Living myocardial tissue slices

Commonly used acronym: *Cardiac slices*

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Organisation

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Department Cardiovascular Sciences

Specific Research Group or Service Experimental Cardiology

Country Belgium

Geographical Area Flemish Region

SCOPE OF THE METHOD

The Method relates to	Animal health, 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	Cardiac tissue: this method can be used with human-derived cardiac (residual tissue from surgical procedures) as well as with animal derived tissues

DESCRIPTION

Method keywords

organotypic model

precision cut tissue slices

Cardiac

Scientific area keywords

Cardiology

cardiac function

cardiac disease modelling

cardiac arrhythmia

Cardiac electrophysiology

Method description

Myocardial tissue slices (300 µm thin, 1 cm x 1 cm) are living, three-dimensional primary tissue explants prepared using a high-precision vibratome. These slices retain the full cellular complexity and native tissue architecture of the heart, preserving physiological and functional characteristics. All cell types remain embedded in their original extracellular matrix, allowing for intact cell–cell communication and biologically active responses to stimuli.

Lab equipment

High-precision vibratome

Method status

Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages

1) Preservation of 3D structure and microenvironment: slices maintain the original extracellular matrix and spatial organization, allowing for intact cell–cell and cell–matrix interactions, which are critical for physiological responses.

2) Multicellular complexity: all major cardiac cell types (cardiomyocytes, fibroblasts, endothelial cells, etc.) are present, enabling studies of intercellular communication and integrated tissue responses.

3) Biological activity and responsiveness: tissue slices remain viable and metabolically active, capable of responding to pharmacological agents, electrical stimulation, and pathological insults.

4) Drug testing: slices can be used for non-GLP drug screening and assessing efficacy and toxicity in a cardiac environment.

5) Compatibility with advanced techniques: the model supports integration with imaging, electrophysiology, transcriptomics, and computational modeling, enabling multi-scale analysis.

Challenges

1) Different slicing settings are needed depending on the condition of the tissue sample (e.g. presence of fibrosis).

2) Technically demanding culture conditions: maintaining viability and functionality of slices in culture requires specialized skills and expertise, including precise handling, media optimization, and monitoring of electrophysiological and metabolic parameters.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

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