Macular Telangiectasia

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1

To correct a myth

How it all got started

Now you know the true story of why Eve ate the apple

2

Topics To Be Covered

- What is (Macular) telangiectasia
- Types
- Risk factors
- Possible causes
- Symptoms & findings
- Diagnosis and Treatment
- Natural Course and prognosis
- Mac Tel project

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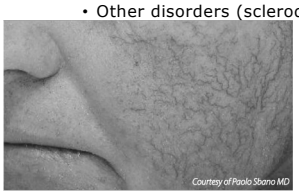
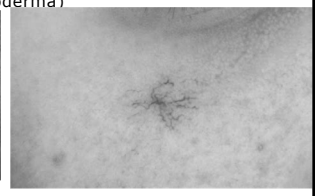
What is ~~Macular~~ Telangiectasia

- **Telangiectasia**
  - Dilation of small (tiny) blood vessels
  - Skin – "spider veins"
    - Rosacea and blepharitis
    - Aging
    - Other disorders (scleroderma)





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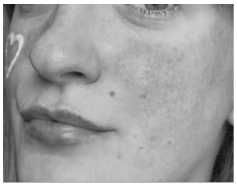
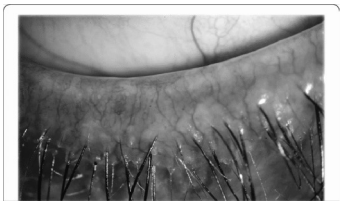
What is ~~Macular~~ Telangiectasia

- **Telangiectasia**
  - Dilation of small (tiny) blood vessels
  - Skin –Rosacea and blepharitis

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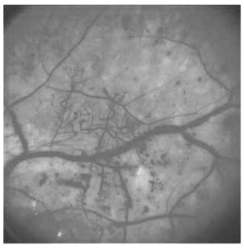
What is Retinal Telangiectasia

- **Dilation of small (tiny) blood vessels in the retina**
  - Diabetes – IRMA
  - Central or branch retinal vein occlusion



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What is Macular Telangiectasia

- **Historical background**
  - 1977 first described – but little known or recognized
  - 1990's – recognized Mac Tel 2 as 1 of 3 distinct forms of idiopathic juxtafoveolar retinal telangiectasia
  - Very little new information for another 10 years
    - 2005 MacTel project begin study of the disorder.
      - Increased awareness of the disorder

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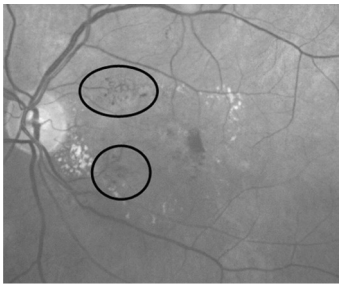
What is Macular Telangiectasia

- **Dilation of small (tiny) blood vessels in the juxtafoveal macular area**



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Macular Telangiectasia

- **There is more to this disorder than just telangiectasia**
- **3 Types of Macular Telangiectasia (MacTel)**
  - Type I, II, and III
    - **Type III**
      - **Extremely Rare**
      - Have more diseased vessels
      - Associated with systemic or cerebral vascular occlusive disease
      - Poor prognosis

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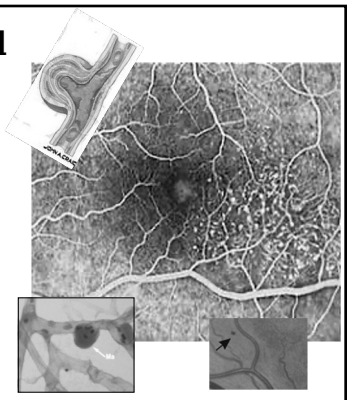
Type 1 MacTel

- Very Uncommon
- 40 years old or older
- Usually Only involves one eye
  - Rare cases of bilateral involvement
- Telangiectatic vessels develop microaneurysms that
  - Leak fluid, blood, and occasionally lipid



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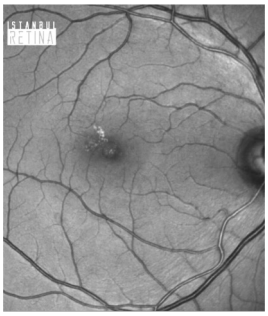
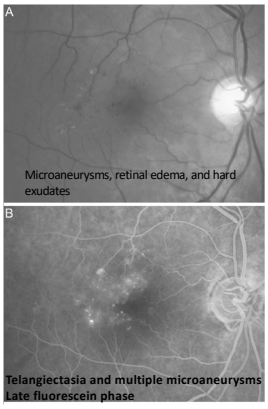
Type 1 MacTel





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Type 2 Macular Telangiectasia

- **Most common, but is uncommon**
  - Incidence
    - .01%. (1/10,000)
    - Slightly more prevalent in females
    - Onset in older people
      - Mean age of diagnosis was 57
    - Always Bilateral
    - >50% associated with systemic disorders
      - Hypertension / coronary artery disease
      - Type II Diabetes
      - Hyperlipidemia & hypertriglyceridemia

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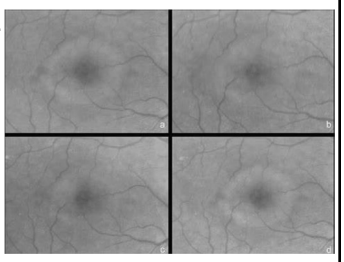
Type 2 MacTel



- **Findings Early**
  - A Novel Clinical Sign in patients with Mac Tel 2
  - Frequently, the very 1st change seen.

Opacification (graying) of juxtafoveal retina.
As light intensity is increased from an indirect ophthalmoscope, graying decreased.
After dark adaptation for 15 minutes, intensity of graying increased again. Possibly due to the release of chromophores from abnormal Müller cells.

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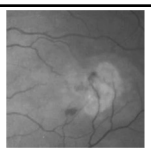
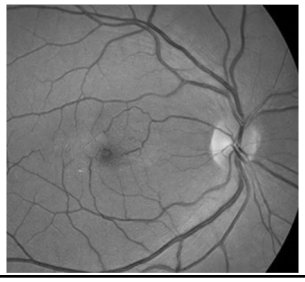
Type 2 MacTel



- **Findings Early**
  - Can be misdiagnosed as macular degeneration or diabetic retinopathy
  - All parafoveal
    - Mild paramacular dot and blot hemorrhages
    - Mild changes in RPE
    - Mild telangiectasia



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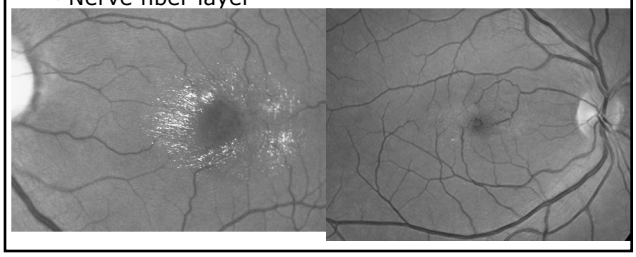
Type 2 MacTel

- **Findings**
  - Crystalline deposits -46% (60% bilateral) when first seen.
  - Nerve fiber layer



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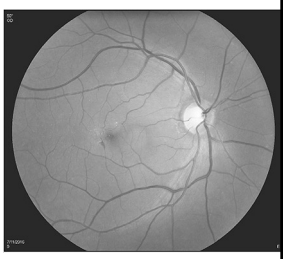
Type 2 MacTel

- **Findings**
  - Decrease or absence of macular pigment
  - RPE hyperplasia
    - Increased proliferation of RPE cells



Opacification of retina, crystalline deposits, and retinal pigment epithelial hyperpigmentation (hyperplasia)

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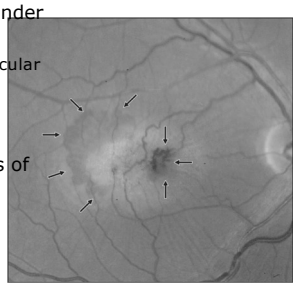
Type 2 MacTel

- **Findings as disease progresses**
  - May see neovascularization under retina (11%)
    - May leak fluid and cause macular edema and thickening
    - May bleed
    - Scarring may occur
  - Loss of photoreceptors > loss of central vision
  - Foveal atrophy



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Type 2 MacTel

- **How do we make the diagnosis**
  - Fluorescein angiography
  - Retinal autofluorescence
  - OCT
  - Confocal reflectance imaging, macular pigment density, Confocal optics scanning laser ophthalmoscopy
- **What do these tests show us**

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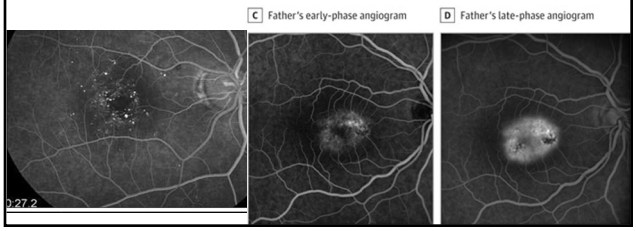
Type 2 MacTel

- **Fluorescein angiography shows**
  - The anomalous vessels early in disease
    - Telangiectasia
  - Leakage of fluid (edema)
  - Changes in RPE



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Type 2 MacTel

- **Fluorescein angiography** **But**
  - MacTel causes retinal changes that cannot be seen by FA, thus
  - This tool may not be effective, alone, in detecting early cases of MacTel
  - May be unnecessary exam now

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Type 2 MacTel

- **OCT**
  - Diagnose disease and identify changes in the eye in very early stages
  - Shows changes not seen by FA
  - Tells us what some of the pathology is
  - Less invasive than FA
  - Quick results

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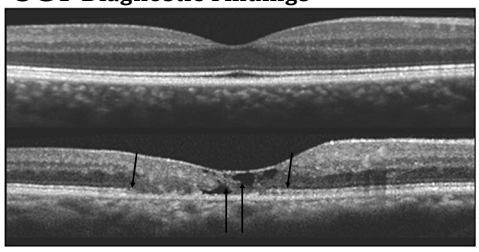
Type 2 MacTel

- **OCT Diagnostic Findings**



The upper image shows the normal OCT and the lower image shows the typical **cavitations** (red arrows)seen in the inner and outer retina and the **disruption of the photoreceptor cell layer** (yellow arrows)

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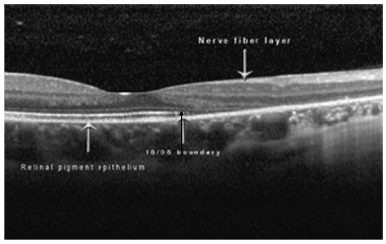
Type 2 MacTel

- **OCT Diagnostic Findings**
  - Photoreceptor loss



Spectral domain OCT demonstrating photoreceptor loss beginning

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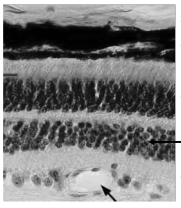
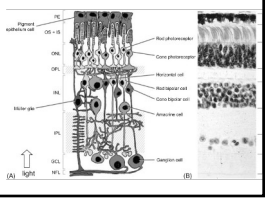
Type 2 MacTel

- **Pathology**
  - Begins **juxtafoveal**
  - Retinal vessels -telangiectasia
  - Müller, glial, and RPE cells
    - **Retinal glia**, which include **Müller cells** and astrocytes are vital for maintaining normal retinal function
- In the MacTel eyes that have been donated for research, **Müller glia** cells were found to be missing from the MacTel zone. **Müller glia** cells play an important supportive role to **photoreceptors** in the retina, which begin to **die** early in the disease.





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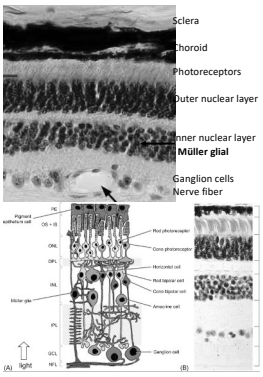
Type 2 MacTel

- **Pathology**
  - Lead to **loss of photoreceptors**
    - Loss of central vision is associated with these structural changes
    - **Occurs early** in the disorder



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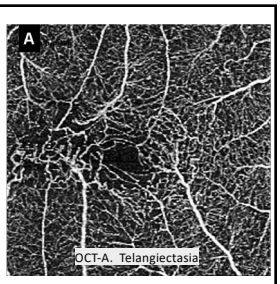
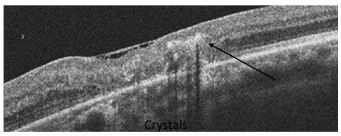
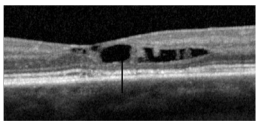
Type 2 MacTel

- **Pathology** – in addition to perifoveal telangiectasia
  - Disruption of photoreceptor junctions > atrophy of photoreceptors.
  - Typical **cavities** in both inner and outer retina
  - Intra-retinal **crystals**







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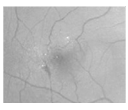
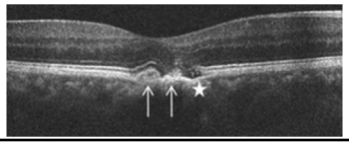
Type 2 MacTel

- **Pathology**
  - Decrease or absence of macular pigment
    - A unique depletion of macular pigment
    - Seen best with special testing
    - Recent trials showed that such depleted areas **cannot** re-accumulate **lutein and zeaxanthin** after oral supplementation
  - RPE hyperplasia – increased proliferation of RPE cells. White arrows





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Type 2 MacTel

- **What causes Type 2 Mac Tel**
- **Considered a neurovascular degenerative / neuro degenerative metabolic disorder**
  - A combination of
    - Genetics
    - Metabolism
    - Biochemistry
  - 2019 found that low serine levels were responsible for buildup of toxic lipids which cause photoreceptors to die

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Type 2 MacTel

- **What causes Type 2 Mac Tel**
  - 2020 found 22 variants of a gene that effects the serine levels which accounts for 3-4% of cases MacTel.
  - Between 10-50% of an affected person's first-degree relatives (parent, sibling, or child) may have MacTel.
  - They know there are many more variants likely exist, but not found yet.

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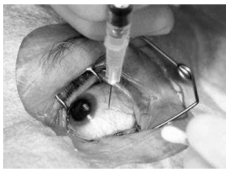
Type 2 MacTel

- **Treatment and prognosis with treatment non-proliferative form**
  - No proven treatments
- **Treatment of proliferative stage**
  - Focal laser to small leaking areas
    - Not really effective
  - Intravitreal anti-VEGF agents
    - Bevacizumab has been effective and safe for subretinal neovascular membranes in some cases
      - Improved VA from 1.5 to 3 lines in various studies



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Type 2 MacTel Project

- **Began 2005**
  - National registry for the disorder
  - 3000 patients enrolled in the study
  - Over 50 clinical sites
    - U.S., Australia, and Europe
  - Reported on gene studies
    - By more fully understanding the role of the gene and its' variants in MacTel, hopeful they can begin to map out potential treatment approaches.
  - Research group
    - One study in phase 3 clinical trials
  - Have made increased awareness of the disease among clinicians and vision science researchers

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MacTel Summary

- Macular telangiectasia type 2 initially described by blood vessel changes (telangiectasia)
- Now understood that MacTel is **not** primarily a blood vessel disease.
- The blood vessel abnormalities occur **secondary** to other changes in the eye.
- In the MacTel eyes that have been donated for research, **Müller glia** cells were found to be missing from the MacTel zone. **Müller glia** cells play an important supportive role to **photoreceptors** in the retina, which begin to **die** early in the disease.

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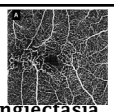
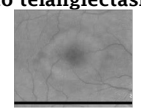
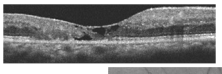
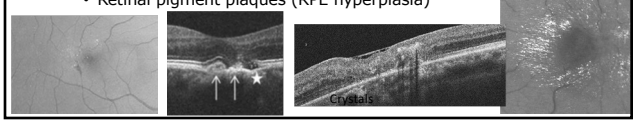
MacTel Summary



- **Diagnostic clinical signs in addition to telangiectasia**
  - Graying (opacification) of juxtafoveal retina
  - Cavitation of inner and outer retina on OCT
  - Loss of photoreceptor cells on OCT
  - Crystals in retina
  - A loss of macular pigment and
  - Retinal pigment plaques (RPE hyperplasia)







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MacTel Summary

- The natural history of macular telangiectasia suggests a slowly progressive disorder.
- A retrospective series of patients over 10 to 21 years showed deterioration of vision in more than 84% of eyes, either due to intra-retinal edema and serous retinal detachment (Type 1) or retinal pigment epithelium (RPE) scar formation or neovascularization (Type 2).
- **The good news!**
- Most patients retained a vision of at least 20/200

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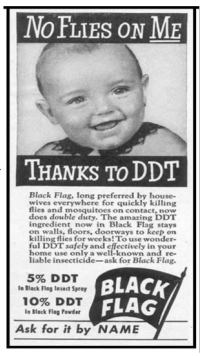
Sometimes
Only Time
Will Tell
If a drug or treatment
Is effective
And

Safe

Newspaper ad from 1940's



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The quote of the day

If you don't know where you are going

You probably won't get there.

Always go to other people's funerals,

otherwise they won't come to yours.

Yogi

- **Yogi Berra 1920-2015**
  - Hall of Fame NY Yankees

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What's up doc?
Any Questions?

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