

The use of induced pluripotent stem cell-derived cardiomyocytes to study cardiac arrhythmias and cardiomyopathies

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Organisation

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Country Belgium

Geographical Area Flemish Region

SCOPE OF THE METHOD

The Method relates to	Human health
The Method is situated in	Basic Research, Translational - Applied Research
Type of method	In vitro - Ex vivo
Specify the type of cells/tissues/organs	Induced pluripotent stem cell-derived cardiomyocytes

DESCRIPTION

Method keywords

induced pluripotent stem cells

Disease modeling

Cardiomyocyte

drug screening

CRISPR/Cas

Scientific area keywords

cardiac arrhythmia

cardiomyopathy

Brugada syndrome

Method description

Cardiomyocytes derived from induced pluripotent stem cells (iPSC-CMs) offer an attractive platform for cardiovascular research, including disease modeling, drug toxicity testing and development of regenerative therapies. Patient-specific iPSC-CMs are very useful to study disease pathogenesis and have a huge potential for evaluation of disease prognosis and development of personalized treatment. In our research group we study inherited cardiac arrhythmias (currently with a focus on Brugada syndrome) and cardiomyopathies. We create iPSC-CM models, either patient-derived or using CRISPR/Cas, to evaluate the functional effect of specific genetic variants, assist the search for modifier genes and novel therapeutic targets, and screen for novel drug compounds.

Lab equipment

- Biosafety cabinets ;
- Nucleofector ;
- Patch-clamp equipment ;
- Multi-electrode array (MEA) ;
- Next-generation sequencing (NGS) instruments.

Method status

Still in development

Internally validated

PROS, CONS & FUTURE POTENTIAL

Advantages

Human model mimicking the native cardiomyocyte environment, patient-based disease model recapitulating full genomic background.

Challenges

Relative immaturity of the cells, variability of the phenotype of the final iPSC-CM model

Modifications

Improved protocols for more standardized differentiation and maturation of the cardiomyocytes.

Future & Other applications

iPSC-CMs can as well be used for drug cardiotoxicity screening and regenerative therapies after further improvements and validation.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

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