Sickle Cell Retinopathy:
Retinal imaging to improve detection and monitoring of sickle cell disease progression in children

Translational Science Benefits Model
IMPACT PROFILE

Dr. Jing Jin's research focuses on using retinal imaging techniques to improve detection and monitoring of retinal damage in children with sickle cell disease.

The Challenge

Sickle cell retinopathy develops due to blockages in blood vessels in the retina, leading to abnormal blood vessel growth and retinal thinning. It is the most common cause of **vision impairment** in individuals with sickle cell disease. Sickle cell disease has a **global incidence rate of 515,000 neonates**, with approximately **100,000 individuals** affected in the United States.

The Approach

Dr. Jin's research includes:

- Using high-resolution non-invasive imaging methods for early identification and monitoring of sickle cell retinopathy.
- Investigating biological markers associated with retinal damage in sickle cell disease.
- Establishing links between retinal damage and other at-risk organs, including silent cerebral infarcts (SCI)

The Impact

Dr. Jin's research has resulted in clinical, economic, and policy benefits through:

- Leveraging spectral domain optic coherence tomography (SD-OCT) retinal imaging to **improve accuracy and early identification** of sickle cell retinopathy in pediatric patients.
- **Development and training of a deep learning detection model** for identifying sickle cell retinopathy in cross-sectional SD-OCT images.
- **Identifying hematologic markers associated with retinopathy** in sickle cell disease to improve identification of patients at higher risk for disease progression.
- Evaluation of abnormal SD-OCT retinal images as proxy indicators to **improve the detection and monitoring of cerebrovascular disease (CVD) and silent cerebral infarcts (SCI)** associated with sickle-cell disease (SCD).

RESEARCH HIGHLIGHTS

Dr. Jin's research, conducted in collaboration with her colleagues, has resulted in:

- **Improved detection and monitoring** of sickle cell retinopathy in pediatric patients using non-invasive high-resolution imaging.
- **Novel applications of deep learning detection models** to recognize and detect sickle cell retinopathy in high-resolution retinal images.
- **Advancing knowledge of hematologic factors implicated in sickle cell disease progression,** including retinal damage.
- **Using retinal imaging results to guide further interdisciplinary clinical care** for children with sickle cell disease.

Key Benefits

Clinical — Improved patient experiences during eye examinations for children with SCD due to non-invasive retinal imaging techniques.

Clinical — Identification of hematologic factors predictive of organ damage associated with retinal injury in sickle cell disease.

Clinical — Development of a deep learning detection model in collaboration with computer scientists to improve the detection of sickle cell retinopathy using high-resolution retinal images.

Economic — *Reduced social and economic health care costs through early identification and monitoring of SCD progression, including retinal injury.*

Policy — Spectral domain optic coherence tomography (SD-OCT) has been adopted as a standard of care at Nemours Children's Health for pediatric patients with SCD.

The investigator:

Jing Jin, MD, PhD, is a pediatric ophthalmologist at Nemours Children's Hospital in Wilmington, Delaware, and holds an appointment as Associate Professor at the Sidney Kimmel Medical College of Thomas Jefferson University. Dr. Jin completed her PhD at Boston University and completed postgraduate studies on retinal degeneration at the Massachusetts Eye and Ear Infirmary. She completed her Internship, Residency, and Fellowship in pediatric ophthalmology at Duke University Medical Center.

Find out more:
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