Clinical Guideline



Oscar Clinical Guideline: Optical Coherence Tomography (OCT) (CG025, Ver. 11)

Optical Coherence Tomography (OCT)

Disclaimer

Clinical guidelines are developed and adopted to establish evidence-based clinical criteria for utilization management decisions. Clinical guidelines are applicable according to policy and plan type. The Plan may delegate utilization management decisions of certain services to third parties who may develop and adopt their own clinical criteria.

TtCoverage of services is subject to the terms, conditions, and limitations of a member's policy, as well as applicable state and federal law. Clinical guidelines are also subject to in-force criteria such as the Centers for Medicare & Medicaid Services (CMS) national coverage determination (NCD) or local coverage determination (LCD) for Medicare Advantage plans. Please refer to the member's policy documents (e.g., Certificate/Evidence of Coverage, Schedule of Benefits, Plan Formulary) or contact the Plan to confirm coverage.

Summary

Optical coherence tomography, or OCT, is a medical imaging test that uses light waves to capture live 3-dimensional images. It is similar in principle to ultrasound (which uses sound echoes, rather than light wave reflections), however OCT provides much higher spatial resolution. OCT has been used to image different structures of the body, including the eye, the heart, the gastrointestinal (GI) system, the breast, and the upper airway. In the eyes, OCT allows for imaging of the retina and optic nerve. This imaging is helpful in monitoring and treating retinal disorders or optic nerve disorders such as glaucoma. It does not require any contact with the target surfaces and does not produce any ionizing radiation. In some cases, OCT can be used with other instruments such as an endoscope in the GI system or as an intravascular device in the arteries of the heart. OCT is a relatively novel technology and is rapidly evolving in both technique and clinical utility. This guideline provides the clinical criteria and exclusions for the currently supported clinical applications of optical coherence tomography.

Definitions

"Retinopathy" refers to diseases of the retina that may impair vision, and is most often due to diabetes or hypertension. Diabetic retinopathy can be "proliferative" or "nonproliferative", depending on the severity of the disease.

"Macular degeneration" is a condition that affects the macula, which is the central portion of the retina responsible for fine detail vision. It can be further categorized as "wet" or "dry" depending on the

underlying process, and stratified by stage (early, intermediate, late). Macular degeneration is a leading cause of vision loss.

"Macular edema" occurs when fluid builds up behind the macula of the eye, leading to swelling and distortion of central vision. Macular edema can occur in a number of diseases, including macular degeneration, diabetic retinopathy, and retinal vein occlusions.

"Optical coherence tomography (OCT)" is an imaging technique that uses the reflections of light particles to create live 3-D images. Because OCT is based on light, it has significantly higher spatial resolution than comparable imaging techniques such as ultrasound and MRI. However, given the poor penetration of light into tissue, OCT is limited to relatively superficial surfaces. OCT does not generate ionizing radiation. OCT can be used to evaluate the retinal, optic nerve, and anterior chamber.

- "Spectral domain OCT" is a newer version of OCT technology which can obtain images up to 50 times faster than traditional "time domain" and may be more appropriate in the diagnosis and assessment of certain conditions.
- "OCT angiography" or "intravascular OCT" refers to OCT imaging conducted with specialized, miniature devices from within a blood vessel.

"Posterior segment" refers to the back two-thirds of the eye, and includes the vitreous humor, retina, choroid, macula, and optic nerve.

"Anterior segment" refers to the anterior one-third of the eye, and includes the cornea, iris, ciliary body, and lens.

"Glaucoma suspect" refers to an individual with clinical findings and/or risk factors that indicate an elevated risk of developing primary open angle glaucoma. Risk factors include age older than 50 years, family history of glaucoma, and black race. Clinical findings include optic nerve or nerve fiber layer defect suggestive of glaucoma, visual field abnormality consistent with glaucoma, and/or elevated intraocular pressure (IOP) >21 mm Hg.

A. Clinical Indications

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Medical Necessity Criteria for Clinical Review

General Medical Necessity Criteria

The Plan considers posterior optical coherence tomography (OCT) medically necessary when any ONE of the following criteria is met:

- 1. Spectral-domain OCT (SD-OCT) is indicated when a member is taking chloroquine, hydroxychloroquine, ezogabine, or vigabatrin and ONE of the following criteria are met:
 - a. Baseline exam within the first year of medication use; or
 - b. As a once yearly exam for patients with 1 or more of the following:
 - i. 5 years or more of use; *or*
 - ii. Documentation of elevated risk for developing retinopathy, defined by:
 - 1. Concurrent macular disease; or
 - 2. Concurrent renal disease: or
 - 3. Concomitant use of tamoxifen; or
 - 4. High-dose chloroquine (>2.3mg/kg) or hydroxychloroquine (>5mg/kg).
- 2. Macular edema when at least ONE of the following criteria is met:
 - a. Needed to establish the diagnosis of macular edema; or
 - b. Cystoid macular edema; or
 - c. When the results may impact the treatment plan (e.g., the need for antiangiogenic treatment).
- 3. Macular degeneration when at least ONE of the following criteria is met:
 - a. Neovascular age-related macular degeneration and OCT needed to establish the diagnosis when fluorescein angiography is contraindicated or unavailable; *or*
 - b. Cystoid macular degeneration; or
 - c. Macular drusen associated with suspected age-related macular degeneration; or
 - d. When the results may impact the treatment plan (e.g. the need for antiangiogenic treatment).
- 4. OCT may be indicated to document the appearance of posterior segment structures in members who have a diagnosis of at least ONE of the following:
 - a. Benign neoplasms of the retina and choroid; or
 - b. Central serous retinopathy (CSR); or
 - c. Diabetic retinopathy; or
 - d. Glaucoma or glaucoma suspect, no more than once per year; or
 - e. Inherited retinal dystrophy (e.g., RPE65 gene mutations); or
 - f. Macular hole; or
 - g. Macular pucker (epiretinal membrane); or
 - h. Macular scar; or
 - i. Malignant neoplasms of the retina and choroid; or
 - j. Neurodegenerative disorders affecting the optic nerve (e.g., multiple sclerosis, optic neuritis); *or*
 - k. Other retinal disorders and retinopathy; or
 - I. Optic nerve atrophy; or

- m. Papilledema associated with increased intracranial pressure; or
- n. Pseudotumor cerebri; or
- o. Posterior vitreous detachment (vitreous degeneration); or
- p. Retinal vein occlusion; or
- q. Uveitis (intermediate, posterior, or panuveitis); or
- r. Vitreomacular adhesion or vitreomacular traction; or
- s. Vogt-Koyanagi-Haradas.

Experimental or Investigational / Not Medically Necessary

The Plan considers optical coherence tomography (OCT) experimental, investigational, or unproven for the following indications, as the current evidence is insufficient to demonstrate clear clinical benefit:

- 1. Gastrointestinal usage, including but not limited to assessment or diagnosis of:
 - a. Esophageal mucosal diseases (e.g. Barrett's esophagus or squamous cell carcinoma)
 - b. Gastric mucosa
 - c. Diseases of the colon and small bowel (e.g. inflammatory bowel disorders, polyps)
 - d. Biliary and pancreatic duct measurements
- 2. Upper airway OCT for obstructive sleep apnea
- 3. Any intraoperative OCT, including OCT for the purpose of lymph node or tumor margin assessment
- 4. Ocular indications other than those specified in this guideline, including but not limited to:
 - a. Anterior segment OCT (AS-OCT) imaging (e.g., cornea, iris, ciliary body, and lens) is considered experimental/investigational as evidence is still insufficient for anterior OCT to be used as a substitute or as a stand-alone method for guiding treatment of anterior segment conditions. Overall, there is a lack of recommendations from society practice guidelines and peer-reviewed literature strongly supporting AS-OCT, and it has not been shown to improve net health outcomes.
 - i. Rationale: Gonioscopy is the gold-standard for evaluating the anterior segment of the eye, per the American Academy of Ophthalmology (AAO).
 - Upon review of recent literature, guidelines and Hayes, the role of anterior segment OCT is still evolving in the utility of AS-OCT for a variety of conditions or with different methodologies such as swept source anterior segment optical coherence tomography (SS-ASOCT). Although there may be some literature and cross-sectional studies on clinical validity for AS-OCT indications, overall, there is a lack of peer-reviewed literature supporting clinical utility with AS-OCT guided treatment in RCT trials or comparative trials with AS-OCT and another technology, placebo, or sham (Hayes, Inc., 2023; Fernández-Vigo et al., 2022; Marin et al., 2022; Preetam Peraka et al., 2023; Pujari et al., 2021; Triolo et al., 2021). The American Academy of Ophthalmology (AAO) Preferred Practice Patterns for Primary Angle Closure (2015) state that AS-OCT is "limited to evaluating the iridocorneal angle" and that it "may prove useful in evaluating

- secondary causes of angle closure". Gonioscopy is discussed as the gold standard to be performed in all patients with suspected angle closure. There have been no large, prospective, randomized clinical trials looking at the clinical effectiveness of AS-OCT for primary angle closure.
- For the 2023 Cornea/External Disease Summary Benchmarks, anterior segment optical coherence tomography is listed in the preferred practice pattern guidelines as an applicable diagnostic test, but not an explicit recommendation for Corneal Edema and Opacification (Initial Evaluation). For the 2023 Retina Summary Benchmarks, the preferred practice pattern guidelines mention that an OCT evaluation may be indicated to document post-op macular anatomy for a macular hole post-operative follow-up visit, but does not explicitly recommend OCT for the anterior chamber and central retina.
- A 2022 systematic review by Marin and colleagues assessed anterior segment-OCT and image analysis methods as this field is less developed compared to posterior segment-OCT; however, comparisons for AS-OCT were difficult due to limited number of images from studies and additional research is needed.
- For lens-to-cornea fit of rigid gas-permeable (RGP) lenses: Piotrowiak et al (2014) showed AS-OCT was inferior to fluorescein pattern assessment, with lower sensitivity for apical clearance detection.
- Anterior chamber angle (ACA) measurement Maram et al (2015) looked at 20
 eyes and found low reproducibility among experienced clinicians. Further
 literature is limited for this indication.
- Other potential indications for AS-OCT, including but not limited to intraoperative OCT, graft versus host disease (GVHD), anterior segment vascular imaging, and assessment of Haab striae, have inadequate clinical evidence in the currently available literature.
- 5. Routine *screening* of asymptomatic members for ocular conditions, including but not limited to the following:
 - a. Glaucoma, pre-glaucoma, or ocular hypertension
 - i. Rationale: The USPSTF (2022) concludes that for asymptomatic adults 40 years or older, the current evidence is insufficient to assess the balance of benefits and harms of screening (e.g., OCT, visual field assessment) for primary open-angle glaucoma in adults. Bussel et al (2014) summarized the findings of 7 studies on glaucoma screening and monitoring of progression using OCT. They found that "in summary, OCT currently lacks the necessary diagnostic performance for general population glaucoma screening." While there is some evidence of the ability of OCT to differentiate normal and glaucomatous eyes, the current clinical evidence has not been fully validated.

b. Cataracts

i. Rationale: OCT is not used for the diagnosis or screening of cataracts. OCT has been used in the pre-operative planning or for monitoring of post-operative

complications following cataract surgery; however, the clinical evidence is limited for these indications. Furthermore, the presence of cataracts may impact OCT image quality and retinal thickness measurements (Van Velthoven 2006).

- c. Corneal conditions, including but not limited to keratitis, Thygeson's disease
- d. Keratoconjunctivitis sicca (i.e., dry eyes)
 - i. Rationale: A single center, prospective study by Ibrahim et al (2010) looked at OCT for diagnosing keratoconjunctivitis sicca in 24 patients and 27 control subjects. Sensitivity and specificity were 67% and 81%, respectively. Further research is needed to identify the clinical outcomes using OCT for this indication.
- e. Posterior capsule opacification
- f. Neurodegenerative disorders that may affect the optic nerve
 - i. Rationale: Routine OCT screening for neurodegenerative disorders that may affect the optic nerve in asymptomatic individuals with a normal eye exam is not indicated. OCT has not been adequately studied for this purpose.
- g. Papilledema or unexplained vision loss (not caused by diabetic retinopathy or pseudotumor cerebri)
 - i. Rationale: Extensive literature review by the AAO states that there is not currently enough randomized evidence to use OCT for routine evaluation of unexplained vision loss, in routine screening for diabetic retinopathy, or for "other causes" of macular swelling. OCT is not mentioned as indicated or not indicated for other disease processes in the AAO guidelines.
- 6. Identification of fungal endophthalmitis after cataract surgery
 - a. *Rationale:* The evidence for the use of AS-OCT in the identification of fungal infections after cataract surgery is limited to case reports (Kitahata 2016) and has not been validated in a randomized, prospective clinical trial.
- 7. Imaging of extra- or intra-ocular musculature
 - a. Rationale: Several studies (Pihlblad 2016, Ngo 2015, Park 2014) have looked at AS-OCT for imaging of the ocular musculature. While the results on the ability to accurately and reproducibly measure the muscle insertion distances for pre-operative planning have been promising, the current evidence has not been validated in clinical studies nor has it demonstrated any improved clinical outcomes.
- 8. Any other procedure or indication not meeting the medical necessity criteria

The Plan considers OCT angiography or intravascular OCT experimental or investigational, as the current evidence is insufficient to demonstrate clear clinical benefit. This includes, but is not limited to:

- 1. Diagnosis of spontaneous coronary artery dissection (SCAD)
- 2. Diagnosis or assessment of coronary artery plaques
- 3. Treatment of coronary disease (as an adjunct to percutaneous coronary intervention (PCI)
- 4. Assessment or guidance of coronary artery stent placement (including evaluation of arterial bifurcations)

- 5. Assessment of coronary artery stent failure (malposition)
- 6. Identification of angiographically unclear lesions
- 7. Assessment of acute coronary syndromes
- 8. Diagnosis or assessment of intracranial aneurysms, ruptured or intact
- 9. Assessment of carotid artery stenosis and/or stroke risk
- 10. Assessment of pulmonary arterial wall fibrosis

Clinical Evidence on Intravascular OCT

- 1. A systematic review of 15 studies was published in 2015 by D'Ascenzo et al. to evaluate the accuracy of intravascular OCT and intravascular ultrasound (IVUS) in identifying functional coronary stenosis. The group found that both modalities had only a moderate diagnostic accuracy for hemodynamically significant lesions. The authors concluded that both the sensitivity and specificity were inadequate to guide revascularization. (D'Ascenzo F, Barbero U, Cerrato E, et al. Accuracy of intravascular ultrasound and optical coherence tomography in identifying functionally significant coronary stenosis according to vessel diameter: a meta-analysis of 2,581 patients and 2,807 lesions. Am Heart J. 2015; 169(5):663-673)
- 2. The Society of Cardiovascular Angiography and Interventions released a consensus statement in 2014 evaluating IVUS and intravascular OCT, concluding that "the appropriate role for optical coherence tomography in routine clinical decision making has not been established". (Lotfi A, Jeremias A, Fearon WF, et al. Society of Cardiovascular Angiography and Interventions. Expert consensus statement on the use of fractional flow reserve, intravascular ultrasound, and optical coherence tomography: a consensus statement of the Society of Cardiovascular Angiography and Interventions. Catheter Cardiovasc Interv. 2014; 83(4):509-418)
- 3. The ILUMIEN IV study (NCT NCT03507777) is underway for a prospective, single-blind clinical investigation randomizing subjects to OCT-guided coronary stent implantation vs. angiography-guided coronary stent implantation in a 1:1 ratio. The clinical investigation will be conducted at approximately 125 centers in North America (US and Canada), Europe, Middle East and Asia-Pacific. After hospital discharge, all patients will have clinical follow-up at 30 days, 1 year, and 2 years. As of April, 2024, the publication for this ILUMIEN IV study has not been completed. The ILUMIEN III: OPTIMIZE PCI trial was performed to compare IVUS, OCT, and coronary angiography (CA) in guiding coronary stent placement. The randomized study demonstrated that IVUS and OCT were non-inferior, however CA was superior to both modalities. (Ali ZA, Maehara A, Généreux P, et al. Optical coherence tomography compared with intravascular ultrasound and angiography to guide coronary stent implantation (ILUMIEN III: OPTIMIZE PCI): a randomised controlled trial. Lancet 2016; 388:2618.)
- 4. For coronary plaque characterization and stent implantation for coronary artery revascularization, the FDA has 510(k) clearance for Tigereye Cto-Crossing Catheter, Pantheris System, Optis Mobile Next Imaging System, Optis Integrated Next Imaging System, Otis 2.1 Optical Coherence Tomography System, Thia Optical Coherence Tomography System, Apollovue S100 Image System. The 2021 ACC/AHA/SCA Guideline states that, "In patients undergoing coronary stent implantation, OCT is a reasonable alternative to IVUS for procedural guidance, except in

ostial left main disease" (2a) and "In patients with stent failure, IVUS or OCT is reasonable to determine the mechanism of stent failure. (2a)" However, because OCT requires blood clearance, its effectiveness for imaging ostial left main disease is limited. The results of the ILUMIEN IV study will be pivotal for practice guidance.

Applicable Billing Codes

Table 1	
CPT/HCPCS codes considered medically necessary if criteria are met:	
Code	Description
92133	Scanning computerized ophthalmic diagnostic imaging (eg, optical coherence tomography [OCT]), posterior segment, with interpretation and report, unilateral or bilateral; optic nerve
92134	Scanning computerized ophthalmic diagnostic imaging (eg, optical coherence tomography [OCT]), posterior segment, with interpretation and report, unilateral or bilateral; retina

Table 2		
ICD-10 codes cons	ICD-10 codes considered medically necessary with Table 1 codes if criteria are met:	
Code	Description	
C69.20 - C69.22	Malignant neoplasm of choroid	
C69.30 - C69.32	Malignant neoplasm of retina	
D18.09	Hemangioma of other sites	
D31.20 - D31.22	Benign neoplasm of retina	
D31.30 - D31.32	Benign neoplasm of choroid	
E08.311 - E08.319	Diabetes mellitus due to underlying condition with unspecified diabetic retinopathy	
E08.3211 - E08.3299	Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy	
E08.3311 - E08.3399	Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy	
E08.3411 - E08.3499	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy	

Table 2	
ICD-10 codes c	onsidered medically necessary with Table 1 codes if criteria are met:
Code	Description
E08.3511 - E08.3599	Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy
E09.311 - E09.319	Drug or chemical induced diabetes mellitus with unspecified diabetic retinopathy
E09.3211 - E09.3299	Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy
E09.3311 - E09.3399	Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy
E09.3411 - E09.3499	Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy
E09.3511 - E09.3599	Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy
E10.311 - E10.319	Type 1 diabetes mellitus with unspecified diabetic retinopathy
E10.3211 - E10.3299	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy
E10.3311 - E10.3399	Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy
E10.3411- E10.3499	Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy
E10.3511 - E10.3599	Type 1 diabetes mellitus with proliferative diabetic retinopathy
E11.311 - E11.319	Type 2 diabetes mellitus with unspecified diabetic retinopathy
E11.3211 - E11.3299	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy
E11.3311 - E11.3399	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy
E11.3411 - E11.3499	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy

Table 2	
ICD-10 codes considered medically necessary with Table 1 codes if criteria are met:	
Code	Description
E11.3511 - E11.3599	Type 2 diabetes mellitus with proliferative diabetic retinopathy
E13.311 - E13.319	Other specified diabetes mellitus with unspecified diabetic retinopathy
E13.3211 - E13.3299	Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy
E13.3311 - E13.3399	Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy
E13.3411 - E13.3499	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy
E13.3511 - E13.3599	Other specified diabetes mellitus with proliferative diabetic retinopathy
G35	Multiple sclerosis
G40.201 - G40.219	Localization-related (focal)(partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures
G40.401 - G40.409	Other generalized epilepsy and epileptic syndromes, not intractable
G40.411 - G40.419	Other generalized epilepsy and epileptic syndromes, intractable
G40.821 - G40.824	Epileptic spasms
G93.2	Benign intracranial hypertension
H20.821 - H20.823	Vogt-Koyanagi syndrome
H30.891 - H30.899	Other chorioretinal inflammations
H31.011 - H31.019	Macula scars of posterior pole (postinflammatory) (post-traumatic)
H34.8110 - H34.9	Retinal vascular occlusions
H35.00 - H35.09	Background retinopathy and retinal vascular changes

Table 2	
ICD-10 codes cons	sidered medically necessary with Table 1 codes if criteria are met:
Code	Description
H35.101 - H35.179	Retinopathy of prematurity
H35.20 - H35.23	Other non-diabetic proliferative retinopathy
H35.30	Unspecified macular degeneration Age-related macular degeneration
H35.3110 - H35.3194	Nonexudative age-related macular degeneration
H35.3210 - H35.3293	Exudative age-related macular degeneration
H35.341 - H35.349	Macular cyst, hole or pseudohole
H35.351 - H35.359	Cystoid macular degeneration
H35.361 - H35.369	Drusen (degenerative) of macula
H35.371 - H35.379	Puckering of macula
H35.50 - H35.54	Hereditary retinal dystrophy
H35.711	Central serous chorioretinopathy, right eye
H35.712	Central serous chorioretinopathy, left eye
H35.713	Central serous chorioretinopathy, bilateral
H35.81	Retinal edema
H40.001 - H40.9	Glaucoma
H42	Glaucoma in diseases classified elsewhere
H43.811 - H43.819	Vitreous degeneration
H43.821 - H43.829	Vitreomacular adhesion
H43.89	Other disorders of vitreous body
H44.11 - H44.119	Panuveitis

Table 2	
ICD-10 codes considered medically necessary with Table 1 codes if criteria are met:	
Code	Description
H46.0 - H46.9	Optic neuritis
H47.091 - H47.099	Other disorders of optic nerve, not otherwise classified
H47.11	Papilledema associated with increased intracranial pressure
H59.031- H59.039	Cystoid macular edema following cataract surgery
Q15.0	Congenital glaucoma
T37.2X1A - T37.2X1S	Poisoning by antimalarials and drugs acting on other blood protozoa, accidental (unintentional)
T37.2X2A - T37.2X2S	Poisoning by antimalarials and drugs acting on other blood protozoa, intentional self-harm
T37.2X3A - T37.2X3S	Poisoning by antimalarials and drugs acting on other blood protozoa, assault
T37.2X4A - T37.2X4S	Poisoning by antimalarials and drugs acting on other blood protozoa, undetermined
Z79.899	Other long term (current) drug therapy

Table 3	
ICD-10 codes considered experimental or investigational with Table 1 codes:	
Code	Description
C69.10 - C69.12	Malignant neoplasm of cornea
C69.40 - C69.42	Malignant neoplasm of ciliary body
D31.10 - D31.12	Benign neoplasm of cornea
D31.40 - D31.42	Benign neoplasm of ciliary body
D89.810 - D89.813	Graft-versus-host disease
G47.33	Obstructive sleep apnea (adult) (pediatric)

Table 3		
ICD-10 codes con	ICD-10 codes considered experimental or investigational with Table 1 codes:	
Code	Description	
H04.121 - H04.129	Dry eye syndrome	
H16.001 - H16.9	Keratitis	
H17.00 - H17.89	Corneal scars and opacities	
H18.001 - H18.069	Other disorders of cornea	
H20.00 - H20.9	Iridocyclitis	
H21.00 - H21.9	Hyphema	
H22	Disorders of iris and ciliary body in diseases classified elsewhere	
H25.011 - H25.9	Age-related cataract	
H26.001 - H26.9	Other cataract	
H27.00 - H27.9	Other disorders of lens	
H28	Cataract in diseases classified elsewhere	
H47.10	Unspecified papilledema	
H47.12	Papilledema associated with decreased ocular pressure	
H47.13	Papilledema associated with retinal disorder	
H49.00 - H52.7	Disorders of ocular muscles, binocular movement, accommodation and refraction	
H53.121 - H53.129	Transient visual loss	
H53.131 - H53.139	Sudden visual loss	
K20.0 - K31.A29	Diseases of esophagus, stomach and duodenum	

Table 3	
ICD-10 codes considered experimental or investigational with Table 1 codes:	
Code	Description
K50.00 - K52.9	Noninfective enteritis and colitis
K55.011 - K64.9	Other diseases of intestines
M35.00 - M35.09	Sjogren syndrome Sicca syndrome
Q12.0 - Q12.9	Congenital lens malformations
Z13.5	Encounter for screening for eye and ear disorders
Z46.0	Encounter for fitting and adjustment of spectacles and contact lenses

Table 4	
CPT/HCPCS codes	considered experimental or investigational for indications in this guideline:
Code	Description
92132	Scanning computerized ophthalmic diagnostic imaging (eg, optical coherence tomography [OCT]) anterior segment, with interpretation and report, unilateral or bilateral
92978	Endoluminal imaging of coronary vessel or graft using intravascular ultrasound (IVUS) or optical coherence tomography during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation and report; initial vessel (List separately in addition to code for primary procedure)
92979	Endoluminal imaging of coronary vessel or graft using intravascular ultrasound (IVUS) or optical coherence tomography (OCT) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation and report; each additional vessel (List separately in addition to code for primary procedure)
0351T	Optical coherence tomography of breast or axillary lymph node, excised tissue, each specimen; real time intraoperative
0352T	Optical coherence tomography of breast or axillary lymph node, excised tissue, each specimen; interpretation and report, real-time or referred

Table 4	
CPT/HCPCS codes considered experimental or investigational for indications in this guideline:	
Code	Description
0353T	Optical coherence tomography of breast, surgical cavity; real-time intraoperative
0354T	Optical coherence tomography of breast, surgical cavity; interpretation and report, real-time or referred

References

- 1. Ahsen, O., Liang, K., Lee, H., Giacomelli, M., Wang, Z., Potsaid, B., Figueiredo, M., Huang, Q., Jayaraman, V., Fujimoto, J., & Mashimo, H. (2018). Assessment of Barrett's esophagus and dysplasia with ultrahigh-speed volumetric en face and cross-sectional optical coherence tomography. *Endoscopy*, 51(04), 355–359. https://doi.org/10.1055/a-0725-7995
- 2. Al-Ani, A., Benard-Seguin, É., & Costello, F. (2024). Optical coherence tomography: implications for neurology. *Current Opinion in Neurology*, 38(1), 62–70. https://doi.org/10.1097/wco.0000000000001340
- 3. Ali ZA, Maehara A, Généreux P, et al. Optical coherence tomography compared with intravascular ultrasound and with angiography to guide coronary stent implantation (ILUMIEN III: OPTIMIZE PCI): a randomised controlled trial. Lancet 2016; 388:2618.
- 4. Allam RS, AbdElmohsen MN, Khafagy MM, Raafat KA, Sheta SM. Spectral domain optical coherence tomography of preclinical chloroquine maculopathy in Egyptian rheumatoid arthritis patients. Journal of Ophthalmology 2015;2015:292357
- American Academy of Ophthalmology. (2025). Age-Related Macular Degeneration Preferred Practice Pattern®.
 https://www.aao.org/education/preferred-practice-pattern/age-related-macular-degeneration-pp
 p
- American Academy of Ophthalmology. (2023). Cornea/External Disease Summary Benchmarks for Preferred Practice Pattern®.
 https://www.aao.org/education/summary-benchmark-detail/cornea-external-disease-summary-benchmarks-2020
- 7. American Academy of Ophthalmology. (2020). Diabetic Retinopathy Preferred Practice Pattern®. https://www.aaojournal.org/article/S0161-6420(19)32092-5/fulltext
- American Academy of Ophthalmology. (2023). Glaucoma Summary Benchmarks for Preferred Practice Pattern®.
 https://www.aao.org/education/summary-benchmark-detail/glaucoma-summary-benchmarks-202

- 9. American Academy of Ophthalmology. (2025). Idiopathic Macular Hole Preferred Practice Pattern®.
 - https://www.aao.org/education/preferred-practice-pattern/idiopathic-macular-hole-ppp
- 10. American Academy of Ophthalmology. (2019). OCT: How it works and when to use it. https://www.aao.org/young-ophthalmologists/yo-info/article/oct-how-it-works-and-when-to-use-it
- 11. American Academy of Ophthalmology. (2017). Optical coherence tomography in pediatric optic neuropathies. https://www.aao.org/education/disease-review/oct-in-ped-optic-neuropathies
- 12. American Academy of Ophthalmology. (2023). Retina Summary Benchmarks for Preferred Practice Pattern®.
 - https://www.aao.org/education/summary-benchmark-detail/retina-summary-benchmarks-2020

13.

- 14. American Academy of Ophthalmology. (2020). Primary Angle-Closure Disease Preferred Practice Pattern®.
 - https://www.aao.org/education/preferred-practice-pattern/primary-angle-closure-disease-ppp
- 15. American Academy of Ophthalmology. (2020). Primary Open-Angle Glaucoma Preferred Practice Pattern®.
 - https://www.aao.org/education/preferred-practice-pattern/primary-open-angle-glaucoma-ppp
- 16. American Academy of Ophthalmology. (2020). Primary Open-Angle Glaucoma Suspect Preferred Practice Pattern®.
 - https://www.aao.org/education/preferred-practice-pattern/primary-open-angle-glaucoma-suspec t-ppp
- 17. American Academy of Ophthalmology. (2020). Retinal Vein Occlusions Preferred Practice Pattern®. https://www.aaojournal.org/article/S0161-6420(19)32096-2/fulltext
- 18. American Optometric Association. (2024). Evidence-Based Clinical Practice Guideline: Care of the Patient with Primary Open-Angle Glaucoma (1st Edition). https://www.aoa.org/a/19461
- 19. Araki, M., Park, S., Dauerman, H. L., Uemura, S., Kim, J., Di Mario, C., Johnson, T. W., Guagliumi, G., Kastrati, A., Joner, M., Holm, N. R., Alfonso, F., Wijns, W., Adriaenssens, T., Nef, H., Rioufol, G., Amabile, N., Souteyrand, G., Meneveau, N., . . . Jang, I. (2022). Optical coherence tomography in coronary atherosclerosis assessment and intervention. *Nature Reviews Cardiology*, 19(10), 684–703. https://doi.org/10.1038/s41569-022-00687-9
- Arf, S., Sayman Muslubas, I., Hocaoglu, M., Ersoz, M. G., Ozdemir, H., & Karacorlu, M. (2020).
 Spectral domain optical coherence tomography classification of diabetic macular edema: a new proposal to clinical practice. Graefe's archive for clinical and experimental ophthalmology, 258, 1165-1172.
- 21. Arroyo JG. Age-related macular degeneration: Clinical presentation, etiology, and diagnosis. In: UpToDate, Trobe J (Ed), UpToDate, Waltham, MA (Accessed March 13, 2017)
- 22. Bezerra H. Intravascular OCT in PCI. JACC. June 13, 2016.
- 23. Boppart SA, Herrmann J, Pitris C, et al. High-resolution optical coherence tomography-guided laser ablation of surgical tissue. J Surg Res 1999; 82:275.

- 24. Boyd, K. (March 27, 2020). Eye Cancer. Retrieved 6/10/2024 from https://www.aao.org/eye-health/diseases/eye-cancer#:~:text=The%20most%20common%20cancer%20that,get%20it%20in%20your%20eye.
- 25. Boyd, K. (April 23m 2023). CME (Cystoid Macular Edema). Retrieved 6/10/20204 from https://www.aao.org/eve-health/diseases/cme-cystoid-macular-edema
- 26. Britze, J., Pihl-Jensen, G., & Frederiksen, J. L. (2017). Retinal ganglion cell analysis in multiple sclerosis and optic neuritis: a systematic review and meta-analysis. *Journal of Neurology*, 264(9), 1837–1853. https://doi.org/10.1007/s00415-017-8531-y
- 27. Chou, R., Selph, S., Blazina, I., Bougatsos, C., Jungbauer, R., Fu, R., Grusing, S., Jonas, D. E., & Tehrani, S. (2022). Screening for glaucoma in adults: Updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA*, 327(20). https://doi.org/10.1001/jama.2022.6290.
- 28. Chou, R., Selph, S., Blazina, I., Bougatsos, C., Jungbauer, R., Fu, R., ... & Tehrani, S. (2022). Screening for Glaucoma in Adults: A Systematic Review for the US Preventive Services Task Force.
- 29. Ciulla, T. A., Kapik, B., Barakat, M. R., Khurana, R. N., Nguyen, Q. D., Grewal, D. S., Albini, T., Cunningham, E. T., Jr, & Goldstein, D. A. (2021). Optical coherence tomography anatomic and temporal biomarkers in uveitic macular edema. *American Journal of Ophthalmology*, 237, 310–324. https://doi.org/10.1016/j.ajo.2021.10.024
- 30. ClinicalTrials.gov. (last update posted June 9, 2023) ILUMIEN IV: OPTIMAL PCI. Retrieved from https://clinicaltrials.gov/study/NCT03507777?tab=results Accessed 5/21/24.
- 31. Consugar, M. B., Navarro-Gomez, D., Place, E. M., Bujakowska, K. M., Sousa, M. E., Fonseca-Kelly, Z. D.,... & Pierce, E. A. (2015). Panel-based genetic diagnostic testing for inherited eye diseases is highly accurate and reproducible, and more sensitive for variant detection, than exome sequencing. Genetics in Medicine, 17(4), 253-261.
- 32. Covert DJ. Retinal vein occlusion: Epidemiology, clinical manifestations, and diagnosis. In: UpToDate, Trobe J(Ed), UpToDate, Waltham, MA (Accessed March 13, 2017).
- 33. Craven, E. R., Chopra, V., Goldberg, J. L., Marion, K. M., Chen, X., Chang, C., & Chen, M. Y. (2022). Comparison of iridocorneal angle assessments in open-angle glaucoma and ocular hypertension patients: anterior segment optical coherence tomography and gonioscopy. *Clinical Ophthalmology*, Volume 16, 1301–1312. https://doi.org/10.2147/opth.s322962
- 34. Culp, M. B., Benard, V., Dowling, N. F., King, J., Lu, H., Rao, C., ... & Wu, M. (2021). Ocular melanoma incidence rates and trends in the United States, 2001–2016. Eye, 35(2), 687-689.
- 35. Duncan, J. L., Bernstein, P. S., Birch, D. G., Fishman, G. A., Heon, E., & Jacobson, S. G. (2016). Recommendations on clinical assessment of patients with inherited retinal degenerations-2016. American Academy of Ophthalmology Clinical Education/Guidelines/Clinical Statements. https://www.aao.org/clinical-statement/recommendations-on-clinical-assessment-of-patients
- 36. Fabian, I. D., Abdallah, E., Abdullahi, S. U., Abdulqader, R. A., Boubacar, S. A., Ademola-Popoola, D. S., ... & Gole, G. A. (2020). Global retinoblastoma presentation and analysis by national income level. JAMA oncology, 6(5), 685-695.

- Farci, R., Sellam, A., Coscas, F., Coscas, G. J., Diaz, G., Napoli, P. E., Souied, E., Galantuomo, M. S., & Fossarello, M. (2019). Multimodal OCT reflectivity analysis of the cystoid spaces in cystoid macular edema. *BioMed Research International*, 2019, 1–9. https://doi.org/10.1155/2019/7835372
- 38. Felfeli, T., Eshtiaghi, A., Tai, F., Batawi, H., Rhee, J., Kryshtalskyj, M., Dzulynsky, K., Bakshi, N. K., & Derzko-Dzulynsky, L. A. (2022). Optical coherence tomography features in idiopathic noninfectious intermediate, posterior, or panuveitis. Retina, 42(11), 2143–2149. https://doi.org/10.1097/iae.00000000000003572
- 39. Fernández-Vigo, J. I., Shi, H., Burgos-Blasco, B., Fernández-Aragón, S., De-Pablo-Gómez-de-Liaño, L., Kudsieh, B., ... & Ángel Fernández-Vigo, J. (2022). Anterior scleral thickness dimensions by swept-source optical coherence tomography. Clinical and Experimental Optometry, 105(1), 13-19.
- 40. FDA Drug Safety Communications. Potiga (Ezogabine): Drug Safety Communication Linked To Retinal Abnormalities And Blue Skin Discoloration. November 1, 2013.
- 41. Filippatou, A., Theodorou, A., Stefanou, M., Tzanetakos, D., Kitsos, D., Moschovos, C., Koutsouraki, E., Tzartos, J. S., Giannopoulos, S., Voumvourakis, K., & Tsivgoulis, G. (2025). Optical coherence tomography and angiography in multiple sclerosis: A systematic review and meta-analysis. *Journal of the Neurological Sciences*, 123422. https://doi.org/10.1016/j.jns.2025.123422
- 42. Friedland S. Optical coherence tomography in the gastrointestinal tract. In: UpToDate, Saltzman JR (Ed), UpToDate, Waltham, MA (Accessed March 13, 2017).
- 43. Giacoppo, D., Laudani, C., Occhipinti, G., Spagnolo, M., Greco, A., Rochira, C., Agnello, F., Landolina, D., Mauro, M. S., Finocchiaro, S., Mazzone, P. M., Ammirabile, N., Imbesi, A., Raffo, C., Buccheri, S., & Capodanno, D. (2024). Coronary angiography, intravascular ultrasound, and Optical coherence Tomography for guiding of percutaneous coronary Intervention: A Systematic Review and Network Meta-Analysis. *Circulation*, 149(14), 1065–1086. https://doi.org/10.1161/circulationaha.123.067583
- 44. Gündüz, A. K., Mirzayev, I., Heper, A. O., Kuzu, I., Gahramanli, Z., Ersöz, C. C., Gündüz, Ö. Ö., & Ataoğlu, Ö. (2022). Anterior segment optical coherence tomography in ocular surface tumours and simulating lesions. *Eye*, 37(5), 925–937. https://doi.org/10.1038/s41433-022-02339-1
- 45. Guymer, R. H., & Campbell, T. G. (2023). Age-related macular degeneration. *The Lancet*, 401(10386), 1459–1472. https://doi.org/10.1016/s0140-6736(22)02609-5
- 46. Hayes, Inc. Evidence Analysis Research Brief. *Optical Coherence Tomography Angiography with AngioPlex for Macular Degeneration.* Lansdale, PA: Hayes, Inc.; Sep 17, 2020.
- 47. Hayes, Inc., Evidence Analysis Research Brief. *Optical Coherence Tomography for Diagnosis and Management of Open Angle Glaucoma.* Lansdale, PA: Hayes, Inc.; Jun 22, 2023.
- 48. Hayes, Inc. Evidence Analysis Research Brief. *Optical Coherence Tomography for Plaque Characterization and Stent Implantation*. Lansdale, PA: Hayes, Inc.; Jan 11, 2023.
- 49. Huang, J., Belmadani, K., Chatot, M., Ecarnot, F., Chopard, R., Wang, M., ... & Meneveau, N. (2018). Clinical significance of optical coherence tomography-guided angioplasty on treatment selection. Experimental and Therapeutic Medicine, 16(2), 483-492.

- 50. Huang-Link, Y., Eleftheriou, A., Yang, G., Johansson, J. M., Apostolou, A., Link, H., & Jin, Y. P. (2019). Optical coherence tomography represents a sensitive and reliable tool for routine monitoring of idiopathic intracranial hypertension with and without papilledema. European journal of neurology, 26(5), 808-e57.
- 51. Hui, V. W., Szeto, S. K., Tang, F., Yang, D., Chen, H., Lai, T. Y., ... & Cheung, C. Y. (2022). Optical coherence tomography classification systems for diabetic macular edema and their associations with visual outcome and treatment responses—an updated review. Asia-Pacific Journal of Ophthalmology, 11(3), 247-257.
- 52. Kashani et al. Optical coherence tomography angiography: A comprehensive review of current methods and clinical applications. Prog Retin Eye Res. 2017 Sep;60:66-100.
- 53. Kitahata M, Suzuki T, Oka N, Toriyama K, Ohashi Y. Anterior Segment Optical Coherence Tomography of Patients With Late-Onset Tunnel Fungal Infections With Endophthalmitis After Cataract Surgery. Cornea. 2016;35(8):1138-40.
- 54. Koustenis A, Harris A, Gross J, Januleviciene I, Shah A, Siesky B. Optical coherence tomography angiography: an overview of the technology and an assessment of applications for clinical research. Br J Ophthalmol. 2017 Jan;101(1):16-20.
- 55. Kim, J. S., Rho, C. R., Cho, Y. W., & Shin, J. (2021). Comparison of corneal thickness measurements using ultrasound pachymetry, noncontact tonopachy, Pentacam HR, and Fourier-domain OCT. *Medicine*, 100(16), e25638. https://doi.org/10.1097/md.00000000000025638
- 56. Lawton, J. S., Tamis-Holland, J. E., Bangalore, S., Bates, E. R., Beckie, T. M., Bischoff, J. M., ... & Zwischenberger, B. A. (2022). 2021 ACC/AHA/SCAI guideline for coronary artery revascularization: executive summary: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation, 145(3), e4-e17.
- 57. Liu XY, Peng XY, Wang S, et al. Features of optical coherence tomography for the diagnosis of Vogt- Koyanagi-Harada disease. Retina. 2016;36(11):2116- 2123.
- 58. Maldonado, R. S., Mettu, P., El-Dairi, M., & Bhatti, M. T. (2015). The application of optical coherence tomography in neurologic diseases. *Neurology Clinical Practice*, 5(5), 460–469. https://doi.org/10.1212/cpj.0000000000000187
- 59. Mangione, C. M., Barry, M. J., Nicholson, W. K., Cabana, M., Chelmow, D., Coker, T. R., Davis, E. M., Donahue, K. E., Epling, J. W., Jaén, C. R., Krist, A. H., Kubik, M., Li, L., Ogedegbe, G., Pbert, L., Ruiz, J. M., Simon, M. A., Stevermer, J., & Wong, J. B. (2022). Screening for primary open-angle glaucoma. *JAMA*, 327(20), 1992. https://doi.org/10.1001/jama.2022.7013
- 60. Maram J, Pan X, Sadda S, et al. Reproducibility of angle metrics using the time-domain anterior segment optical coherence tomography: Intra-observer and inter-observer variability. Curr Eye Res. 2015;40(5):496-500.
- 61. Marin, Y. F. G., Alonso-Caneiro, D., Vincent, S. J., & Collins, M. J. (2022). Anterior segment optical coherence tomography (AS-OCT) image analysis methods and applications: A systematic review. Computers in Biology and Medicine, 146, 105471.

- 62. Marion KM, Maram J, Pan X, et al. Reproducibility and Agreement Between 2 Spectral Domain Optical Coherence Tomography Devices for Anterior Chamber Angle Measurements. J Glaucoma. 2015;24(9):642-6.
- 63. Marmor MF, Kellner U, Lai TY, Melles RB, Mieler WF, American Academy of Ophthalmology. Recommendations on screening for chloroquine and hydroxychloroquine retinopathy (2016 Revision). Ophthalmology 2016;123(6).
- 64. Meneveau, N., Souteyrand, G., Motreff, P., Caussin, C., Amabile, N., Ohlmann, P., ... & Schiele, F. (2016). Optical coherence tomography to optimize results of percutaneous coronary intervention in patients with non–ST-elevation acute coronary syndrome: results of the multicenter, randomized DOCTORS study (Does Optical Coherence Tomography Optimize Results of Stenting). Circulation, 134(13), 906-917.
- 65. Michelessi M, Lucenteforte E, Oddone, et al. Optic nerve head and fibre layer imaging for diagnosing glaucoma. Cochrane Database Syst Rev. 2015;11:CD008803.
- 66. Minakaran, N., De Carvalho, E. R., Petzold, A., & Wong, S. H. (2020). Optical coherence tomography (OCT) in neuro-ophthalmology. Eye, 35(1), 17–32. https://doi.org/10.1038/s41433-020-01288-x
- 67. Moon, Y., Gim, Y., Park, K., Yang, H. K., Kim, S., Kim, S., & Jung, J. H. (2024).

 Recurrence-independent progressive inner-retinal thinning after optic neuritis: A longitudinal study. *Journal of Neuro-Ophthalmology*. https://doi.org/10.1097/wno.00000000000002244
- 68. National Comprehensive Cancer Network. (May 23, 2024). NCCN Clinical Practice Guidelines in Oncology. Melanoma: Uveal. Version 1.2024. Retrieved from https://www.nccn.org/professionals/physician_gls/pdf/uveal.pdf
- 69. Ngo, C. S., Smith, D., & Kraft, S. P. (2015). The accuracy of anterior segment optical coherence tomography (AS-OCT) in localizing extraocular rectus muscles insertions. Journal of American Association for Pediatric Ophthalmology and Strabismus, 19(3), 233–236. https://doi.org/10.1016/j.jaapos.2015.03.012
- 70. Oertel, F. C., Specovius, S., Zimmermann, H. G., Chien, C., Motamedi, S., Bereuter, C., Cook, L., Peixoto, M. a. L., Fontanelle, M. A., Kim, H. J., Hyun, J., Palace, J., Roca-Fernandez, A., Leite, M. I., Sharma, S., Ashtari, F., Kafieh, R., Dehghani, A., Pourazizi, M., . . . Paul, F. (2021). Retinal Optical coherence tomography in neuromyelitis optica. *Neurology: Neuroimmunology & Neuroinflammation*, 8(6). https://doi.org/10.1212/nxi.000000000001068
- 71. Ong, J., Zarnegar, A., Corradetti, G., Singh, S. R., & Chhablani, J. (2022). Advances in optical coherence tomography imaging technology and techniques for choroidal and retinal disorders. *Journal of Clinical Medicine*, 11(17), 5139. https://doi.org/10.3390/jcm11175139
- 72. Papadoliopoulou, M., Matiatou, M., Koutsoumpos, S., Mulita, F., Giannios, P., Margaris, I., Moutzouris, K., Arkadopoulos, N., & Michalopoulos, N. V. (2023). Optical imaging in human lymph node specimens for detecting breast cancer metastases: a review. *Cancers*, 15(22), 5438. https://doi.org/10.3390/cancers15225438
- 73. Papaliodis, GN. (Oct 2022). Uveitis: Etiology, clinical manifestations, and diagnosis. UpToDate, Waltham, MA. Last reviewed: May 2024. Retrieved from https://www.uptodate.com/contents/uveitis-etiology-clinical-manifestations-and-diagnosis?searc

- h=panuveutis&source=search_result&selectedTitle=1%7E21&usage_type=default&display_rank =1#H3185467976
- 74. Pasarikovski, C. R., Ku, J. C., Priola, S. M., da Costa, L., & Yang, V. X. D. (2020). Endovascular optical coherence tomography imaging in cerebrovascular disease. Journal of clinical neuroscience: official journal of the Neurosurgical Society of Australasia, 80, 30–37. https://doi.org/10.1016/j.jocn.2020.07.064 R
- 75. Pihlblad MS, Erenler F, Sharma A, Manchandia A, Reynolds JD. Anterior Segment Optical Coherence Tomography of the Horizontal and Vertical Extraocular Muscles With Measurement of the Insertion to Limbus Distance. J Pediatr Ophthalmol Strabismus. 2016;53(3):141-5.
- 76. Porporato, N., Baskaran, M., Perera, S., Tun, T. A., Sultana, R., Tan, M., Quah, J. H., Allen, J. C., Friedman, D., Cheng, C. Y., & Aung, T. (2020). Evaluation of meridional scans for angle closure assessment with anterior segment swept-source optical coherence tomography. *British Journal of Ophthalmology*, 105(1), 131–134. https://doi.org/10.1136/bjophthalmol-2019-315461
- 77. Preetam Peraka, R., & Murthy, S. I. (2023, April). Role of anterior segment optical coherence tomography in scleral diseases: A review. In Seminars in Ophthalmology (Vol. 38, No. 3, pp. 238-247). Taylor & Francis.
- 78. Pujari, A., Agarwal, D., & Sharma, N. (2021, November). Clinical role of swept source optical coherence tomography in anterior segment diseases: a review. In Seminars in Ophthalmology (Vol. 36, No. 8, pp. 684-691). Taylor & Francis.
- 79. Quénéhervé, L., Olivier, R., Gora, M. J., Bossard, C., Mosnier, J., La Guillaume, E. B. A., Boccara, C., Brochard, C., Neunlist, M., & Coron, E. (2020). Full-field optical coherence tomography: novel imaging technique for extemporaneous high-resolution analysis of mucosal architecture in human gut biopsies. *Gut*, 70(1), 6–8. https://doi.org/10.1136/gutjnl-2020-321228
- 80. Ribeiro, J., & Pires-Morais, G. (2023). IVUS versus OCT: Calibrating the use of intracoronary imaging. Revista Portuguesa de Cardiologia.
- 81. Russell S, Bennett J, Wellman JA, et al. (2017). Efficacy and safety of voretigene neparvovec (AAV2-hRPE65v2) in patients with RPE65-mediated inherited retinal dystrophy: a randomised, controlled, open-label, phase 3 trial. The Lancet. 390 (10097), P849-860. Doi: https://doi.org/10.1016/S0140-6736(17)31868-8
- 82. Schmidt-Erfurth, U., Klimscha, S., Waldstein, S. M., & Bogunović, H. (2016). A view of the current and future role of optical coherence tomography in the management of age-related macular degeneration. Eye, 31(1), 26–44. https://doi.org/10.1038/eye.2016.227
- 83. Singh, S. R., Iovino, C., Zur, D., Masarwa, D., Iglicki, M., Gujar, R., Lupidi, M., Maltsev, D. S., Bousquet, E., Bencheqroun, M., Amoroso, F., Lima, L. H., Padhy, S. K., Govindahari, V., Chandra, K., Souied, E. H., Rodriguez, F. J., Daza, L. A., Rios, H. A., . . . Chhablani, J. (2020). Central serous chorioretinopathy imaging biomarkers. *British Journal of Ophthalmology*, 106(4), 553–558. https://doi.org/10.1136/bjophthalmol-2020-317422
- 84. Stolowy, N., Gutmann, L., Lüpke, M., David, T., Dorr, M., Mayer, C., Heesen, C., Oertel, F. C., Lin, T., Paul, F., Zimmermann, H. G., & Stellmann, J. (2025). OCT-based retina assessment reflects visual impairment in multiple sclerosis. *Investigative Ophthalmology & Visual Science*, 66(2), 39. https://doi.org/10.1167/iovs.66.2.39

- 85. Szeto, S. K., Lai, T. Y., Vujosevic, S., Sun, J. K., Sadda, S. R., Tan, G., Sivaprasad, S., Wong, T. Y., & Cheung, C. Y. (2023). Optical coherence tomography in the management of diabetic macular edema. *Progress in Retinal and Eye Research*, 98, 101220. https://doi.org/10.1016/j.preteyeres.2023.101220
- 87. Triolo, G., Barboni, P., Savini, G., De Gaetano, F., Monaco, G., David, A., & Scialdone, A. (2021). The use of anterior-segment optical-coherence tomography for the assessment of the iridocorneal angle and its alterations: update and current evidence. Journal of Clinical Medicine, 10(2), 231.
- 88. Tsai, T. H., Leggett, C. L., Trindade, A. J., Sethi, A., Swager, A. F., Joshi, V., Bergman, J. J., Mashimo, H., Nishioka, N. S., & Namati, E. (2017). Optical coherence tomography in gastroenterology: a review and future outlook. Journal of biomedical optics, 22(12), 1–17. https://doi.org/10.1117/1.JBO.22.12.121716
- 89. Tubert, D. (June 2021). What Is Optical Coherence Tomography? AAO.org. https://www.aao.org/eye-health/treatments/what-is-optical-coherence-tomography
- 90. Tyberg, A., Xu, M., Gaidhane, M., & Kahaleh, M. (2018). Second generation optical coherence tomography: Preliminary experience in pancreatic and biliary strictures. *Digestive and Liver Disease*, 50(11), 1214–1217. https://doi.org/10.1016/j.dld.2018.05.019
- 91. U.S. National Library of Medicine. ClinicalTrials.gov. ILUMIEN IV: OPTIMAL PCI. NCT03507777. Start date March 26, 2018, Completion Date Feb 28, 2023. Retrieved from https://clinicaltrials.gov/ct2/show/NCT03507777
- 92. Vazquez, L. E., Bye, A., & Aref, A. A. (2020). Recent developments in the use of optical coherence tomography for glaucoma. *Current Opinion in Ophthalmology*, 32(2), 98–104. https://doi.org/10.1097/icu.000000000000000033
- 93. Virgili G, et al. Optical coherence tomography (OCT) for detection of macular oedema in patients with diabetic retinopathy. Cochrane Database of Systematic Reviews 2015, Issue 1.
- 94. Vijay, V., Mollan, S. P., Mitchell, J. L., Bilton, E., Alimajstorovic, Z., Markey, K. A., ... & Sinclair, A. J. (2020). Using optical coherence tomography as a surrogate of measurements of intracranial pressure in idiopathic intracranial hypertension. JAMA ophthalmology, 138(12), 1264-1271.
- 95. Wang, M. T., Bhatti, M. T., & Danesh-Meyer, H. V. (2022). Idiopathic intracranial hypertension: pathophysiology, diagnosis and management. Journal of Clinical Neuroscience, 95, 172-179.
- 96. Weissman, N.J. & Muhlestein, J.B. (2024). Intravascular ultrasound, optical coherence tomography, and angioscopy of coronary circulation. *UpToDate*. https://uptodate.com/contents/intravascular-ultrasound-optical-coherence-tomography-and-angioscopy-of-coronary-circulation
- 97. Wielders, L. H., Schouten, J. S., Winkens, B., van den Biggelaar, F. J., Veldhuizen, C. A., Murta, J. C., ... & Sisquella, M. (2018). Randomized controlled European multicenter trial on the prevention of cystoid macular edema after cataract surgery in diabetics: ESCRS PREMED Study Report 2. Journal of Cataract & Refractive Surgery, 44(7), 836-847.

- 98. Xie, J. S., Donaldson, L., & Margolin, E. (2022). Papilledema: a review of etiology, pathophysiology, diagnosis, and management. Survey of Ophthalmology, 67(4), 1135-1159.
- 99. Yang, L., Chen, Y., Ling, S., Wang, J., Wang, G., Zhang, B., Zhao, H., Zhao, Q., & Mao, J. (2022). Research progress on the application of optical coherence tomography in the field of oncology. *Frontiers in Oncology*, 12. https://doi.org/10.3389/fonc.2022.953934
- 100. Yu, Z., Wang, F., Dong, F., Li, N., Wang, D., & Wang, L. (2022). Comparison of ocular morphological parameters related to lens position by anterior segment optical coherence tomography and ultrasound biomicroscopy. *International Journal of Clinical Practice*, 2022, 1–7. https://doi.org/10.1155/2022/7599631
- 101. Zhuang, Z., Chen, D., Liang, Z., Zhang, S., Liu, Z., Chen, W., & Qi, L. (2023). Automatic 3D reconstruction of an anatomically correct upper airway from endoscopic long range OCT images. *Biomedical Optics Express*, 14(9), 4594. https://doi.org/10.1364/boe.496812

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