

E. Lima-Cabello<sup>1</sup>, Karan B. Singh<sup>2</sup>, Juan D. Alché<sup>1</sup>, Jose C Jimenez-Lopez<sup>1,2\*</sup>

<sup>1</sup> Dept. Biochemistry, Cell & Molecular Biology of Plants; Estacion Experimental del Zaidin; Spanish National Research Council (CSIC); Granada, Spain.

<sup>2</sup> The UWA Institute of Agriculture and School of Agriculture and Environment; The University of Western Australia; Perth WA, Australia.

\* Author for correspondence: [josecarlos.jimenez@eez.csic.es](mailto:josecarlos.jimenez@eez.csic.es)

## INTRODUCTION

*Lupinus angustifolius* or narrow-leafed lupin (NLL) is a legume, and a strategic Pulse world-wide and an exceptional alternative source of high quality proteins<sup>1</sup>. NLL  $\beta$  and  $\gamma$ -conglutins (vicilin and 7S basic globulin, respectively) seeds proteins exhibit multiple nutraceutical properties recently discovered<sup>2</sup>.  $\beta$  and  $\gamma$ -conglutins benefits go beyond nutritional properties since they display nutraceutical benefits making them sources of innovative ingredients for functional food<sup>3</sup>.

These studies are the first describing the anti-inflammatory effects at molecular level of these NLL conglutin protein families, playing crucial roles in the development of novel functional foods for the prevention and treatment of inflammatory-related diseases as obesity, diabetes, cardiovascular diseases and cancer among others<sup>2</sup>.

## MATERIAL & METHODS

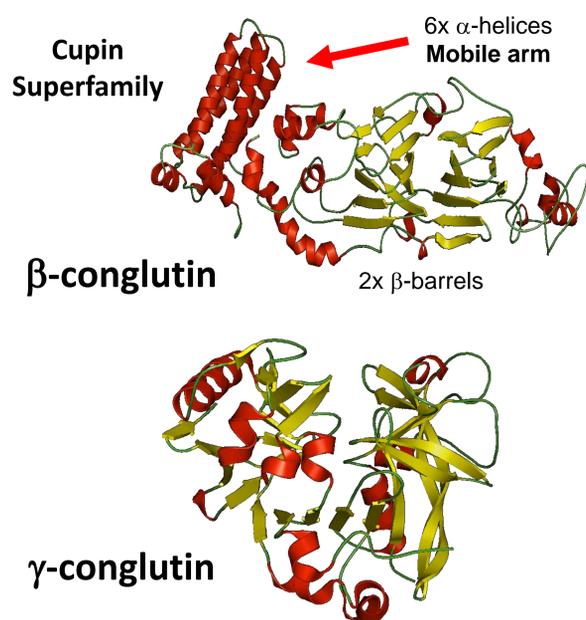
**1) Material** consisted in genetic constructs made with the coding sequence fused to the 6xHis-tag, over-expressed in *E. coli* and purified by affinity chromatography using Ni<sup>2+</sup>-resin packed columns, obtaining proteins of >95% purity.

**2) Methods** used to obtain the results described below are the following: RT-qPCR, Western/immunoblotting, and ELISA for markers genes and proteins level of expression and synthesis, glucose uptake measuring, NOS and GSH production, catalase and SOD catalytic activity, proteins carbonylation.

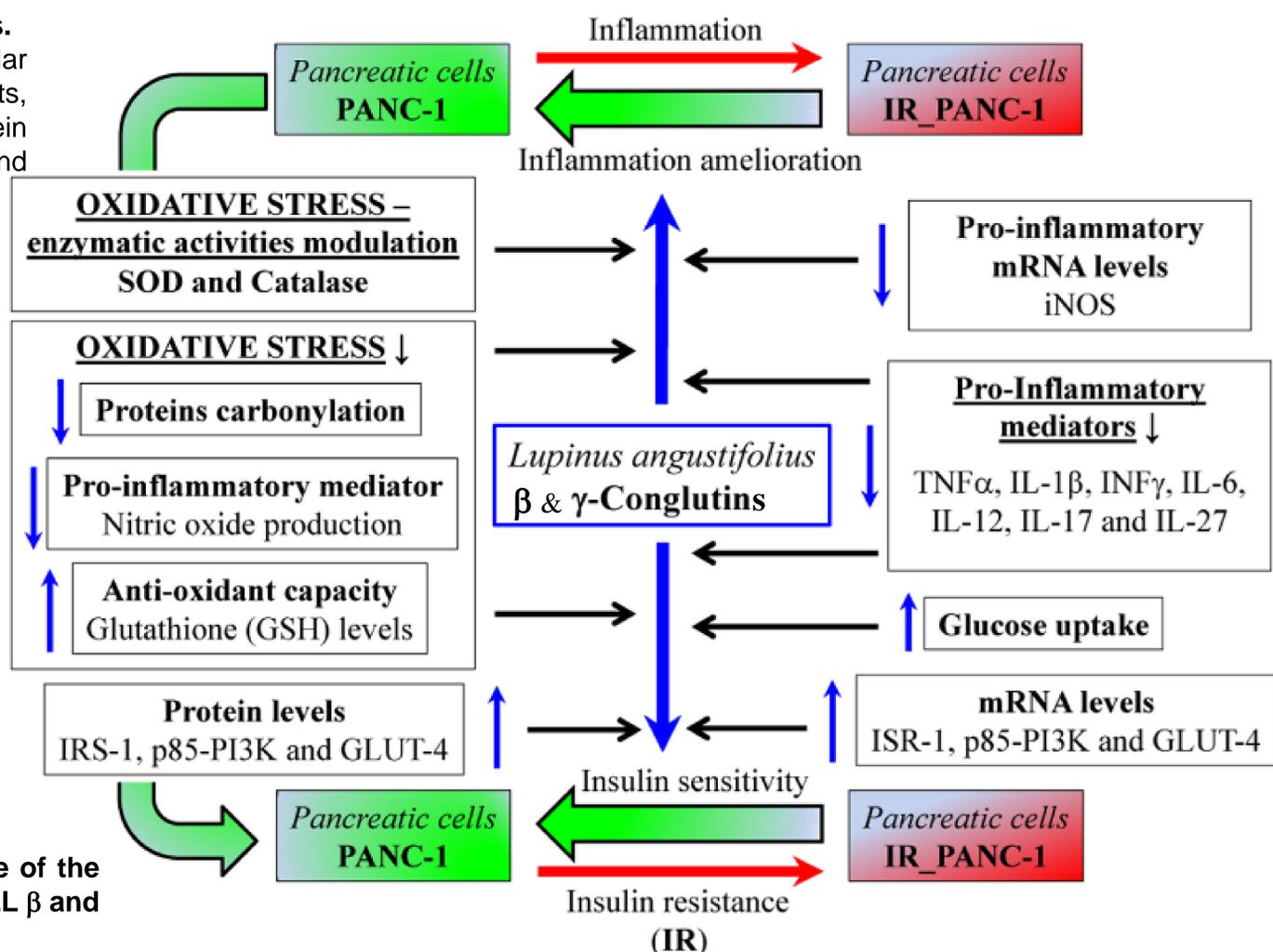
## RESULTS

**Figure 1. 3D structure of NLL  $\beta$  and  $\gamma$ -conglutins.**

$\beta$ -conglutin is a protein integrated by a globular domain of two barrels made of antiparallel  $\beta$ -sheets, and a unique mobile arm.  $\gamma$ -conglutin is a protein integrated by two chains linked by a disulphide bond making a globular domain.



**Figure 2. Summary of a molecular perspective of the nutraceutical properties (health benefits) of NLL  $\beta$  and  $\gamma$ -conglutins.**



## CONCLUSIONS

- $\beta$  and  $\gamma$ -conglutins are potent antioxidant and anti-inflammatory agents that help reducing oxidative stress, and are able to reverse back the inducible insulin resistance in pancreatic cells.
- $\beta$  and  $\gamma$ -conglutins activate insulin signalling pathway, increase glucose uptake, and help balancing metabolism.
- $\beta$  and  $\gamma$ -conglutins are promising sources of innovative functional food ingredients with potential uses for prevention and treatment of type 2 diabetes and inflammatory-related diseases as obesity, type 2 diabetes, cardiovascular-related diseases, and cancer.

## Acknowledge & Funding



## References

- Lima-Cabello E, et al. 2017. *Molecular Nutrition & Food Research* 61(5).
- Jimenez-Lopez JC. 2020. *Legume Science* e33.
- Lima-Cabello E, et al. 2020. *Antioxidants* 9(1):12.