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The GIOME: Concept and current role in gastrointestinal tract studies

The goal of the Physiome Project is to understand and describe the physiology and pathophysiology of the human organism. Multiscale mathematical and computer models are developed within this concept to help understand human health. From its beginning about 15 years ago, most of the focus has been in the cardiac field (the Cardione project) but other areas are developing as well now.

Gastroenterology research has traditionally been based on experimental approaches rather than on mathematical modeling. However, in the past five to ten years several groups independently started to model the gastrointestinal tract and Gregersen introduced the term "GIOME" a couple of years ago (Gregersen H. The Giome Project. *Neurogastroenterol Motility* 2006; 18:401-402, www.giome.com). Thus, the Physiome based GIOME project is a very new concept in gastroenterology. The purpose is to facilitate modeling of physiological and pathophysiological processes in the gastrointestinal tract. It is a framework that allows experts from a variety of disciplines to work collaboratively to database and analyze observations and models. GIOME work so far has been on the mechanics and electromechanical properties at the tissue and organ level based on medical imaging and other highly advanced techniques. However, the long-term goal is to develop integrative models at all levels of gastrointestinal organization from the genes through regulatory pathways to the whole gastrointestinal tract function. Such models will have applications not only in research but also in teaching, training, development of medical devices and in clinical work. Models span from simple analytical computations to advanced multiscale models that need input and validation from highly skilled experimental work.

This special issue of *World Journal of Gastroenterology* contains a number of reviews and original papers related to the GIOME Project from the majority of the active groups in this field. The studies represent bioengineering models, primarily anatomical, functional and pathophysiological models, from most parts of the gastrointestinal tract. By publishing such a special issue we hope to increase the awareness of GIOME related research and to stimulate further research and collaboration in this area. The GIOME Project together with other European Physiome groups recently received funding from the European Union to develop a Strategy for the EuroPhysiome. It is the hope that this will facilitate further funding from the European Union and major funding agencies around the World to nurse this important effort.

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