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Stem Cells International

Special Issue on

Towards Creating the Perfect *In Vitro* Cell Model

CALL FOR PAPERS

Researchers regularly rely on *in vitro* models to study physiological and pathological processes related to human health and disease. These models range from relatively simple overexpression systems in, for example, HEK293 or COS cells, to more complex specialized cells/tissue/organs from animals or, in rare cases, humans (e.g., skin models). Translation of the results from bench to bedside is sometimes challenging; nevertheless, *in vitro* models are the foundation of contemporary research. Though a complete abolishment of animal models is highly unlikely in the near future, the importance of cell models will increase as initiatives like the 3Rs (refining, reducing, and replacing animals models) are gaining importance and the FDA is planning to adapt its guidelines for preclinical cardiotoxicity studies by incorporating a computational integration of various individual ion channel assays as well as electrophysiological tests on stem cell-derived cardiomyocytes. Needless to say, a continuous improvement of our *in vitro* models is therefore needed.

The discovery of (induced pluripotent) stem cells and their ability to differentiate into a large variety of different cell types has raised the hope for increasingly reliable *in vitro* models of human origin which includes the possibility to further explore their potential for personalized medicine. Extensive evaluation of these models has indeed shown great promise but has at the same time also identified several important limitations that currently hinder their implementation in routine assays. One of the most important problems still related to stem cell-derived models is an immature phenotype of the specialized cell, and this leaves consequently a too big gap to the *in vivo* situation. For this special issue, we invite investigators to contribute original research articles as well as review articles that will help the research community in approaching the goal of obtaining models for the lab that can mirror the *in vivo* situation.

Potential topics include, but are not limited to:

- ▶ Advances in steering *in Vitro* cell differentiation: biomarkers for monitoring the differentiation process and for identifying/purifying intermediate and end-stage cell types, characterization of cell populations, and upscaling of harvest
- ▶ New or improved methods to directly reprogram somatic cells into specialized cell types
- ▶ Advanced model systems and culture platforms: semi-3D culture systems (coatings and scaffolds) as well as full 3D systems (organoids, tissue engineering) and the combination of different specialized cell types within one assay
- ▶ Improvements in cell culture to simulate natural environments: hypoxia, extracellular matrix, culture at air-liquid interfaces, continuous flow of media, and so forth
- ▶ The role of epigenetics and small noncoding RNAs during differentiation
- ▶ Precise genomic engineering to generate disease models and cellular tools
- ▶ Computer models: creation of *in silico* models or real-time interfaces between a living cell and a computer, such as a dynamic clamp

Authors can submit their manuscripts via the Manuscript Tracking System at <http://mts.hindawi.com/submit/journals/sci/tccm/>.

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First Round of Reviews

Friday, 23 October 2015

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Friday, 18 December 2015