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Understanding the interfacial behaviour of bile salts, a key to their roles during fat digestion

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Regulating fat (dietary lipid) digestion to tackle the ongoing obesity crisis has become a pressing issue. Bile salts (BS) are biosurfactants produced in the liver and released into the small intestine, which play key roles in lipid digestion and absorption: they facilitate enzyme adsorption to fat droplet interfaces and remove insoluble lipolysis products from the interface, carrying them to the gut mucosa for absorption. It is suggested that BS structural diversity is responsible for these contrasting functionalities (1). Our objective is to correlate BS molecular structure with their interfacial properties to shed light on the mechanisms governing their different functions in lipolysis. Two BS constituting 15% of human bile were selected, sodium taurocholate (NaTC) and sodium taurodeoxycholate (NaTDC), which differ only by one hydroxyl group but display contrasting adsorption/desorption dynamics (1). Their adsorption behaviour at the air/water interface and their interaction with a phospholipid monolayer – a preliminary mimic of physiological fat interfaces – were assessed using a Langmuir trough and ellipsometer, and the interfacial film structure characterised by Brewster angle microscopy, X-ray and neutron reflectometry. NaTC was found to exhibit a high affinity for the interface, while NaTDC was shown to remove DPPC molecules from the interface, through a dynamic exchange (2). NaTC may thus facilitate enzyme adsorption onto fat droplet surfaces, whereas NaTDC may displace lipolysis products from the interface. BS micellisation was studied using pyrene fluorescence spectroscopy and small-angle neutron/X-ray scattering. NaTC was found to form smaller micelles from a higher critical micelle concentration (CMC), compared to NaTDC (3). Interestingly, BS interfacial properties correlate with their bulk aggregation: both BS preferentially adsorb at the interface below their CMC and desorb above that value.

1. Parker, R.; Rigby, N.M.; Ridout, M.J.; Gunning, A.P.; Wilde. P.J.; The adsorption-desorption behaviour and structure function relationships of bile salts, Soft Matter, 10 (2014) 6457-6466

2. Pabois, O.; Lorenz, C.D.; Harvey, R.D.; Grillo, I.; Grundy, M.M.-L.; Wilde, P.J.; Gerelli, Y.; Dreiss, C.A.; Molecular insights into the behaviour of bile salts at interfaces: a key to their role in lipid digestion, J. Colloid Interface Sci., 556 (2019) 266-277

3. Pabois, O.; Ziolek, R.M.; Lorenz, C.D.; Prévost, S.; Mahmoudi, N.; Skoda, M.W.A.; Welbourn, R.J.L.; Valero, M.; Harvey, R.D.; Grundy, M.M.-L.; Wilde, P.J.; Grillo, I.; Gerelli, Y.; Dreiss, C.A.; Morphology of bile salts micelles and mixed micelles with lipolysis products, from scattering techniques and atomistic simulations, J. Colloid Interface Sci., 587 (2021) 522-537

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