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Letter to the Editor

To: G. Sivakumar, A. Aliboni, L. Bacchetta (2007). HPLC screening of anti-cancer sulforaphane from important European Brassica species. Food Chemistry, 104 (4), 1761–1764

Sir: In a recent paper published in *Food Chemistry*, Sivakumar, Aliboni, and Bacchetta examined 18 different European *Brassica* varieties and measured by HPLC the sulforaphane fraction among glucosinolates present in the young seedlings. *Brassica* species are especially rich in glucosinolates, which are converted by plant myrosinase (thioglucohydrolase; E.C. 3.2.1.147) and gastrointestinal microflora into isothiocyanates.(Fahey, Zalcmann, & Talalay, 2001; Shapiro, Fahey, Wade, Stephenson, & Talalay, 2001). The authors extracted sulforaphane from *Brassica* samples according to the method of Bertelli, Plessi, Braghiroli, and Monzani (1998) and Nakagawa et al. (2006) with slight modification. Iori, Leoni, and Palmieri (1999) asserted in a Letter to the Editor of this Journal that the method described by Bertelli et al. (1998) for the quantitative analysis of sulforaphane in broccoli was considered not suitable due to the favourable conditions at pH 3.0 for the formation of nitriles instead of isothiocyanates. Sivakumar, Aliboni, and Bacchetta (2007) reported that the lyophilised *Brassica* sample (1 g) was suspended in 0.1 M HCl (20 mL) and incubated at 42 °C for 2 h in a shaking water bath in order to release sulforaphane from the glucosinolates and put emphasis on the fact that acid hydrolysis (pH 1.0) performed before extraction consistently enhances the yield of sulforaphane release from glucoraphanin and their method is much faster than any other hydrolysis procedure with a better sulforaphane recovery.

In a recent review, Bones and Rossiter (2006) reported that acid decomposition of a glucosinolate leads to the corresponding carboxylic acid together with hydroxylammonium ion. Moreover, Rosa, Heaney, Fenwick, and Portas (1997) reported in another review that myrosinase-induced hydrolysis of glucosinolates yields isothiocyanates at pH 5–7 while under more acidic conditions an increasing amount of nitriles is produced. The authors have not verified the release of total sulforaphane from intact glucoraphanin in *Brassica* samples under neutral conditions in the presence of myrosinase, nor the conversion of pure glucoraphanin into sulforaphane at pH 1. Pure glucoraphanin isolated in our laboratory (Perocco et al., 2006) was treated with HCl 0.1 M at 42 °C, and HPLC analysis did not show any presence of sulforaphane peak.

For these reasons we consider that the determination of the sulforaphane content in some important European *Brassica* seedlings reported in Table 1 of the paper authored by Sivakumar et al. (2007) is doubtful with regard to the real values.

References

Bertelli, D., Plessi, M., Braghiroli, D., & Monzani, A. (1998). Separation by solid-phase extraction and quantification by reverse phase HPLC of sulforaphane in broccoli. *Food Chemistry, 63*, 417–421.

Bones, A. M., & Rossiter, J. T. (2006). The enzymic and chemically induced decomposition of glucosinolates. *Phytochemistry, 67*(11), 1053–1067.

Fahey, J. W., Zalcmann, A. T., & Talalay, P. (2001). The chemical diversity and distribution of glucosinolates and isothiocyanates among plants. *Phytochemistry, 56*(1), 5–51.

Iori, R., Leoni, O., & Palmieri, S. (1999). *Letter to the Editor/Food Chemistry, 67*(1), 101–102.

Nakagawa, K., Umeda, T., Higuchi, O., Tsuzuki, T., Suzuki, T., & Miyazawa, T. (2006). Evaporative light-scattering analysis of sulforaphane in broccoli samples: Quality of broccoli products regarding sulforaphane contents. *Journal of Agriculture Food Chemistry, 54*, 2479–2483.

Perocco, P., Bronzetti, G., Canistro, D., Valgimigli, L., Sapone, A., Affatato, A., et al. (2006). Glucoraphanin, the bioprecursor of the widely extolled chemopreventive agent sulforaphane found in broccoli, induces Phase-I xenobiotic metabolizing enzymes and increases free radical generation in rat liver''. *Mutation Research, 595*(1–2), 125–136.

Rosa, E. A., Heaney, R. K., Fenwick, G. R., & Portas, C. A. M. (1997). Glucosinolates in crop plants. *Horticulture Reviews, 19*, 99–215.

Shapiro, T. A., Fahey, J. W., Wade, K. L., Stephenson, K. K., & Talalay, P. (2001). Chemoprotective glucosinolates and isothiocyanates of broccoli sprouts: metabolism and excretion in humans. *Cancer Epidemiology Biomarkers and Prevention., 10*(5), 501–508.

Sivakumar, G., Aliboni, A., & Bacchetta, L. (2007). HPLC screening of anti-cancer sulforaphane from important European Brassica species. *Food Chemistry, 104*(4), 1761–1764.

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