



Artículo del mes

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Título:

"An O-Acetylserine(thiol)lyase Homolog with L-Cysteine Desulfhydrase Activity Regulates Cysteine Homeostasis in Arabidopsis".

Referencia:

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Abstract:

Cysteine (Cys) occupies a central position in plant metabolism due to its biochemical functions. Arabidopsis (*Arabidopsis thaliana*) cells contain different O-acetylserine(thiol)lyase (OASTL) enzymes that catalyze the biosynthesis of Cys. Because they are localized in the cytosol, plastids, and mitochondria, this results in multiple subcellular Cys pools. Much progress has been made on the most abundant OASTL enzymes; however, information on the less abundant OASTL-like proteins has been scarce. To unequivocally establish the enzymatic reaction catalyzed by the minor cytosolic OASTL isoform CS-LIKE (for Cys synthase-like; At5g28030), we expressed this enzyme in bacteria and characterized the purified recombinant protein. Our results demonstrate that CS-LIKE catalyzes the desulfuration of L-Cys to sulfide plus ammonia and pyruvate. Thus, CS-LIKE is a novel L-Cys desulfhydrase (EC 4.4.1.1), and we propose to designate it DES1. The impact and functionality of DES1 in Cys metabolism was revealed by the phenotype of the T-DNA insertion mutants *des1-1* and *des1-2*. Mutation of the DES1 gene leads to premature leaf senescence, as demonstrated by the increased expression of senescence-associated genes and transcription factors. Also, the absence of DES1 significantly reduces the total Cys desulfuration activity in leaves, and there is a concomitant increase in the total Cys content. As a consequence, the expression levels of sulfur-responsive genes are deregulated, and the mutant plants show enhanced antioxidant defenses and tolerance to conditions that promote oxidative stress. Our results suggest that DES1 from Arabidopsis is an L-Cys desulfhydrase involved in maintaining Cys homeostasis, mainly at late developmental stages or under environmental perturbations.

Experiencia del grupo de investigación:

Los autores del artículo pertenecen al grupo de investigación Biosíntesis de Cisteína y Redes Metabólicas, que dirigen Luis C. Romero y Cecilia Gotor. Sus estudios se centran, principalmente, en clarificar la dinámica de la ruta de biosíntesis de cisteína en cada compartimento subcelular y la función fisiológica de la cisteína en la respuesta de la planta a señales intracelulares y medioambientales.

Para llevar a cabo sus investigaciones, este grupo combina técnicas tradicionales de biología molecular con aproximaciones de biología de sistemas. A partir de estos métodos, trabaja en la puesta a punto de un sistema de análisis de metabolitos mediante espectrometría de masa acoplado a cromatografía líquida.



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