

**Title** Effects of postharvest waters and treatments with elicitors on transcript profiling in skins of wine grape berries

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### **Abstract**

For certain food products, postharvest controlled stresses or treatment with different elicitors are applied to induce desired physical/chemical changes and/or to positively affect phytochemical content. This is the case of wine grapes where both strategies, singularly applied or coupled, can be used to modulate berry composition and, as a consequence, affect wine quality traits. Since the knowledge of the effects of these postharvest treatments on berry metabolism and the regulation of gene expression is very limited, a large-scale transcriptome analysis has been conducted, using an oligo-based microarray (14,562 probes), on skins of wine grape (*Vitis vinifera* L.) berries subjected to dehydration up to 30% of weight loss or to ethylene, treatment (500-1000 ppm for 2-7 days) after harvesting. A number of differentially expressed targets was detected following both treatments, indicating that grape berries are still reactive at advanced stages of postharvest dehydration and that ethylene induces marked changes in transcriptome after harvest also in a non-climacteric fruit such as grape berries. Bioinformatic analysis revealed that about 70% of the differentially expressed targets resulted as annotated and a putative function was assigned. Functional characterization highlighted that, for both strategies, differential expression is present in particular for genes associated to general metabolism, regulatory processes, and responses to biotic and abiotic stimuli. Among these, genes involved in hormone metabolism, regulation of transcription, carbohydrate and secondary (polyphenols) metabolism, transport and stress responses are present. Considering the role of polyphenols in wine flavour and quality, a more detailed analysis on the expression of genes involved in their metabolism has been performed by RT-PCR. Results pointed out that postharvest dehydration of grape berry selectively activates specific steps of phenylpropanoid pathway such as those leading to the synthesis of stilbene compounds and flavonols. The effects of postharvest ethylene treatments have been observed not only in terms of modulation of gene expression in the skins but also considering specific wine parameters: an increase of total polyphenol and specific polyphenol categories (anthocyanins, simple phenols) has been observed in most of ethylene-treated berries.