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Using scattering approaches to understand the behaviour of drugs during digestion of milk and infant formula

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The development of low cost and paediatric-friendly drug formulations for highly effective but poorly water-soluble drugs is critical to the progress of new medicines in low economy settings. Milk and infant formula are potential candidate formulations for this task, but the interaction of these systems with drugs during digestion is not well understood. We have developed small angle X-ray scattering based methods to understand the nature of lipid self-assembly during digestion, while simultaneously tracking the signature diffraction peaks from the drug to understand its polymorphic behaviour and solubilization into lipid digestion products. The studies have revealed that both fat content and the chain length distribution of fatty acids generated upon digestion of the lipid components are critical to the solubilization of drug. The antimalarial drug combination, artefenomel and ferroquine has consequently been investigated in the clinical as a single dose cure for malaria, in a paediatric-friendly format enabled by the lipid components in infant formula, with the ideal composition supported by these scattering studies.

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