Dr Chew is a medical officer at the Division of Biometry and Epidemiology at the National Eye Institute, the National Institutes of Health (Bethesda, MD). She earned her Doctor of Medicine and completed her residency at the University of Toronto, Ontario, Canada. Dr Chew obtained her postgraduate fellowship training at the Johns Hopkins Hospital, Baltimore, MD. She currently sees patients with retinal disorders, including patients with diabetes mellitus, at the Clinical Center of the National Institutes of Health.

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Diabetic retinopathy is one of the leading causes of vision loss in the United States. There are approximately 4.1 million individuals aged 40 years and older affected by diabetic retinopathy, and 1 in 12 persons with diabetes has advanced vision-threatening retinopathy. In the future, these numbers will likely rise along with the expected increase in the incidence of diabetes, resulting from the aging population and the increase in obesity. Vision loss caused by diabetic retinopathy is a significant and growing public health problem. Early detection in persons with diabetes is critical because timely treatment can reduce the rate of severe vision loss by as much as 90%. However, despite the availability of effective treatment, many patients with diabetic retinopathy are not adequately screened so that timely intervention can be implemented. Intensive medical management of glycemia, hypertension, and possibly dyslipidemia are important and integral parts of the therapy for diabetic retinopathy. The ophthalmologists and the medical physicians must adopt an interdisciplinary collaboration to care optimally for patients with diabetes. In the following interview, Emily Y. Chew, MD, discusses the importance of screening and early intervention in improving the outcomes for diabetic retinopathy. She also describes methods of diagnosis and assessment, treatment, and the disease rating scales that can facilitate interdisciplinary and international collaborative treatment efforts.

ASiO: Early screening for diabetes and the microvascular complications that often precede the negative sequelae that occur as the disease progresses is an important determinant for patient outcomes. Please discuss the relationship of screening to early diagnosis and the effect of early treatment on outcomes.

Dr Chew: Early detection of diabetic retinopathy is essential in preventing further progression and potential vision loss. Because the early stages and even the more severe stages of diabetic retinopathy need not produce symptoms, persons with diabetes must be screened with periodic, thorough, dilated eye examinations to establish the presence and the severity of diabetic retinopathy. The American Academy of Ophthalmology, the American Diabetes Association, and other organizations have provided guidelines for
the frequency of these eye examinations. The recommendations for most individuals with diabetes include an annual dilated eye examination with an eyecare provider who is familiar with the course and the management of diabetic retinopathy. Currently, the adherence to the annual eye examination guidelines falls short of the providers' goals, with approximately 35% to 65% of individuals with diabetes having an annual eye examination. Early detection would lead to earlier and more appropriate and effective treatment.

Early detection is also important because the physicians caring for patients with diabetes and diabetic retinopathy can appropriately counsel them regarding the importance of medical management. Recent improvements in diabetes care reflect the general acceptance of the results of randomized controlled clinical trials demonstrating that good glycemic control reduces the development and progression of diabetic retinopathy in individuals with type 1 or type 2 diabetes. Management of hypertension is important in decreasing the progression of diabetic retinopathy. Observational data suggest management of dyslipidemia also may be beneficial in preventing the progression of diabetic retinopathy. Screening for this disease is particularly important because there are effective treatments, such as laser photocoagulation and vitrectomy, that can reduce the risk of severe vision loss to less than 5%. Long-term follow-ups of these treatments show promising results.

**ASIO**: What is the status and the available methods for a treatment team approach (primary care physicians, endocrinologists, and ophthalmologists) to screening for retinopathy?

**Dr Chew**: There are many methods (with or without pharmacologic dilation of the pupils) available for detecting diabetic retinopathy that can be conducted by a variety of healthcare providers using a team approach, including direct and indirect ophthalmoscopy (with or without stereoscopic viewing) and fundus photography.

**Ophthalmoscopy**: Physicians in general practice, endocrinologists, and ophthalmologists can use an ophthalmoscope to perform fundus examinations within their own practices. Ophthalmoscopy is a useful screening procedure, relatively easy to use, and accessible for all physicians. Examination of the eyes through dilated pupils provides the physician with an optimal view of the fundus. However, the sensitivity and specificity or the ability of each of these groups of healthcare workers to diagnose diabetic retinopathy will vary greatly. Studies conducted among different groups of healthcare providers clearly show that ophthalmologists, specifically retinal specialists, are most likely to detect the presence of diabetic retinopathy requiring laser photocoagulation or other treatments. Assessment from simple ophthalmoscopy through dilated fundus by an experienced examiner was found to agree with results obtained by fundus photography 85% of the time. The diagnosis of diabetic macular edema, an important cause of vision loss, often requires stereoscopic evaluation that may only be performed effectively by an ophthalmologist. Ophthalmoscopy is less sensitive than fundus photography for detecting some of the earliest lesions of diabetic retinopathy.

**Fundus photography**: Several forms of retinal screening with standard fundus photography or digital imaging (with and without pupil dilation) are being investigated as a means of detecting retinopathy early; these methods warrant further evaluation. Some studies have shown that screening patients with diabetes to identify sight-threatening retinopathy with photography is more sensitive compared to a clinical examination using an ophthalmoscope. It is unclear whether the new digital photography techniques (eg, single-field 45° photograph) are as sensitive and specific as traditional standard 7-field stereoscopic 30° fundus photography for determining the level of diabetic retinopathy. Most digital nonmydriatic cameras lack stereoscopic capability that is useful for identifying subtle neovascularization and macular edema. However, there are digital nonmydriatic cameras that are used in a stereoscopic manner and have been validated against fundus photography. Future studies may eventually show that these cameras are useful tools.

Whether photographic screening programs achieve a greater reduction in vision loss compared to routine community care in areas with unrestricted access to ophthalmologists has not been proven. These screening programs have great value in circumstances in which access to ophthalmic care is limited. Currently, these technologies are not considered as a replacement for a comprehensive eye examination by an ophthalmologist experienced in managing diabetic retinopathy.
**ASiO:** Please discuss the importance of early diagnosis in more detail.

**Dr Chew:** Early detection of diabetic retinopathy is essential because diabetic retinopathy can progress to irreversible stages with relatively few symptoms, and the optimal time for treatment is before visual acuity is impaired. Treatment will often stabilize vision, but it improves vision less frequently. Studies have confirmed that the clinical outcome is better if patients are screened and treated early.

The 2 main causes of vision loss in patients with diabetic retinopathy include proliferative retinopathy and diabetic macular edema; both conditions can be asymptomatic initially. Patients with proliferative retinopathy may have excellent vision until the neovascularization leads to a vitreous hemorrhage or to the more severe stage with tractional retinal detachment involving the center of the macula. Patients with severe nonproliferative diabetic retinopathy also are asymptomatic but are at a high risk for developing proliferative disease within 1 year after initial onset of the disease. Patients with an early or even more moderate stage of diabetic macular edema may maintain reasonable vision, but they may suffer a threat to central vision when thickening of the retina occurs close to the fovea.

The standard treatments for eyes approaching or classified as showing proliferative diabetic retinopathy and diabetic macular edema include laser photocoagulation (occasionally combined with vitrectomy). Neither laser photocoagulation nor vitrectomy is likely to result in a complete reversal of any vision loss; however, if the treatment is performed in a timely fashion, the long-term results show that a large proportion of patients can maintain “driving” vision. This important result underscores the significance of treating diabetic retinopathy when the visual acuity is still good, which requires regular dilated eye examinations by an eyecare provider who is familiar with diabetic retinopathy and can diagnose diabetic retinopathy requiring treatment.

**ASiO:** What are the other methods or tools available for diagnosing diabetic retinopathy?

**Dr Chew:** In addition to ophthalmoscopy and fundus photography, other techniques include fluorescein angiography and optical coherence tomography (OCT).

Fluorescein angiography. Fluorescein angiography is used mainly to evaluate the blood flow in the macular area and to guide laser treatment for diabetic macular edema. These angiograms can also be transmitted to reading centers for evaluations in clinical studies. Fluorescein angiography requires specialized and expensive equipment and personnel. It is not a useful screening procedure because of its invasiveness, time demands, and possible adverse reactions from allergy to the sodium fluorescein dye. Serious complications are rare.

Optical coherence tomography. OCT, using laser light, provides high-resolution (eg, 10 µm) imaging of the retina and its surrounding structures. OCT can be useful for quantifying retinal thickness, monitoring partial resolution of macular edema, and identifying abnormalities in the vitreous and retinal junction. OCT is becoming an important tool to assess diabetic macular edema for clinical trials and in clinical practice.

**ASiO:** Please discuss in greater detail how the primary care physician, endocrinologist, and ophthalmologist can work together effectively in a treatment team approach to improve early detection and diagnosis of diabetic retinopathy.

**Dr Chew:** Clearly, the ophthalmologist should manage eye disease and ensure that patients with diabetes are referred for appropriate management of their systemic condition. The patient’s family physician, primary care physician, internist, or endocrinologist should manage the systemic condition of the patient with diabetes. The ophthalmologist should communicate with the attending physician. An ongoing dialogue must occur between the members of the interdisciplinary team who are treating the patient.

Development of educational material regarding the importance of good glycemic control and tight control of hypertension in the role of diabetic retinopathy is important for the physicians and the patients. Education regarding the need of a regular dilated eye examination for all patients (at least annually) should also be directed toward the physicians, the patients, and their families who would benefit from this knowledge.

**ASiO:** What are some of the issues and considerations in terms of classifying diabetic retinopathy to standardize care?

**Dr Chew:** For decades, the gold standard for grading the severity of diabetic retinopathy was stereoscopic fundus photography of 7 standard fields through dilated pupils. These fields were graded using the Early Treatment Diabetic Retinopathy Study (ETDRS) clas-
sification, a classification used in research studies. Use of the ETDRS classification in everyday clinical practice was not easy or practical. The photographic grading system has more levels than are necessary for clinical use and the specific definitions of the levels are detailed, often requiring comparisons with standard photographs. This system was too complex for clinicians to use in their offices. In addition, development of a common practical standard terminology that would be acceptable for worldwide exchange of information was needed.

The need to provide a framework for improved communication and transfer of information among primary care physicians, endocrinologists, ophthalmologists, and other eyecare providers has been the major drive to develop simplified clinical disease severity scales that could be used internationally. The International Summary Severity Scale was developed for diabetic retinopathy and diabetic macular edema as an attempt to improve communication between ophthalmologists and primary care physicians, endocrinologists, and other healthcare providers who are caring for diabetic patients and among clinicians worldwide. This scale is based on the data collected in clinical trials and epidemiologic studies of diabetic retinopathy. It simplifies the ETDRS classification of diabetic retinopathy for clinical use.

One of the criteria for the development of this classification system was its usefulness for a broad range of providers with varying skills and diagnostic equipment (ie, ranging from retinal specialists with contemporary equipment to trained physician assistants with only direct ophthalmoscopes). This criterion required a simpler classification because all lesions described must be detected by the personnel with the least level of training who are using the direct ophthalmoscope.

This staging system is intended primarily for comprehensive ophthalmologists and others with skills necessary for evaluating the retina and also should allow better communication regarding diabetic retinopathy severity to all physicians and care providers for patients with diabetes. The improved communication should lead to more effective and consistent follow-up of diabetic retinopathy and diabetic macular edema cases.

ASiO: Please discuss the use of any disease rating scales and their applicability and use across the span of healthcare providers.

Dr Chew: The diabetic retinopathy severity scale (see “International Classification of Diabetic Retinopathy Disease Severity Scale” table on page 13) can be easily translated into field work with minimal training of the clinician because of the simplicity of the lesions. The level of severe nonproliferative diabetic retinopathy, although somewhat difficult to diagnose, is essential because treatment with scatter laser photocoagulation is initiated at this stage, allowing for worldwide communication as to the severity of the retinopathy.

The scale used for diabetic macular edema (see “International Classification of Diabetic Macular Edema Disease Severity Scale” table on page 13) is more difficult to use compared to the scale for diabetic retinopathy because without stereoscopic viewing, retinal thickening in the absence of retinal hard exudates may be difficult to recognize; however, this presentation may be less common. Diabetic macular edema is a prevalent cause of vision loss, thus it is important to have a classification that can be easily used by clinicians worldwide.

In the classification system, the most important groups indicate patients at risk for vision loss from diabetic retinopathy. Patients who have severe nonproliferative diabetic retinopathy are at high risk for developing proliferative retinopathy associated with risk of severe vision loss. Diabetic macular edema is another important cause of vision loss that is evaluated with this simple scale. This international collaboration will hopefully initiate studies to improve the ocular health and quality of life for all patients with diabetes.

REFERENCES


