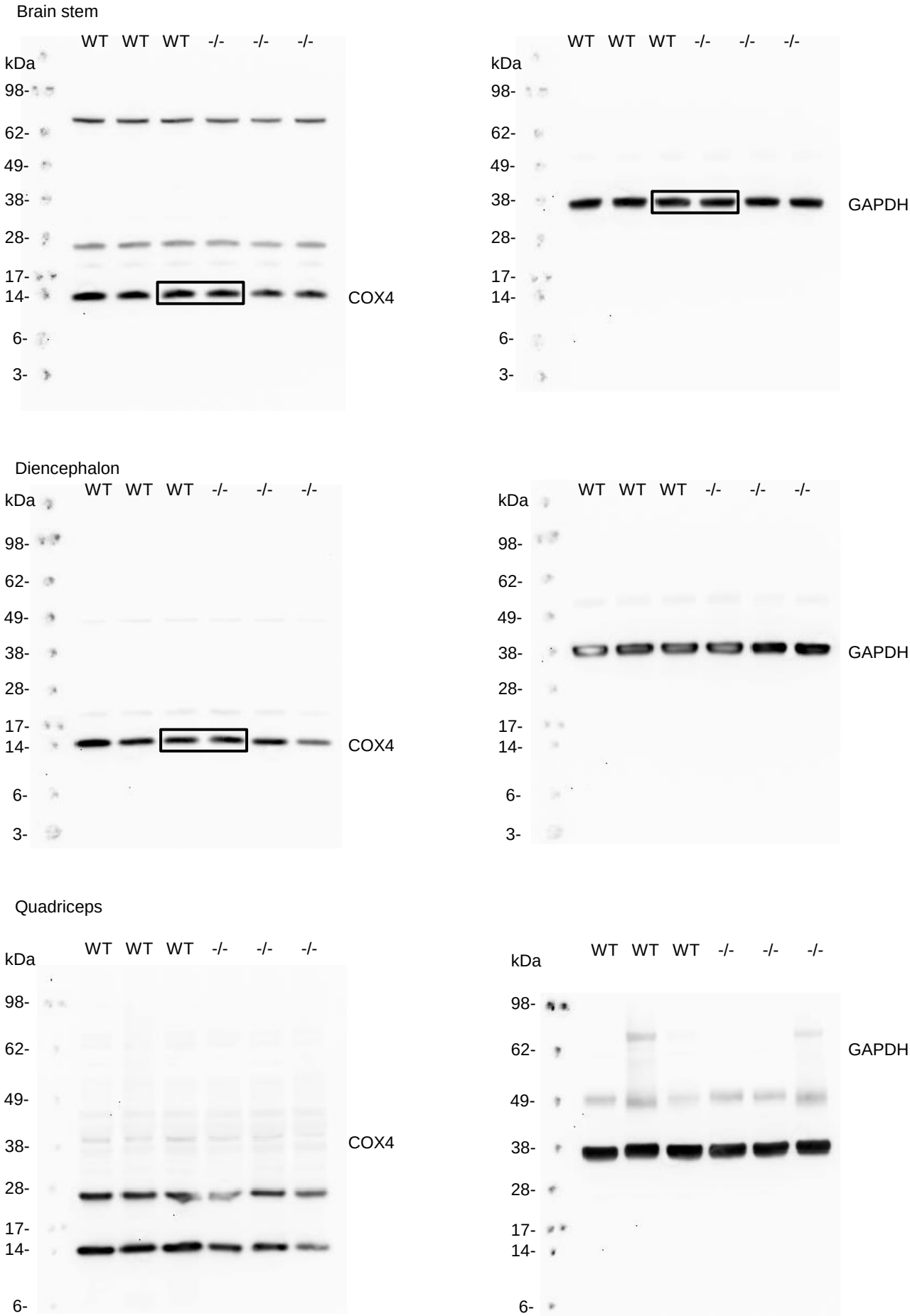
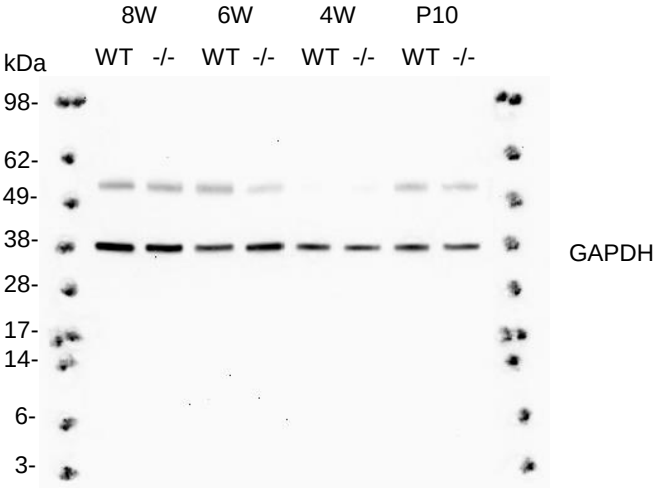
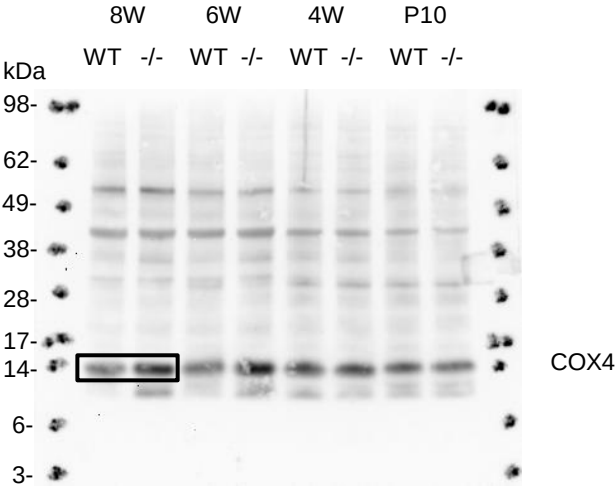


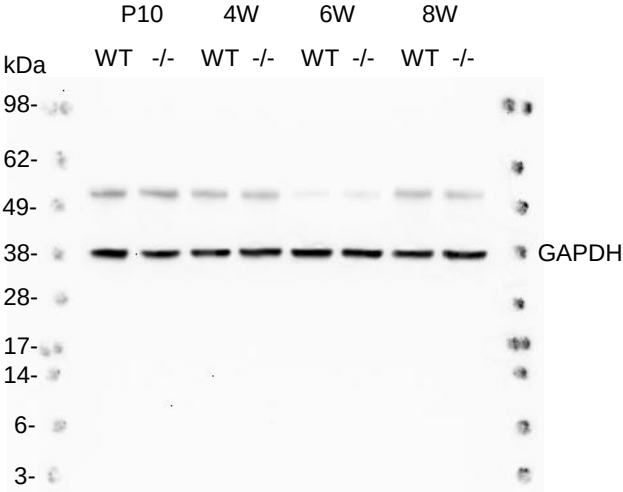
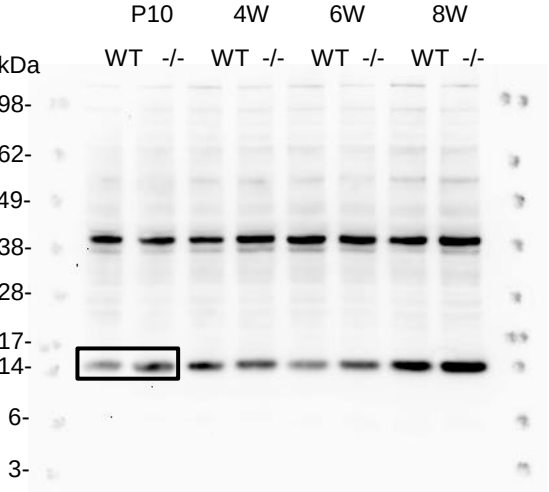
Fig. S9: Uncropped images of Western Blots Fig. 4d



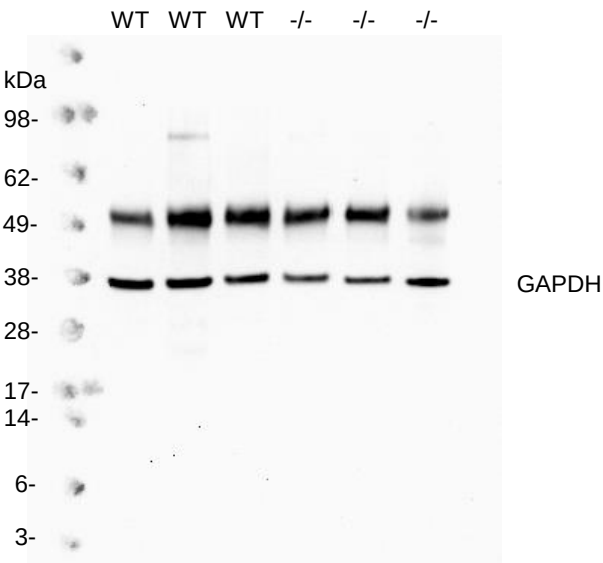
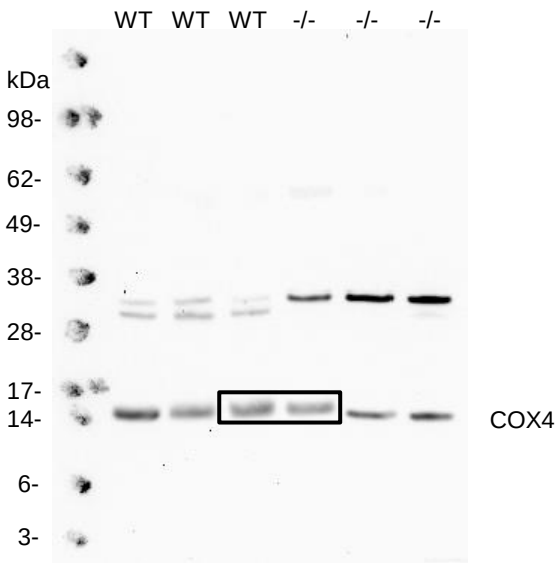
Spleen



Thymus



Ovary



Western blot analysis of COX4 protein levels. The blot shows COX4 protein bands around 14-15 kDa. A box highlights the bands in the 8W WT and 8W -/- lanes. Molecular weight markers are indicated on the left (98, 62, 49, 38, 28, 17, 14, 6, 3 kDa) and the protein name COX4 is on the right.

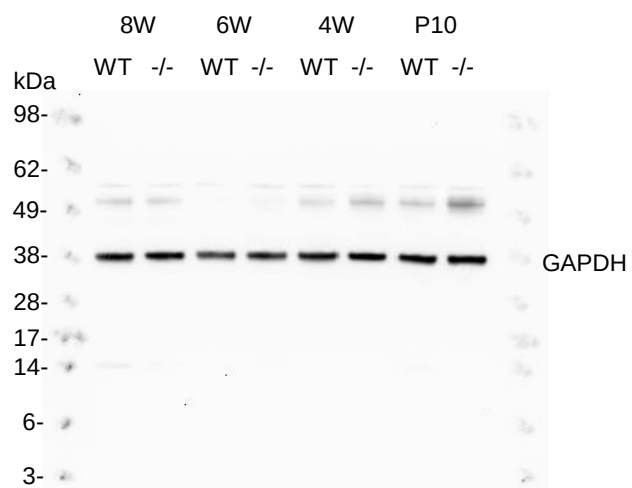
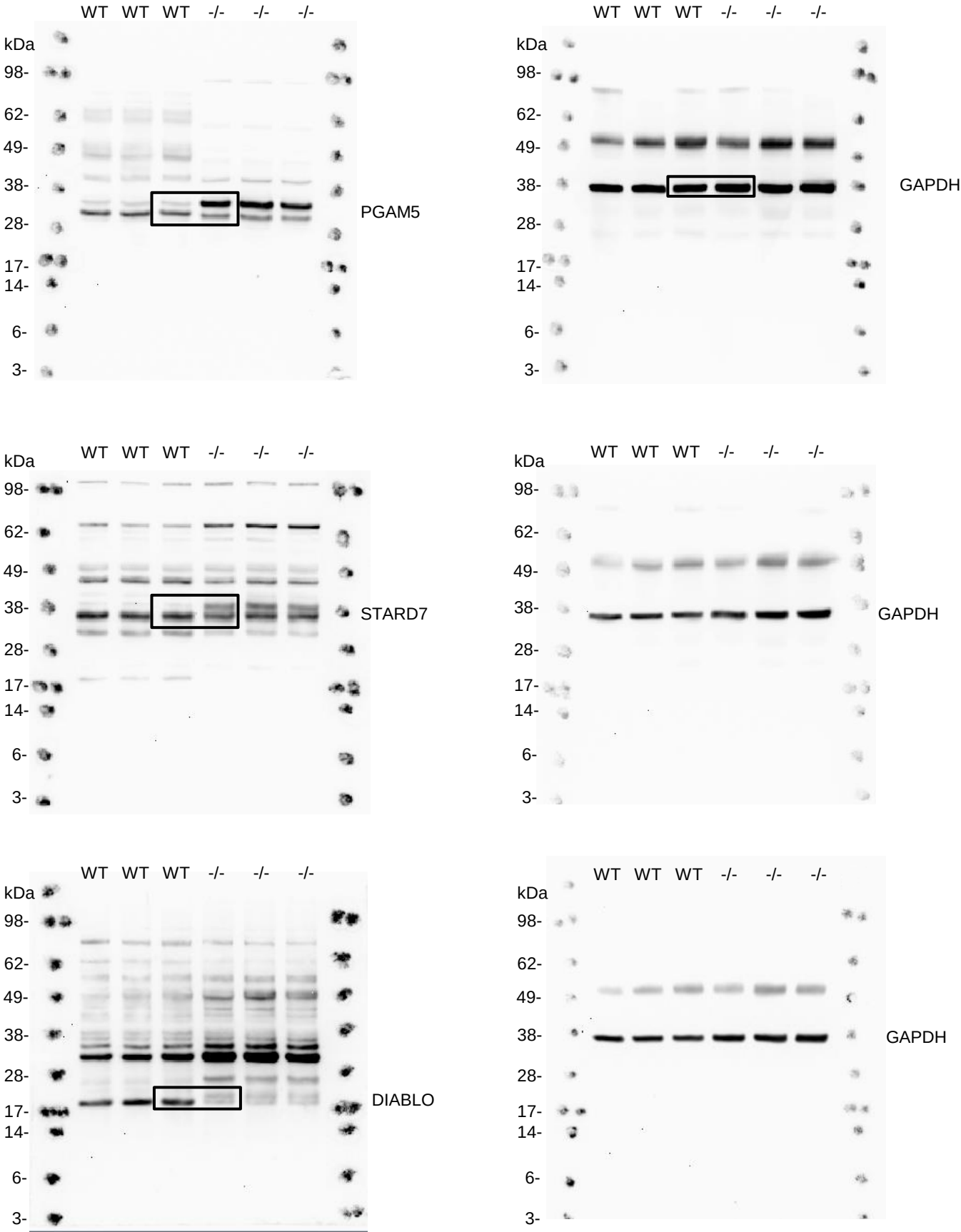


Fig. S10: Uncropped images of Western Blots Fig. 4e



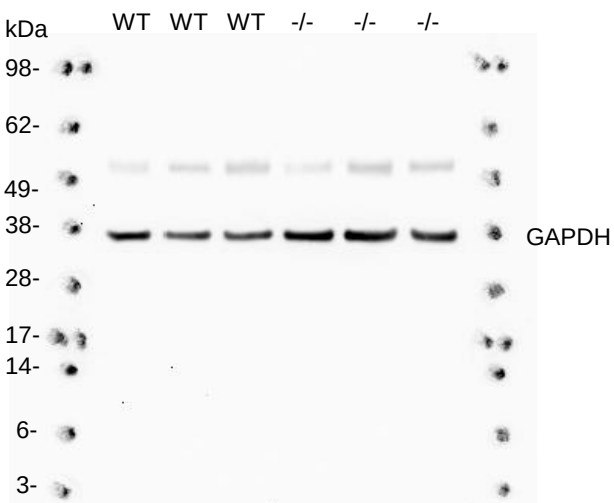
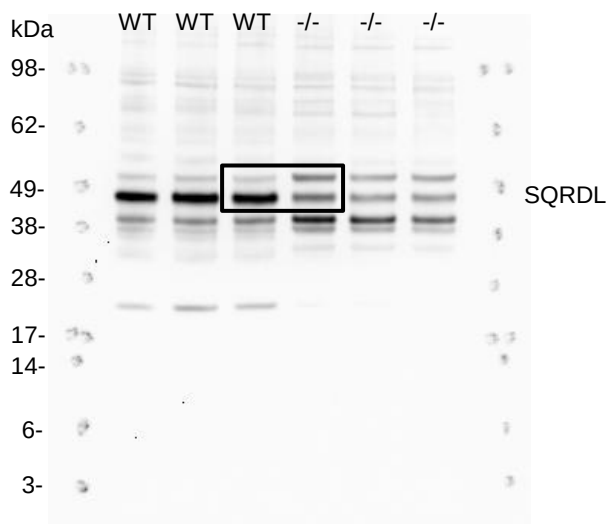
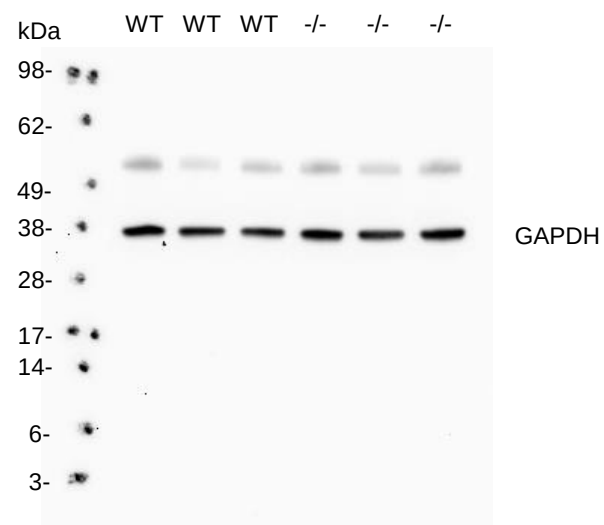
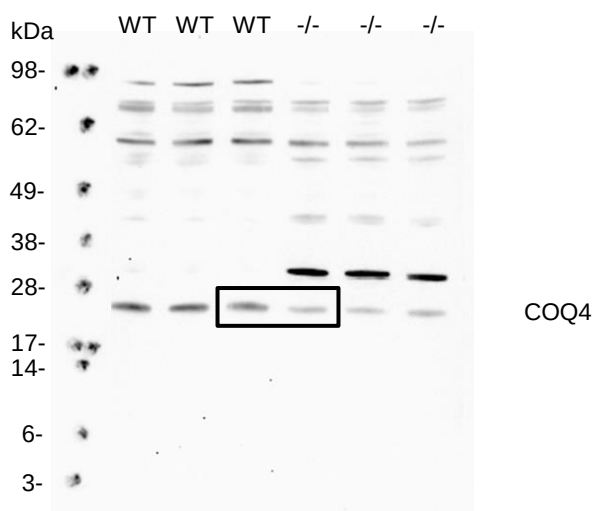
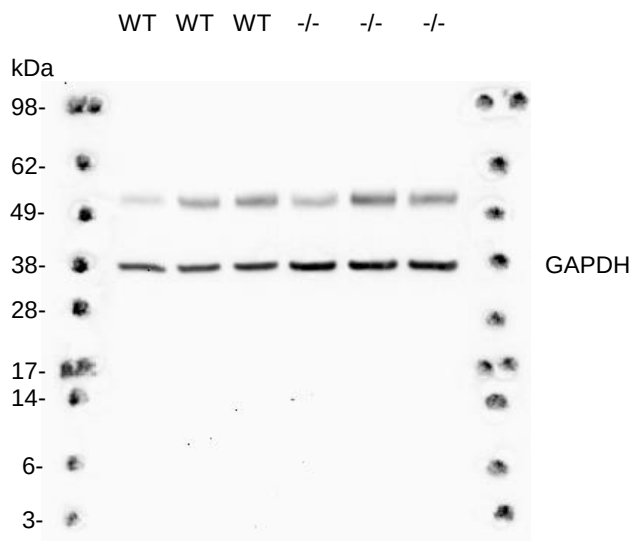
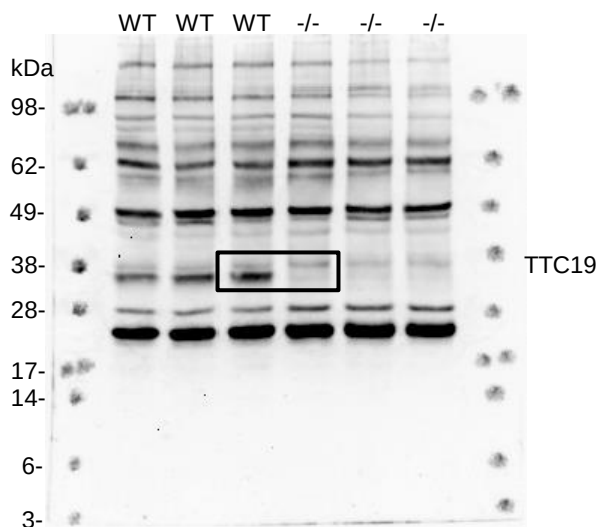
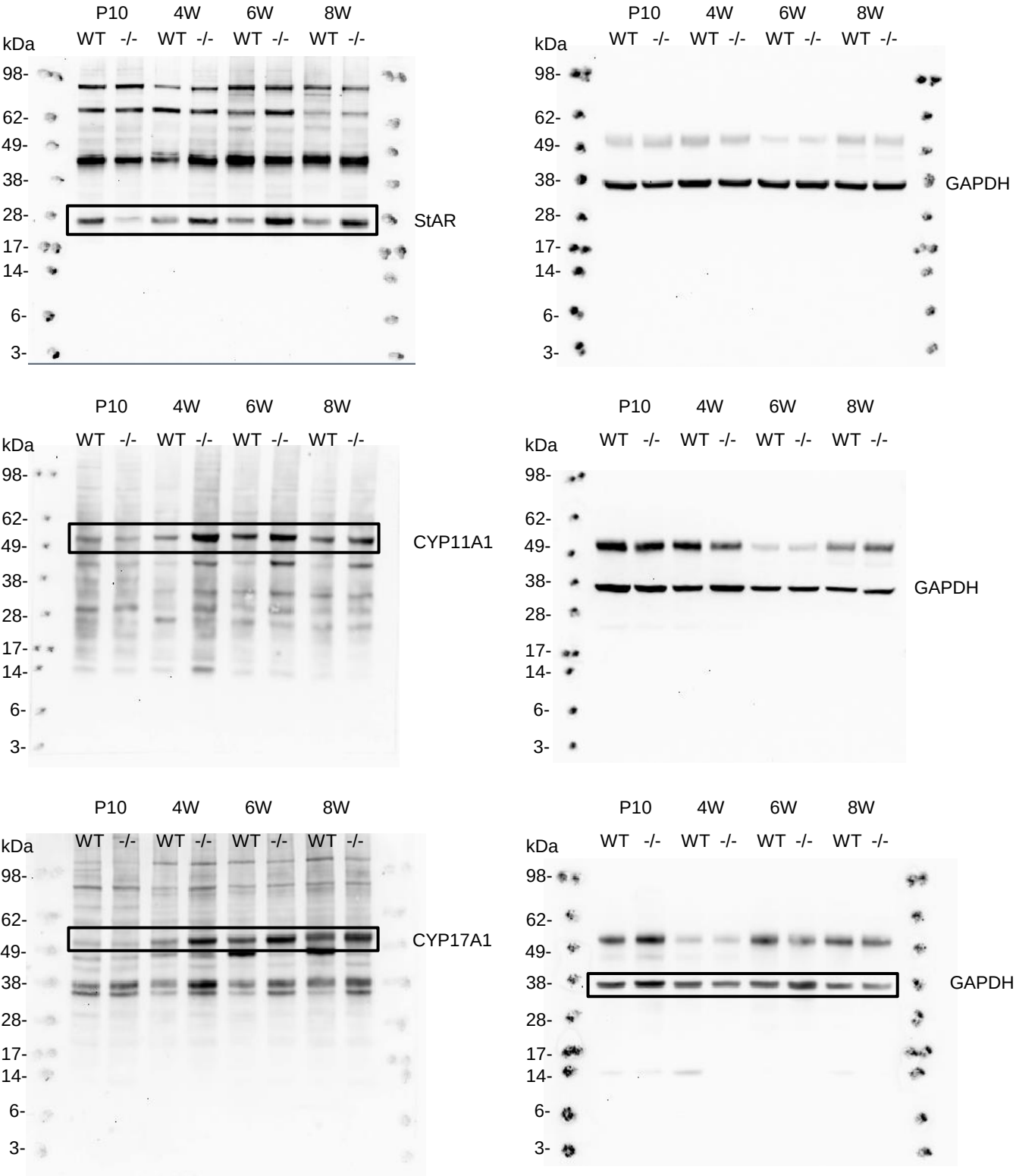


Fig. S11: Uncropped images of Western Blots Fig. 7a



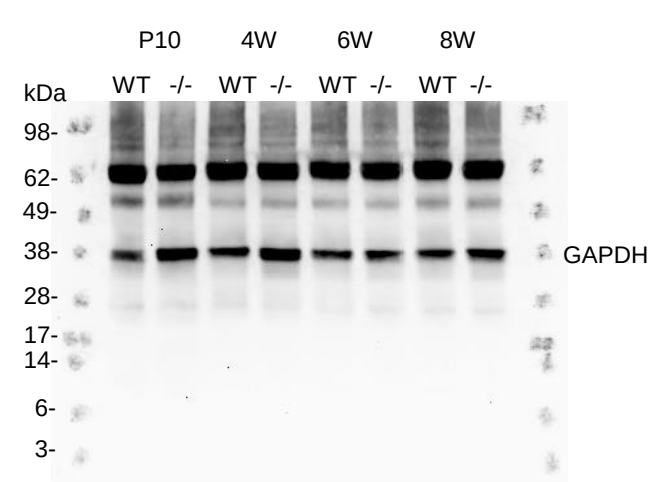
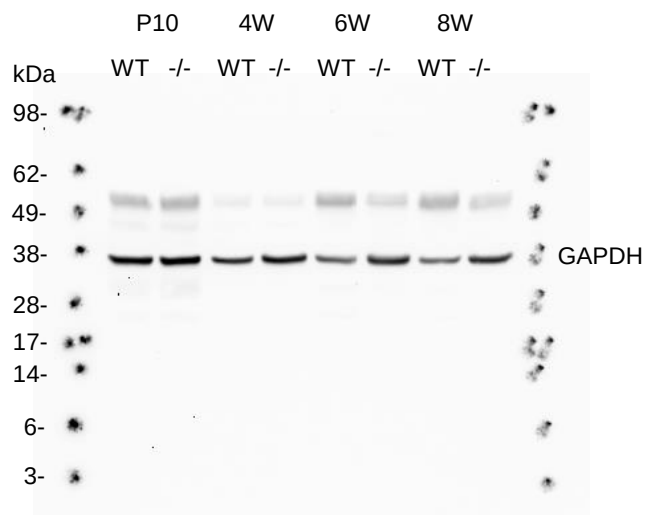


Fig. S12: Uncropped images of Western Blots Fig. 8b

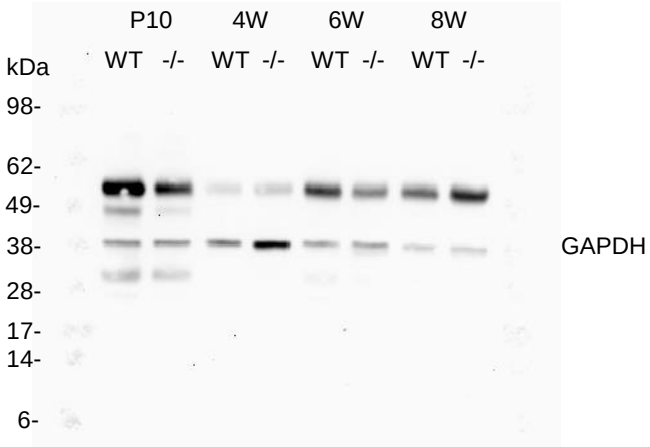
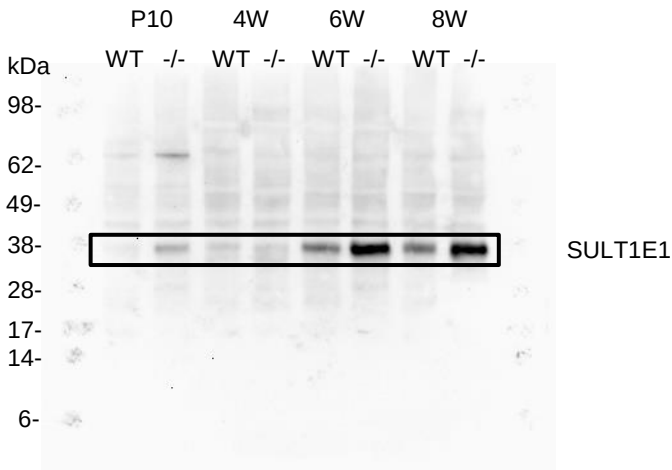
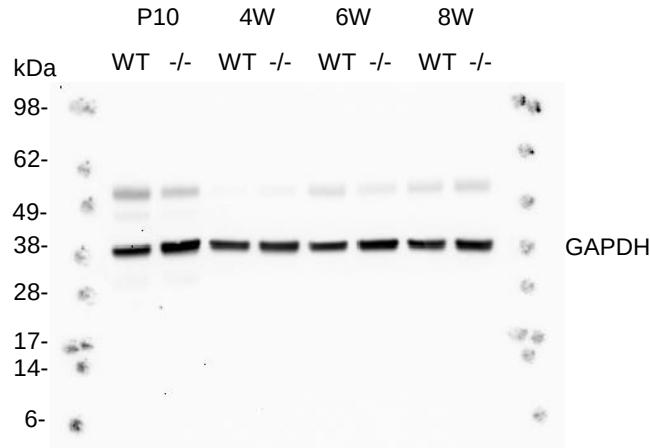
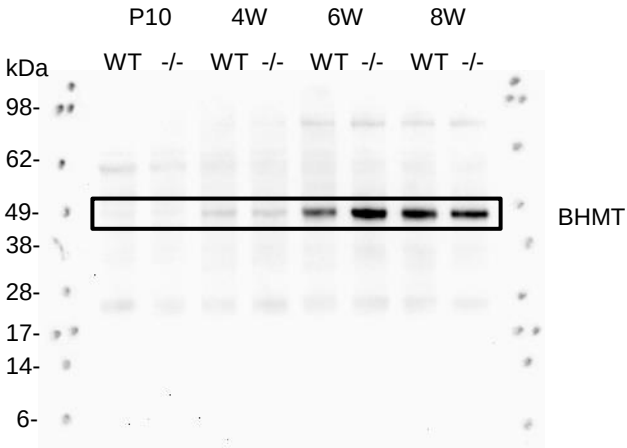


Fig. S13: Uncropped images of Western Blots Fig. 9c

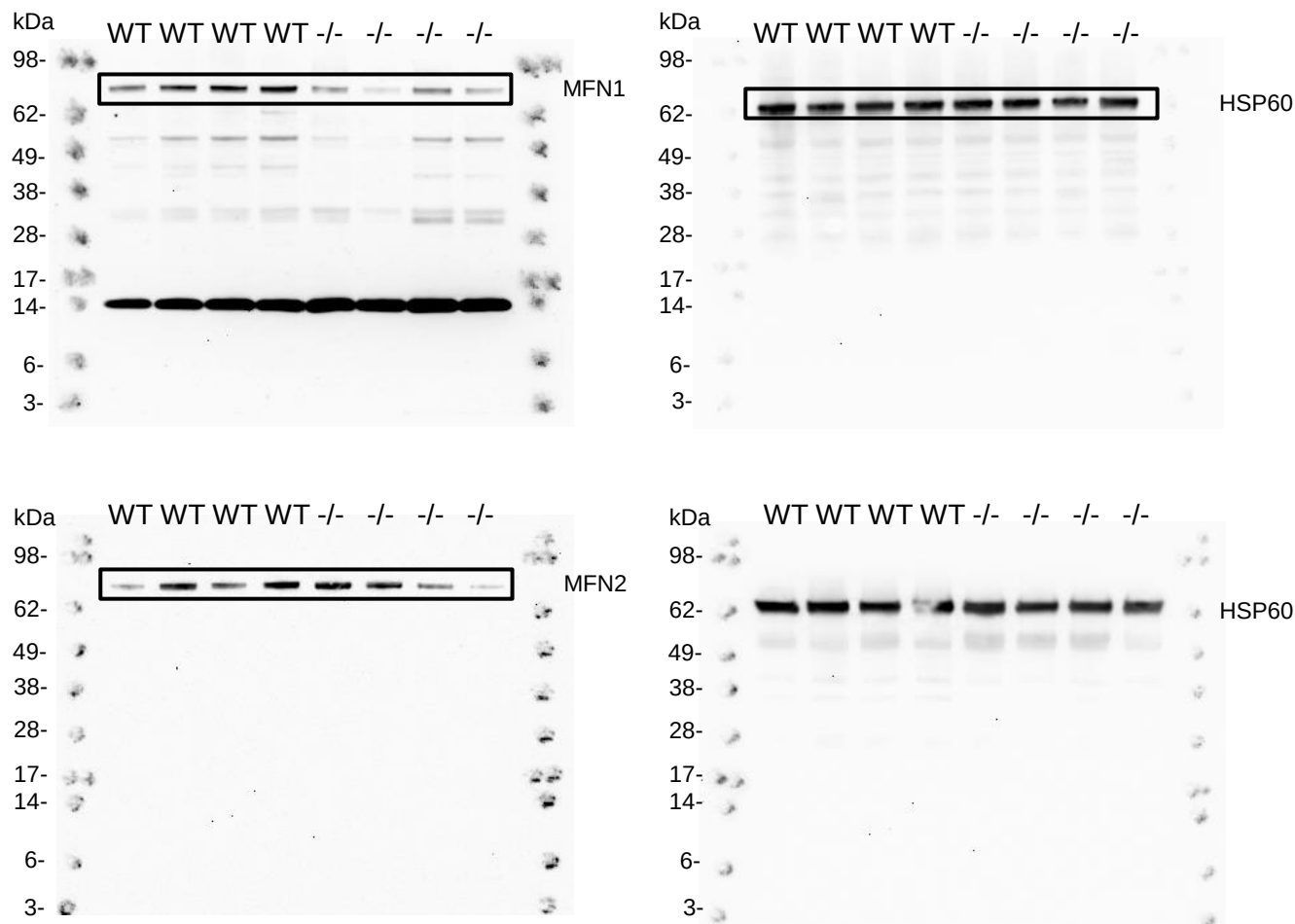


Fig. S14: Uncropped images of Western Blots Fig. S3c

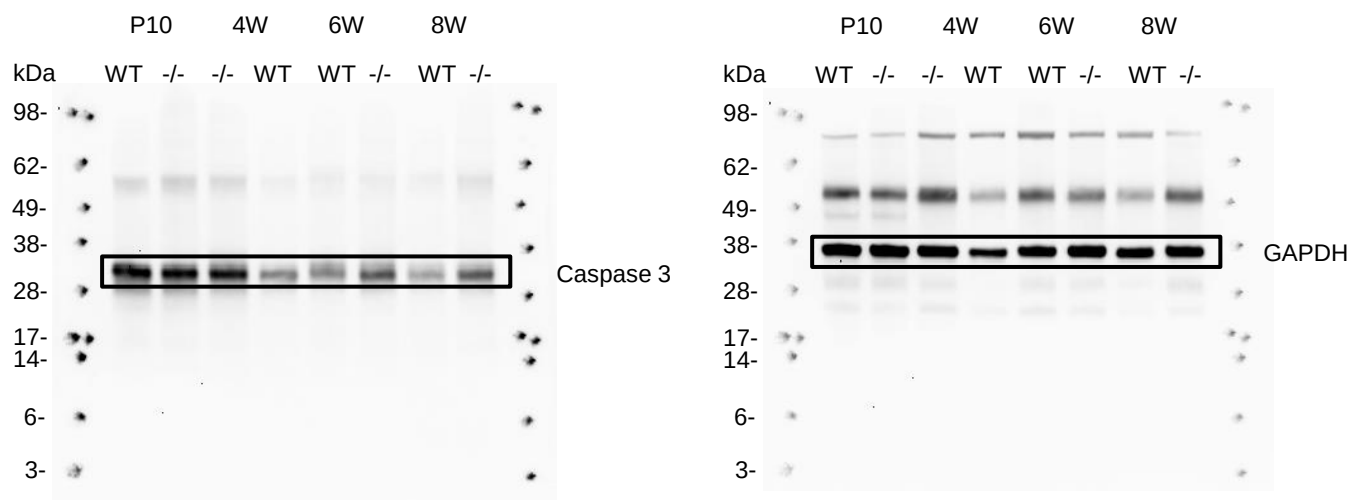


Fig. S15: Uncropped images of Western Blots Fig. S5b

