

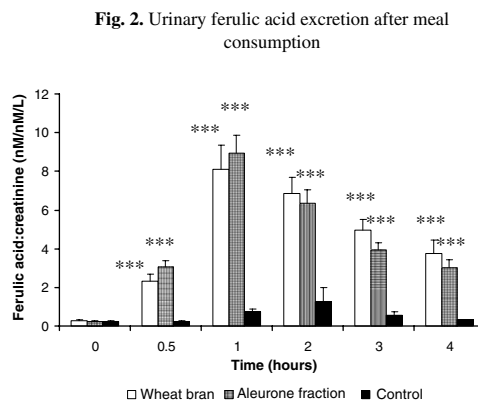
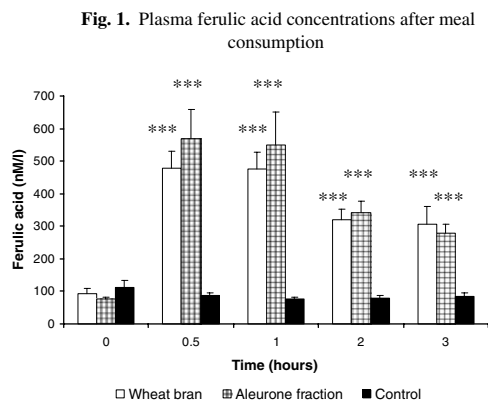
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## Absorption of ferulic acid in human subjects after consumption of wheat-bran and wheat-aleurone fractions

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Epidemiological evidence suggests that increased whole-grain intake is associated with decreased incidence of chronic diseases such as cancers<sup>(1)</sup>. The grain components and mechanisms underlying this relationship remain unclear. However, ferulic acid, a phenolic compound (specifically a hydroxycinnamic acid) found in plant foods such as fruits, vegetables and cereals, can exert antioxidant effects *in vitro* and is available *in vivo* from several foods<sup>(2)</sup>. In wheat ferulic acid and its conjugates are concentrated in the bran and aleurone fractions. The aim of the present study was to investigate the absorption of ferulic acid in human subjects after consumption of meals of wheat bran or wheat-aleurone fraction.

Using a randomised within-subject cross-over design fourteen healthy adults (seven male, seven female; age 21–43 years) were studied on three occasions at least 1 week apart. Before each study day subjects consumed a low-phenolic diet for 2 d. On the three study days fasted subjects consumed meals including 50 g wheat-bran fraction or 50 g wheat-aleurone fraction (Bühler, Uzwil, Switzerland) or a control meal balanced for macronutrients. Blood and urine samples were taken at baseline and at 0.5, 1, 2, 3 h after the meal; with an additional urine sample at 4 h. After deconjugation by  $\beta$ -glucuronidase and sulfatase the samples were analysed for total ferulic acid by liquid chromatography–MS–MS.



Values are means with their standard errors represented by vertical bars. Data were analysed by repeated measures ANOVA. Values were statistically different from those for the control: \*\*\* $P < 0.001$ .

Both plasma ferulic acid and urinary ferulic acid showed significant postprandial increases following consumption of the wheat-bran or wheat-aleurone fractions compared with the control. Plasma concentrations of ferulic acid were approximately 5-fold higher than at baseline following consumption of the bran fraction, but effects were most marked after consumption of the aleurone fraction, with an approximately 7-fold increase from baseline. Maximum plasma concentrations occurred at 0.5 h for both meals whereas maximum urinary excretion occurred at 1 h for both meals.

The maximum postprandial plasma ferulic acid concentrations (approximately 600 nM) were approximately 3-fold those previously reported following consumption of 100 g wheat-bran ready-to-eat cereal<sup>(3)</sup>. This finding suggests that grain processing factors may influence ferulic acid uptake. These results indicate that ferulic acid is absorbed from wheat-bran and wheat-aleurone fractions, and might contribute to the health benefits associated with increased consumption of wholegrain foods.

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