DEFINING NEW CELLULAR MECHANISMS FOR CADMIUM DETOXIFICATION AND/OR TOLERANCE IN THE YEAST *SACCHAROMYCES CEREVISIAE*

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Cadmium is a non-essential heavy metal that can be absorbed by the cells during the active transport of essential ions. It forms complexes with reduced glutathione (GSH), generating an oxidative stress. In *Saccharomyces cerevisiae* $Cd.[GS]_2$ complexes can be removed from cytosol and transported into the vacuole by Ycf1p – a GS-conjugated pump that exhibits striking overall sequence similarity to the human MRP1. The maintenance of GSH homeostasis is particularly important for the protection against oxidative stress during respiratory metabolism, since reactive oxygen species are generated by mitochondrial activity. We investigated the role of Ycf1p in Cd^{2+} detoxification during respiratory metabolism of *S. cerevisiae* and its correlation with the maintenance of GSH homeostasis. The results suggest that in respiring cells Ycf1p is not the only pathway for Cd^{2+} detoxification because the sequestration of GSH or GSH-containing compounds into the vacuoles could alter the redox state of the cells, interfering with their antioxidant defense systems. We investigate the participation of Pmr1p – a Golgi Ca^{2+}-ATPases that belongs to the major route of Ca^{2+} and Mn^{2+} homeostasis – in Cd^{2+}detoxification. Using standard techniques of yeast molecular research and a multi-elemental procedure named particle-induced X-ray emission (PIXE), it was possible to identify Pmr1 as a protein that directly participate in the detoxification of Cd^{2+}, possibly using the exocytosis pathway. Together, these results allow us to propose that in *S. cerevisiae* multiple biochemical pathways could act on protection against Cd^{2+} toxicity. The choice of what biochemical pathway employ will depend of the metabolic and redox states of the cells during Cd^{2+} stress.

***Keywords*:** cadmium, *YCF1*, *PMR1*