



Does REDD1 act as an AMPK-like in skeletal muscle?

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Does REDD1 act as an AMPK-like in skeletal muscle ?

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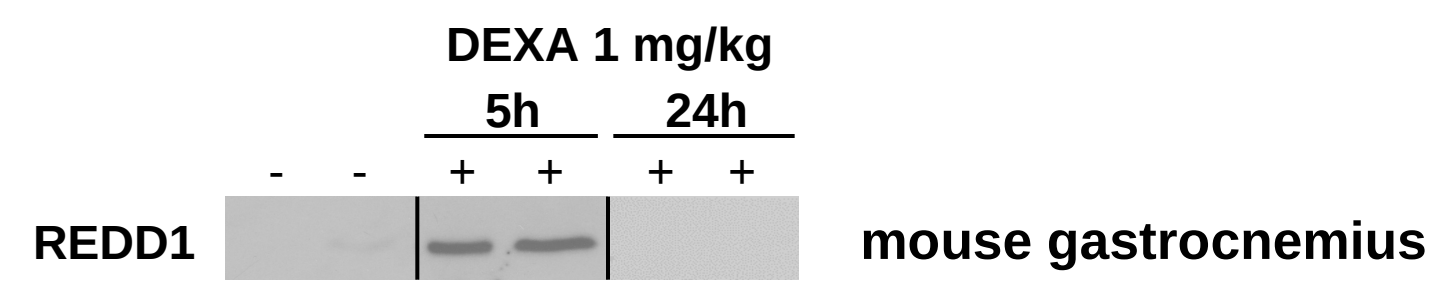
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REDD1 is a stress response protein

REDD1 induction by glucocorticoids

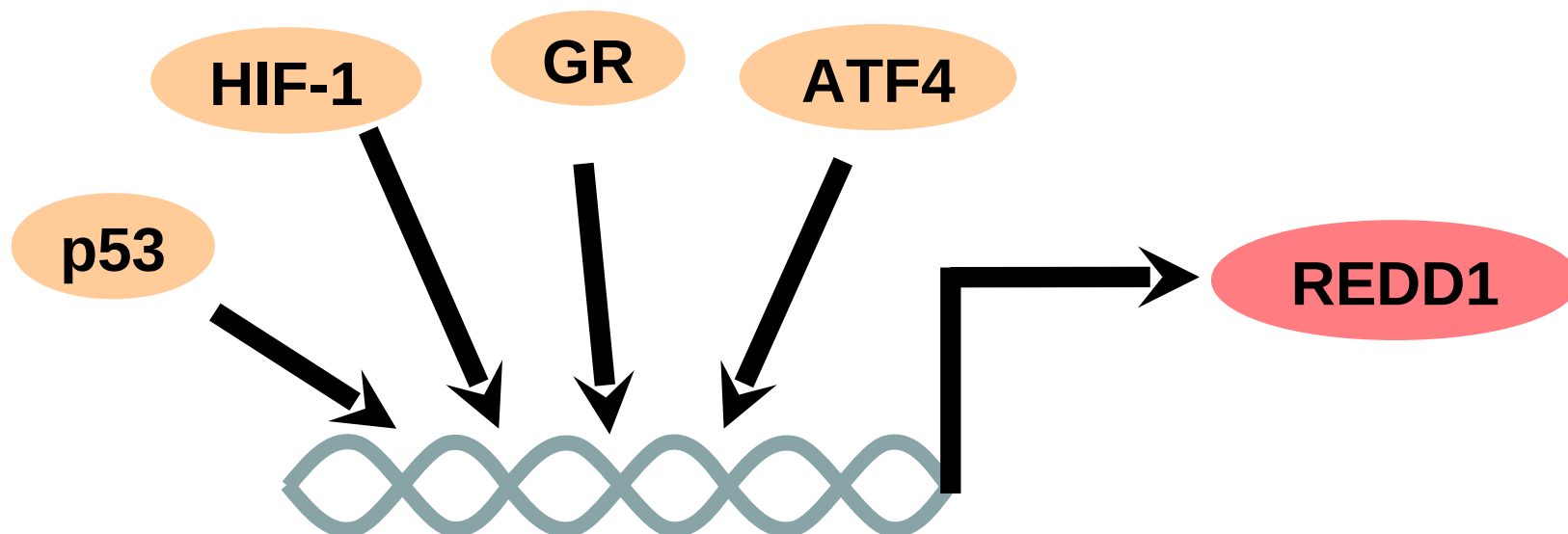


- Low basal expression
- Short half-life

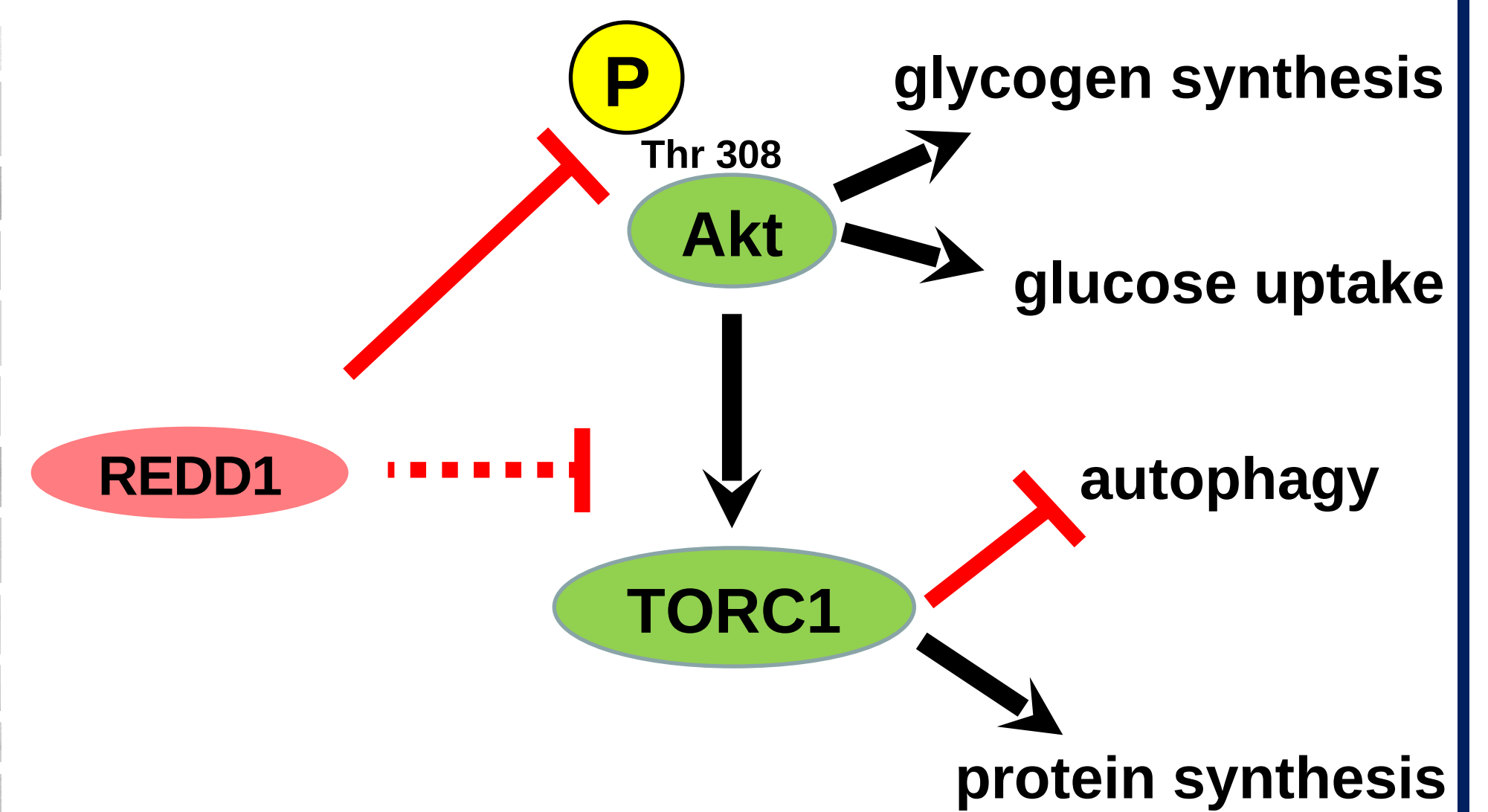
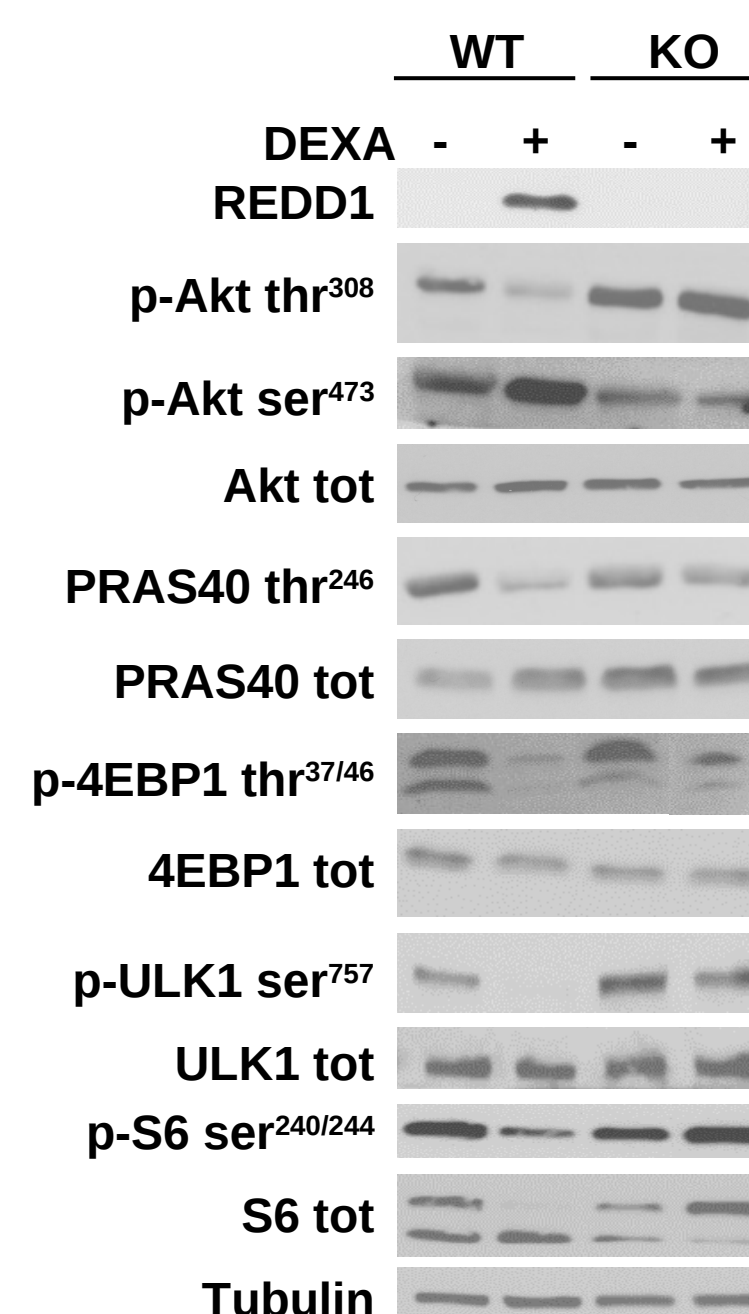
- 90-min running exercise (mouse gastrocnemius)
- 16-h fast (mouse gastrocnemius)
- 3 wk of hypobaric hypoxia (6,000 m, rat soleus)



- REDD1 induction in response to metabolic challenge



REDD1 inhibits Akt/TORC1



- The deletion of REDD1 impedes the inhibition of the Akt/TORC1 pathway in response to dexamethasone (mouse gastrocnemius)

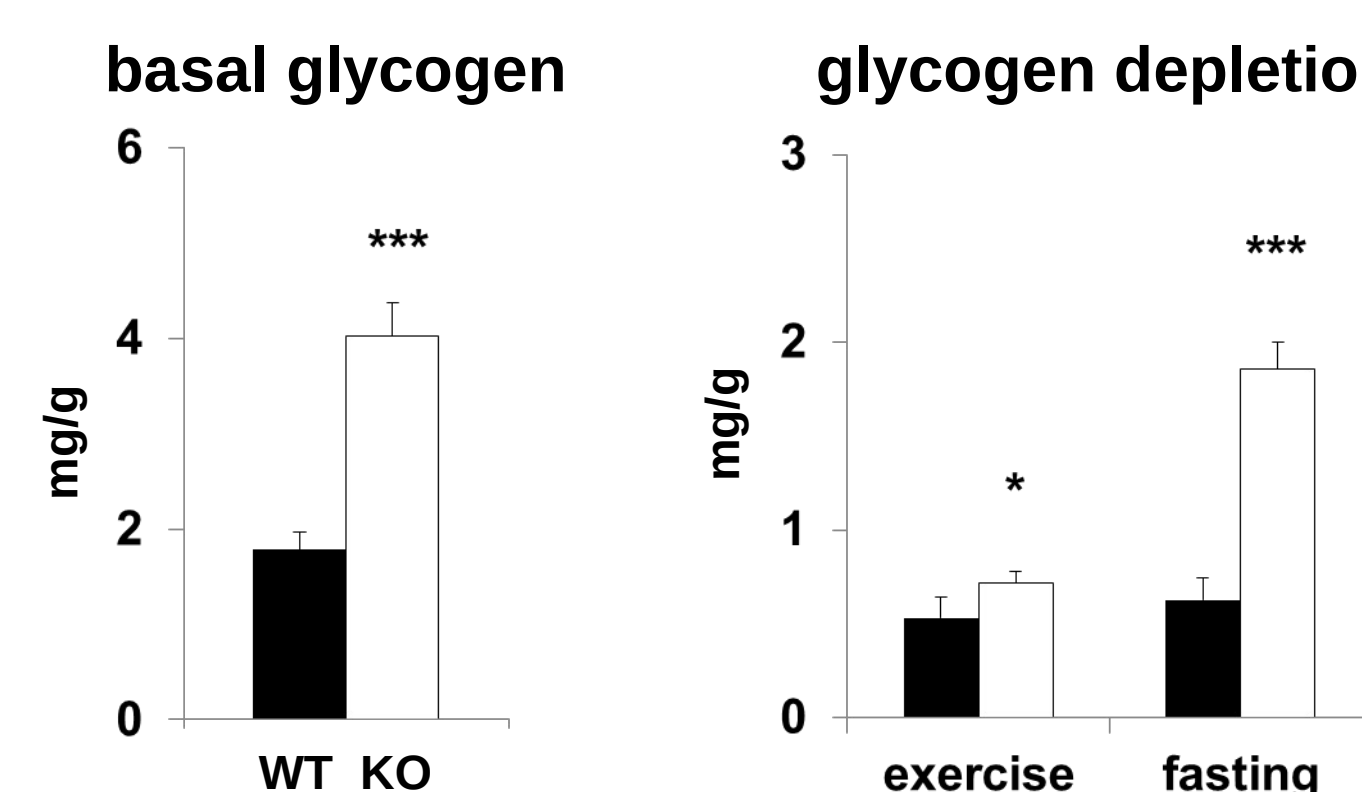
REDD1 alters nutrients storage

Protein synthesis & muscle mass



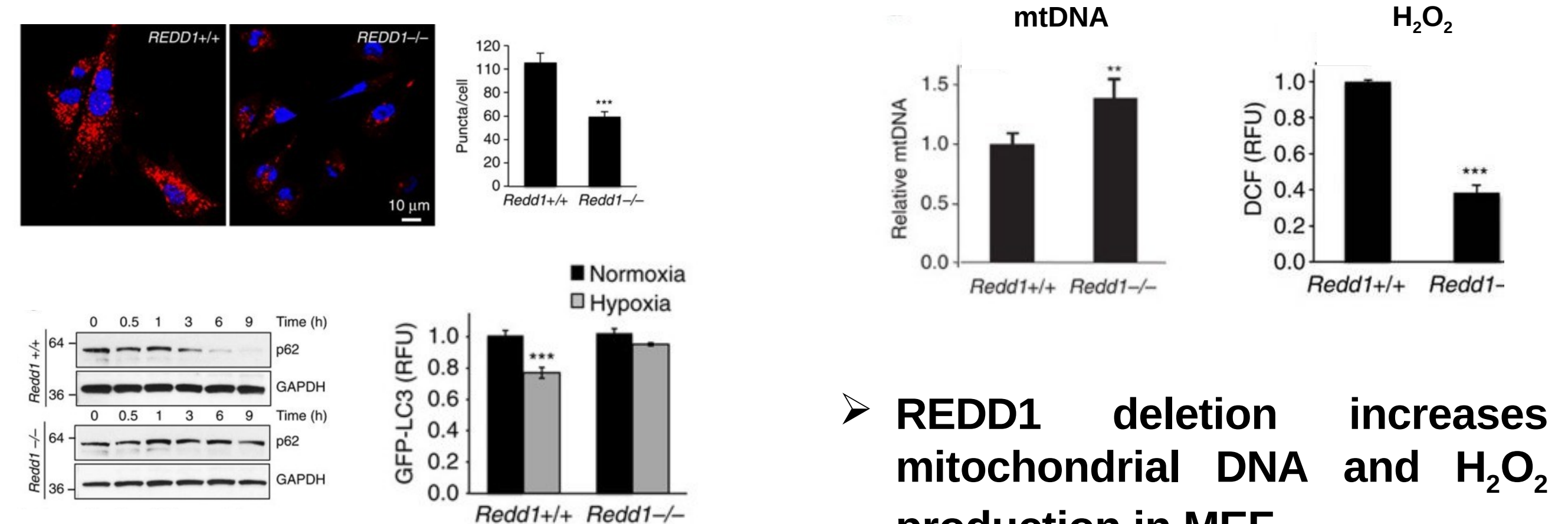
- REDD1 deletion abolishes the decrease in protein synthesis and in muscle mass after dexamethasone administration (mouse gastrocnemius)

Glycogen stores



- REDD1 deletion increases muscle glycogen content
- REDD1 deletion exacerbates glycogen depletion upon energetic stress

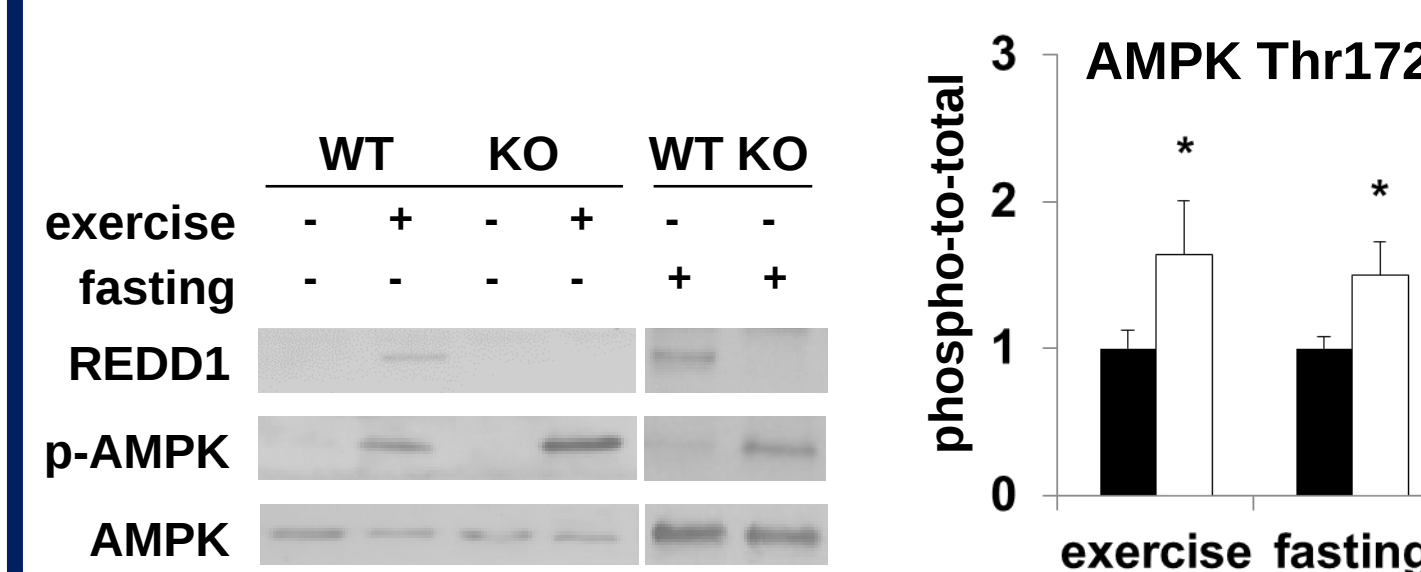
REDD1 promotes mitophagy



- REDD1 deletion increases mitochondrial DNA and H₂O₂ production in MEF
- Basal and hypoxia-induced ATG are reduced in REDD1^{-/-} MEF

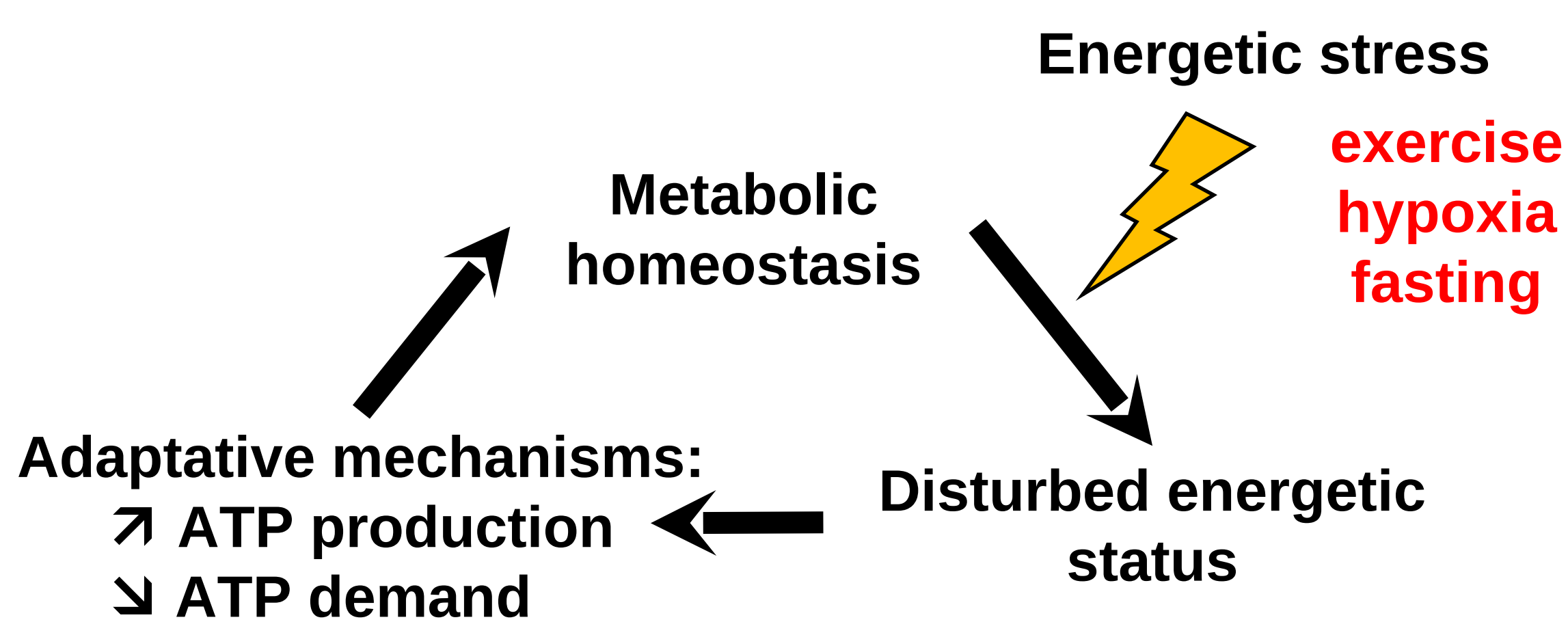
Qiao et al., 2015 Nat Commun

AMPK activation is related to REDD1 upregulation



- AMPK activation is exacerbated in REDD1 KO mice upon energetic stress

Conclusion



- By slowing down anabolic processes, REDD1 would spare ATP and delay AMPK activation

References

➤ Britto et al., 2014, *Am J Physiol Endocrinol Metab.* Dec;307(11):E983-93.

➤ Ellis et al., 2002, *Mol Cell.* Nov;10(5):995-1005.

➤ Favier et al., 2010, *Am J Physiol Regul Integr Comp Physiol.* Jun;298(6):R1659-66.

➤ Qiao et al., 2015 *Nat Commun.* 2015 Apr 28; 6: 7014.

➤ Shimizu et al., 2011, *Cell Metab.* Feb 2;13(2):170-82.

➤ Shoshani et al., 2002, *Mol Cell Biol.* Apr;22(7):2283-93

➤ Whitney et al., 2009, *Biochem Biophys Res Commun.* Feb 6;379(2):451-5.