Myostatin deficiency in skeletal muscle alters the lipids composition of mitochondrial membranes
Narjes Baati, Christine Feillet Coudray, Gilles Fouret, Barbara Vernus, Benedicte Goustard, Charles Coudray, Jérôme Lecomte, Anne Bonnieu, Christelle Ramonatxo

To cite this version:
Narjes Baati, Christine Feillet Coudray, Gilles Fouret, Barbara Vernus, Benedicte Goustard, et al.. Myostatin deficiency in skeletal muscle alters the lipids composition of mitochondrial membranes. JED Marseille, May 2016, Marseille, France. 1 p. hal-01837644

HAL Id: hal-01837644
https://hal.science/hal-01837644
Submitted on 5 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers. L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Myostatin deficiency in skeletal muscle alters the lipids composition of mitochondrial membranes

Kajarje Baatti, Christine Frelot-Coudray, Gilles Fouraret, Barbara Vernus, Bénédicte Goustard, Charles Coudray, Jérôme Le comet, Anne Bonnne & Christelle Ramonatxo
1 INRA, UMR866 Dynamique Musculaire Et Musculaires, 34398 Montpellier, France.
2 Centre de recherche agronomique pour le développement (CIRAD)/SupAgro, UMR IATE, F-34398 Montpellier, France.

Background

Myostatin (Mstn) is a negative regulator of skeletal muscle growth.

- Natural mutation or targeted inhibition of mstn gene expression results in a twofold increase in skeletal muscle mass (hypertrophic phenotype) in some species. 
- It is considered as a promising treatment for various muscle-wasting disorders.

In skeletal muscles

Muscles Membranes (Maintain architecture of the muscle fiber) and Mitochondrial Membranes (Contain respiratory chain)

"Does exist an alteration of the lipid composition of muscle and mitochondrial membranes in KO mstn mice that could participate in the metabolic and contractile alterations observed in this model?"*

Lack of Mstn led to decreased oxidative pathway of lipids in KO mstn muscle

Lack of Mstn induced a decreased of lipogenesis in KO mstn muscle

Modification of lipids composition of muscle and mitochondrial membrane in KO mstn muscle

Fatty acids composition of muscle:

Phospholipids composition of mitochondrial membrane:

Synthetic Pathways of cardiolipin

Discussion/Conclusion

In this study, we demonstrated a decrease in mitochondrial cardiolipin content, in relation with a decrease in FAS and cardiolipin synthase gene expressions. Overall, our results demonstrate that myostatin deficiency reduced lipogenesis and lipolysis and alters the lipid composition of muscle and mitochondrial membranes, with a decrease in cardiolipin mitochondrial content. We can be the cause of the mitochondrial function alteration observed in KO mstn mice. In this regard, many researchers suggest the possibility to modulate the mitochondrial phospholipid composition in muscle and mitochondrial using physical training. Next study will be devoted to modulate the phospholipids composition in KO mstn mitochondria using endurance training, and evaluate their consequences on mitochondrial function.

Figure 1:

Figure 2:

Figure 3:

Figure 4:

Figure 5:

Figure 6:

Figure 7:

ACKNOWLEDGEMENTS

The present study was supported by Scientific structuring platform LipPolGreen, Supagro, Montpellier, FRANCE