

# Antioxidant capacity of plasma after red wine intake in Human

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## Abstract

**Aim:** Antioxidant effects after consumption of red wine have been investigated in several studies but results are contradictory and the difference in the plasma antioxidant capacity (AC) after intake of red wine between women and men has never been studied. This work purpose is manifold: to ascertain whether red wine intake modifies the human plasma AC; to study the behaviour of plasma AC of women in comparison with men and finally to investigate on the plasma uric acid concentration and its relationship with the plasma AC after red wine intake. **Methods:** 5 woman and 4 man aged 28-42 were recruited for the study. Volunteers eat the same meal and 300 ml of red wine chosen was the Merlot 2004. Blood extraction was performed before (baseline value) and 50, 120, and 240 min. after wine intake. Plasma AC against alkoxy, peroxy radicals was measured by the crocin bleaching assay (CBA). While the red wine's action against hydroxyl radicals was evaluated using the SHp test. On the other hand, the plasma uric acid concentrations were evaluated. **Results:** the data confirm an increase in plasma AC after red wine consumption, versus the baseline values. The evolution of plasma AC, in women, along time is different if comparison with men. Most of the female subjects showed a maximum value at 120 min after wine intake and they fell back to the baseline after 240 min. On the other hand, in men maximum peak of plasma AC was reached at 50 min and kept constant until to the end of experiment. The thiolic groups' concentrations have shown a similar trend, in women and men. The acid uric

**concentration has shown the same trend both in women and men. The maximum concentration was reached after 50 min. and remained constant until 240 min after red wine intake. In men, uric acid concentration has the same trend of the plasma AC. While was different in women. In fact, the maximum peak of plasma AC occurs after 120 min. while uric acid shows a higher concentration after 50 min. Moreover, after 240 min, the antioxidant protection goes back to the baseline value while uric acid remains constant until the end of the experiment. Conclusions: women and men show a different period of protection from the radical species after the red wine consumption. It could be hypothesized a relationship between plasmatic antioxidant protection from red wine consumption and sexual hormones.**

## Introduction

Epidemiological studies evidence that a moderate wine consumption protects against cardiovascular disease. This protection is due to its alcoholic content and phenolic compounds that act with different mechanism (Fernandez-Pachos *et al.*, 2005). Red wine is rich in antioxidant polyphenols that might protect from oxidative stress-related diseases. Antioxidant effects after consumption of red wine have been investigated in several studies, but results are contradictory. Acute antioxidant effect after single and regular ingestion of native and dealcoholized red wine, as measured by increased antioxidant capacity (AC) in plasma or serum (Serafini *et al.* 2000), have been shown in several studies (Tsang *et al.*, 2005) but not in all (Van der Gaag *et al.*, 2000). The nature of the effect on plasma AC observed after red wine consumption is unclear and the mechanisms are not completely understood. Moreover, the difference in the plasma AC after intake of red wine between women and men has never been studied. This work purpose is manifold: to ascertain whether red wine intake modifies the human plasma AC; to study the behaviour of plasma AC of

women in comparison with men, and finally to investigate on the plasma uric acid concentration and its relationship with the plasma AC after red wine intake.

### Materials and Methods

Nine healthy subjects non-smokers (5 woman and 4 man) with a mean age 27 years-old were recruited. The nutritional status of subjects was evaluated by analysis of body composition through bioimpedenziometric assay as well as anthropometric measurements. Subjects were asked to follow a norm caloric dietary three day before the study, and to avoid the following food: wine and alcoholic drinks, fruits, vegetables, tea, coffee, chocolate, which can interfere in the evaluation of plasma antioxidant capacity. On the experimental day, after an overnight fast, each subject was asked to ate the same meal (ham sandwich) and to ingest 300 ml of red wine (Merlot 2004: total polyphenols content:  $3,03 \pm 0,01$  g/L GAE; Antioxidant Capacity:  $4,07 \pm 0,10$  mM Trolox).

Blood extraction was performed in EDTA vacutainers before (baseline value) and 50, 120 and 240 minutes after wine intake. Blood samples were immediately centrifuged at 2000 rpm for 10 min, at 23 °C; the plasma obtained was separated in different aliquots (500 µl) and stored at -80°C until the analysis. Plasma antioxidant capacity against alkoxyl, peroxy radicals was measured by the crocin bleaching assay (CBA) (Tubaro et al., 1998). The red wine's action against hydroxyl radicals was evaluated using the SHp test (Diacron) and The plasma uric acid concentrations were evaluated by a commercial kit (fluitest® UA).

### Results

The data confirm an increase in plasma AC after red wine consumption, versus the baseline values. The evolution of plasma AC, in women, along time is different if compared with men. Most of the female subjects showed a maximum value at 120 min after wine intake and they fell back to the baseline after 240 min (figure 1,2). On the other hand, in

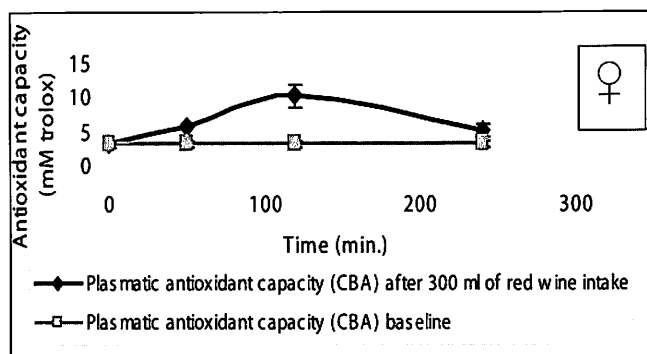


Fig. 1 - Changes of antioxidant capacity measured with CBA along time after 300 ml of red wine intake. Values are means  $\pm$  SD for two women subjects. CBA, Crocin Bleaching Assay.

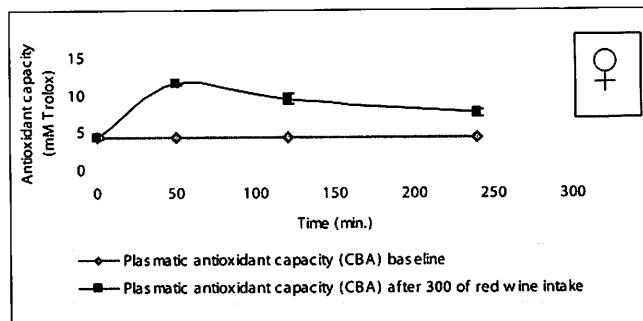


Fig. 2 - Changes of antioxidant capacity, measured with CBA, along time after 300 ml of red wine intake. Values are means  $\pm$  SD for three women subjects. CBA, Crocin Bleaching Assay.

men maximum peak of plasma AC was reached at 50 min and kept constant until to the end of experiment (figure 3).

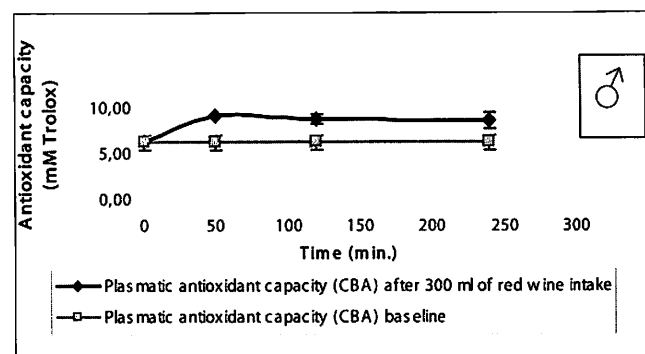


Fig. 3 - Evolution of plas matic antioxidant capacity, measured with CBA, after 300 ml of red wine intake. Values are means  $\pm$  SD for men subjects. CBA, Crocin Bleaching Assay.

The thiolic groups' concentrations have shown a similar trend, in women and men, to the plasma AC calculated with CBA. The acid uric concentration has shown the same trend both in women and men: the maximum concentration was reached after 50 min and remained constant until 240 min after red wine intake. In men, uric acid concentration has the same trend of the plasma AC, in women are different; infact, the maximum peak of plasma AC occurs after 120 min, while uric acid shows a higher concentration after 50 min; moreover, after 240 min, the antioxidant protection goes back to the baseline value while uric acid remains constant until the end of the experiment. In our study women and men show a different period of protection from the radical species after the red wine consumption. It could be hypothesized a relationship between plas matic antioxidant protection from red wine consumption and sexual hormones. Changes in the plasma AC are only in part due to changes in the plasma urate. Further investigation would be important to determine which of the single components of red wine (phenolic, lactic acid and ethanol) is responsible for the increment in plasma AC.

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