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**STUDY OF THE METABOLOMIC CHANGES IN RED WINES DURING AGING UNDER DOMESTIC AND CELLAR CONDITIONS THROUGH AN UNTARGETED-TARGETED METABOLOMIC WORKFLOW**

Panagiotis Arapitsas, Daniele Perenzoni, Andrea Angeli, Fulvio Mattivi

*Fondazione Edmund Mach, San Michele all'Adige, Italy*

Storage conditions and duration have a great influence on the quality and nutritional value of food. Wine may improve its value during aging only if occurring under optimum condition. Temperature, relative humidity and time are important factors affecting wine quality. In order to evaluate the global effects of storage on wine composition, 20 red wines (10 bottles each) were stored under two conditions for a period of 24 months and sampled every 6 months. The wines were stored either under optimum temperature and humidity in a wine cellar or under typical domestic conditions with slightly higher and fluctuating temperature and humidity. The samples were analyzed first by untargeted UPLC-ESI-QTOF/MS analysis both in positive and negative mode, in order to find the putative biomarkers of wine aging.

The marker selection highlighted the influence of wine storage on a number of phenolic compounds (i.e. pigments, tannins, flavonols, etc) and others non-phenolic metabolites. Targeted UPLC-MS/MS analysis for the metabolites of the phenylpropanoid biosynthetic pathway, confirmed the results of the untargeted experiment concerning the pigments and other phenolic compounds, while providing a more detailed picture about the relative reaction rates occurring during the storage and revealing additional markers.

The results of the multivariate analysis (PCA plots) showed that the wines stored under optimum condition had small variation even after 24 months of storage, while the wines stored under typical house conservation developed approximately four times faster, reaching after 6 months a composition similar to the wines stored in cellar for 24 months.

In conclusion this project evaluated in an unbiased manner the chemical implications of the appropriate storage of red wines, highlighting a number of known and novel metabolites as markers. The data obtained following the kinetic of the biomarkers over 24 months at two conditions of storage, allowed us to build hypothesis about the metabolic changes in wine during storage, which can be useful for improving both the production and storage of red wines.

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