**Behaviour of UHMP emulsion during gastrointestinal digestion and its potential as the delivery material for tributyrin**

Weichao Cao1, Suyi Guan1, Yuyin Yuan1, Zhitao Li2 and Xiao Hua1

*1School of Food Sciences and Technology, Jiangnan University, Wuxi 214122, China*

*2School of Biotechnology, Jiangnan University, Wuxi 214122, China*

A modified ultrahigh methoxylated pectin (UHMP, DM>90%) was used to prepare O/W emulsion, and the stability of emulsion were evaluated by simulated gastrointestinal model[1]. In simulated gastric fluid (SGF), emulsion droplets flocculated via hydrophobic interactions but droplets rupture was not occurred. This phenomenon was supported by diverse characterizations including droplet size, macroscopic and microscopic structure. During the simulated intestinal fluid (SIF) digestion, the flocs were redistributed under the action of bile salts, which provided space for the action of pancreatin. As a result, the deesterification of UHMP induced the oil release. UHMP emulsions had a lower oil release ratio (~7%) than emulsions stabilized by unmodified citrus pectin, suggesting that UHMP provided better encapsulation of the oil phase. Subsequently, UHMP emulsions embedded with tributyrin were prepared for in vitro fecal fermentation in a biomimetic large intestine bioreactor, and its impacts on gut microbiota, the production of short-chain fatty acids (SCFAs) and amide nitrogen were investigated. The results show that UHMP-embedded tributyrin increased the diversity of operational taxaonomic units (OTUs) in gut microbiota and remarkably regulate bacterial community by increasing the relative abundances of several microbes, including Bacteroides, Bifidobacterium and Ruminococcus. Moreover, UHMP-embedded tributyrin significantly promote the production of SCFAs after 24 h of fermentation. Especially, acetic acid increased from 9.57 to 14.05 mmol/L, while butyric acid increased from 1.59 to 10.58 mmol/L. In contrast, UHMP-embedded tributyrin show inhibitory effects on the production of amide nitrogen and present a lower concentration of 280 μg/mL in comparison with blank control (303.49 μg/mL). This study improved our understanding of the digestion of UHMP emulsion and will be useful for designing UHMP-embedded bioactive substances that possess the potential to promote intestinal health.

*References:*

1 Guan, S.Y., Hua, X., Wang, Z.J., Yuan, Y.Y., Yang, R.J. (2023). Performance of ultrahigh methoxylated pectin as the delivery material in the simulated *in vitro* digestion. *Food Hydrocolloids*, 134, 108086.

