

# Focus of research group (I)

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Department, UMC Ophthalmology  
Size of research group: 2 PhD students, 1 technician, 1 UD

## Current mission, vision and aims

To understand molecular mechanisms of ocular angiogenesis, vascular leakage and wound healing, and to translate these insights to the clinical management of eye disease

Research lines:

- 1) Mechanisms of inner **Blood-Retinal Barrier** loss in (diabetic) macular edema

*Focus on the **transcellular** mechanism of barrier breakdown; Development of PLVAP, a marker of increased vascular permeability, as a target for therapy*

- 2) Molecular regulation of angiogenic **tip cells**

*CD34 is a marker for tip cells in vitro and allows studies into new mechanisms of tip cell regulation and angiogenesis which may identify new targets for anti-angiogenesis therapy*

- 3) Mechanisms involved in the angio-fibrotic switch in proliferative diabetic retinopathy

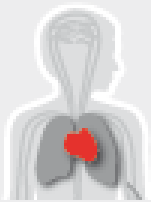
*A change in the balance between VEGF and CTGF causes the angio-fibrotic switch; Identification of proteins that cause formation of fibrovascular membranes*

- 4) Diagnostic and predictive biomarkers in (diabetic) macular edema

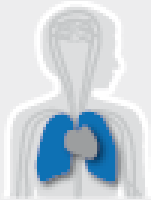
*Proteins, mRNA, miRNA, EVs*

- 5) VEGF inhibitors in retinal disease

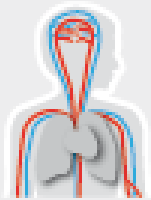
*RCT programme for cost-effective implementation of VEGF inhibitors in ophthalmology*



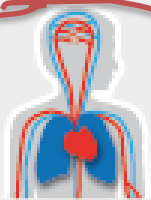
Heart Failure & Arrhythmias



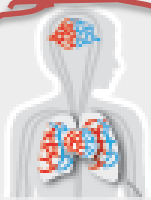
Pulmonary Hypertension & Thrombosis



Atherosclerosis & Ischemic Syndromes



Diabetes & Metabolism



Microcirculation

# Focus of research group (II)

## Current expertise

### In vitro models:

- Model for blood-retinal and blood-brain Barrier
- Endothelial tip cells
- Spheroid based angiogenesis model

*Permeability, TEER  
FACS, IF-staining, lentiviral  
transfection  
Sprouting, live-cell  
imaging*

### In vivo models:

- Oxygen induced retinopathy model
- Developing mouse retina

*Angiogenesis, vascular  
permeability, siRNA  
Whole mount staining*

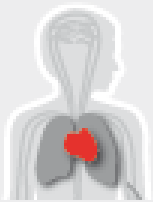
### Other:

- High-throughput analysis of proteins

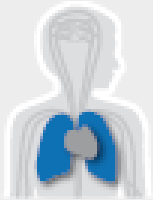
*Antibody arrays and ELISA*

## Current funding

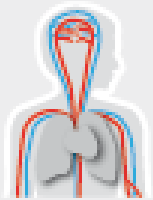
1. Dutch Eye Funds (10-100K/yr)
2. Dutch Diabetes Fund (€250K)
3. Bayer Global Ophthalmology Award - I. Klaassen (\$50K)
4. EFSD/Boehringer Ingelheim European Research Programme in Microvascular Complications of Diabetes (€100K)
5. Private Fund (€500K)



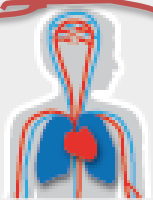
Heart Failure & Arrhythmias



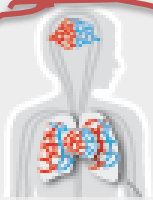
Pulmonary Hypertension  
& Thrombosis



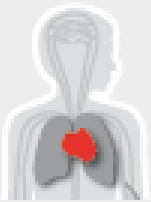
Atherosclerosis  
& Ischemic Syndromes



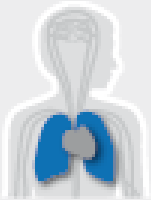
Diabetes & Metabolism



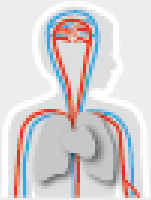
Microcirculation



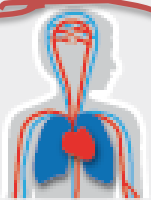
Heart Failure & Arrhythmias



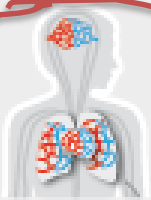
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Diabetes & Metabolism



Microcirculation

# Future plans

## Short term (1-2 year) plan

- Preclinical intervention targeting Plvap in mouse DME model
- Characterize novel genes involved in tip cell formation and angiogenesis

### Necessary infrastructure:

ML-II and DM-II laboratories, CLSM, EM, live cell imaging

## Long term (>2 year) plan

- Develop tools for transcellular EC transport mechanisms
- Develop 3D tools for angiogenesis
- Validate novel targets for anti-angiogenesis therapy in vivo

### Necessary infrastructure:

- Idem + access to zebrafish facility

## Collaborations in ACS

Arjan Griffioen/Else Huijbers, Elga de Vries, Riekelt Houtkooper, Peter Hordijk, Noam Zelcer