

International Conference on

Food Chemistry & Hydrocolloids

August 11-12, 2016 Toronto, Canada

Ca²⁺ enhancing isothiocyanates formation in broccoli sprouts and their dynamic variation during hydrolysis

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Broccoli sprouts are widely consumed because of rich glucosinolates (GLs). In intact broccoli sprout issue, GLs are spatially separated from myrosinase (MYR). When cells are damaged, GLs combine with MYR and are converted into isothiocyanates (ITCs). ITCs present strong anti-cancer activities. They are natural potent inducer of phase II detoxification enzymes like glutathione S-transferase and quinone reductase. As a secondary metabolite in *Brassica*, GLs metabolism could be influenced by Ca²⁺ in broccoli sprouts. Hence, the effects of Ca²⁺ treatment on GLs metabolism and ITCs formation in broccoli sprouts and their dynamic variation during hydrolysis were investigated. Results showed that Ca²⁺ increased *BrST5b* expression and decreased *AOP2* expressions which are beneficial to GLs biosynthesis thereby facilitating the accumulation of GLs especially for GRA. Moreover, Ca²⁺ enhanced MRY gene expression and its activity; reduced epithiospecifier protein (ESP) activity, which in turn increased ITCs formation especially for sulforaphane and 1-isothiocyanato-butane while decreased the nitrile content. Three kinds of ITCs and 2 kinds of nitriles were detected in broccoli sprouts hydrolysate, however, the corresponding nitriles of 4-isothiocyanato-1-butene and 1-isothiocyanato-butane were not detectable. This inferred that inter-transformation among ITCs existed during sprouts hydrolysis. According to the identification, 4-isothiocyanato-1-butene had another source in addition to gluconapin. 1-isothiocyanato-butane stemmed from glucoerucin (GER). Moreover, results showed that the affinity of MYR in broccoli sprout was stronger to GER than to GRA and sinigrin. In conclusion, Ca²⁺ increased ITCs formation by regulating related genes expression and enzymes activity. There was an inter-transformation among ITCs during sprouts hydrolysis.

Biography

Runqiang Yang has completed his PhD from Nanjing Agricultural University. He is an Associate Professor of Nanjing Agricultural University. He has published more than 50 papers in reputed journals and has been serving as a reviewer of *Food Chemistry* and *Journal of Agricultural and Food Chemistry*, etc.

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