

Metabolic Responses to Acute Wine Consumption: A Time-Dependent Nutri-Metabolomic Study of Phenolic Metabolites using High-Resolution Mass Spectrometry.

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Wine has been extensively studied over the past few decades to better understand its potential health benefits from its consumption, including antioxidant, lipid-regulating, and anti-inflammatory effects [1], [2]. These benefits are believed to arise from the combined action of alcohol, micronutrients, and polyphenols, particularly the over 100 polyphenolic compounds identified in red wine, including flavonoids and non-flavonoids[3].

To gain a deeper insight into wine's biological effects, it is crucial to understand not only its phenolic composition but also the bioavailability and metabolism of these compounds in the human body. Our study aims to investigate the time-dependent plasma changes in phenolic metabolites following wine consumption, offering novel evidence on the bioavailability of wine's phenolics and their potential health impacts. We conducted a cross-over study involving 10 healthy male participants, with four separate daily trials. Each participant consumed a standardized meal accompanied by red wine, white wine, ethanol solution, or water. Blood samples were collected before (-15 min), immediately after consumption (0 min), and at multiple intervals over the following 6 hours (30, 60, 90, 120, 150, 180, 210, 240, 300, and 360 min). Plasma samples were analyzed using LC-qTOF-MS, employing both data-dependent acquisition (AutoMS, DDA) and data-independent acquisition (bbCID, DIA) methods. A suspect screening approach was applied, using an in-house list of 125 phenolic metabolites derived from extensive literature research [4].

This study aims to clarify the metabolic changes in phenolic metabolites caused by acute red wine consumption, compared to ethanol and white wine. It is the first to examine time-resolved alterations in these metabolites, offering insights into the metabolic pathways of wine phenolic compounds.

References:

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