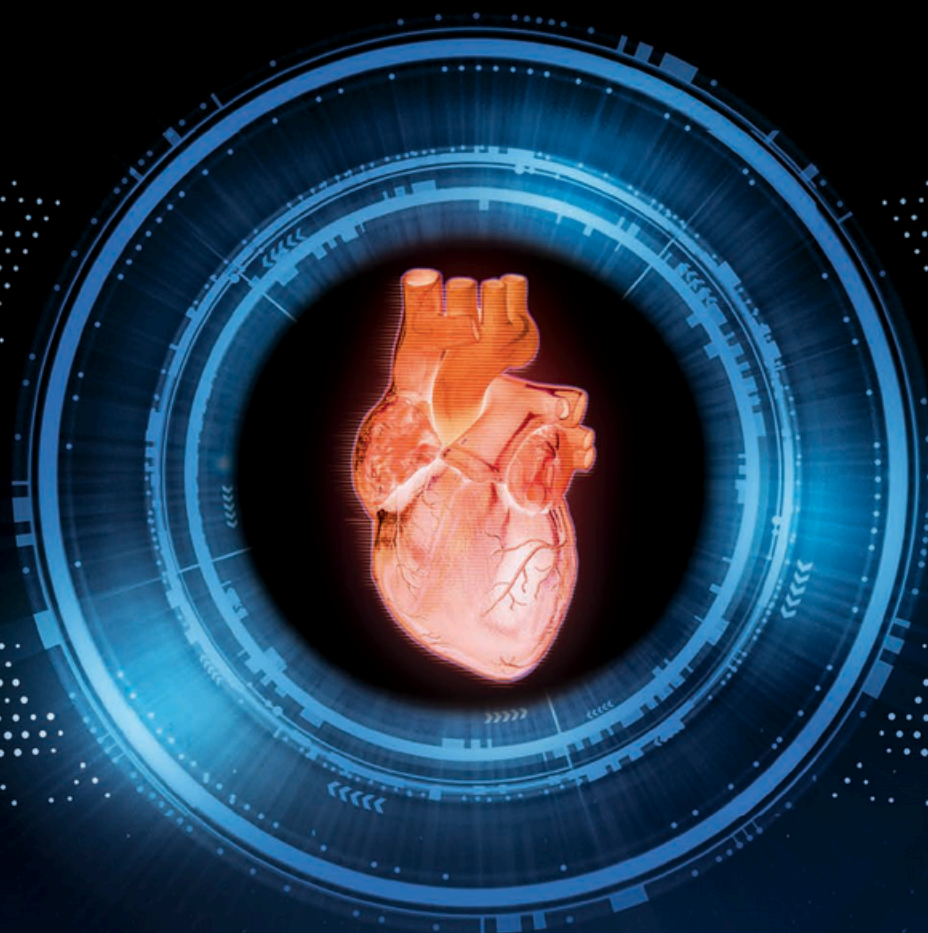Cardiovascular disease management

Start with Reti-CVD

Anew,innovative andnovelperspectiveon
assessing cardiovascularrisk

Reti-CVD is an artificial intelligence(AI)-empowered software for the cardiovascular risk assessment, which verifies the structure and vessels of the retina through a simple eye examination to predict the risk of developing cardiovascular disease.

Reference 1. Prescribing information of Reti-CVD. Ministry of Food and Drug Safety. This product is a 'medical device', please read 'Precautions for use' and 'How to use' carefully before use.

Reti-CVD

Relatively low cost and high accuracy lead to
an increased participation rate in testing.

Efficiency
Optimization

Multiple studies have demonstrated the association between retinal vascular damage and subtle changes and the risk of cardiovascular disease.1-6

The NEW ENGLAND JOURNAL of MEDICINE

CURRENT CONCEPTS

Hypertensive Retinopathy

THE LANCET

Retinal microvascular abnormalities and incident stroke: the Atherosclerosis Risk in Communities Study

Tien Yin Wong, Ronald Klein, David J Couper, Lawton S Cooper, Eyal Shahar, Larry D Hubbard, Marion R Wofford, A Richey Sharrett

Survey of Ophthalmology

Retinal Microvascular Abnormalities and their Relationship with Hypertension, Cardiovascular Disease, and Mortality

Tien Yin Wong, FRCS, MPH,1,2,3 Ronald Klein, MD, MPH,1 Barbara E. K. Klein, MD, MPH,1 James M. Tielsch, PhD,3,4 Larry Hubbard, MAT,1 and F. Javier Nieto, MD, PhD3

Stroke

Retinal Microvascular Signs and Risk of Stroke
The Multi-Ethnic Study of Atherosclerosis (MESA)

Ryo Kawasaki, MD, PhD; Jing Xie, PhD; Ning Cheung, MBBS; Ecosse Lamoureux, PhD; Ronald Klein, MD; Barbara E. K. Klein, MD; Mary Frances Cotch, PhD; A. Richey Sharrett, MD; Steven Shea, MD; Tien Y. Wong, MD, PhD; for MESA*

The American Journal of Cardiology

Risk Prediction of Coronary Heart Disease Based on Retinal Vascular Caliber (from the Atherosclerosis Risk In Communities [ARIC] Study)

Kevin McGeechan, MBiostat*, Gerald Liew, MBBS, MMed*, Petra Macaskill, PhD*, Les Irwig, MBBCh, PhD*, Ronald Klein, MD, MPH*, A. Richey Sharrett, MD, DrPH#, Barbara E.K. Klein, MD, MPH*, Jie J. Wang, MMed, PhD*,*, Lloyd E. Chambless, PhD*, and Tien Y. Wong, PhD*,*,*

Hypertension

Abnormalities of Retinal Microvascular Structure and Risk of Mortality From Ischemic Heart Disease and Stroke

Nicholas Witt, Tien Y. Wong, Alun D. Hughes, Nish Chaturvedi, Barbara E. Klein, Richard Evans, Mary McNamara, Simon A. McG Thom, Ronald Klein

The American Heart Association/American College of Cardiology (AHA/ACC) recommends the coronary artery calcium (CAC) score for evaluating cardiovascular disease risk and making treatment decisions in the intermediate-risk group.7

✓ 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease7

CAC (Agatston unit)	Treatment decision	Note
0	Consider no statin	Unless diabetes, family history of premature CHD, or cigarette smoking are present
1~99	Favor statin	Especially after age 55
>100	Initiate statin therapy	

ACC, American College of Cardiology; AHA, American Heart Association; CAC, coronary artery calcium; CHD, coronary heart disease.

References 1. Wong et al., N Engl J Med. 2004;351(22):2310-7. 2. Kawasaki et al., Stroke. 2012;43(12):3245-51. 3. McGeechan et al., Am J Cardiol. 2008;102(1):58- 63. 4. Wong et al., Lancet. 2001;358(9288):1134-40. 5. Witt et al., Hypertension. 2006;47(5):975-81. 6. Wong et al., Surv Ophthalmol. 2001;46(1):59-80. 7. Arnett DK, et al., Circulation. 2019;140(11):e596-646.

Reti-CVD predicts the incidence of cardiovascular disease similarly to the coronary artery calcium (CAC) score measured by cardiac CT.1,2
Furthermore, it has shown superior performance in predicting the incidence of cardiovascular disease compared to the carotid intima-media thickness or the brachial-ankle pulse wave velocity (baPWV).1,2

Cumulative incidence of cardiovascular events in the CMERC-HI cohort2
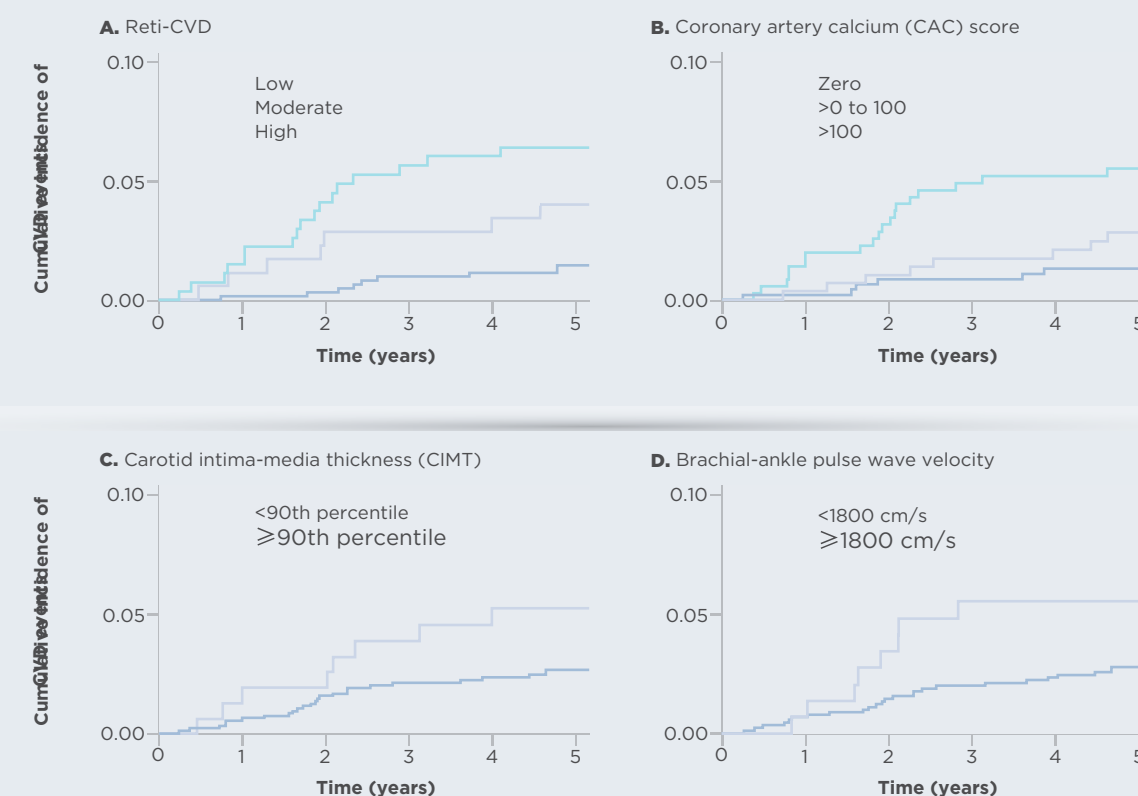
- The performance of Reti-CVD risk assessment was evaluated in the "Cardiovascular and Metabolic Disease Etiology Research Center- High Risk (CMERC-HI) Study: A Prospective Cohort Study" which was funded by national research funds.
- A total of 1,106 patients were followed prospectively for 5 years. During the study, retinal imaging (A), cardiac computed tomography (CT)-based coronary artery calcium (CAC) score (B), carotid ultrasound (C), and brachial-ankle pulse wave velocity (baPWV) were measured to evaluate cardiovascular risk at the time of recruitment.
- The 5-year follow-up revealed that the risk stratification performance of Reti-CVD based on retinal imaging was similar to the CAC score based on cardiac CT, and superior to carotid ultrasound-based carotid intima-media thickness or baPWV. Cardiocerebrovascular disease occurred in 17 out of 277 high-risk patients on Reti-CVD, and cardiovascular disease occurred in 19 out of 352 high-risk patients with a CAC score exceeding 100. The 10-year incidence rate was 13.3% for the high-risk group by Reti-CVD and 11.2% for the high-risk group with a CAC score above 100. These findings suggest that Reti-CVD appears to be a promising tool for accurately assessing CVD risk.

References 1. Rim TH, et al., The Lancet Digit Health. 2021;3(5):e306-e316. 2. Identified.", The Lancet Digit Health. 2021;3(5):e306-e316. External trial of a deep-learning-based retinal biomarker (Reti-CVD) in the prediction of cardiovascular disease: data from CMERC-HI. 2023.

A fast and convenient testing method
reducestheburdenonclinicsandpatients.

Reti-CVD enables quick and easy prediction of the risk of cardiocerebrovascular disease.

3 mins

"With Reti-CVD, the entire process of predicting cardiocerebrovascular risk can be completed **in just 3 minutes.**"
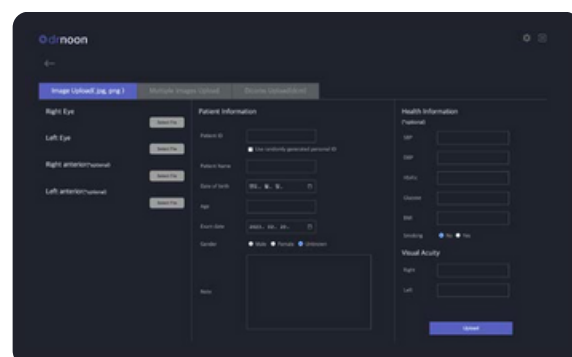
Take retinal phot og ra ph s

STEP 01

● Capture retinal photographs using a retinal camera

Upload image and use AI analysis

STEP 02

● Input patient information

● Upload retinal images

● AI analysis

Generate test results and provide the reports

STEP 03

● Risk assessment for cardiovascular events

● Provide test result and report to the patients

Reti-CVD is user-friendly for installation and operation, reducing the burden on clinics and patients.
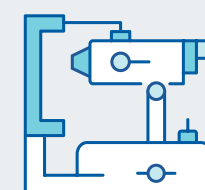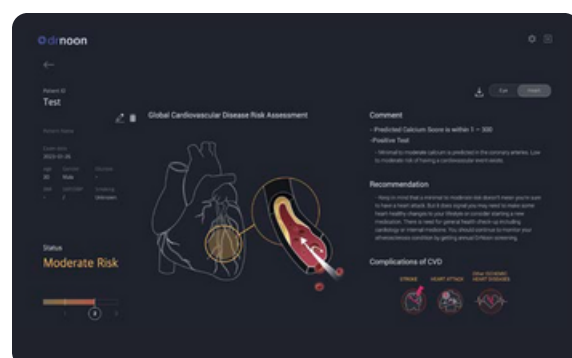
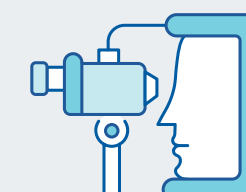Easy installation on the available retinal camera

Easy integration with the current wor k f low (API call / PACS)
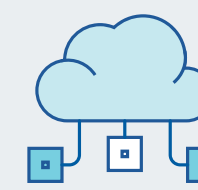
A cloud-based system that does not require any additional program installation

Rapid results within 3 minutes

A non-invasive test reducing the burden of the examination (procedure, cost, and risk of radiation exposure, etc)

Easy to capture images by nurses or optometrists without requiring a s pecia l i st

API, application programming interface; PACS, picture archiving communication system.
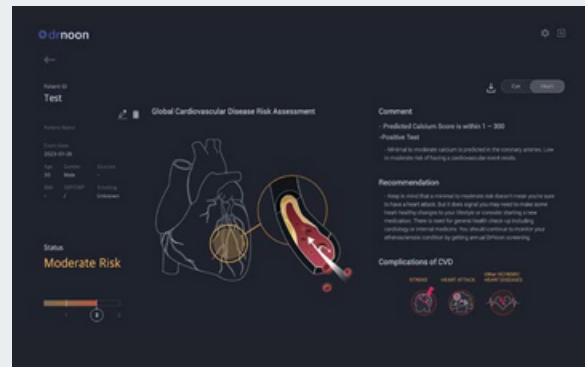
Reti-CVD provides objective AI analysis reports and
additional guidance tailored to individual patient coditions.

Strengthen
professionalism

Reti-CVD provides professional and objective data for effective and efficient patient consultation.

### ✓ Reti-CVD test result page for medical professionals

The AI analysis results classify patients into 3 risk groups (low, moderate, and high risk) and provide corresponding recommendations for the risk of cardiovascular events and CAC score.

✓ Reti-CVD test report for patients

The report provides an explanation of the Reti-CVD test and its working principle, as well as a risk assessment and a quantified risk score for cardiovascular disease based on AI analysis.
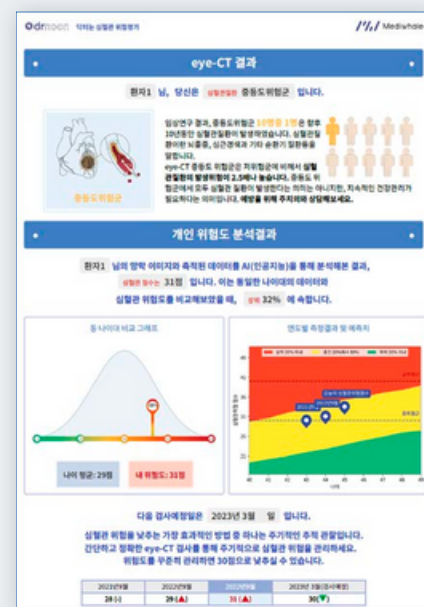
Reti-CVD's performance has been validated through several studies and published in prestigious medical journals.1-7
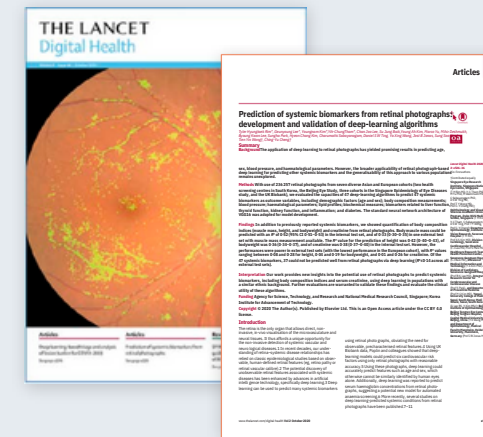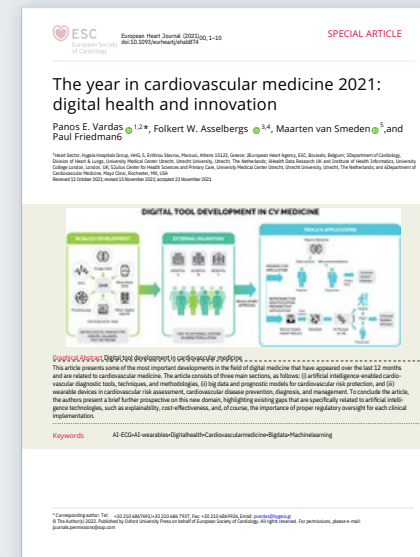

The Lancet Digital Health (IF 36.6)

Predicting systemic biomarkers through AI analysis of retinal photos.

The Lancet Digital Health (IF 36.6)

AI analysis of retinal photos yields similar results to cardiac CT in predicting incident cardiovascular diseases.

In a review article published in the European Heart Journal, Prof. Vardas, former president of the European Society of Cardiology, suggests that emerging medical innovations have the potential to enable early detection of hidden cardiovascular risks.

The review article emphasizes Reti-CVD as an innovative medical technology alongside other cutting-edge cardiology examination methods like smartwatches and AI-driven ECG analysis.

European Heart Journal (IF 35.9)

Reti-CVD was introduced as one of the significant innovative technologies in cardiovascular medicine in 2021

References 1 Rim et al., Lancet Digit Health. 2020;2(10):e526-36. 2. Rim et al., Lancet Digit Health. 2021;3(5):e306-16. 3. Vardas et al., Eur Heart J. 2022;43(4):271-9.
4. Tsengetal.,BMC Med. 2023;21:28. 5. Kang et al., Circulation. 2022;146:A11334. 6. Rim et al., Circulation. 2022;146:A11822. 7. Tseng et al., Circulation. 2022;146:A10113.

Summary

Reti-CVD

◈ Reti-CVD

Reti-CVD have demonstrated comparable performance to coronary artery calcium (CAC) scores measured by cardiac CT and a superior performance to carotid intima-media thickness measured by carotid ultrasound in predicting the risk cardiovascular disease.1-3

Reti-CVD enables quick and easy prediction of the risk of cardiocerebrovascular disease.

Reti-CVD is easy to install and use with no risk of radiation exposure, and reduces the burden on both medical professionals and patients.

Reti-CVD provides professional and objective data for effective and efficient patient consultation.

Reti-CVD's performance has been validated in multiple studies published in prestigious medical journals.3-9

References 1. Prescribing information of Reti-CVD. Ministry of Food and Drug Safety. 2. Pivotal trial of a deep-learning-based retinal biomarker (Reti-CVD) in the prediction of cardiovascular disease: data from CMERC-HI. 2022. 3. Rim et al., Lancet Digit Health. 2021;3(5):e306-16. 4. Rim et al., Lancet Digit Health. 2020;2(10):e526-36. 5. Vardas et al., Eur Heart J. 2022;43(4):271-9. 6. Tseng et al., BMC Med. 2023;21:28. 7. Kang et al., Circulation. 2022;146:A11334. 8. Rim et al., Circulation. 2022;146:A11822. 9. Tseng et al., Circulation. 2022;146:A10113.