

# TIM GASTRO- INTESTINAL TESTING



**TNO** triskelion bv

During pharmaceutical product development, reliable scientific data about the behaviour of oral drug products during transit through the gastro-intestinal tract is needed, preferably in a time- and cost-efficient way.

TNO Triskelion fulfils these requirements by offering gastro-intestinal testing with the TNO Intestinal Models (TIM).

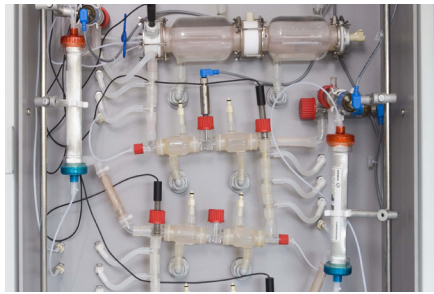
The TIM technology is used to get reproducible and reliable scientific data about the behaviour of your oral drug products during transit through the stomach, the small intestine and large intestine.

Twenty years of experience with simulation of dynamic gastro-intestinal conditions and performance of evaluation studies in comparison with clinical studies guarantees the predictive quality of the results.

TIM-1 and tiny-TIM simulate the successive dynamic conditions in the stomach and small intestine, TIM-2 in the large intestine.

## **TIM-1 SYSTEM**

The multi-compartmental, computer-controlled TIM-1 system accurately simulates the successive conditions in the stomach, duodenum, jejunum, and ileum. These conditions are responsible for the digestion of food and the release and dissolution of pharmaceutical ingredients or bioactive compounds. Dissolved low molecular weight compounds are dialysed or filtered from the jejunum and ileum compartments. Samples collected during the experiments are analysed for the relevant compounds. TIM-1 provides accurate insight into the total and time-related availability for absorption of pharmaceutical ingredients and bioactive compounds.



TIM -1

### TINY-TIM SYSTEM

The tiny-TIM system also simulates the upper gastro-intestinal tract and has been evaluated successfully for nutritional and pharmaceutical applications. It comprises a stomach and one small-intestinal compartment in which the intestinal passage is mimicked. In comparison with the TIM-1 system, this medium throughput system yields less detailed information, but is more cost-effective.

### TIM-2 SYSTEM

The TIM-2 system simulates the large intestine (colon). This system includes a high-density, metabolic active microbiota under strict anaerobic conditions. Released compounds and produced metabolites are continuously filtered and kept at physiological concentrations, allowing stable composition of the microbiota.

### APPLICATION

Studies can be performed under simulated fasted and fed conditions related to different types of drinks and meals for infants, adults and the elderly, and related to different dosage forms, co-medication, and health status.



Cabinet with two separate tiny-TIM systems for parallel experiments.

Over 140 scientific publications in peer-reviewed journals demonstrate the predictive quality of the TIM studies. Applications related to pharmaceutical research include:

- dissolution and bioaccessibility of single or combined active pharmaceutical ingredients;
  - investigation of diverse oral dosage forms, from liquids to enteric coated single or multiple (mini) tablets;
  - interaction of food and co-medication on the bioaccessibility of the target drug.
- TIM data support the making of better-informed decisions, helping to minimise the number of clinical studies.

### ANALYTICAL SERVICES

An emerging part of newly developed drugs is poorly soluble in water and/or its drug product are controlled release formulations. The generic analytical methods are tailored to these different physicochemical properties (solubility in water, methanol, acetonitril; logP, pKa, prodrug or not) and stability of the drugs. The clean-up of the of the samples obtained from the TIM model are focused to obtain an representative homogeneous subsample from the TIM model and to deal with the solubility and stability of the drug and/or the formulation.



Cabinet with three separate TIM-2 systems simulating the colon.

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When you look for a trusted independent research partner who can offer full support in assessing the safety and efficacy of your Products, TNO Triskelion offers a complete portfolio of high quality and innovative services with over 35 years of experience. We operate in compliance with the highest quality standards, including GLP, ISO17025 and AAALAC. TNO Triskelion has a track record of conducting tailor-made studies by integrating expert knowledge and flexibility to meet your schedules.

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