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AMPK, more than just a metabolic sensor in cardiac pathologies

Prof. Luc Bertrand

Université catholique de Louvain, UCLouvain

Faculty of Pharmacy and Biomedical Sciences

Institute of Experimental and Clinical Research

Pole of Cardiovascular Research (CARD)

Brussels, Belgium

The AMP-activated protein kinase (AMPK) has been firstly discovered to be activated under metabolic stress conditions such as myocardial ischemia. Its protective action during an ischemic episode has been demonstrated by several research groups. By targeting metabolism, AMPK helps the heart to survive under such deleterious conditions. However, AMPK action extends beyond metabolism and acute stress conditions. Indeed, it has been more recently shown that AMPK acts as protector of the heart in several chronic diseases such heart failure, diabetic cardiomyopathy and cardiac hypertrophy by acting in cardiomyocytes but also on the other cell types such as fibroblasts. Very recently, our group discovered a connection between AMPK and a particular post-translational modification called O-GlcNAcylation, this interplay acting a major role in the development of cardiac hypertrophy. The lecture will focus on the different protective roles of cardiac AMPK, particularly focusing on the more recent advances linking AMPK and OGlcNAcylation.

Selected references:

1. Gélinas R. et al., AMPK activation counteracts cardiac hypertrophy by reducing OGlcNAcylation (2018) Nat. Comm., 9, 374.
2. Gélinas R. et al., AMP-activated protein kinase and O-GlcNAcylation, two partners tightly connected to regulate key cellular processes (2018) Front. Endocrinol., 9, 519.
3. Mailleux F. et al., O-GlcNAcylation, enemy or ally during cardiac hypertrophy development? (2016) Biochim. Biophys. Acta, 1862, 2232-2243.
4. Horman S. et al., AMP-activated protein kinase in the control of cardiac metabolism and remodeling (2012) Curr. Heart Fail. Rep., 9, 164-173.

Most relevant Publications:

2018

92. Gélinas R., Dontaine J., Horman S., Beauloye C., Bultot L. and Bertrand L. AMP-activated protein kinase and O-GlcNAcylation, two partners tightly connected to regulate key cellular processes (2018) Front. Endocrinol., 9, 519 (IF: 3.5, CI: -)

90. Renguet E., Bultot L., Beauloye C., Horman S. and Bertrand L. The regulation of insulinstimulated cardiac glucose transport via protein acetylation (2018) Front. Cardiovasc. Med., 5, 70 (IF:-, CI:-)

89. Gélinas R., Mailleux F., Dontaine J., Bultot L., Demeulder B., Ginion A., Daskalopoulos E.P., Esfahani H., Dubois-Deruy E., Lauzier B., Gauthier C., Olson A.K., Bouchard B., DesRosiers C., Viollet B., Sakamoto K, Balligand J.L., Vanoverschelde J.L., Beauloye C., Horman S. and Bertrand L. AMPK activation couteracts cardiac hypertrophy by reducing OglcNAcylation (2018) Nat. Comm., 9, 374 (IF: 13.0, CI: -)

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80. Daskalopoulos E.P., Dufeys C., Bertrand L., Beauloye C. and Horman S. AMPK in cardiac fibrosis and repair: Actions beyond metabolic regulation (2016) J. Mol. Cell. Cardiol., 91, 188-200. (IF: 5.1, CI: 25)

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