



Eyes on the Prize:

Anne Suhr Thykjær
Dept. of Ophthalmology, Odense
University Hospital
The Faculty of Health Sciences,
University of Southern Denmark



Illuminating Diabetic Retinopathy through a Screening Database

On October 12, 2023, Anne Suhr Thykjær defended her thesis “Diabetic retinopathy screening in Denmark – Validation, attendance and complications in relation to systemic treatment” at the Faculty of Health Sciences, University of Southern Denmark (SDU). Her main supervisor was Jakob Grauslund, M.D., Ph.D., D.M.Sc., Dept. of Ophthalmology, Odense University Hospital (OUH), Dept. of Clinical Research, SDU; her co-supervisors were Lonny M. Stokholm, M.Sc., Dept. of Clinical Research, SDU; Kurt Højlund, M.D., Ph.D., D.M.Sc., Steno Diabetes Center Odense and Dept. of Endocrinology, OUH, Dept. of Clinical Research, SDU; and Ryo Kawasaki, M.D., M.P.H., Ph.D., Dept. of Social Medicine, Osaka University, Japan, Dept. of Clinical Research, SDU.

Key points:

- Adherence to screening schedules is crucial in preventing diabetic retinopathy (DR) progression.
- The DR gradings provided in the Danish screening program are predominantly correct.
- Reliable data within DiaBase support robust register-based studies.
- Systemic interventions show promise in managing DR without exacerbating progression.

Background

Diabetic retinopathy (DR), the leading cause of vision loss among individuals with diabetes, poses a significant threat due to its rapidly increasing prevalence worldwide. In response to this escalating concern, Denmark has implemented a comprehensive national screening program aimed at the early detection and management of DR. Our research delved into the efficacy of this screening program and examined the impact of systemic interventions on DR progression. We collected data from a national screening database—The Danish Registry of Diabetic Retinopathy (DiaBase)—which includes data from over 200,000 individuals with a total of over 1 million screenings. Data were further enriched with information on diagnoses, in- and outpatient hospital visits, pharmaceutical treatments, and socioeconomic data from the vast national Danish registers.

High-quality data

One notable contribution of our research was the validation of DiaBase as a reliable data source. The assessment of the

screening program revealed a high level of agreement in the grading of DR levels within DiaBase, underscoring the accuracy and consistency of the collected data; specifically, the analysis revealed an overall agreement of 93% in grading DR levels, and stratified results showed 96% agreement for screenings conducted by practicing ophthalmologists and 90% agreement for hospital-based screenings.

The consequences of delays

Furthermore, we investigated attendance patterns within the screening program to elucidate the importance of adherence to recommended screening schedules. Paper II revealed that only approximately half of the screened population attended screenings as recommended by the National Clinical Guidelines. The analysis revealed that delays in screenings were associated with an increased risk of DR progression. Individuals who experienced three or more delays had over 12 times the risk of clinically significant (level 3 or 4) progression of DR compared with those who followed the program as intended.

Systemic treatments and eye health

Additionally, our research explored the safety of systemic interventions, such as continuous subcutaneous insulin infusion (CSII) for type 1 diabetes and bariatric surgery for type 2 diabetes, and their potential effect on DR progression. The findings indicated that these interventions are safe and do not exacerbate DR progression in the short- or long-term. These results helped form the updated National Clinical Guidelines (2023) for DR screening in Denmark.

Overall, the thesis underscores the effectiveness of the Danish screening program in preventing the sight-threatening progression of DR when individuals adhere to recommended screening schedules. The reliability of the data within DiaBase confirms that this information is valuable for register-based studies, facilitating advancements in understanding and managing DR. Moreover, the findings emphasize the importance of comprehensive management strategies in diabetes care, which involves incorporating both screening and systemic interventions to mitigate the risk of DR progression and preserve vision.

Future directions:

- Qualitative exploration of the factors that influence the attendance of DR screenings to improve interventions.
- Studies assessing the efficacy of new systemic interventions compared with traditional, invasive methods.
- Investigations of pathways exploring how systemic interventions affect DR progression to develop targeted treatments.

References

1. Thykjaer, A. S., et al., Inter-grader reliability in the Danish screening programme for diabetic retinopathy, *Acta Ophthalmol.* 2023 Nov., 101(7): 783-788.
2. Thykjaer, A. S., et al., Attendance in a national screening program for diabetic retinopathy: a population-based study of 205,970 patients, *Acta Diabetologica*, 2022 Nov., 59(11): 1493-1503.
3. Thykjaer, A. S., et al., Long-term development of diabetic retinopathy in individuals with type 1 diabetes, in response to the use of continuous subcutaneous insulin injections: a national cohort study. (submitted)
4. Thykjaer, A. S., et al. Bariatric surgery in individuals with type 2 diabetes is not associated with short or long-term risk of diabetic retinopathy progression: results from a nationwide cohort study. *Acta Diabetologica*, 2023 Nov., 60(11): 1531-1539