Thesis Title Nutritional and Toxicological Aspects of Some Food Colors: Effects on *In Vitro* Protein and Starch Digestibilities and The Mutagenic Potential Using Ames Test

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Abstract

The effects of six natural food colors namely, *Clitorea ternatea* Linn. (อัญชัน), *Hibiscus sabdariffs* Linn. (กระเจี๊ยบ), *Pandanus amaryllifolius* Roxb. (เตย), *Carthamus tinctorius* Linn. (คำฝอย), Caramelized coconut sugar (น้ำตาลไหม้), Carbon black from coconut skin (ถ่านกาบมะพร้าว) and seven synthetic food colors namely, Ponceau 4 R, Erythrosine, Brilliant Blue FCF, Indigo Carmine, Sunset Yellow FCF, Tartrazine, Tartrazine with Indigo Carmine 1:1 were studied after being interacted with nitrite the apparent *in vitro* digestibilities of bovine serum albumin (BSA) and starch as well as on their mutagenic potential. The determination of amino group with 2,4,6 trinitrobenzenesulfonic acid (TNBS) after an *in vitro* hydrolysis of pepsin followed with trypsin and chymotrypsin, the determination of maltose with 3,5-dinitrosalycylic acid after an *in vitro* hydrolysis of α-amylase were performed.

Most of natural food colors and synthetic food colors significantly decreased the digestion of BSA and starch. Being added with nitrite, BSA and

starch were poorly digested. The inhibitory actions may depend on the properties of food color components e.g. protease and amylase inhibitors, tannins, other phenolic substances and the inhibition of enzymatic activity by specific small molecules and ion. Nitrosated products of food colors also decreased BSA and starch digestibilities. Nevertheless, the mode of action of food colors and nitrite on BSA and starch digestion were required further investigation.

The nitrosated products of natural food colors contained direct mutagens indicated by the revertants of *Salmonella typhimurium* TA 98 and TA 100. It was interpreted that some direct mutagens of frameshift and base-pair substitution were formed during nitrosation. Some synthetic colors such as ponceau 4 R, erythrosine and sunset yellow FCF were mutagenic to TA 98. Only ponceau 4 R was mutagenic to TA 100 after nitrite treatment.