

Development and Characterization of Retinal and Choroidal Endothelial Cells Derived from Human Pluripotent Stem Cells

Record number : OPR-1448

Overview

RESEARCH DIRECTION

Rony Chidiac, Professeur - Department of Pharmacology-Physiology

INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté de médecine et des sciences de la santé
Département de pharmacologie-physiologie

LEVEL(S)

2e cycle
3e cycle

LOCATION(S)

Campus de la santé

Project Description

Scientific Background

The retina and choroid contain two distinct vascular networks that play essential roles in maintaining vision. Retinal blood vessels form a highly selective barrier that protects retinal neurons and regulates exchanges with the bloodstream. In contrast, the choriocapillaris, located beneath the retina, consists of fenestrated capillaries that facilitate the rapid exchange of nutrients and metabolites required for photoreceptor function. Despite their anatomical proximity, retinal and choroidal endothelial cells exhibit distinct molecular, structural, and functional characteristics.

These differences also contribute to their involvement in various ocular diseases, including diabetic retinopathy and age-related macular degeneration (AMD). However, the mechanisms that establish these specialized vascular identities and determine their susceptibility to disease remain poorly understood.

Project Description

Our laboratory develops specialized endothelial cell models derived from human induced pluripotent stem cells (iPSCs) to investigate the mechanisms governing their development and function.

We are seeking a motivated graduate student to join a research project focused on generating and characterizing retinal and choroidal endothelial cells from human iPSCs and comparing their molecular and functional properties.

The project will aim to:

- Develop and optimize differentiation approaches to generate endothelial cells exhibiting retinal or choroidal characteristics.

- Identify the signaling pathways responsible for establishing their distinct vascular identities.
- Compare their functional properties, including vascular permeability, intercellular junction organization, and fenestration formation.
- Investigate their responses to disease-associated stress conditions to better understand their differential susceptibility to ocular diseases.

The project will combine stem cell culture and differentiation, molecular biology, cellular imaging, transcriptomics, and functional characterization. Genome-editing approaches may also be used to investigate the mechanisms regulating endothelial specialization.

Candidate Profile

We are looking for a curious, motivated, and detail-oriented student with a strong interest in cell biology, stem cell research, and vascular biology. Applicants should have a background in biochemistry, cell biology, molecular biology, pharmacology, or a related field. Previous experience in cell culture is an asset but is not required.

Research Environment

The selected candidate will join the laboratory of Prof. Rony Chidiac in the Department of Pharmacology and Physiology at the Université de Sherbrooke, affiliated with the Institut de pharmacologie de Sherbrooke (IPS) and the Centre de recherche du CHUS (CRCHUS).

The student will benefit from a collaborative research environment, personalized mentorship, and access to state-of-the-art technologies to investigate the development and function of human vascular cells.

Interested candidates are invited to submit their CV, academic transcripts, and a brief cover letter describing their research interests.

Funding offered

Yes

The last update was on 8 October 2026. The University reserves the right to modify its projects without notice.