LABORATORY OF BIOPHYSICS

WAGENINGEN UNIVERSITY & RESEARCH

NMR/MRI of gastric milk protein digestion

Topsector Agri& Food

Industrial preparation of milk products involves heating, as well as the co-existence of lipids and carbohydrates in the product matrix, which all can modify protein structure and digestibility. Accurate prediction of heating or food matrix effects on protein digestion can thus aid optimizing industrial processing of milk products. Static or dynamic *in vitro* digestion models are typically used to mimic either adult or infant protein digestion. Yet, verifying *in vitro* findings *in vivo*, especially in humans, remains a big challenge.

In this industrially-sponsored TKI-AF project between the laboratory of Biophysics (BIP) and Human Nutrition and Health (HNH), we develop magnetic resonance (MR) methods for *in vitro* and *in vivo* monitoring of gastric protein digestion (Fig. 1) [1]. Parameters such as water-protein chemical exchange have proven successful for unravelling the effect of heat treatment on the digestion of the proteins [2].

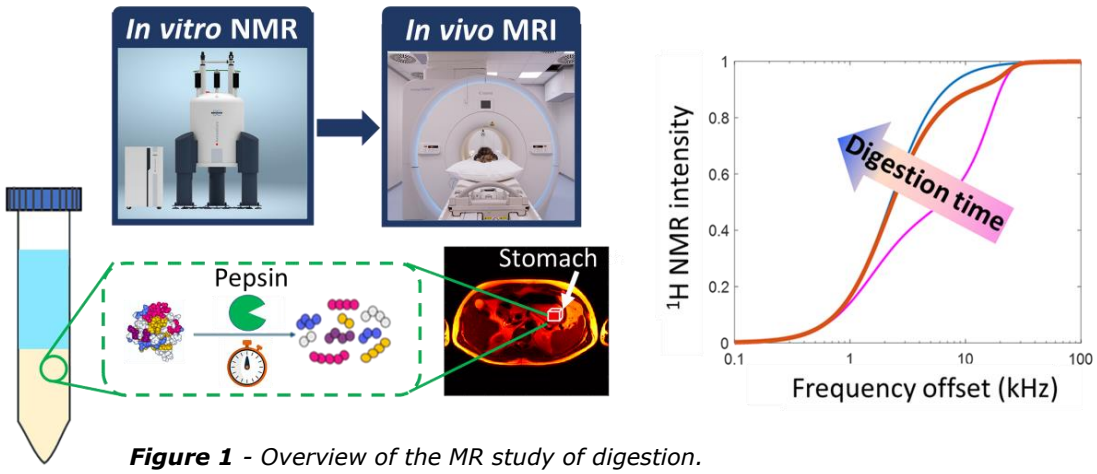

Figure 1 *- Overview of the MR study of digestion.*

We are looking for **BSc** and **MSc thesis** students to apply NMR/MRI to:

1. study the digestion of milk with different protein and lipid composition
2. study the digestion of milk proteins using a dynamic digestion model [3]

Data analysis is done using in-house developed scripts (MATLAB). The project offers exposure to our industrial partners and further possible opportunities for internships.

References:

1. Smeets, P. *et al.* (2021). Monitoring food digestion with magnetic resonance techniques. *PNS*, 80(2), 148-158.
2. Mayar, M. *et al.* Non-invasive monitoring of in vitro gastric milk protein digestion kinetics by ^{1}H NMR magnetization transfer. Submitted to *Food Chem*.
3. Deng, R. *et al.* (2022).Monitoring pH and whey protein digestion by TD-NMR and MRI in a novel semi-dynamic in vitro gastric simulator (MR-GAS). *Food Hydrocoll, 125, 107393-107403.*

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