White Dot Syndromes
Noninfectious Chorioretinopathies
Update 2019

Definition
Noninfectious disease
Inflammation of choroid, choriocapillaris, RPE, and Retina
“GENERALLY”
  SX: blurred central vision, scotomata
  PE: A/C and PS inflammation variable, single or multiple white, yellow or gray areas deep in retina
  Imaging will be helpful

DX of exclusion: syphilis/Toxo/TB/sarcoid/VKH
Retinal Labeled Layers

Blood Vessels  Temporal Nerve Fiber Layer

External Limiting Membrane
Inner Photoreceptor Segments
Outer Photoreceptor Segments
Outer Nuclear Layer
RPE (Bruch's Membrane Complex)

Internal Limiting Membrane
Nerve Fiber Layer
Ganglion Cell Layer
Inner Plexiform Layer
Inner Nuclear Layer
Outer Plexiform Layer
Outer Nuclear Layer

Ganglion Cells
Bipolar Neurons
Horizontal Neurons
RPE

Disruption of the IS/OS junction

Vitreous cells

Severely disrupted IS/OS junction
Mildly disrupted IS/OS junction

Improved but persistent IS/OS junction attenuation
Resolved vitreous cell

Improved but still irregular IS/OS junction
MEWDS
Multiple Evanescent White Dot Syndrome

Who:
- Young (20-40s ave 28), female 75%, viral trigger 50% (to include vaccinations HB)
  Usually myopic

SX:
- Acute/abrupt
  - Unilateral loss of acuity, scotomata, photopsia

PE:
- Yellow-white spots consisting of 100-200 micron spots in wreath shape, posterior pole and round disc,
- Orange granularity of fovea
  +/- papillitis/vitritis
  VF: enlarged blind spot or cecocentral scotomata

FA/AF: HyperAF more than hypo
OCT: focal disruption of IS/OS junction//RPE
FA: Early blocking, late staining, can see staining of ONH
ICG: Early, barely visible lesions; late hypofluorescence more than visible lesions
ERG: loss of A wave and abnormal EOG (impact at Photoreceptors/RPE)

Clinical Triad: big blind spot, papillitis/vitritis, orange fovea
MEWDS
Multiple Evanescent White Dot Syndrome

Pathology: photoreceptor and RPE junction
  - ERG: A wave abnormality
  - EOG: Abnormal
Associations: none except viral exposure
Prognosis:
  - Good (rare VF defects or CNVM) → no TX
  - Rare (less than 10%) recur
MEWDS
Multiple Evanescent White Dot Syndrome

- **Summary**
  - Unilateral disease of young women most with viral prodrome
  - Small spots (tiny spots in wreath pattern)
  - Orange granularity of fovea
  - Papillitis → visual field changes
  - **Clinical triad:** big blind spot, papillitis/vitritis, orange fovea
  - Impact at Photoreceptor & RPE layer = abn a wave EOG
  - **BRIEF AND BENIGN COURSE → NO TX**
A(p)MPPE
Acute posterior Multifocal Placoid Pigment Epitheliopathy

Who:
- Young adults (20-40 ave 28), M=F
- 30% viral prodrome

SX:
- Acute/abrupt Bilateral, asymmetric acuity loss, photopsia

PE:
- Large (1-2DD), cream colored spots in posterior pole and around arcade and disc move toward equator, at RPE level, 50% vitritis, papillitis
- FAF: Early hyperAF then mixed areas of hypoAF
- OCT: Irregularity at outer retina/RPE/inner choroid layer
- FA: Early blockage, late staining
- ICG: Hypofluorescence
- ERG → mild, transient abnormality and EOG → marked persistent abnormality

A(p)MPPE
Acute posterior Multifocal Placoid Pigment Epitheliopathy

Associations:
- HLA B7 and DR2

Ocular
- Corneal thinning, episcleritis, retinal vasculitis, serous RD

Systemic
- Cerebritis, TIA, Erythema nodosum, thyroiditis, hearing loss

Prognosis:
- Good (most >20/30 rare cnvm) → no TX
- If neurologic sx are present then treat
A(p)MPPE
Acute posterior Multifocal Placoid Pigment Epitheliopathy

Summary
Bilateral disease in young adults, some with viral prodrome
Large spots → areas of RPE atrophy
Most like Serpiginous
EOG abnormalities are persistent

Most have brief and benign course → NO TX
Unless extensive macular involvement:
Oral corticosteroids have been recommended to speed resolution, especially in cases with extensive macular or foveal involvement; its efficacy has not been proven; high dose corticosteroid treatment suggested if cerebral vasculitis is present
Rare cause of cerebritis, and CNVM, hearing loss
high dose corticosteroid treatment if cerebral vasculitis is present
TX CNVM with AntiVEGF
Serpiginous Choroiditis
Geographic Helicoid Peripapillary Choroidopathy

Who: (20-60 ave 40s), M=F or M>F
SX: Variable onset of Bilateral vision loss, scotomata
PE: Gray-white, fingerlike projections at edge of previous atrophy → usually spreads out from disc
Macular lesion only in 20%, vitritis 30%
FAF: early hyperAF, late hypoAF
OCT: loss, fluid, extra reflective band IS/OS junction/RPE
FA: early blocking and late staining
ICG: early can show hyper; late hypo
ERG is usually normal and the EOG abnormal since pathology is at RPE/choriocapillaris
Serpiginous Choroiditis
Geographic Helicoid Peripapillary Choroidopathy

Associations:
- HLA B-7 (55%), nongenetic dystonia, hypoglycemia, elevated factor VIII-vwf, TB/HSV history

Prognosis: Poor (one eye with useful VA)
- Recurrences, cnvm (25%-33%),

TX: steroids/immunosuppression

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Serpiginous Choroiditis
Geographic Helicoid Peripapillary Choroidopathy

- Summary
  - Bilateral disease of middle aged adults
  - Usually lesions start from the disc and spread both confluently and outwardly
    - Most like AMPPE
  - Associations: HLA B-7 (55%), ↑ factor VIII (VWF), may have history of TB/HSV
  - Prognosis: Poor
    - Progressive, recurrent → poor vision → TX
Serpiginous Choroiditis
Geographic Helicoid Peripapillary Choroidopathy
Relentless Placoid Chorioretinitis (RPC)
“ampiginous”

Resembles both APMPPE and Serpiginous
Who: 2nd to 6th decades M=F Rare
SX: Bilateral, Decreased vision, Scotoma, Floaters, Photopsias
PE:
Active lesions
  - Smaller than APMPPE (1/2 disc area).
  - May affect the mid- and far periphery first
  - Then involvement of the posterior pole (unlike APMPPE or serpiginous)
Lesions heal over weeks, resulting in chorioretinal atrophy
New lesions occur in all patients.
Presence of fifty or more lesions throughout the fundus
  - Subretinal fluid may be seen in association with the acute lesions.
  - Lesions heal - visual acuity is often preserved even with macula involved

Diagnostic Testing
FA/ICG (like APMPPE and Serpiginous)
  Early hypofluorescence & late staining of acute lesions
SDOCT
  Early Lesions
    - retinal photoreceptor disruption in the ellipsoid zone
    - surrounding areas of central subretinal fluid
  Healed lesions (RPE atrophy with patchy hyperplasia)
FAF
  lesions different zones:
    - of hypoautofluorescence (sick RPE)
    - and of hyperautofluorescence (dead RPE and RPE scaring blocking)

Laboratory evaluation is not helpful.
No consistent systemic association has been found.
Relentless Placoid Chorioretinitis (RPC)

Treatment
Oral corticosteroids
Steroid Sparing IMT • Course
Healing with treatment
Relapses common
Preserved central vision despite 100s Of lesions and macular involvement
**Bird Shot Chorioretinopathy**

**Vitiliginous Chorioretinitis**

**WHO:** Middle aged (40-60 ave 53) white, W>F

**SX:** EARLY Bilateral decrease of acuity, floaters

**LATE** nyctalopia, color vision problems, VF complaints

**PE:** Smaller than disc, cream colored, round-oval spots at choroidal level

Swirl out from disc, nasal>temporal, do not pigment over time, vitritis 90-100%, a/c cells 30%

**FAF:** hypoAF lesions

**OCT:** focal loss of is/os junction and RPE layer (late CME)

**FA:** Quenching – dye rapidly disappears from retinal circulation

later see leakage at vessels/ONH and CME can be normal

**ICG:** early and late hypofluorescence

**ERG** is abnormal, Lymphocyte proliferation to S antigen

**Associations:**

HLA A29 90%

depression, abnormal sleep cycle

Hearing loss and vertigo

**Prognosis:** Fair (50% have > 20/60)

Usually due to CME, can see CNVM

**TX:** If VA worse than 20/40
Bird Shot Chorioretinopathy
Vitiliginous Chorioretinitis

• Summary
  • Bilateral, middle aged, white women
    • Early acuity loss,
    • Late night and/or color vision problems
  • Spots swirl out from disc, do not pigment
  • Vitritis and HLA A29 in 90%!
    • May see iritis, depression and sleep problems
  • Prognosis: FAIR
    • Vision Loss (<20/40) usually due to CME/CNVM → TX
AZOOR
Acute Zonal Occult Outer Retinopathy

Who: (Teens -60s ave 38) young women 75%
SX: Subacute Bilateral (75%), asymmetric, large peripheral scotomata, photopsias,
PE: Early, mild vitritis (50%), minimal retinal changes
Late, seen RPE changes, large gray rings around ONH, in mid-periphery or periphery
FAF: early hyperAF then mottled hyper/hypoAF
OCT: early focal loss of IS/OS then broader loss of outer retina
FA: Late leakage at retinal vessels/ONH
Especially in patients with vitritis
without vitritis FA can be normal
ERG: abnormal, pathology is in the outer retina

AZOOR
Acute Zonal Occult Outer Retinopathy

Pathology: outer retina
   ERG: abnormal
   EOG: normal

Associations: none
   CAR and RP should be in DDX

Prognosis:
   Good for central VA
   Peripheral field loss stabilizes in 6 months

TX:
   Steroids for significant vitritis
AZOOR
Acute Zonal Occult Outer Retinopathy

- Summary
  - Bilateral disease in young women
  - Complaint is peripheral field loss
  - Initial retina normal/mild vitritis
  - Prognosis: Fair
    - Some have mild central acuity loss due to CME
    - Peripheral Field Loss can be moderate but is non progressive
    - TX based on level of vitritis/CME
PIC
Punctate Inner Choroidopathy

Who: Young (20-40s, ave 33), myopic women (90%)
SX: Acute/abrupt Bilateral (can be unilateral) decrease in acuity, metamorphopsia, scotomata, photopsia
PE: Bilateral smaller than disc yellow spots, → like OHS
   Usually in posterior pole
   Rare Serous RD, NO a/c or vitreous cell
F AF: mix of hypo and hyperAF
OCT: focal loss at R PE level and then signs of CNVM
FA: Early blockage, late staining, leakage of CNVM
ICG: early and late hypo, with hyper think CNVM
ERG: either normal or borderline abn depending on amount of pathology at RPE choroid junction
PIC
Punctate Inner Choroidopathy

Associations: none or possible EBV

Prognosis:
- Good most return to 20/20
- CNVM (20-40%) worse acuity, but some resolve

TX:
- Usually none, treat cnvm, consider steroids
- Amsler grid

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PIC
Punctate Inner Choroidopathy

• Summary
  - Bilateral young myopic women
  - Spots in periphery
    - Most like MCP
  - Pathology is in choroid → ERG/EOG are nl
  - NO vitiritis/iritis
  - Lower association with EBV
  - Prognosis: GOOD no TX
  - (except for 40% CNVM)→Amsler → TX as needed
PIC
Punctate Inner Choroidopathy

[Images of ophthalmic scans and fundus photographs]
**MCP**

Multifocal Choroiditis and Panuveitis (pseudo histoplasmosis syndrome)

Who: Young (30’s ave 39) women (75%), myopic, +/- viral trigger

SX: Subacute bilateral decrease in acuity, floaters

PE: Smaller than disc gray-white spots

  - Inferior and nasal → late punched out lesion (like OHS)
  - Vitritis 100%, iritis 50%, CME 30%, CNVM 33%

FAF: mix of hypo and hyperAF

OCT: RPE subretinal space

FA: early blocking, later staining, old lesions → window defects

ICG: hypofluorescence

ERG: variable because of focal lesions at RPE/choroid level

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**MCP**

Multifocal Choroiditis and Panuveitis (pseudo histoplasmosis syndrome)

Associations: Epstein Barr Virus

Prognosis:

- Poor: Recurrent, CME common (CNVM 30%)

TX:

- Steroids, cyclosporine
- Acyclovir in patients with elevated EBV titers
MCP
Multifocal Choroiditis and Panuveitis (pseudo histoplasmosis syndrome)

- Summary
  - Bilateral in young, myopic women
  - Spots are usually nasal or inferior
    - Late lesions are areas of atrophy “punched out”
  - All have vitritis, half have iritis
  - Associations: EBV
  - Prognosis: Poor
    - Vision loss due CME > CNVM → TX
      - Acylovir for pt with ↑ EBV titers
Progressive Subretinal Fibrosis and Uveitis

Who: Young (teens-30’s) women 100%, BLACKS > WHITES

SX: Chronic/recurrent, bilateral asymmetric loss of acuity
   1-2 months many separate eyes

PE: Smaller than disc white dots, temporal > nasal
   Iritis 30%, vitritis 50-70%
   Later spots resolve, subretinal fluid → stellate fibrosis,
   CME, CNVM, RD

FA: early blockage or sometimes see window defect,
    late hyperfluorescence staining of scars

ERG/EOG: decreased
    impact is in Sub retinal space (b cells/plasma cells)
PSFU
Progressive Subretinal Fibrosis and Uveitis

• Associations: none
• Prognosis: POOR (CF-HM months-years)
  • Recurrences, CNVM, RD
• TX:
  • steroids, immunosuppressives, acyclovir
  • Treat CME, CNVM, RD

PSFU
Progressive Subretinal Fibrosis and Uveitis

• Summary
  • Bilateral disease in young, black women,
  • Dots associated with subretinal fluid, fibrosis, RD
  • Temporal > nasal, a bad end of MCP spectrum
  • Vitritis >> iritis

• Prognosis: POOR \(\rightarrow\) TX
  • progressive (CNVM/RD)
**PSFU**
Progressive Subretinal Fibrosis and Uveitis

**ARPE**
Acute Retinal Pigment Epitheliitis (Krills Disease)
ARPE

Acute Retinal Pigment Epithelitis
(Krills Disease)

Who: Young (teens -40) adults, rare disease
SX: Acute Unilateral 75%, mild drop in acuity, metamorphosia
PE: 2-4 clusters of small black spots + halo at macula
   Later spots darken, halo fades
FAF: nonspecific area of hypopAF or focal hyper
OCT: a range of subtle change at RPE to more significant outer retinal findings that seem to fade away
FA: Honeycomb pattern (hyperpigmented center/halo stains)
   “bulls eye pattern” No leakage
ERG/EOG: normal and abnormal; pathology is at RPE
ARPE
Acute Retinal Pigment Epitheliitis (Krills Disease)
Associations: none or possibly virus
Prognosis: Good, recovery over 2-3 months
TX: none

ARPE
Acute Retinal Pigment Epitheliitis (Krills Disease)
- Summary
  - Rare unilateral disease in young adults
  - Dark spots with halo
  - FA: bulls eye or honeycomb pattern
- Good Prognosis → NO TX
AMN Acute macular neuroretinopathy

Who: young women >85%
SX: acute paracentral scotomas in one or both eyes
PE: reddish-brown tear-drop wedge shape lesions pointing toward the fovea sometimes hard to seen on exam Retina vessels and ONH are unaffected and no vitritis
These can look similar to those seen blunt or whiplash trauma
Redfree/FAF: show areas affected more clearly as darker areas/blocking
OCT: either in middle or outer retina see focal areas of abn
Pathology: ischemia of deep plexus of the capillary plexus
Association:
Preceding flulike illness, use of OCP, caffeine, injection of adrenaline or epinephrine.
Usually complete recovery in weeks to months

ANM Acute Macular Neuroretinopathy
AIM Acute idiopathic maculopathy

Who: young adults after a flu (coxackievirus)
SX: acute severe central or paracentral vision loss
PE: exudative macular neurosensory detachment
  little or no vitritis, but may seen disc swelling & vasculitis
FAF: areas of mottled AF in NSD usually hyper
OCT: shows NSD
FA:
  Early shows irregular hyperfluorescence at RPE and late pooling
  Late shows bullseye pattern of RPE alteration
ICG: shows early and persistent blocking/hypofluorescence
Prognosis is good with near complete recovery of vision
Cause is not known but
DUSN Diffuse Unilateral Subacute Neuroretinitis

• Usually young – 14 years (11-65yrs)
• Symptoms:
  • Unilateral decrease in acuity
• PE
  EARLY
  • Evanescent crops of grayish white dots (400-1500 microns) usually posterior to equator
  • Motile Nematode (400-2000micron)
    - Baylisascaris procyonis, Ancylostoma caninum
  LATE
  • Diffuse atrophy due to toxic/immunologic reaction to nematode
    - Retinitis Pigmentosa Like:
      - Optic nerve, retina, and RPE atrophy
• Prognosis: Poor without Treatment
• Treatment: Find and laser worm (no toxic reaction), if unable to find worm then treat with oral albendazole 400mg QD for 30 days and and as needed IVT

DUSN Diffuse Unilateral Subacute Neuroretinitis

Images of patients' eyes showing early and late stages of DUSN.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Presentation</th>
<th>White dot description</th>
<th>Other findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple evanescent white dot syndrome (MEWDS)</td>
<td>Young females most common • Usually unilateral • Decreased vision, scotomata, photopsias • Proptosis &amp; flu-like illness</td>
<td>Numerous small white spots throughout mid peripheral retina • Orange specks at fovea</td>
<td>• Mild vitreous cells • Hypofluorescence on fluorescein angiography • Decreased a wave on ERG • Most patients obtain full recovery</td>
</tr>
<tr>
<td>Punctate inner choroiditis (PIC)</td>
<td>Healthy young women • Bilateral • Decreased vision, scotomata, photopsias</td>
<td>Mid peripherial/posterior pole spots at RPE and choroid • Serous detachment over lesions</td>
<td>No anterior or posterior cells • Early hyperfluorescence with leakage on fluorescein angiography • Most patients recover but 35% can develop CNV</td>
</tr>
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<td>Acute multifocal placoid pigment epitheliopathy (AMPPPE)</td>
<td>Young male OR female patients most common • Proptosis &amp; flu-like illness common • Bilateral</td>
<td>Large yellow placoid lesions throughout posterior pole in both retinas</td>
<td>• Mid anterior and posterior cells • Early hypofluorescence with late staining on fluorescein angiography • Self limiting in 6 months • Consider cerebral vasculitis if associated neurological signs</td>
</tr>
<tr>
<td>Serpiginous choroiditis (SC)</td>
<td>Rare • Older patients • No proptosis • Bilateral</td>
<td>Peripapillary yellow/grey confluous large placoid lesions spreading out to peripheral retina</td>
<td>Poor visual prognosis • 30% develop CNV • Early hypo- and late hyperfluorescene on fluorescein angiography</td>
</tr>
<tr>
<td>Bechterew choroidopathy (BC)</td>
<td>Bilateral • Decreased vision, fluctuans, photopsias, decreased colour vision</td>
<td>Cresent shaped rice shaped dots starting at disc then scattering throughout entire posterior pole</td>
<td>Slow chronic disease • No anterior cells but persistent vitritis present • Disc swelling, leakage, and CME on fluorescein angiography • HLA-B27 positive in 90% of patients</td>
</tr>
<tr>
<td>Acute zonal occult outer retinopathy (AZOOR)</td>
<td>Various ages • Bilateral • Photopsias • Rapid loss of visual field</td>
<td>Large, thin grey rings in peripheral retina</td>
<td>No anterior or posterior cells • Reduced ERG in both eyes • Central vision often remains good • Normal fluorescein angiography</td>
</tr>
<tr>
<td>Multifocal choroiditis with panretinal (MCP)</td>
<td>Women &gt; men • Decrease vision, fluctuans, photopsias</td>
<td>Variable sized white/grey/yellow dots, single or in clumps, in posterior pole and peripheral retina</td>
<td>• 35% develop CNV • Variable anterior and posterior cells angiography • Chronic and recurrent with guarded visual prognosis</td>
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<tr>
<td>APMPPPE</td>
<td>Birdshot Chorioretinitis</td>
<td>DLSN</td>
<td>MEWDS</td>
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<tr>
<td>Age</td>
<td>20-50</td>
<td>40-60</td>
<td>Variable</td>
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<tr>
<td>Sex</td>
<td>M=F</td>
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<tr>
<td>Laterality</td>
<td>Bilateral</td>
<td>Unilateral</td>
<td>Bilateral</td>
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<tr>
<td>Systemic association</td>
<td>Viral prodrome</td>
<td>HLA B7/B82</td>
<td>HLA A29</td>
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<td>Pathogenesis</td>
<td>Viral</td>
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<td>Onset</td>
<td>Acute</td>
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<tr>
<td>Course</td>
<td>Self-limiting</td>
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<tr>
<td>Vitritis</td>
<td>Mild</td>
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<td>IV Morquio syndrome</td>
<td>Multifocal flat yellowish-white lesion at the level of RPE</td>
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<td>V or IH Scheie syndrome</td>
<td>Early phase hypofluorescence, which passes into hyperfluorescence recovery</td>
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<td>Variable</td>
<td>20-40s</td>
<td>Young, possibly children</td>
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<tr>
<td>Sex</td>
<td>M=F</td>
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**General Information**

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<tr>
<th>Disease</th>
<th>Average age (years)</th>
<th>Gender analysis (% women)</th>
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<tbody>
<tr>
<td>BCR</td>
<td>55.3</td>
<td>F &gt; M (58%)</td>
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<tr>
<td>APMPPE</td>
<td>27.1</td>
<td>M &gt; F (46%)</td>
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<td>MEWDS</td>
<td>28.7</td>
<td>F &gt; M (74%)</td>
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<tr>
<td>MFC</td>
<td>39.2</td>
<td>F &gt; M (75%)</td>
</tr>
<tr>
<td>PIC</td>
<td>33.1</td>
<td>F &gt; M (85%)</td>
</tr>
<tr>
<td>AZOOR</td>
<td>38</td>
<td>F &gt; M (79%)</td>
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**Summary of white-dot chorioretinal inflammatory syndromes**

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<th>Acute posterior multifocal placoid pigment epitheliopathy</th>
<th>Multifocal evanescent white-dot syndrome</th>
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<th>Multifocal chorioiditis with panuveitis</th>
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<td>Asymmetric</td>
<td>Bilateral</td>
<td>Bilateral</td>
<td>Variable</td>
<td></td>
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<tr>
<td>FFA</td>
<td>Early hypofluorescence; late hyperfluorescence</td>
<td>Early hyperfluorescence; disc stain</td>
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<td></td>
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<tr>
<td>ICGV</td>
<td>Multiple hypofluorescent lesions</td>
<td>Hypofluorescent lesions</td>
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<tr>
<td>Choroidal neovascularisation</td>
<td>Rare</td>
<td>Rare</td>
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</tr>
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</table>

**Source**: Annual #