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Early Diabetic Retinopathy Detection Remains a Challenge

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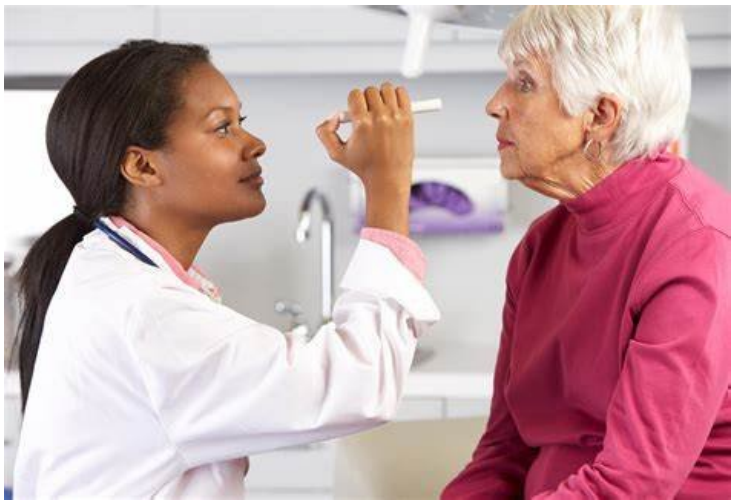
There is a need to promote and fund a global research agenda for diabetes and diabetic retinopathy



The Vitreo Retinal Society of India (VRSI) and the Research Society for the Study of Diabetes in India (RSSDI) have formulated a first-of-its-kind diabetic retinopathy (DR) screening guideline to help physicians and diabetologists in India educate their patients about DR.

With a national prevalence of 12.5 per cent of DR and 4 per cent of vision-threatening DR, approximately 3 million Indians are at risk of vision loss. This highlights the critical need for timely screening of every patient with diabetes to prevent an irreversible loss of vision, which goes undetected in its early stage and is thus aptly known as a ‘silent thief of sight.’

Despite the increasing prevalence of DR, limited awareness and the often-asymptomatic nature of the condition result in a disappointingly low number of individuals with diabetes seeking eye screenings. This makes raising awareness about vision loss due to DR and the need for timely screening and management imperative.

On the global front, earlier this year, the International Agency for the Prevention of Blindness (IAPB) and the International Diabetes Federation (IDF) came up with a policy brief to target advocates, healthcare professionals and policymakers in diabetes and eye health. According to their recommendation, there is a need to promote and fund a global research agenda for diabetes and DR that includes health systems, technological innovation and research to maximise the impact of the research into practice.

As a result, technology developers across India, and the globe, are exploring this need as an opportunity to develop innovative devices. Reports have revealed that manufacturers in the DR sector globally, are primed to capitalise on this rising demand, anticipating a substantial revenue boost, with a forecasted target of $15.5 billion by 2033.

For instance, Remidio, a Bengaluru headquartered company, received the Central Drugs Standard Control Organisation (CDSCO) approval, a few weeks ago, for its product- Medios DR AI. It is the country's first ophthalmic artificial intelligence (AI) software that automatically detects referable DR in retinal images.

On the global front, US-based AEYE Health has recently the first-ever portable, fully autonomous DR screening solution, that enables screening patients anywhere-whether at home or in clinics- providing instant diagnostic results without the need for human interpretation. It is the first US FDA-cleared solution of its kind, requiring just one image per eye and providing instant results directly on the camera screen for patients, along with diagnostic reports for healthcare providers.

University of Liverpool AI diagnostic technology spin-out, AI-Sight, has successfully concluded its seven-figure equity funding round from healthcare industry investors, for its first commercial product. The AI software device is designed to support training and diagnostic decision-making by human graders of DR in retinal scans.

While AI is demonstrating promising results in accurately detecting DR, whether the implementation of these algorithms is cost-effective in comparison with human graders can pose a challenge.

Besides AI, next-generation sequencing technology is emerging as a new tool to detect the genetic variations associated with DR, thereby pushing the development of personalised medicines to treat this condition. Further, technologies like single-cell RNA sequencing are offering a role in identifying unique retinal microglia types in early diabetic retinopathy. Studies have revealed that to prevent blindness in patients, it is important to identify early diabetic retinopathy more precisely based on the understanding of the pathological and molecular mechanisms in retinal microglia-induced inflammation.

However, just like AI, these new technologies also pose numerous challenges that might restrict their application at the clinical level for diagnosing DR on a large scale. Restricted by the acquisition of retinal samples from patients with DR, the majority of single-cell detection samples currently are derived from animal models, with only a few reports on human samples. A proper framework, cost-effectiveness, accessibility, and head-to-head validation are important factors to be considered to address the growing burden of DR worldwide.

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