

Functional MRI: Food in the body

Penny Gowland¹, Luca Marciani², Caroline Hoad¹, Susan Francis¹, Benito De Celis¹, Eleanor Cox¹ and Robin Spiller²

⁽¹⁾ Sir Peter Mansfield Magnetic Resonance Centre, University of Nottingham, UK

⁽²⁾ Wolfson Digestive, Diseases Foundation, University of Nottingham, UK

Penny.Gowland@nottingham.ac.uk

Magnetic resonance imaging has been developed mainly as a tool for clinical diagnosis. However MRI can study function as well as anatomy, and it provides a unique tool for making non invasive physiological measurements in vivo. MRI can measure not only movement and volumes, but also flow and shear rates, and parameters related to viscosity and fat content.

Over the last decade we have used MRI to study the handling of food in the gastrointestinal tract, and also the brain's response to food. MRI has been used to study the effect of meal viscosity on the rate of gastric emptying, gastric motility and intragastric dilution of nutrient and non nutrient meals. MRI has demonstrated the fate of solid particles in the stomach and intestine and has shown that alginates will gel in the acidic gastric environment, providing a method to control intragastric viscosity. MRI has shown that the fate of an emulsion in the stomach depends on whether it will crack or cream, and hence layer, in the gastric environment, and this has been related to changes in satiety and the profile of gut signalling hormones.

fMRI has been used to study the cortical response to odours, tastants and viscous agents presented relatively naturally. This has used this to study the cortical interaction between taste and aroma, and the interactions between fat and viscosity.

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