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## Clearing a path: Highlighting the way forward for retinal artery occlusion

On December 8, 2023, Nanna Vestergaard Azuz defended her thesis, “Retinal artery occlusion—experimental and epidemiological studies,” at Aalborg University. The research was conducted at the Dept. of Clinical Medicine, Aalborg University Hospital. Her main supervisor was Prof. Henrik Vorum, Dept. of Ophthalmology and Dept. of Clinical Medicine, Aalborg University Hospital. The co-supervisors were Prof. Bent Honoré, Prof. Christian Torp-Pedersen, Dr. Lasse Jørgensen Cehofski, Dr. Kristian Aasbjerg, and Dr. Benedict Kjærgaard.

Retinal artery occlusion (RAO) is a devastating disorder that frequently leads to severe vision loss in the affected eye. Most often induced by embolism, RAO shares similarities with the pathophysiology of cerebral stroke. The focus for the development of treatment for RAO has been restoring circulation, but no effective treatment yet exists. Parallel to investigations in stroke research, alternative treatment directions include the development of neuroprotective agents and the effect of secondary prevention, but these remain to be thoroughly investigated in RAO. This dissertation aimed at broadening the foundation for potential future treatment directions for RAO, using a multifaceted approach.

We first completed a comprehensive review of previously applied animal models of RAO to explore favorable experimental setups. The findings stressed the importance of closely mimicking the human disease characteristics to maximize the translational potential. We then conducted an epidemiological study based on Danish registries, evaluating the risk of cardiovascular diseases in patients with RAO and the effect of antithrombotic treatment as secondary prevention. The study found increased risks of death, stroke, and myocardial infarction among patients with RAO. Treatment with antithrombotic medication was not associated with decreased risks.

An experimental study was conducted, following up on the findings of the review. This validated a new model for RAO using laser on a retinal artery in pigs. Proteomics of the retinas was applied as an unbiased investigation of the molecular changes in RAO. Numerous regulated proteins were identified, including upregulation of several proteins involved in inflammation and downregulation of proteins involved in visual pathways and synapses.

This dissertation contributes to the understanding of RAO by addressing important aspects such as animal models, secondary prevention, and molecular changes. The findings provide a foundation for future research and highlight the complexity of RAO, emphasizing the potential for new directions in the development of effective treatments.

### Key points:

- Retinal artery occlusions are associated with increased risks of death, stroke, and myocardial infarction.
- Antithrombotic medication did not demonstrate consistently effective protection.
- A new model for retinal artery occlusions, suitable for proteomics, was validated.
- Numerous regulated proteins were identified in retinas subjected to retinal artery occlusion.

### Future directions:

- The potential for the identified proteins as future treatment targets in terms of neuroprotection remains to be investigated.
- The effect of secondary prevention in terms of antithrombotic treatment should be further investigated in clinical studies.

### References

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