PHENOLIC COMPOUNDS COULD INTERFERE WITH SECONDARY AMINE N-NITROSATION IN CURED MEAT FORMULATION AND DIGESTION.

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Nitrite is a common additive in cured meat formulation that provides microbiological safety, lipid oxidation management and typical organoleptic properties. However, nitrite is also associated with the formation of nitrosamines, some of them being associated with colon carcinogenesis. Nitrite addition is thus pointed at and strategies should be established in order to control the formation of nitroso-compounds during meat processing and digestion. This study aimed to evaluate the antinitrosating capacity of phenolic compounds representing plant diversity and to investigate the mechanisms underlying their antinitrosating capacity.

N-acetyltryptophan (AcTrp) was used as a model of secondary amine and its corresponding nitrosamine, *N*-acetyl-*N*-nitrosotryptophan (NO-AcTrp), was followed in an aqueous solution modelling ham. Kinetics were run at pH 5 to simulate secondary amine nitrosation during product storage and the beginning of the digestion and at pH 2.5 in order to mimic the end of gastric digestion. AcTrp nitrosation and reactivity of phenolic compounds were followed by UPLC-DAD-MS.

In the absence of phenolic compounds, AcTrp nitrosation was found to be five times higher at pH 2.5 compared to pH 5 suggesting that the pH decrease occurring during gastric digestion can favor secondary amine nitrosation. Additionally, all the phenolic compounds evaluated were able to limit NO-AcTrp formation at both pH 2.5 and pH 5. The antinitrosating capacity decreased in the same following order for both pH: caffeic and ferulic acids > epicatechin > chlorogenic acid ≈ rutin. Hydroxytyrosol proved to be slightly more efficient than chlorogenic acid and rutin to limit nitrosation at pH 5 while those three compounds exhibited the same antinitrosating capacity at pH 2.5. UPLC-DAD-MS analyses highlighted the unique ability of each phenolic compound to react with nitrite undergoing mostly C-nitration, C-nitrosation and oxidation as shown below for epicatechin. Phenolic compounds are able to scavenge part of the nitrite thus reducing residual nitrite available for N-nitrosation of AcTrp.

This major finding suggests that introducing phenolic compounds either as additives or through the diet could be an efficient way to manage nitrosamine formation during cured meat processing, storage and digestion. Studies are now underway to test these hypotheses with real cured meats.

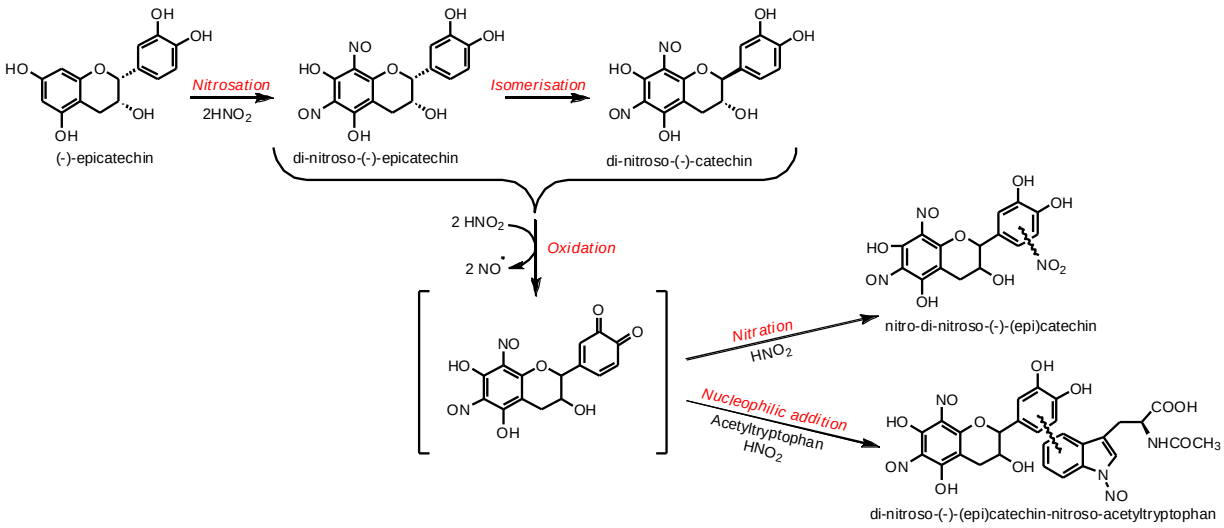

Figure 1 : Proposition of mechanisms occurring behind epicatechin antinitrosating capacity