The endothelium-dependent relaxation of rat thoracic aorta: Correlation between polyphenol content in wine and pharmacological response

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1. The purpose of the present study was to investigate a correlation between the polyphenol content of wines and their vasorelaxant capabilities in rat aortic rings.
2. Relaxation in rat aortic rings with functional endothelium was measured after precontraction by phenylephrine (1 µM) and normalized to the endothelium-dependent relaxation mediated by methacholine (30 µM) in the same tissue. Red wines produced endothelium-dependent relaxation with a maximal response of 120 ± 25% of the relaxation shown by methacholine. White and blush wines showed very little relaxation (20 ± 20% of methacholine response).
3. Wine polyphenol content was measured in terms of gallic acid equivalents (GAE) by a colourimetric assay. Red wines aged in oak barrels had the highest polyphenol content (2900 ± 800 µg/mL - GAE) while white wines had the lowest (410 ± 150 µg/mL- GAE).
4. The polyphenolic content and vasorelaxant activity of three, isolated polyphenols (gallic acid, resveratrol and quercetin) were investigated. No relaxant effect was mediated by quercetin, but gallic acid and resveratrol showed biphasic contractile-relaxant activity. Of the three compounds, quercetin had the highest degree of polyphenolic content and resveratrol the lowest.
5. Polyphenol content of the wines was reduced after opening the bottle and exposing the wine to air at room temperature.
6. The results show a moderately strong correlation ($R^2 = 0.72$) between wine polyphenol content and vasorelaxant activity in rat aorta by an endothelium-dependent pathway.