| 9.03.13 | Retinal Telescreening for Diabetic Retinopathy | | |
|---|---|---|---|
| **Original Policy Date:** | August 1, 2016 | **Effective Date:** | May 1, 2024 |
| **Section:** | 9.0 Other | **Page:** | Page 1 of 20 |

## Policy Statement

I. Retinal telescreening with digital imaging and manual grading of images may be considered **medically necessary** as a screening technique for the detection of diabetic retinopathy.

II. Digital retinal imaging with image interpretation by artificial intelligence software that is approved by the U.S. Food and Drug Administration (e.g., IDX-DR, EyeArt) may be considered **medically necessary** for screening for diabetic retinopathy.

III. Retinal telescreening is considered **investigational** for all other indications, including the monitoring and management of disease in individuals diagnosed with diabetic retinopathy.

**NOTE**: Refer to Appendix A to see the policy statement changes (if any) from the previous version.

## Policy Guidelines

**Coding**
See the Codes table for details.

## Description

Retinopathy telescreening and risk assessment with digital imaging systems are proposed as an alternative to conventional dilated fundus examination in diabetic individuals. Digital imaging systems use a digital fundus camera to acquire a series of standard field color images and/or monochromatic images of the retina of each eye. Captured digital images may be transmitted via the Internet to a remote center for interpretation, storage, and subsequent comparison.

## Related Policies

- N/A

## Benefit Application

Benefit determinations should be based in all cases on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program [FEP]) prohibits plans from denying Food and Drug Administration (FDA)-approved technologies as investigational. In these instances, plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.

## Regulatory Status

Several digital camera and transmission systems (see Table 1 for examples) have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process. Digital image storage and data communication systems that are designed to be utilized with a variety of cameras have also been cleared for marketing by the FDA. FDA product codes: HKI and NFJ

Many artificial intelligence analysis systems are in use around the world. As of January 2022, 2 have received marketing clearance from the FDA (Table 2). In 2018, the FDA gave de novo clearance for the automated retinal analysis system (IDx-DR®) that uses artificial intelligence (DEN180001). IDx-DR is indicated "for use by health care providers to automatically detect more than mild diabetic retinopathy in adults diagnosed with diabetes who have not been previously diagnosed with diabetic retinopathy. IDx-DR is indicated for use with the Topcon NW400." EyeArt® retinal analysis software (Eyenuk) received marketing clearance through the FDA's 510(k) pathway in 2020. It is indicated for use with the Canon CR-2 AF and Canon CR-2 Plus AF cameras in both primary care and eye care settings. Use of automated retinal analysis of images obtained with other cameras would be considered off-label. FDA product code: PIB

**Table 1. Examples of Digital Camera and Transmission Systems Cleared by FDA for Retinal Telescreening**

| Camera and Transmission Systems | Manufacturer | FDA Clearance | Date |
|---|---|---|---|
| RetinaVue™ Network REF 901108 PACS Medical Image System | Welch Allyn | K181016 | 2018 |
| IRIS Intelligent Retinal Imaging System™ | Ora Inc. | K141922 | 2015 |
| EyeSuite Imaging | Haag-Streit AG | K142423 | 2014 |
| CenterVue Digital Retinography System (DRS) | Welch Allyn | K101935 | 2010 |
| ImageNet™ Digital Imaging System | Topcon Medical Systems | | 2008 |
| The Fundus AutoImagerä | Visual Pathways | | 2002 |
| Zeiss FF450 Fundus Camera and the VISUPAC® Digital Imaging System | Carl Zeiss Meditec | | 2001 |
| DigiScope® | Eye Tel Imaging with Johns Hopkins Medicine | | 1999 |

FDA: Food and Drug Administration.

**Table 2. Automated Analysis Systems**

| Automated Analysis Systems | Software Developer | FDA Clearance | Date |
|---|---|---|---|
| IDx-DR Artificial Intelligence Analyzer for the Topcon NW400 | IDx, LLC | DEN180001 | 2018 |
| EyeArt® | Eyenuk | K200667 | 2020 |

## Rationale

### Background

#### Diabetic Retinopathy

Diabetic retinopathy is the leading cause of blindness among adults aged 20 to 74 years in the United States. The major risk factors for developing diabetic retinopathy are the duration of diabetes and severity of hyperglycemia. After 20 years of disease, almost all patients with type 1 and more than 60% of patients with type 2 diabetes will have some degree of retinopathy.[1,] Other factors that contribute to the risk of retinopathy include hypertension and elevated serum lipid levels.

Diabetic retinopathy progresses, at varying rates, from asymptomatic, mild non-proliferative abnormalities to proliferative diabetic retinopathy, with new blood vessel growth on the retina and posterior surface of the vitreous. The 2 most serious complications for vision are diabetic macular

edema and proliferative diabetic retinopathy. At its earliest stage (non-proliferative retinopathy), the retina develops microaneurysms, intraretinal hemorrhages, and focal areas of retinal ischemia. With the disruption of the blood-retinal barrier, macular retinal vessels become permeable, leading to exudation of serous fluid and lipids into the macula (macular edema). As the disease progresses, retinal blood vessels are blocked, triggering the growth of new and fragile blood vessels (proliferative retinopathy). The new blood vessels that occur in proliferative diabetic retinopathy may fibrose and contract, resulting in tractional retinal detachments with significant vision loss. Severe vision loss with proliferative retinopathy arises from vitreous hemorrhage. Moderate vision loss can also arise from macular edema (fluid accumulating in the center of the macula) during the proliferative or non-proliferative stages of the disease. Although proliferative disease is the main cause of blinding in diabetic retinopathy, macular edema is more frequent and is the leading cause of moderate vision loss in people with diabetes.

### Treatment

With early detection, diabetic retinopathy can be treated with modalities that can decrease the risk of severe vision loss. Tight glycemic and blood pressure control is the first line of treatment to control diabetic retinopathy, followed by laser photocoagulation for patients whose retinopathy is approaching the high-risk stage. Although laser photocoagulation is effective at slowing the progression of retinopathy and reducing visual loss, it causes collateral damage to the retina and does not restore lost vision. Focal macular edema (characterized by leakage from discrete microaneurysms on fluorescein angiography) may be treated with focal laser photocoagulation, while diffuse macular edema (characterized by generalized macular edema on fluorescein angiography) may be treated with grid laser photocoagulation. Corticosteroids may reduce vascular permeability and inhibit vascular endothelial growth factor production, but are associated with serious adverse events including cataracts and glaucoma, with damage to the optic nerve. Corticosteroids can also worsen diabetes control. Vascular endothelial growth factor inhibitors (e.g., ranibizumab, bevacizumab, pegaptanib), which reduce permeability and block the pathway leading to new blood vessel formation (angiogenesis), are also used for the treatment of diabetic macular edema and proliferative diabetic retinopathy.

### Digital Photography and Transmission Systems for Retinal Imaging

A number of photographic methods have been evaluated that capture images of the retina to be interpreted by expert readers, who may or may not be located proximately to the patient. Retinal imaging can be performed using digital retinal photographs with (mydriatic) or without (non-mydriatic) dilation of the pupil. One approach is mydriatic standard field 35-mm stereoscopic color fundus photography. Digital fundus photography has also been evaluated as an alternative to conventional film photography and has become the standard in major clinical trials. Digital imaging has the advantage of easier acquisition, transmission, and storage. Digital images of the retina can also be acquired in a primary care setting and evaluated by trained readers in a remote location, in consultation with retinal specialists.

### Literature Review

Evidence reviews assess whether a medical test is clinically useful. A useful test provides information to make a clinical management decision that improves the net health outcome. That is, the balance of benefits and harms is better when the test is used to manage the condition than when another test or no test is used to manage the condition.

The first step in assessing a medical test is to formulate the clinical context and purpose of the test. The test must be technically reliable, clinically valid, and clinically useful for that purpose. Evidence reviews assess the evidence on whether a test is clinically valid and clinically useful. Technical reliability is outside the scope of these reviews, and credible information on technical reliability is available from other sources.

Promotion of greater diversity and inclusion in clinical research of historically marginalized groups (e.g., People of Color [African-American, Asian, Black, Latino and Native American]; LGBTQIA (Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual); Women; and People with Disabilities [Physical and Invisible]) allows policy populations to be more reflective of and findings more applicable to our diverse members. While we also strive to use inclusive language related to these groups in our policies, use of gender-specific nouns (e.g., women, men, sisters, etc.) will continue when reflective of language used in publications describing study populations.

## Optometrist or Ophthalmologist Image Interpretation

### Clinical Context and Test Purpose

The purpose of retinal telescreening with manual grading of images in patients who have diabetes is to inform a decision whether to refer to an ophthalmologist.

There is value in screening for diabetic retinopathy because diabetic retinopathy has few visual or ocular symptoms until vision loss develops. Because treatments are primarily aimed at preventing vision loss, and retinopathy can be asymptomatic, it is important to detect disease and begin treatment early in the process. Annual dilated, indirect ophthalmoscopy, coupled with biomicroscopy or 7-standard field stereoscopic 30° fundus photography, has been considered the screening technique of choice.

The benefit of early treatment of diabetic retinopathy was established in the early 1990s in the large Early Treatment Diabetic Retinopathy Study (ETDRS), which was supported by the National Eye Institute.[2,3,]A local acquisition/remote interpretation technique, with interpretation by skilled readers, was used to consistently detect and evaluate the retinal changes of participants in the study. The ETDRS used mydriatic 30° stereoscopic color fundus 35-mm photographs of 7 standard fields evaluated by a single reading center. While 7-field fundus photography by a professional ophthalmic photographer with evaluation by a skilled clinician has high sensitivity for diabetic retinopathy detection, the need for on-site professional services limits its utilization as a screening tool. Because these techniques require a dedicated visit to a competent eye care professional, typically an ophthalmologist, retinopathy screening is underutilized. This underuse has resulted in the exploration of remote retinal imaging, using film or digital photography, as an alternative to direct ophthalmic examination of the retina.

The following PICO was used to select literature to inform this review.

### *Populations*

The relevant population of interest is patients with diabetes who are undergoing screening for diabetic retinopathy. Because treatments are primarily aimed at preventing vision loss, and retinopathy can be asymptomatic, it is important to detect disease and begin treatment early in the process.

The diabetic retinopathy screening recommendations of the American Diabetes Association (2020) are provided in Table 3.[4,]

**Table 3. Retinopathy Screening Recommendations**

| Patient Group | First Retinal Examination | Follow-Up |
|---|---|---|
| **Adults with type 1 diabetes** | Initial dilated and comprehensive eye examination by an ophthalmologist or optometrist within 5 y after onset of diabetes | Yearly |
| **Type 2 diabetes** | Initial dilated and comprehensive eye examination by an ophthalmologist or optometrist at the time of diagnosis of diabetes | Yearly |

| Patient Group | First Retinal Examination | Follow-Up |
|---|---|---|
| **Pregnancy in preexisting diabetes** | Before pregnancy or in the first trimester | Every trimester and for 1 y postpartum as indicated by the degree of retinopathy |

*Interventions*
The test being considered is digital retinal imaging with manual image interpretation.

*Comparators*
The following tests are currently being used to screen for diabetic retinopathy: dilated retinal fundus evaluation via ophthalmoscopy and 7-field fundus photography. Seven-field fundus photography is considered the criterion standard for the detection of diabetic retinopathy and has sensitivity and specificity superior to direct and indirect ophthalmoscopy by ophthalmologists. Studies from the 1970s established the accuracy of 7-field fundus photography in the detection of diabetic retinopathy. Moss et al (1985) reported an overall agreement of 85.7% when comparing retinopathy detection by ophthalmoscopy performed by skilled examiners with 7-standard-field stereoscopic 30° fundus photography evaluated by trained readers.[5,]Kinyoun et al (1992) found fair-to-good agreement between ophthalmoscopy and evaluation of 7-standard-field stereoscopic 30° fundus photography by the examining ophthalmologist, as well as by trained readers.[6,] Analysis of the discordance suggested that conventional ophthalmoscopy could miss up to 50% of microaneurysms, which are some of the earliest manifestations of diabetic retinopathy.

*Outcomes*
The general outcomes of interest are test validity, change in disease status, and functional outcomes. Tests should have sufficient sensitivity and specificity to detect retinopathy in order to facilitate early treatment and prevent a loss of visual function.

The beneficial outcome of a true-positive test is the early detection of diabetic retinopathy with treatment and preservation of vision. The beneficial outcome of a true-negative test is continued assurance with follow-up scheduled after 1 year.

A harmful outcome of a false-positive test is unnecessary referral to an ophthalmologist. A harmful outcome of a false-negative test is delay in treatment potentially resulting in vision loss.

Comparison with 7-field fundus photography would be immediate. A change in retinopathy can be observed over the period of a year, while a change in vision may occur over several years.

## Study Selection Criteria
For the evaluation of clinical validity of the test, studies that meet the following eligibility criteria were considered:

- Reported on the accuracy of the marketed version of the technology (including any algorithms used to calculate scores);
- Included a suitable reference standard;
- Patient clinical characteristics were described.

## Review of Evidence
The efficacy of diabetic retinopathy detection with digital image acquisition, compared with 7-field fundus photography, has been evaluated in over 20 studies (N=1960 patients) and summarized in a systematic review by Shi et al (2015).[7,] In pooled analysis, the sensitivity of digital imaging with telemedicine ophthalmologic evaluation for various diabetic retinopathy states was greater than 70%. The pooled specificity of digital imaging for various diabetic retinopathy states was greater than 90%, except for the detection of mild non-proliferative diabetic retinopathy (specificity, 89%; 95% confidence interval [CI], 88% to 91%). Summary receiver operating characteristic curves showed an area under the curve of greater than 0.9 for the detection of diabetic retinopathy and diabetic macular edema, across a range of severity.

The 7-field fundus photography technique used in ETDRS, and in some of the studies of digital photography, used dilated pupils. However, screening using undilated pupils has advantages regarding time, cost, and patient compliance. Thus, in addition to the examination technique and the comparison of different photographic techniques, the results of dilated (mydriatic) versus undilated (non-mydriatic) fundus photography have been studied. Bragge et al (2011) conducted a meta-analysis to evaluate variations in qualifications of photographers and mydriatic status.[8,] Twenty studies were included that assessed the accuracy of a diabetic retinopathy screening method that used photography- or examination-based retinopathy screening compared with a standard of either 7-field mydriatic photography or dilated fundal examination. In a multivariable logistic regression, variations in mydriatic status alone did not significantly influence sensitivity (odds ratio [OR], 0.89; 95% CI, 0.56 to 1.41) or specificity (OR, 0.94; 95% CI, 0.57 to 1.54).

One 2015 randomized controlled trial (RCT) compared the effectiveness of a telemedicine screening program for diabetic retinopathy with traditional surveillance with an eye care professional.[9,] The trial randomized 567 adults with diabetes to a telemedicine program (n=296) or traditional surveillance (n=271). After 2 years of enrollment, those randomized to the traditional surveillance program were offered the opportunity to cross over to telemedicine screening. At 0- to 6-month follow-up, those randomized to the telemedicine program were more likely to undergo retinopathy screening (94.6%) compared with those randomized to traditional surveillance (43.9%; risk difference, 50.7%; 95% CI, 46.6% to 54.8%; p<.001).

### Section Summary: Optometrist or Ophthalmologist Image Interpretation

Data from systematic reviews have demonstrated there is concordance between direct ophthalmoscopy and grading by mydriatic or non-mydriatic photography and remote evaluation. An RCT that compared a telemedicine screening program with traditional surveillance found that patients who were randomized to the telemedicine arm were more likely to undergo screening (95% vs. 44%). There is limited direct evidence related to visual outcomes for patients evaluated with a strategy of retinal telescreening. However, given evidence from the EDTRS that early retinopathy treatment improves outcomes, coupled with studies showing high concordance between the screening methods used in the ETDRS, and an RCT demonstrating higher uptake of screening with a telescreening strategy, a strong chain of evidence can be made that telescreening is associated with improved health outcomes. Digital imaging systems have the additional advantages of short examination time and the ability to perform the test in the primary care physician setting. For individuals who cannot or would not be able to access an eye care professional at the recommended screening intervals, the use of telescreening has a low risk and is very likely to increase the likelihood of retinopathy detection.

## Automated Image Interpretation

### Clinical Context and Test Purpose

Early detection of diabetic retinopathy is critical to vision preservation. The telemedicine screening programs (described above) rely on human grading. Screening for diabetic retinopathy using human grading is labor intensive and requires trained personnel. Because the prevalence of diabetes has doubled since 1980 and is expected to increase even more in the future, this creates an increasing demand for professionals who are trained to screen for diabetic retinopathy.

The purpose of digital retinal imaging with automated image interpretation in patients who have diabetes is to inform a decision of whether to refer to an eye care specialist. The potential benefits of an automated screening system are to reduce the strain on a limited resource of eye care providers and increase the rate of screening for a population that is seeing substantially increased rates of diabetes prevalence, and who may not be fully compliant with annual screening recommendations. Automated annual screening at the same time as a routine diabetes check-up could increase rates of screening in accordance with annual screening recommendations and facilitate referral to eye care specialists for patients who screen positive for retinopathy. A number of artificial intelligence scoring systems are being evaluated for diabetic retinopathy screening.

The following PICO was used to select literature to inform this review.

*Populations*
The relevant population of interest is patients with diabetes who are undergoing screening for diabetic retinopathy. Because treatments are primarily aimed at preventing vision loss, and retinopathy can be asymptomatic, it is important to detect disease and begin treatment early in the process.

The diabetic retinopathy screening recommendations of the American Diabetes Association (2020) are provided in Table 3.[4,]

*Interventions*
The test being considered is digital retinal imaging with automated image interpretation for screening for diabetic retinopathy as an alternative to human grading of retinal images. Automated image interpretation provides a dichotomous result, either negative (non-referral) or positive (referral) for more than mild diabetic retinopathy. Algorithms for retinal imaging analysis are undergoing rapid evolution, and the version of the software, which can change frequently, is important for evaluating performance characteristics.

In 2018, the U.S. Food and Drug Administration (FDA) gave the first marketing clearance for an automated retinal analysis system (IDx-DR) with artificial intelligence through the de novo classification process. The IDx-DR was previously known as the Iowa Detection Program for Referable Diabetic Retinopathy.

EyeArt (Eyenuk) automated image interpretation software received marketing clearance in 2020. The EyeArt versions evaluated here are v2.0 and v2.1.0.

Both IDx-DR and EyeArt are indicated for use with specific retinal imaging cameras. Automated image interpretation systems are also being evaluated with mobile phone cameras.

*Comparators*
The following tests are currently being used to screen for diabetic retinopathy: dilated retinal fundus evaluation via ophthalmoscopy and 7-field fundus photography. Fundus photography with expert evaluation of images is considered the criterion standard for the detection of diabetic retinopathy. Telescreening with digital mydriatic or non-mydriatic photography and remote human grading of images is an accepted method of diabetic retinopathy screening. Standard telescreening is limited by the number of eye care specialists for a population that is seeing dramatic increases in rates of diabetes. Screening for diabetic retinopathy may also require a separate visit to an eye care specialist, which can impact compliance with annual screening recommendations.

*Outcomes*
The general outcomes of interest are test validity, change in disease status, and functional outcomes. Tests must have sufficient sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) to detect retinopathy in order to facilitate early treatment and prevent a loss of visual function. When used as a screening tool with referral for further evaluation by an eye care specialist, detection of retinopathy (sensitivity) is the most critical feature for referral to an eye care specialist.

The beneficial outcome of a true-positive test is the early detection of diabetic retinopathy with treatment and preservation of vision. The beneficial outcome of a true-negative test is assurance with scheduling follow-up for 1 year.

The harmful outcome of a false-positive test is unnecessary referral to an ophthalmologist for further evaluation. The harmful outcome of a false-negative test is delay in treatment potentially resulting in

vision loss. Annual screening would limit the harms of false-negatives as more severe and treatable retinopathy could be detected in subsequent years as the disease progresses.

Comparison with fundus photography and manual grading of images would be immediate. A change in retinopathy can be observed over the period of a year, while a change in vision would occur over several years.

### Study Selection Criteria

For the evaluation of clinical validity of the test, studies that meet the following eligibility criteria were considered:

- Reported on the accuracy of a marketed version of the technology (including any algorithms used to calculate scores);
- Included a suitable reference standard;
- Patient clinical characteristics were described.

### Clinically Valid

A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

### Review of Evidence

Study characteristics and results are shown in Tables 4 and 5. Study limitations are described in Tables 6 and 7.

The pivotal study of the IDx-DR artificial intelligence image analysis system (DEN180001) was published by Abramoff et al (2018).[10,] The reference standard was expert mydriatic photography with centralized reading of images. Performance thresholds for the FDA application were set at 85.0% for sensitivity and 82.5% for specificity. Nine hundred patients with diabetes and no history of diabetic retinopathy were enrolled at primary care centers. The study was enriched with patients who had elevated hemoglobin A1C in order to increase the likelihood of enrolling patients with more serious diabetic retinopathy. The primary care staff received 4 hours of training in image capture and use of the system. The system includes an image quality algorithm, which recommended pupil dilation in 23.6% of patients when 3 attempts at non-mydriatic image capture had failed. Compared to expert mydriatic photography and centralized image assessment, the artificial intelligence system had a sensitivity of 87.2%, specificity of 90.7%, PPV of 74.9% and NPV of 95.7% (Table 5). Enrichment corrected sensitivity and specificity calculated similar diagnostic performance if the study population had not been enriched with subjects with higher hemoglobin A1C levels.

The pivotal study for the EyeArt 2.1.0 artificial intelligence imaging system (NCT03112005) was reported in the summary of the 510(k) application to the U.S. Food and Drug Administration.[11,] In addition to 235 participants who were sequentially enrolled (described in more detail in the Tables below), an enriched cohort of 420 participants was studied. Participants were seen in either a primary care setting or an ophthalmology setting. Initial 2-field non-mydriatic images were automatically analyzed by EyeArt, which notified the operator if the image was not gradable in order to retake images. Imageability on the first attempt ranged from 83.5% to 94.2%. This was then followed with a reference standard of mydriatic 4-wide field images that were graded at a centralized reading facility. For the non-enriched cohort, more than mild diabetic retinopathy was present in 12.2% of patients seen in primary care and 10.5% of patients seen by ophthalmologists. Sensitivity for more than mild diabetic retinopathy was 100% among primary care providers and 92.5% for ophthalmologists. Specificity was 88.5% among primary care providers and 85.7% for ophthalmologists. For the enriched cohort of 335 patients seen in primary care, disease prevalence was 15.5%, with sensitivity of 92.9% and specificity of 85.6%. For the enriched cohort seen in ophthalmology practices, disease prevalence was 19.4% with sensitivity of 96.6% and specificity of 85.2% to detect more than mild diabetic retinopathy. Full results from the EyeArt 2.1.0 pivotal study were published in 2021 and confirmed the accuracy of the system to detect both more-than-mild

diabetic retinopathy (sensitivity 95.5%; 95% CI, 92.4% to 98.5%; specificity 85.0%; 95%CI, 82.6% to 87.4%) and vision-threatening diabetic retinopathy (sensitivity 95.1%; 95% CI, 90.1% to 100%; specificity 89.0%; 95% CI, 87.0% to 91.1%) without dilation.[12,]

Publication of the pivotal study was preceded by a non-concurrent study by Bhaskaranand et al (2019) of the diagnostic accuracy of EyeArt v2.0 in a real world setting.[13,] Several of the authors are co-inventors of the technology and employees of Eyenuk, Inc. The REtrospective Validation of Eyeart in the REal world (REVERE) study assessed the EyeArt system v2.0 in previously obtained images from 107,001 consecutive diabetic patient visits from the EyePACS telescreening program. Patients had undergone telescreening at 404 primary care sites from 2014 to 2015. Notably, the fundoscopic images were taken with a variety of cameras, could be either mydriatic or non-mydriatic, and were not the same as the images that the artificial intelligence system had been trained on. The images that had been stored by the EyePACS program were uploaded and regraded by EyeArt v2.0 into referable or non-referable, with results compared with the original telescreening grades from the certified trained optometrist and ophthalmologist readers from EyePACS. Compared to the trained readers, the EyeArt system had sensitivity of 91.3% and specificity of 91.1%. Of the 1803 false negative encounters, 95.4% did not meet general treatment criteria because they had moderate non-proliferative diabetic retinopathy. A subset of 192 patient encounters was randomly selected to be re-graded by a retina specialist. In this subset, the EyeArt system had 95.1% sensitivity for referable diabetic retinopathy and 98.3% specificity. The sensitivity for potentially treatable diabetic retinopathy was 98.5%.

Heydon et al (2020) reported a prospective independent evaluation of the EyeArt v2.1.0 analysis system in over 30,000 patients from the English Diabetic Eye Screening Programme.[14,] The purpose of the study was to assess the utility of the automated analysis system as a screening tool when used in conjunction with human graders. The cameras used and the graders differed between the 3 sites. Images that had been previously scored by human graders were submitted for analysis by EyeArt and classified as referable (positive n=15,091) or non-referable (negative n=15,314). Images that were ungradable by EyeArt were considered referable for further evaluation. Overall, sensitivity and specificity were 95.7% and 54.0%, respectively. EyeArt classified for referral (positive) all cases that had been graded as moderate-to-severe retinopathy by human graders (sensitivity of 100%), but would not have referred 78 (10.6%) of the 739 images that were considered ungradable by the human graders. The number of false positives was high, but it was estimated that when used as a primary screening tool the software could reduce the workload of first level human graders by half.

Lee et al (2021) evaluated diagnostic accuracy to detect referable retinopathy with 7 different artificial intelligence algorithms in a sample of over 26,000 patients from 2 Veteran Affairs Health Systems.[15,] The same camera (Topcon TRC-NW8) was used for all images, but the centers differed on whether the images were mydriatic or non-mydriatic. Over 16% of non-mydriatic images were ungradable compared to 2.5% of mydriatic images. For the analysis, 5 manufacturers (OpthAI, AirDoc, Eyenuk, RetinaAI Health, Retmarker) provided their locked software preloaded on a workstation; the software was identified only by letters A to G. All artificial intelligence algorithms were used clinically across the world, and 1 (EyeArt by Ayenuk) was cleared by the FDA for marketing at the time of the study. Across the 7 algorithms, sensitivity ranged from 50.98% to 85.90%, and specificity ranged from 60.42% to 83.69%, indicating that each marketed software needs to be evaluated separately. Only 1 of the algorithms had diagnostic performance equal to the human teleretinal graders.

Use of the EyeArt image analysis software was also tested in a study of 69 patients from a retina clinic who were screened using a smartphone-based camera (RetinaScope) by non-ophthalmic personnel.[16,] Compared to the gold standard evaluation by a retina specialist, automated interpretation of images had a sensitivity of 87.0% and specificity of 78.6%; grader 1 had a sensitivity of 96.3% and specificity of 42.9%; grader 2 had a sensitivity of 92.5% and specificity of 50.0%. Further study in a larger, more diverse, sample is needed.

Table 4. Study Characteristics of Clinical Validity

| Study | Study Population | Design | Reference Standard | Threshold for Positive Index Test | Timing of Reference and Index Tests | Blinding of Assessors | Comment |
|---|---|---|---|---|---|---|---|
| **Abramoff et al (2018)[10,]** | 900 patients with diabetes and no history of DR seen at primary care sites | Multicenter prospective non-inferiority design with intent-to-screen (IDx-DR) | Expert mydriatic photography and centralized image assessment | Diagnostic algorithm based on multiple detectors | Not specifically stated but images appear to be taken at the same time | Yes | 23.6% required pupil dilation for adequate image quality |
| **Bhaskaranand et al (2019)[13,]** | 107,001 consecutive patient encounters from prior telescreening for DR | Non-concurrent analysis with EyeArt v2.0 on stored images | Original retinal grades with a subset graded by retina specialists | Any level of referable retinopathy | Previously scored images were analyzed within 45 hours | Yes | Images could be mydriatic or non-mydriatic |
| **EyeArt 510(k) Summary (2020)[11,]** | Sequential enrollment of 45 patients seen in primary care and 180 seen in ophthalmology centers, and an enriched cohort | Multicenter prospective concurrent with EyeArt 2.1.0 | Centralized evaluation of mydriatic 4-wide field images | More than mild retinopathy from 2-field retinal photography (not dilated) | Mydriatic wide-field images were taken following the non-mydriatic 2-field images | Yes | Feedback given to operator if image quality is insufficient |
| **Heydon et al (2020)[14,]** | 30,405 patients with diabetes who were seen in the English Diabetic Eye Screening Programme | Non-concurrent analysis with EyeArt 2.1.0 on stored images | Human graders according to a standard national protocol | Any level of referable retinopathy | Previously scored images for each center were analyzed on a single day | Yes | |
| **Lee et al (2021)[15,]** | Sampled from 26,436 patients from 2 VA systems undergoing routine diabetic retinopathy screening | Non-concurrent prospective analysis comparing 7 imaging algorithms | Original VA retinal grades and arbitrated blinded grading by retina specialists | Any level of referable retinopathy, including mild non-proliferative retinopathy | Previously stored images from 2006 to 2018 | Yes | 16.2% of non-mydriatic images were ungradable compared to 2.5% of mydriatic images (Topcon TRC-NW8 camera) |

DR: diabetic retinopathy; VA: veteran affairs health systems.

Table 5. Clinical Validity

| Study | Initial N | Final N | Excluded Samples | Prevalence of Condition | Clinical Validity (95% Confidence Interval) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | *Sensitivity* | *Specificity* | *PPV* | *NPV* |
| **Abramoff et al (2018)[10,]** | 900 | 819 | 33 not evaluable by AI | 24.2% | 87.2% (81.8% to 91.2%) | 90.7% (88.3% to 92.7%) | 74.9% (NR) | 95.7% (NR) |
| **Bhaskaranand et al (2019)[13,]** | 107,001 | 107,001 | None - all non-evaluable images were considered positive for referral | | 91.3% (90.9% to 91.7%) | 91.1% (90.9% to 91.3%) | 72.5% (71.9% to 73.0%) | 97.6% (97.5% to 97.7%) |
| **EyeArt 510(k) Summary (2020)[11,]** | 45 in primary care sites | 45 | 4 ungradable included | 12.2% (4.4% to 20.0%) | 100% (75.1% to 100%) | 88.5% (80.0% to 95.8%) | 64.7% (40.0% to 86.7%) | 100% (94.7% to 100.0%) |
| **EyeArt 510(k) Summary (2020)[11,]** | 190 in ophthalmology sites | 190 | 8 ungradable included | 10.5% (6.6% to 15.0%) | 92.5% (82.6% to 100%) | 85.7% (80.9% to 89.7%) | 45.7% (31.8% to 58.3%) | 96.6% (94.1% to 98.6%) |
| **Heydon et al (2020)[14,]** | 30,405 | 30,405 | None - all non-evaluable images were considered positive for referral | 462 (1.5%) | 95.7% (94.8% to 96.5%) | 54% (53.4% to 54.5%) | | |
| **Lee et al (2021)[15,]** | 26,436 | 23,724 | | 14.79% to 29.95% with approx 1% severe DR | 50.98% to 85.90% | 60.42% to 83.69% | 36.46% to 50.80% | 82.72% to 93.69% |

AI: artificial intelligence; DR: diabetic retinopathy; NPV: negative predictive value; NR: not reported; PPV: positive predictive value.

Table 6. Study Relevance Limitations

| Study | Population[a] | Intervention[b] | Comparator[c] | Outcomes[d] | Duration of Follow-Up[e] |
|---|---|---|---|---|---|
| **Abramoff et al (2018)[10,]** | 4. Study population was enriched for increased likelihood of more serious retinopathy, although sensitivity analysis for enrichment was performed. | | | | |
| **Bhaskaranand et al (2019)[13,]** | | | 2. Results were compared with trained readers. A small subset was compared | | |

| Study | Population[a] | Intervention[b] | Comparator[c] | Outcomes[d] | Duration of Follow-Up[e] |
|---|---|---|---|---|---|
| | | | with retina specialists. | | |
| **EyeArt 510(k) Summary (2020)[11],** | | 2. It appears that repeat imaging may have been either mydriatic or non-mydriatic depending on the center. | | | |
| **Heydon et al (2020)[14],** | | | 1. No information was provided on the cameras used or whether they included mydriatic or non-mydriatic images. | | |
| **Lee et al (2021)[15],** | | 2. Not all commercially available systems were able to be assessed. Those assessed were not identified. | | | |

The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.
[a] Population key: 1. Intended use population unclear; 2. Clinical context is unclear; 3. Study population is unclear; 4. Study population not representative of intended use.
[b] Intervention key: 1. Classification thresholds not defined; 2. Version used unclear; 3. Not intervention of interest.
[c] Comparator key: 1. Classification thresholds not defined; 2. Not compared to credible reference standard; 3. Not compared to other tests in use for same purpose.
[d] Outcomes key: 1. Study does not directly assess a key health outcome; 2. Evidence chain or decision model not explicated; 3. Key clinical validity outcomes not reported (sensitivity, specificity and predictive values); 4. Reclassification of diagnostic or risk categories not reported; 5. Adverse events of the test not described (excluding minor discomforts and inconvenience of venipuncture or noninvasive tests).
[e] Follow-Up key: 1. Follow-up duration not sufficient with respect to natural history of disease (true-positives, true-negatives, false-positives, false-negatives cannot be determined).

### Table 7. Study Design and Conduct Limitations

| Study | Selection[a] | Blinding[b] | Delivery of Test[c] | Selective Reporting[d] | Data Completeness[e] | Statistical[f] |
|---|---|---|---|---|---|---|
| **Abramoff et al (2018)[10],** | | | | | | 1. Confidence intervals for PPV and NPV not reported |
| **Bhaskaranand et al (2019)[13],** | | | 2. Automated analysis was performed on previously | | | |

| Study | Selection[a] | Blinding[b] | Delivery of Test[c] | Selective Reporting[d] | Data Completeness[e] | Statistical[f] |
|---|---|---|---|---|---|---|
| | | | obtained images | | | |
| **EyeArt 510(k) Summary (2020)[11,]** | | | | | | |
| **Heydon et al (2020)[14,]** | | | 2. Automated analysis was performed on previously obtained images | | | |
| **Lee et al (2021)[15,]** | | | 2. Automated analysis was performed on previously obtained images | | 1. Discrepancy between the abstract and text in the number of patients included | |

PPV: positive predictive value: NPV: negative predictive value.
The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.
[a] Selection key: 1. Selection not described; 2. Selection not random or consecutive (i.e., convenience).
[b] Blinding key: 1. Not blinded to results of reference or other comparator tests.
[c] Test Delivery key: 1. Timing of delivery of index or reference test not described; 2. Timing of index and comparator tests not same; 3. Procedure for interpreting tests not described; 4. Expertise of evaluators not described.
[d] Selective Reporting key: 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.
[e] Data Completeness key: 1. Inadequate description of indeterminate and missing samples; 2. High number of samples excluded; 3. High loss to follow-up or missing data.
[f] Statistical key: 1. Confidence intervals and/or p-values not reported; 2. Comparison to other tests not reported.

### Clinically Useful

A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, more effective therapy, or avoid unnecessary therapy or testing.

## Review of Evidence

### Direct Evidence

Direct evidence of clinical utility is provided by studies that have compared health outcomes for patients managed with and without the test. Because these are intervention studies, the preferred evidence would be from RCTs. No RCTs with automated image analysis systems were identified.

### Chain of Evidence

Indirect evidence for clinical utility rests on clinical validity. When used for screening as an alternative to human graders with referral to eye care specialists for patients who screen positive, detection of retinopathy (sensitivity) is the most critical feature, and is highest in patients who have treatable disease. For patients with moderate diabetic retinopathy who do not screen positive (false negatives), annual screening in subsequent years would allow the detection of treatable retinopathy as the disease progresses and mitigate potential harms. Automated annual screening at the same time as a routine diabetes check-up can improve health outcomes of patients with diabetes by increasing screening in accordance with the annual screening recommendation, thereby allowing earlier detection and treatment of diabetic retinopathy. A chain of evidence can be constructed based on the sensitivity of automated image analysis systems to detect more than mild diabetic retinopathy, referral to eye care specialists for patients who screen positive, and the established benefit of early treatment to reduce vision loss in patients with diabetes.

### Section Summary: Automated Image Interpretation

Diagnostic performance of 7 artificial intelligence image analysis systems was evaluated in a large cohort of patients who had been screened for diabetic retinopathy in the U.S. Veteran Administration Healthcare System. Across the 7 algorithms, sensitivity ranged from 50.98% to 85.90% and specificity ranged from 60.42% to 83.69%, indicating that each marketed software needs to be evaluated separately, in a diverse population, and with the specific camera and use of dilation specified. The version of the software, which can change frequently, will also be key to evaluating performance characteristics. Two automated artificial intelligence systems for evaluating diabetic retinopathy in primary care have received de novo or 510(k) marketing clearance from the FDA. The pivotal study for the IDx-DR system met its predefined threshold (85.0% for sensitivity and 82.5% for specificity) when compared to the criterion standard of expert photography and image evaluation from a centralized site (sensitivity of 87.2% and specificity of 90.7%). EyeArt version 2.0 and 2.1.0 automated artificial intelligence system have been evaluated in a prospective pivotal study and 2 large non-concurrent trials (30,000 and 100,000 encounters) that analyzed images from prior screenings for diabetic retinopathy. Sensitivity ranged from 91% to 100% and specificity ranged from 54% to 91% when compared to trained human graders. There is no direct evidence related to visual outcomes for patients evaluated with a strategy of retinal telescreening. However, a chain of evidence can be constructed based on the sensitivity of automated image analysis systems to detect more than mild diabetic retinopathy, referral to eye care specialists for patients who screen positive, and the established benefit of early treatment to reduce vision loss in patients with diabetes. Automated annual screening at the same time as a routine diabetes check-up can improve health outcomes of patients with diabetes by increasing screening in accordance with the annual screening recommendation, thereby allowing earlier detection and treatment of diabetic retinopathy.

### Supplemental Information

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

### Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

### American Academy of Ophthalmology

A 2019 Preferred Practice pattern from the American Academy of Ophthalmology has provided the following on screening for diabetic retinopathy: "The purpose of an effective screening program for diabetic retinopathy is to determine who needs to be referred to an ophthalmologist for close follow-up and possible treatment and who may simply be screened annually. Some studies have shown that screening programs using digital retinal images taken with or without dilation may enable early detection of diabetic retinopathy along with an appropriate referral."[17,]

### American Diabetes Association

In 2020, the American Diabetes Association updated its guidelines on standards of medical care for diabetes.[4,] Included in the guidelines were specific recommendations for initial and subsequent screening examinations for retinopathy:

- "Adults with type 1 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist within 5 years after the onset of diabetes. (B)"
- "Patients with type 2 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist at the time of the diabetes diagnosis. (B)"

- "Eye examinations should occur before pregnancy or in the first trimester in patients with preexisting type 1 or type 2 diabetes, and then patients should be monitored every trimester and for 1 year postpartum as indicated by the degree of retinopathy. (B)"
- "If there is no evidence of retinopathy for one or more annual eye exams and glycemia is well controlled, then screening every 1–2 years may be considered. (B)"
- "Programs that use retinal photography (with remote reading or use of a validated assessment tool) to improve access to diabetic retinopathy screening can be appropriate screening strategies for diabetic retinopathy. Such programs need to provide pathways for timely referral for a comprehensive eye examination when indicated. (B)"

"Artificial intelligence systems that detect more than mild diabetic retinopathy and diabetic macular edema authorized for use by the FDA represent an alternative to traditional screening approaches. However, the benefits and optimal utilization of this type of screening have yet to be fully determined."

### American Telemedicine Association

In 2020, the American Telemedicine Association (ATA) updated their guidelines on the clinical, technical, and operational performance standards for ocular telehealth for diabetic retinopathy.[18,] Recommendations were based on reviews of evidence, medical literature, professional consensus, and a review that included open public comment. The guidelines stated that Early Treatment Diabetic Retinopathy Study 30°, stereo 7-standard field, color 35-mm slides have been the gold standard for evaluating diabetic retinopathy, but with the migration away from film photography, digital retinal images have become the norm for major clinical trials. The ATA recommends that telehealth programs for diabetic retinopathy should demonstrate an ability to compare favorably with Early Treatment Diabetic Retinopathy Study film or digital photography as reflected in $\kappa$ values for agreement of diagnosis, false-positive and false-negative readings, positive predictive value, negative predictive value, and sensitivity and specificity of referral thresholds.
The ATA notes limitations in sensitivity and specificity of smartphone platforms with a lack of standardization and a short product life cycle that create significant operational issues. Portable handheld imaging devices may suffer from some of the same limitations. The ATA considers computer algorithms to enhance digital retinal image quality or provide automated identification of retinal pathology to be emerging technologies.

Additional information on artificial intelligence for detection, classification, and diagnosis of diabetic retinopathy is included in the appendix of the guidelines.

### U.S. Preventive Services Task Force Recommendations

Not applicable.

### Medicare National Coverage

There is no national coverage determination specific to retinal telescreening. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

There is a national coverage determination on intraocular photography, originally developed in 1979, which states[19,]:

> "Intraocular photography is covered when used for the diagnosis of such conditions as macular degeneration, retinal neoplasms, choroid disturbances and diabetic retinopathy, or to identify glaucoma, multiple sclerosis and other central nervous system abnormalities. Make Medicare payment for the use of this procedure by an ophthalmologist [sic] in these situations when it is reasonable and necessary for the individual patient to receive these services."

### Ongoing and Unpublished Clinical Trials

Some currently unpublished trials that might influence this review are listed in Table 8.

Table 8. Summary of Key Trials

| NCT No. | Trial Name | Planned Enrollment | Completion Date |
|---|---|---|---|
| *Ongoing* | | | |
| NCT04699864[a] | The Use of Artificial Intelligence in the Early Detection and the Follow-Up of Diabetic Retinopathy of Diabetic Patients Followed at the CHUM: Evaluation of NeoRetina Automated Algorithm (DIAGNOS Inc.) | 630 | Dec 2026 |
| NCT03076697 | Smartphone Screening for Eye Diseases | 550 | Aug 2028 |
| *Unpublished* | | | |
| NCT04612868[a] | Pivotal Prospective Clinical Trial to Demonstrate the Efficacy and Safety of AEYE-DS Software Device for Automated Diabetic Retinopathy Detection From Digital Fundoscopic Images | 350 | Dec 2021 |
| NCT04732208 | Validation of an Artificial Intelligence Model for Diabetic Retinopathy Screening Using a Smartphone-based Fundus Camera in the UK Population | 410 | Aug 2022 |

NCT: national clinical trial.
[a] Industry sponsored or co-sponsored trial.

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## Documentation for Clinical Review

**Please provide the following documentation:**

- History and physical and/or consultation notes including:
  - Reason for retinal telescreening

**Post Service (in addition to the above, please include the following):**

- Retinal imaging report(s)

## Coding

*This Policy relates only to the services or supplies described herein. Benefits may vary according to product design; therefore, contract language should be reviewed before applying the terms of the Policy.*

*The following codes are included below for informational purposes. Inclusion or exclusion of a code(s) does not constitute or imply member coverage or provider reimbursement policy. Policy Statements are intended to provide member coverage information and may include the use of some codes for clarity. The Policy Guidelines section may also provide additional information for how to interpret the Policy Statements and to provide coding guidance in some cases.*

| Type | Code | Description |
|---|---|---|
| CPT® | 92227 | Imaging of retina for detection or monitoring of disease; with remote clinical staff review and report, unilateral or bilateral |
| | 92228 | Imaging of retina for detection or monitoring of disease; with remote physician or other qualified health care professional interpretation and report, unilateral or bilateral |

| Type | Code | Description |
|---|---|---|
| | 92229 | Imaging of retina for detection or monitoring of disease; point-of-care autonomous analysis and report, unilateral or bilateral |
| HCPCS | None | |

## Policy History

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

| Effective Date | Action |
|---|---|
| 08/01/2016 | BCBSA Medical Policy adoption |
| 05/01/2017 | Policy revision without position change |
| 05/01/2018 | Policy revision without position change |
| 05/01/2019 | Policy revision without position change |
| 06/01/2023 | Policy reactivated. Previously archived from 05/01/2020 to 05/31/2023. |
| 05/01/2024 | Annual review. No change to policy statement. Policy guidelines and literature review updated. Coding update. |

## Definitions of Decision Determinations

**Medically Necessary:** Services that are Medically Necessary include only those which have been established as safe and effective, are furnished under generally accepted professional standards to treat illness, injury or medical condition, and which, as determined by Blue Shield, are: (a) consistent with Blue Shield medical policy; (b) consistent with the symptoms or diagnosis; (c) not furnished primarily for the convenience of the patient, the attending Physician or other provider; (d) furnished at the most appropriate level which can be provided safely and effectively to the patient; and (e) not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of the Member's illness, injury, or disease.

**Investigational/Experimental:** A treatment, procedure, or drug is investigational when it has not been recognized as safe and effective for use in treating the particular condition in accordance with generally accepted professional medical standards. This includes services where approval by the federal or state governmental is required prior to use, but has not yet been granted.

**Split Evaluation:** Blue Shield of California/Blue Shield of California Life & Health Insurance Company (Blue Shield) policy review can result in a split evaluation, where a treatment, procedure, or drug will be considered to be investigational for certain indications or conditions, but will be deemed safe and effective for other indications or conditions, and therefore potentially medically necessary in those instances.

## Prior Authorization Requirements and Feedback (as applicable to your plan)

Within five days before the actual date of service, the provider must confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should be directed to the Prior Authorization Department at (800) 541-6652, or the Transplant Case Management Department at (800) 637-2066 ext. 3507708 or visit the provider portal at www.blueshieldca.com/provider.

We are interested in receiving feedback relative to developing, adopting, and reviewing criteria for medical policy. Any licensed practitioner who is contracted with Blue Shield of California or Blue Shield of California Promise Health Plan is welcome to provide comments, suggestions, or concerns. Our internal policy committees will receive and take your comments into consideration.

For utilization and medical policy feedback, please send comments to: MedPolicy@blueshieldca.com

*Disclaimer: This medical policy is a guide in evaluating the medical necessity of a particular service or treatment. Blue Shield of California may consider published peer-reviewed scientific literature, national guidelines, and local standards of practice in developing its medical policy. Federal and state law, as well as contract language, including definitions and specific contract provisions/exclusions, take precedence over medical policy and must be considered first in determining covered services. Member contracts may differ in their benefits. Blue Shield reserves the right to review and update policies as appropriate.*

## Appendix A

| POLICY STATEMENT (No changes) | |
|---|---|
| **BEFORE** | **AFTER** |
| **Retinal Telescreening for Diabetic Retinopathy 9.03.13**<br><br>**Policy Statement:**<br>I. Retinal telescreening with digital imaging and manual grading of images may be considered **medically necessary** as a screening technique for the detection of diabetic retinopathy.<br><br>II. Digital retinal imaging with image interpretation by artificial intelligence software that is approved by the U.S. Food and Drug Administration (e.g., IDX-DR, EyeArt) may be considered **medically necessary** for screening for diabetic retinopathy.<br><br>III. Retinal telescreening is considered **investigational** for all other indications, including the monitoring and management of disease in individuals diagnosed with diabetic retinopathy. | **Retinal Telescreening for Diabetic Retinopathy 9.03.13**<br><br>**Policy Statement:**<br>I. Retinal telescreening with digital imaging and manual grading of images may be considered **medically necessary** as a screening technique for the detection of diabetic retinopathy.<br><br>II. Digital retinal imaging with image interpretation by artificial intelligence software that is approved by the U.S. Food and Drug Administration (e.g., IDX-DR, EyeArt) may be considered **medically necessary** for screening for diabetic retinopathy.<br><br>III. Retinal telescreening is considered **investigational** for all other indications, including the monitoring and management of disease in individuals diagnosed with diabetic retinopathy. |