Somatic embryogenesis in Vitis vinifera: a proteomic approach

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Somatic embryogenesis is widely investigated in plant biotechnology because, on one end it provides useful systems for plant propagation and genetic manipulation and, on the other end, it is a model system for studying the mechanisms of the de-differentiation and re-differentiation of plant cells.

In this study we have identified a number of protein involved in different pathways during early embryo induction in Vitis vinifera. Proteins have been extracted from embryogenic and non embryogenic calli of Thompson seedless grown on a 2,4-D containing medium. The extract has been separated by a two dimensional gel electrophoresis and identified by mass spectrometry.

Some of the differentially expressed proteins are involved in detoxification or in the maintenance of the redox state. It suggests that an oxidative burst occurs during the development of somatic embryos and might lead to PCD of certain cells. GST and cytosolic ascorbate peroxidase, during acquisition of embryogenic potential are likely to be associated with protecting the cell against the harmful effects of ROS. However the redox status of cells and the glutathione content may have important roles in developmental processes, especially in triggering cell division. In fact has been recently proposed that GST may serve as carrier for plant hormones, including auxin.

Other genes differentially induced in embryogenic cells have been linked to cell proliferation, such as proliferating cell nuclear antigen (PCNA), required for DNA replication, an homologue of actin 1, two putative elongation factors. Involved in protein turnover we have found two isoforms of HSP70 and three chaperonins Cpn60.

These protein are candidates for further investigation in term of their functional relevance in somatic embryogenesis.