Understanding the in-mouth release of aroma sulfur compounds from food precursors and the role of microbial C-S lyases

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ABSTRACT

Flavor perception is the main factor in the acceptance of food. Cysteine conjugates are aroma precursors present in a number of plant-based foods (vegetables, fruits, as well as beverages such as wine and beer). They have low odorant properties, but become odorant when metabolized into aroma sulfur compounds in the oral cavity [1]. The metabolism involved in the production of these sulfur compounds has been associated with food aversion [2]. Therefore, it is desirable to improve our knowledge of the entailed enzymatic mechanisms. The involved enzymes are presumably carbon-sulfur lyases (C-S lyases) from the oral microbiota, but evidences are scarce [3]. Recently, we showed that saliva metabolizes allyl-cysteine into odorant sulfur metabolites, with evidence suggesting that pyridoxal phosphate-dependent C-S lyases are involved [4]. Protein sequence analysis of C-S lyases in the oral anarobe *Fusobacterium nucleatum* was carried out and led to the identification of several putative targets. The C-S lyase FnaPatB1 from *F. nucleatum animalis*, showed high activity with a range of aroma precursors. FnaPatB1 metabolizes cysteine derivatives within a unique active site environment that enables the formation of flavor sulfur compounds. As sulfur compounds can be associated with food aversion especially at high concentration, we have designed an *in vitro* assay, based on the recombinant enzyme, to identify inhibitors of the C-S lyase activity. Among a food compounds library, we identified several compounds able to reduce the C-S lyase activity of FnaPatB1 *in vitro*. Future prospects will rely on the study of this oral microbiota metabolism and strategies to control it using both *in vitro* and *ex vivo* approaches.

Keywords: flavor, volatile sulfur compounds, oral microbiota, enzymes

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