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# Macular Telangiectasia

Macular telangiectasia is a rare neurodegenerative disorder from abnormalities in the perifoveal capillaries that leads to loss of outer retinal layers. Although there were once thought to be three types, [1] currently two forms are recognized, types 1 and 2 (Table 1). MacTel type 2 has also been referred to as macular, juxtafoveal, or parafoveal telangiectasias but now is most commonly known as "MacTel". There is an international effort called the "MacTel Project" that was initiated to amass information in a database, the "MacTel Registry" to better understand the disease. [2] Here we will focus on type 2 only.

**Table 1. Characteristics of the 2 types of macular telangiectasias**

| Type | Laterality | Demographics | Key Features |
|---|---|---|---|
| Macular telangiectasia type 1 | Unilateral | Younger patients; congenital | • Coat's disease- type picture<br>• Exudates |
| Macular telangiectasia type 2 | Bilateral | Middle age patients with vascular risk factors; acquired | • Loss of foveal pigment<br>• Right angled venules<br>• Crystalline and pigmentary deposits<br>• Macular or lamellar hole |

MacTel is a relatively rare condition with prevalence of 0.1% in the Beaver Dam Eye Study, affecting patients in the fifth to seventh decades of life.[1] Patients become symptomatic from blurred vision, especially when reading, and a paracentral scotoma. Visual acuity is generally well preserved, with most eyes maintaining functional vision. In a recent report from the MacTel Project, about 60% of eyes in a cohort of nearly 4,500 eyes retained vision of 20/50 or better. Loss of vision is relatively slow at approximately 1 letter per year. Advanced stages of disease from progressive atrophy resulting in a macular hole or sequelae such as neovascularization, can result in poorer vision to worse than 20/200, although such levels of vision loss are rare, with a frequency of 3.8% being reported in this database. Interestingly, the Registry also identified that right eyes had more advanced stage of disease than left. [3]

The general pathophysiology is thought to be due to abnormalities and eventual loss of Muller cells. Other vascular abnormalities similar to what is seen in diabetic patients, including degeneration of pericytes and lipid in capillary walls, has also been found in histologic examinations.[2]

Clinically, these changes often begin temporal to the fovea and spread perifoveally over time. The first features are gray discoloration from a loss of transparency of the retinal tissues, often accompanied by mild dilatation and ectasia of perifoveal capillaries both in superficial and deep capillary plexuses. These capillaries appear more dilated than the expected size and then appear to abruptly end, as they dive at right angles deeper into the retina. Pigment can migrate in the retina from RPE hyperplasia and crystalline deposits can be present at any point during the disease course (Figure 1). The fovea itself can develop a vitelliform like lesion or in more advanced stages, may form a lamellar or full thickness macular hole from more extensive atrophy and degeneration. Subretinal neovascularization can also form and is often accompanied by intra- or subretinal hemorrhage, edema, and possibly exudates.[2] The MacTel Project identified that the disease remains restricted to a region they named the "MacTel" area, an oval zone in the macula with the horizontal diameter being equal to the distance between the temporal margin of the optic nerve and the foveal center, "d", and the vertical dimension as 0.8 of the horizontal distance "d".[3]

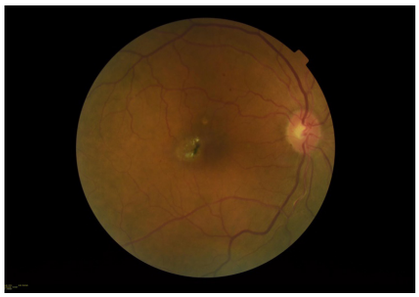

**Figure 1:**
Fundus photo demonstrating pigmentary changes and crystalline deposits temporally with loss of normal foveal pigments

The differential diagnosis for MacTel includes a minor branch/twig vein occlusion, radiation retinopathy, and exudative age-related macular degeneration (AMD), especially in the setting of neovascularization. A retinal vein occlusion would likely show changes distal to an arteriovenous crossing and would not cross the horizontal meridian. Radiation retinopathy usually affects larger areas than just the perifoveal region. Exudative AMD would have other associated features including drusen and RPE changes that would not be present in Mac Tel; however end stage disease as disciform scars may be indistinguishable. Lastly, tamoxifen retinopathy can result in crystal deposition that has a similar appearance to MacTel.[2]

Fluorescein angiogram (FA) was classically used to diagnose MacTel and help distinguish these conditions. FA shows abnormal telangiectatic vessels that abruptly dive deeper into the retina and leak in late frames (Figure 2). If neovascularization is present, a feeding arteriole and draining venule may be able to be visualized. Since the widespread use of OCT imaging, several salient features help to identify MacTel. OCT shows focal loss of outer retinal layers, degenerative cavitations especially in inner retinal layers, and an ILM drape (Figure 3).[3] Signs of neovascularization would include intra- or subretinal fluid and subretinal hyperreflective material, without associated drusen present in AMD (Figure 4). Fundus autofluorescence can be particularly useful in early stages of MacTel, where the loss of foveal pigments can be detected by the loss of normal central hypoautofluorescence, before any other changes are seen clinically (Figure 5). In later stages, there may be adjacent hyperautofluorescence from RPE hyperplasia.[1,2] Lastly, OCT angiography (OCTA), has also been used to demonstrate classic features of MacTel, especially the dilated vessels of the superficial and deep capillary layers that may then anastomose and form neovascularization.[4]

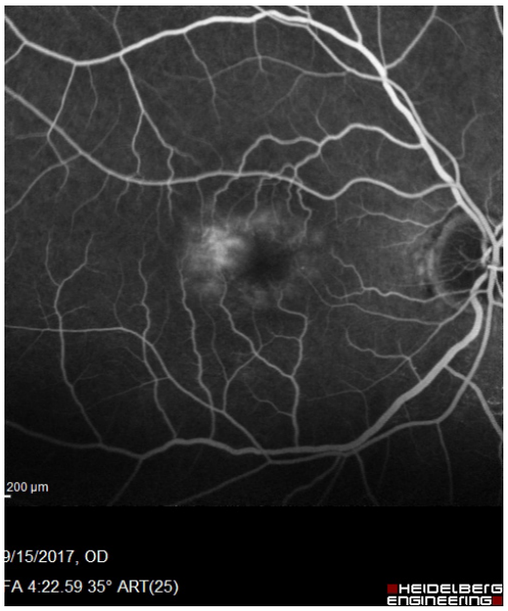


**Figure 2:**
Fluorescein angiogram demonstrating mild leakage temporal to the fovea

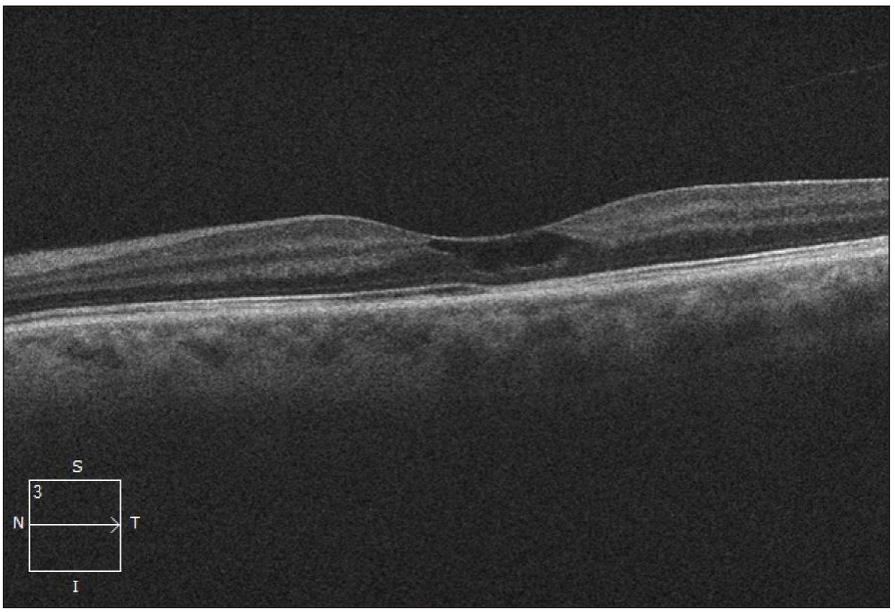


**Figure 3:**
OCT showing degenerative cysts resulting in an ILM drape

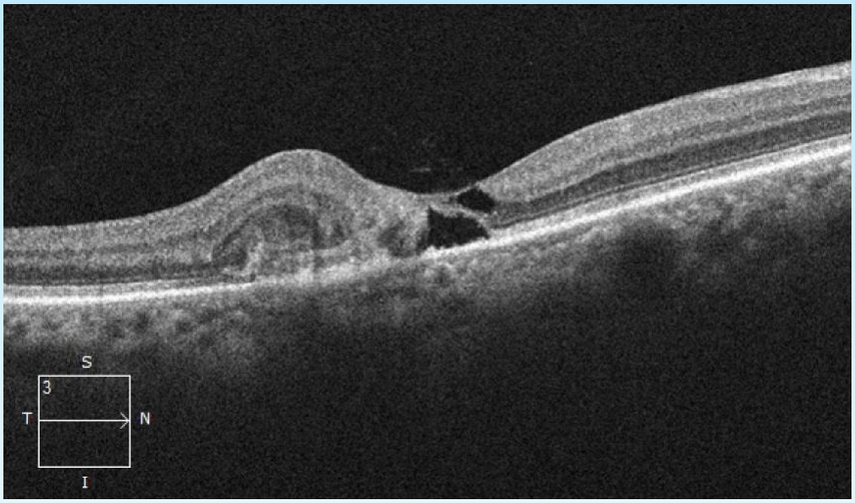


**Figure 4:**
OCT showing subretinal hyperreflective material at the location of neovascularization, adjacent to degenerative cysts

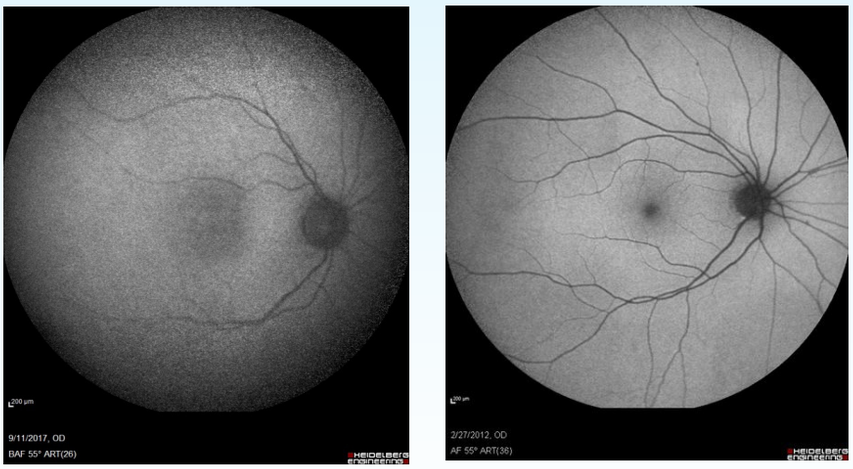


**Figure 5:**
Loss of normal foveal hypoautofluorescence in a patient with MacTel (left) compared to a normal patient (right)

Unfortunately, there are no proven treatments for MacTel and nothing that has been shown to prevent the progressive degeneration. There have been some trials investigating the utility of a surgical implant containing ciliary neurotrophic factor (CNF) to slow retinal degeneration. In the cohort of 65 patients who completed the study, there was less neurodegeneration in the treatment group compared to sham, with no loss of reading speed, while the sham cohort noted a deterioration of nearly 14 words per minute over 24 months. There were some ocular side effects that occurred and would need to be investigated further before this therapy could be considered for clinical use.[5] In cases where neovascularization develops, anti-vascular endothelial growth factor (VEGF) injections can stabilize the vision and hopefully prevent disciform scarring. In cases of full thickness macular holes, some patients may achieve some anatomic benefit to surgery but the success rate is less than that of traditional macular holes, and may depend on the extent of tangential traction versus neurodegeneration that resulted in hole formation.[1, 2]

MacTel is a rare condition, with yet much to be learned regarding the pathogenesis of the disease. Hopefully with more research efforts such as the MacTel Project, additional information can lead to potential therapies to stabilize and improve vision.

***References:***

1. *Mozayan E, Mammo D, Lim JI, Karth PA, Shah VA. Macular telangiectasia. EyeWiki [Internet]. 2020.*
2. *Chew E, Yannuzzi L. Macular Telangiectasia, Ryan's Retina. Schachat A, Sadda S, editors: Elsevier; 2018.*
3. *Heeren TFC, Chew EY, Clemons T, Fruttiger M, Balaskas K, Schwartz R, Egan CA, Charbel Issa P. Macular Telangiectasia Type 2: Visual Acuity, Disease End Stage, and the MacTel Area: MacTel Project Report Number 8. Ophthalmology. 2020;127(11):1539-1548.*
4. *Roisman L, Rosenfeld PJ. Optical Coherence Tomography Angiography of Macular Telangiectasia Type 2. Dev Ophthalmol. 2016;56:146-158.*
5. *Chew EY, Clemons TE, Jaffe GJ, Johnson CA, Farsiu S, Lad EM, Guymer R, Rosenfeld P, Hubschman JP, Constable I, et al. Effect of Ciliary Neurotrophic Factor on Retinal Neurodegeneration in Patients with Macular Telangiectasia Type 2: A Randomized Clinical Trial. Ophthalmology. 2019;126(4):540-549.*

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# At the Forefront of Clinical Research

NJRetina continuously conducts clinical trials at key locations. Our clinical research coordinators will be happy to discuss the inclusion/ exclusion criteria or any other aspect of these studies with you or your patients. If you have any questions, please feel free to contact:

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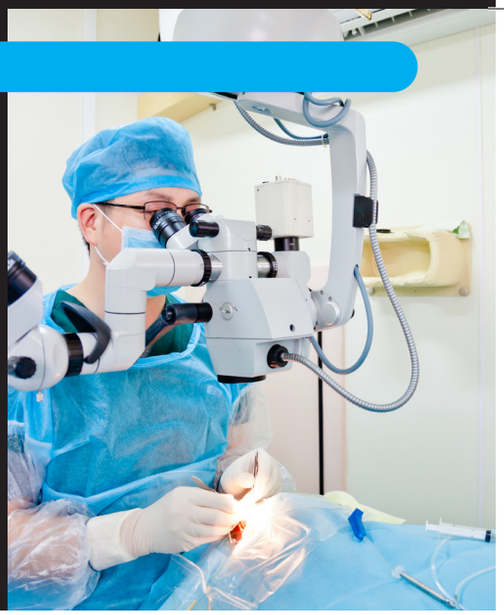
Dina Christodoro - Toms River: 732-797-3984 - Edison: 732-906-1887



# Enrolling Studies:

**Dry AMD**

**Vauxhall**

GTSCOPE: A Study of Disease Progression in Genetically Defined Subjects With Geographic Atrophy Secondary to Age-Related Macular Degeneration

**Teaneck**

Catalina: A Phase 2 Multicenter, Randomized, Double-Masked, Sham-Controlled Study of the Safety and Efficacy of Intravitreal Injections of NGM621 in Subjects with Geographic Atrophy (GA) Secondary to Age-Related Macular Degeneration (AMD)

**Teaneck and Toms River**

Gallego: A phase II, multicenter, randomized, single-masked, sham-controlled study to assess safety, tolerability, and efficacy of intravitreal injections of FHTR2163 in patients with geographic atrophy secondary to age-related macular degeneration (Gallego)

**Wet AMD**

**Edison**

Pulsar: Randomized, Double-Masked, Active-Controlled Phase 3 Study of the Efficacy and Safety of High Dose Aflibercept in Patients with Neovascular Age-Related Macular Degeneration

**Diabetic Macular Edema (DME)**

**Teaneck**

Gleam: A prospective, randomized, double-masked, active comparator-controlled, multi-center, two- arm, phase 3 study to evaluate the efficacy and safety of intravitreal KSI-301 compared with intravitreal aflibercept in participants with visual impairment secondary to treatment- naive diabetic macular edema.

**Teaneck**

Pagoda: A Phase III, multicenter, randomized, visual assessor-masked, active-comparator study of the efficacy, safety, and pharmacokinetics of the Port Delivery system with Ranibzumab in patients with diabetic macular edema

**Edison and Teaneck**

Photon: A Randomized, Double-Masked, Active-Controlled Phase 2/3 Study of the Efficacy and Safety of High-Dose Aflibercept in Patients with Diabetic Macular Edema

**Diabetic Retinopathy**

**Teaneck**

Pavilion: A Phase III, Multicenter, Randomized Study of the Efficacy, Safety, and Pharmacokinetics of the Port Delivery System with Ranibizumab in Patients with Diabetic Retinopathy

## Soon to Enroll Studies:

**Diabetic Retinopathy:**

• Altitude: A Phase 2, Randomized, Dose-escalation, Observation-controlled Study to Evaluate the Efficacy, Safety, and Tolerability of RGX-314 Gene Therapy Delivered via One or Two Suprachoroidal Space (SCS) Injections in Participants with Diabetic Retinopathy (DR) Without Center Involved-Diabetic Macular Edema (CI-DME) (ALTITUDE) – Teaneck

**Retinal Vein Occlusion**

• Balaton: A Phase III, Multicenter, Randomized, Double-Masked, Active Comparator-controlled Study To Evaluate The Efficacy And Safety Of Faricimab In Patients With Macular Edema Secondary To Branch Retinal Vein Occlusion – Toms River