Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance?

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where does Stargardt rank in terms of prevalence?

Q/A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where does Stargardt rank in terms of prevalence?

Stargardt is the most v least common hereditary maculopathy

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where does Stargardt rank in terms of prevalence?
Stargardt is the most common hereditary maculopathy

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where does Stargardt rank in terms of prevalence?
Stargardt is the most common hereditary maculopathy

As hereditary maculopathies go, is AR inheritance the norm?

A

Stargardt Disease/Fundus Flavimaculatus

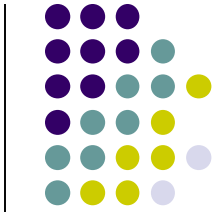
- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where does Stargardt rank in terms of prevalence?
Stargardt is the most common hereditary maculopathy

As hereditary maculopathies go, is AR inheritance the norm?
No--most are inherited in an AD fashion

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)

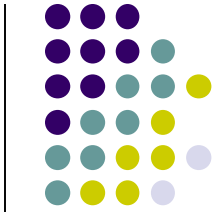
As hereditary maculopathies go, where do
terms of prevalence?
Stargardt is the **most common** hereditar

As hereditary maculopathies go, is AR inheritance the norm?
No--**most are inherited in an AD fashion**

Huh? how can an AR disease be more prevalent than AD diseases?

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where do
terms of prevalence?
Stargardt is the **most common** hereditar

As hereditary maculopathies go, is AR inheritance the norm?
No--**most are inherited in an AD fashion**

Huh? how can an AR disease be more prevalent than AD diseases?
Because the genes that cause Stargardt are very common in the general population

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where do
terms of prevalence?
Stargardt is the **most common** hereditar

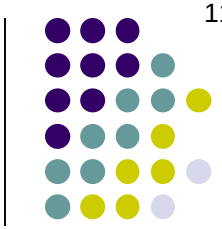
As hereditary maculopathies go
No--**most are inherited in an A**

Huh? how can an AR disease be more prevalent than AD diseases?
Because **the genes that cause Stargardt are very common in the general population**

How common is 'very common'? What percentage of the population is carrying one of the many disease-causing ABCA4 alleles?

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where do
terms of prevalence?
Stargardt is the **most common** hereditar

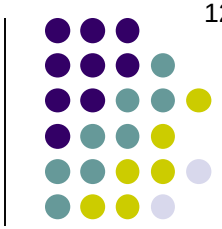
As hereditary maculopathies go
No--**most are inherited in an A**

Huh? how can an AR disease be more prevalent than AD diseases?
Because **the genes that cause Stargardt are very common in the general population**

How common is 'very common'? What percentage of the population is carrying one of the many disease-causing ABCA4 alleles?
Estimates run as high as 10%!

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where do
terms of prevalence?
Stargardt is the **most common** hereditar

As hereditary maculopathies go
No--**most are inherited in an A**

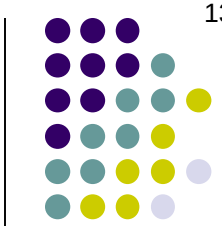
Huh? how can an AR disease be more prevalent than AD diseases?
Because **the genes that cause Stargardt are very common in the general population**

*How common is 'very common'? What percentage of the population is carrying one of **the many disease-causing ABCA4 alleles**?*
Estimates run as high as 10%!

How many is 'many'? That is, how many different dz-causing variants of the ABCA4 gene have been identified?

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where do
terms of prevalence?
Stargardt is the **most common** hereditar

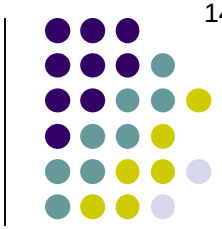
As hereditary maculopathies go
No--**most are inherited in an A**

Huh? how can an AR disease be more prevalent than AD diseases?
Because **the genes that cause Stargardt are very common in the general population**

*How common is 'very common'? What percentage of the population is carrying one of **the many disease-causing ABCA4 alleles**?*
Estimates run as high as 10%!

How many is 'many'? That is, how many different dz-causing variants of the ABCA4 gene have been identified?
As of this writing, almost 500!

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)

As hereditary maculopathies go, where do
terms of prevalence?
Stargardt is the **most common** hereditar

As hereditary maculopathies go
No--**most are inherited in an A**

Huh? how can an AR disease be more prevalent than AD diseases?
Because **the genes that cause Stargardt are very common in the general population**

*How common is 'very common'? What percentage of the population is carrying one of **the many disease-causing ABCA4 alleles**?*
Estimates run as high as 10%!

How many is 'many'? That is, how many different dz-causing variants of the ABCA4 gene have been identified?
As of this writing, almost 500!

The ABCA4 gene is mission-critical to the eye, with implications extending far beyond Stargardt/FF. Given this, let's look at it in some detail…

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

Q

Stargardt Disease/Fundus Flavimaculatus

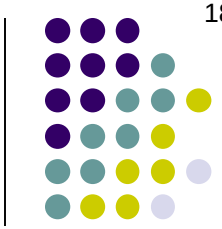
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?

Q/A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of word proteins. (Collectively, they are referred to simply as *ABC* same word, plural .)

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .)

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .) They are ubiquitous--found in every phyla of organism from us down to the prokaryotes. Hundreds of different ABC transporters have been identified (is why they're a 'superfamily'). To date, nearly 50 different ABC transporters have been identified in humans.

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .) They are ubiquitous--found in every phyla of organism from us down to the prokaryotes. Hundreds of different ABC transporters have been identified (is why they're a 'superfamily'). To date, nearly 50 different ABC transporters have been identified in humans.

OK, but what do they **do***?*

A

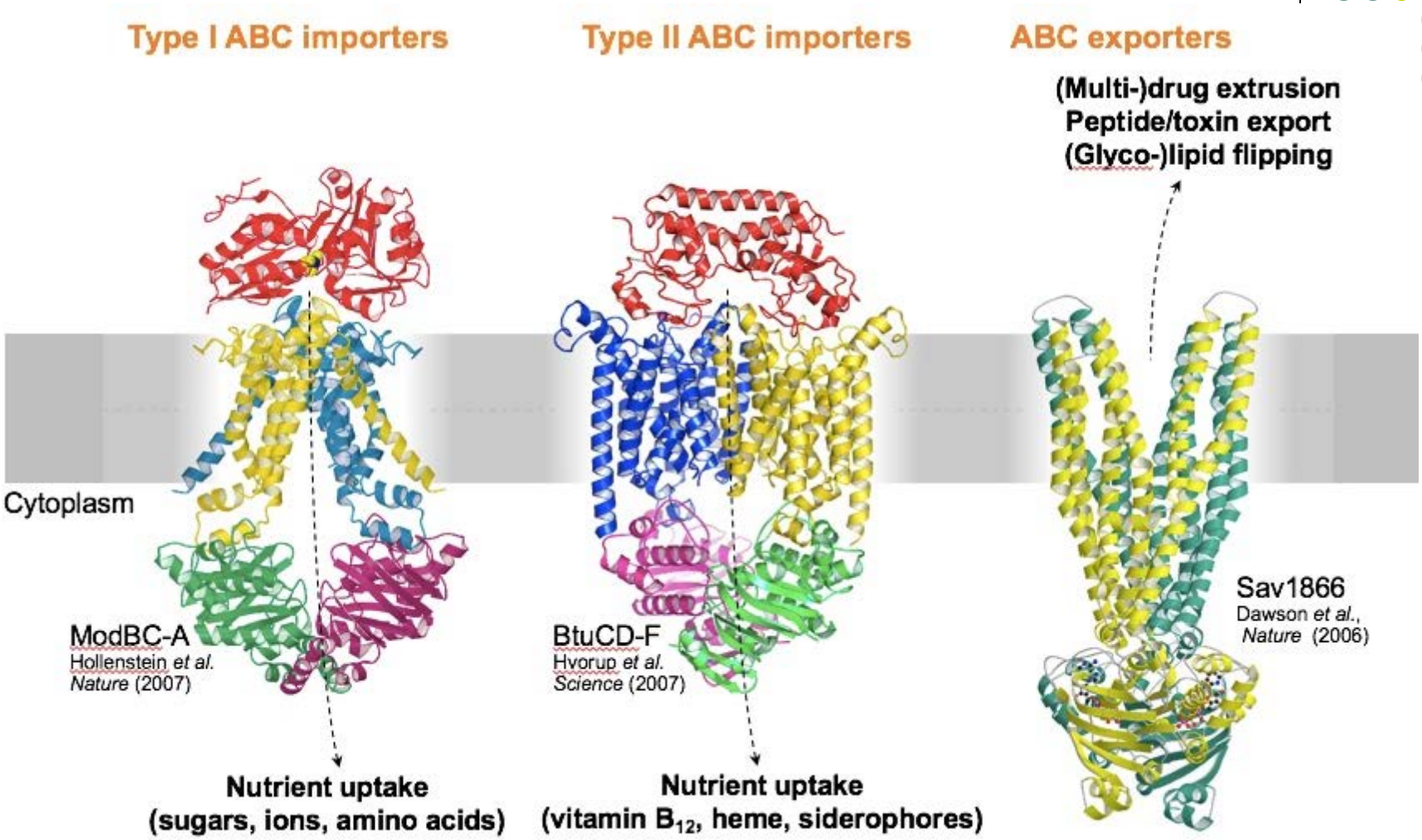
Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

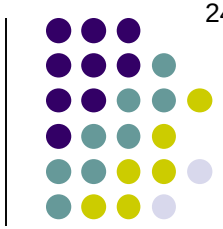
The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .) They are ubiquitous--found in every phyla of organism from us down to the prokaryotes. Hundreds of different ABC transporters have been identified (is why they're a 'superfamily'). To date, nearly 50 different ABC transporters have been identified in humans.

OK, but what do they **do***?*
In a word, they transport--substrates, into (or out of) cells. They are transmembrane channels that use ATP as an energy source to transport substances in or out of a cell against a concentration gradient.


Type I ABC importers
Type II ABC importers
ABC exporters
(Multi-)drug extrusion
Peptide/toxin export
(Glyco-)lipid flipping
Cytoplasm
ModBC-A
Hollenstein et al.
Nature (2007)
BtuCD-F
Hvorup et al.
Science (2007)
Sav1866
Dawson et al.,
Nature (2006)
Nutrient uptake
(sugars, ions, amino acids)
Nutrient uptake
(vitamin B12, heme, siderophores)

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .) They are ubiquitous--found in every phyla of organism from us down to the prokaryotes. Hundreds of different ABC transporters have been identified (is why they're a 'superfamily'). To date, nearly 50 different ABC transporters have been identified in humans.

OK, but what do they **do***?*
In a word, **they transport--substrates, into (or out of) cells**. They are

tances in

For example…?

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .) They are ubiquitous--found in every phyla of organism from us down to the prokaryotes. Hundreds of different ABC transporters have been identified (is why they're a 'superfamily'). To date, nearly 50 different ABC transporters have been identified in humans.

OK, but what do they **do***?*
In a word, **they transport--substrates, into (or out of) cells**. They are

tances in

For example…?
Name a substrate, and an ABC transporter is probably involved--most nutrients, vitamins, trace elements, etc coming in; metabolic waste, fats, sterols, and drugs going out.

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .) They are ubiquitous--found in every phyla of organism from us down to the prokaryotes. Hundreds of different ABC transporters have been identified (is why they're a 'superfamily'). To date, nearly 50 different ABC transporters have been identified in humans.

'Drugs going out'--what does that mean?

ut of) cells. They are

tances in

ved--most nutrients, vitamins,
, and **drugs going out**.

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

What does ABCA4 stand for?
ATP-Binding Cassette, sub-family A, member 4

The ABCA4 gene codes for the ABCA4 protein. (Shocking, I know.) In general terms, what sort of protein is ABCA4? What does it do?
ABCA4 is a member of the **ATP binding cassette** superfamily of transporter proteins. (Collectively, they are referred to simply as *ABC transporters* .) They are ubiquitous--found in every phyla of organism from us down to the prokaryotes. Hundreds of different ABC transporters have been identified (is why they're a 'superfamily'). To date, nearly 50 different ABC transporters have been identified in humans.

'Drugs going out'--what does that mean?
It means exactly what it says--ABC transporters are how cells rid themselves of therapeutic compounds. For example, bacterial drug resistance is often 2ndry to the development of ABC transporters. Likewise, when a previously effective cancer drug loses efficacy for an individual, it can often be attributed to the appearance in the cancer line of an ABC transporter that effluxes the drug.

t of) cells. They are

tances in

ved--most nutrients, vitamins,

, and **drugs going out**.

Q

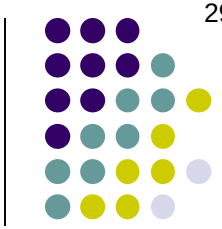
Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?

Q/A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the three words.

A

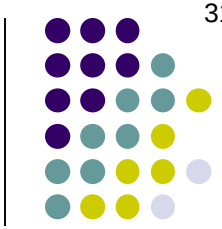
Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

Q

Stargardt Disease/Fundus Flavimaculatus



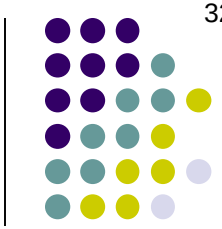
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?

Q/A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?
It is responsible for exporting a potentially toxic metabolic byproduct of the visual cycle. When ABCA4 is defective, this byproduct accumulates within the segment. Then, when the outer segments are shed and 'swallowed' by the underlying RPE (as part of the normal retinal renewal process), the metabolic byproduct is incorporated into the RPE cell's wear-and-tear granule.

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?
It is responsible for exporting a potentially toxic metabolic byproduct of the visual cycle. When ABCA4 is defective, this byproduct accumulates within the segment. Then, when the outer segments are shed and 'swallowed' by the underlying RPE (as part of the normal retinal renewal process), the metabolic byproduct is incorporated into the RPE cell's lipofuscin .

Q/A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?
It is responsible for exporting a potentially toxic metabolic byproduct of the visual cycle. When ABCA4 is defective, this byproduct accumulates within the segment. Then, when the outer segments are shed and 'swallowed' by the underlying RPE (as part of the normal retinal renewal process), the metabolic byproduct is incorporated into the RPE cell's lipofuscin . Specifically, the byproduct is incorporated as [redacted], a substance that damages and ultimately kills RPE cells in which it accumulates.

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?
It is responsible for exporting a potentially toxic metabolic byproduct of the visual cycle. When ABCA4 is defective, this byproduct accumulates within the segment. Then, when the outer segments are shed and 'swallowed' by the underlying RPE (as part of the normal retinal renewal process), the metabolic byproduct is incorporated into the RPE cell's lipofuscin . Specifically, the byproduct is incorporated as A2E , a substance that damages and ultimately kills RPE cells in which it accumulates.

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?
It is responsible for exporting a potentially toxic metabolic byproduct of the visual cycle. When ABCA4 is defective, this byproduct accumulates within the segment. Then, when the outer segments are shed and 'swallowed' by the underlying RPE (as part of the normal retinal renewal process), the metabolic byproduct is incorporated into the RPE cell's lipofuscin . Specifically, the byproduct is incorporated as A2E , a substance that damages and ultimately kills RPE cells in which it accumulates. (Head's up: In the interest of not making your eyes glaze over completely, I've [over]simplified this process a bit.)

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?
It is responsible for exporting a potentially toxic metabolic byproduct of the visual cycle. When ABCA4 is defective, this byproduct accumulates within the segment. Then, when the outer segments are shed and 'swallowed' by the underlying RPE (as part of the normal retinal renewal process), the metabolic byproduct is incorporated into the RPE cell's lipofuscin . Specifically, the byproduct is incorporated as A2E , a substance that damages and ultimately kills RPE cells in which it accumulates. (Head's up: In the interest of not making your eyes glaze over completely, I've [over]simplified this process a bit.)

And death of the RPE leads to…?

A

Stargardt Disease/Fundus Flavimaculatus

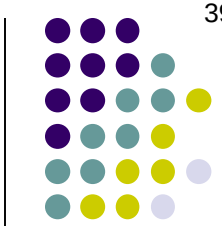
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

What role does the ABCA4 transporter play within rod outer segments?
It is responsible for exporting a potentially toxic metabolic byproduct of the visual cycle. When ABCA4 is defective, this byproduct accumulates within the segment. Then, when the outer segments are shed and 'swallowed' by the underlying RPE (as part of the normal retinal renewal process), the metabolic byproduct is incorporated into the RPE cell's lipofuscin . Specifically, the byproduct is incorporated as A2E , a substance that damages and ultimately kills RPE cells in which it accumulates. (Head's up: In the interest of not making your eyes glaze over completely, I've [over]simplified this process a bit.)

And death of the RPE leads to…?
Changes in the appearance of the posterior pole, as well as (far more importantly) death of overlying photoreceptors, with subsequent decreased vision

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? **ABCA4**

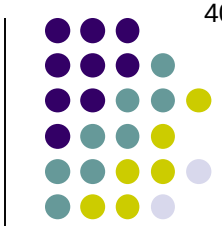
So what does the ABCA4 transporter have to do with the eye?
A great deal. This transporter is located exclusively in the retina, specifically in the membrane of the rod outer segment .

The pathophysiology of Stargardt/FF ***tl;dr***
--Defective ABCA4 alleles inherited; defective ABCA4 transporters expressed in rod outer segments
--Defective ABCA4 transporters can't export metabolic byproducts of the visual cycle, leading to their accumulation within the segments
-- As part of the normal retinal renewal process, byproduct-laden outer segments are shed, then phagocytized by RPE cells
--Within RPE cells, the byproduct is converted to A2E, which eventually kills the cell
--When the RPE cell dies, photoreceptors that depend on it die as well

And death of the RPE leads to…?
Changes in the appearance of the posterior pole, as well as (far more importantly) death of overlying photoreceptors, with subsequent decreased vision

Q

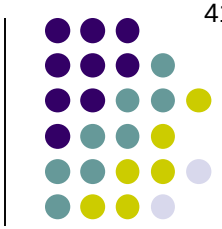
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: status fovea surrounded by color shape flecks

A

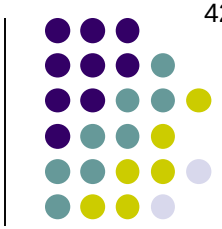
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform **flecks**

At what level of the retina do the flecks occur?

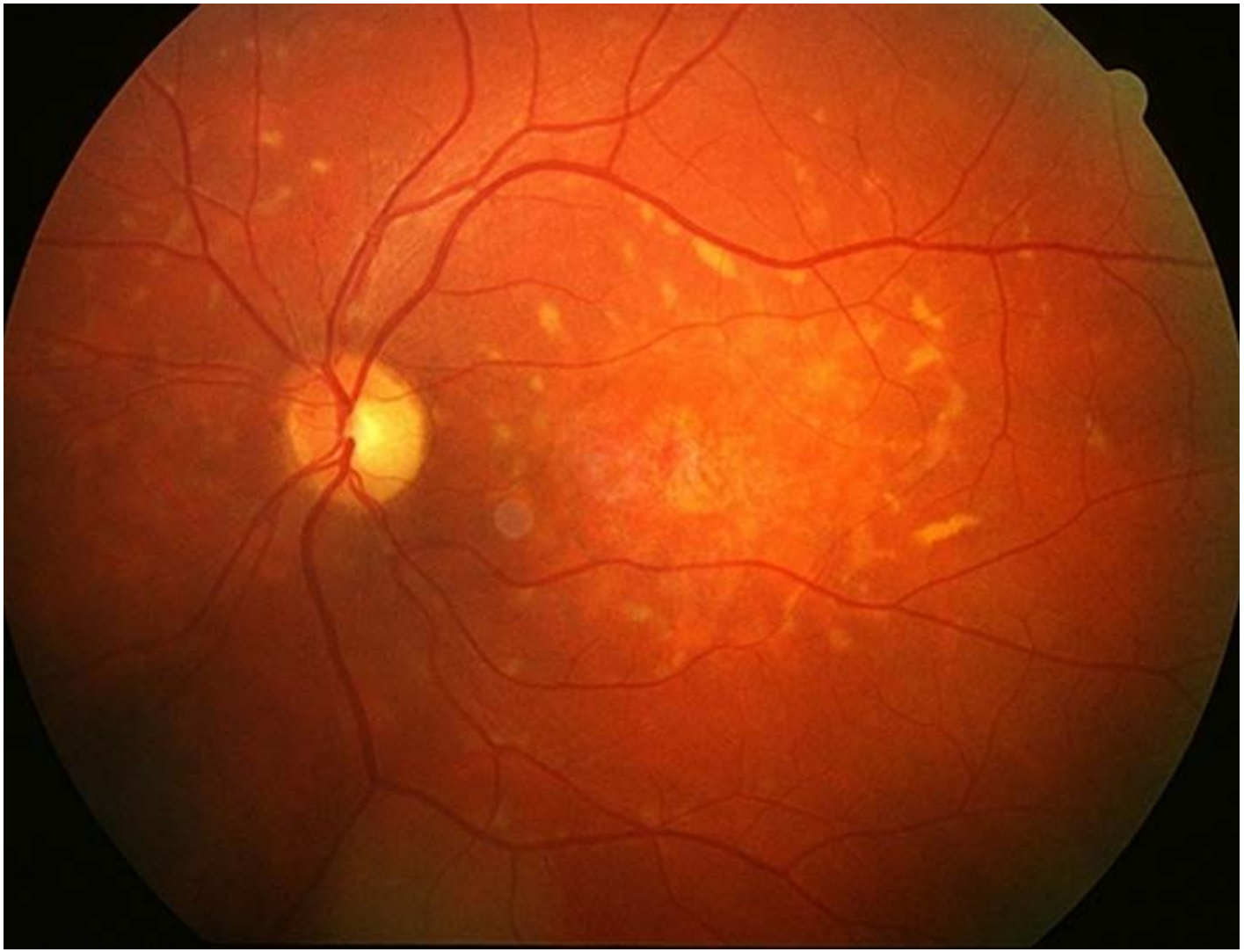
A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform **flecks**

At what level of the retina do the flecks occur?
The RPE

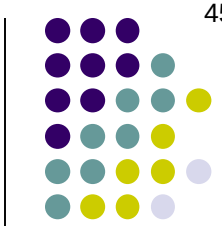
Stargardt Disease/Fundus Flavimaculatus



Stargardt: RPE-level flecks

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform **flecks**

At what level of the retina do the flecks occur?
The RPE

Yellow-white findings in the RPE--that sounds like drusen. How do Stargardt/FF flecks differ ophthalmoscopically from drusen?
--
--

Q/A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform **flecks**

At what level of the retina do the flecks occur?
The RPE

Yellow-white findings in the RPE--that sounds like drusen. How do Stargardt/FF flecks differ ophthalmoscopically from drusen?
--Drusen are round(-ish), whereas some flecks are
--The flecks often touch one another, rendering their aggregate appearance 'net-like'

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform **flecks**

At what level of the retina do the flecks occur?
The RPE

Yellow-white findings in the RPE--that sounds like drusen. How do Stargardt/FF flecks differ ophthalmoscopically from drusen?
--Drusen are round(-ish), whereas some flecks are elongated
--The flecks often touch one another, rendering their aggregate appearance 'net-like'

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow **pisciform flecks**

What does pisciform *mean?*

usen. How do
lrusen?

--Drusen are round(-ish), whereas some flecks are elongated
--The flecks often touch one another, rendering their aggregate appearance 'net-like'

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow **pisciform flecks**

What does pisciform *mean?*
It means 'fish shaped'

usen. How do
lrusen?

--Drusen are round(-ish), whereas some flecks are elongated
--The flecks often touch one another, rendering their aggregate appearance 'net-like'

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow **pisciform flecks**

What does pisciform *mean?*
It means 'fish shaped'

How does that come about?

usen. How do
lrusen?

--Drusen are round(-ish), whereas some flecks are elongated
--The flecks often touch one another, rendering their aggregate appearance 'net-like'

A

Stargardt Disease/Fundus Flavimaculatus

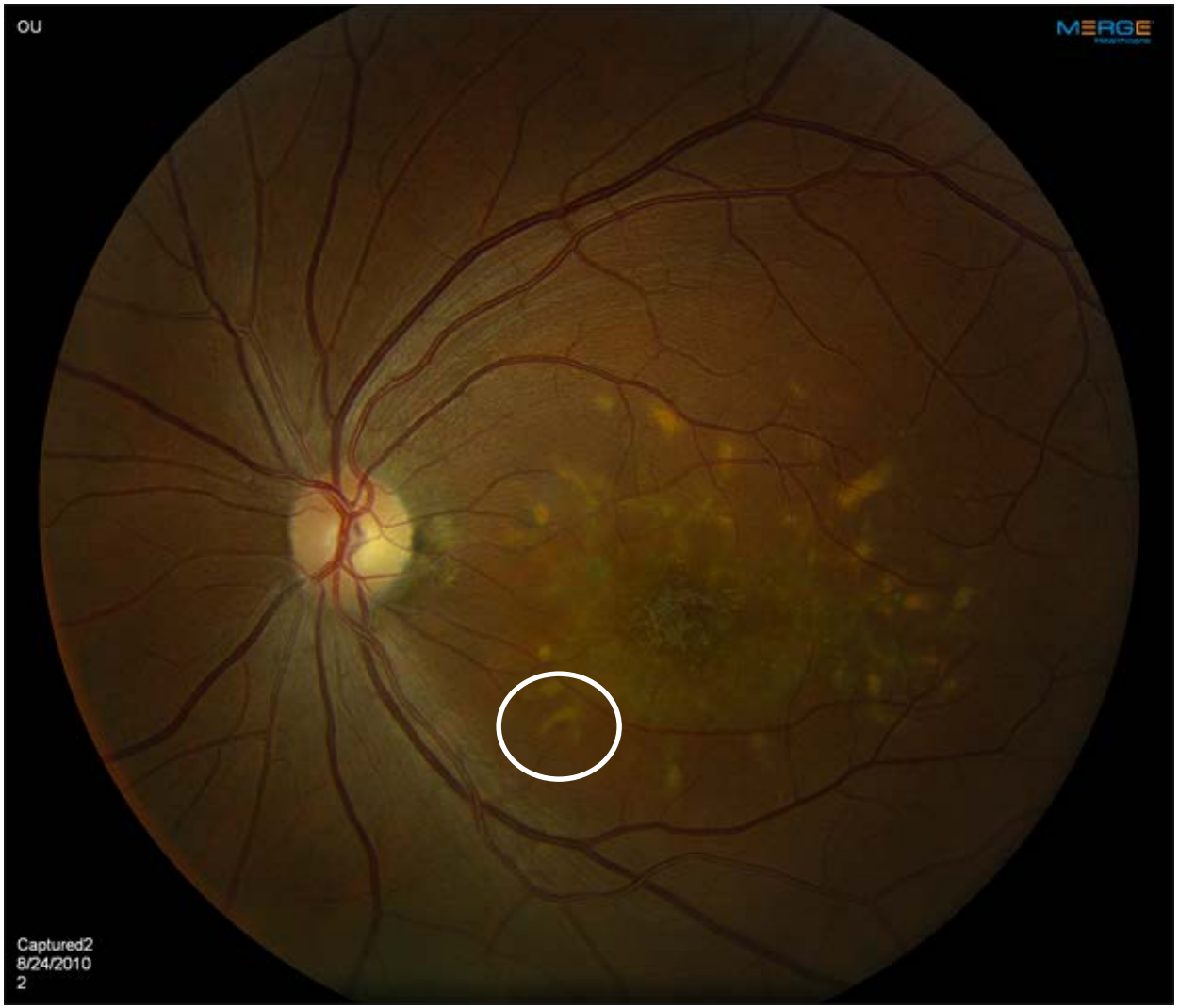
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow **pisciform flecks**

What does pisciform *mean?*
It means 'fish shaped'

How does that come about?
If two of these elongated flecks touch one another at just the right angle, their appearance will be reminiscent of a fish's tail

usen. How do
lrusen?
--Drusen are round(-ish), whereas some flecks are elongated
--**The flecks often touch one another**, rendering their aggregate appearance 'net-like'

Stargardt Disease/Fundus Flavimaculatus



Pisciform lesions

Q

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**

Which appears first--foveal atrophy, or the flecks?

A

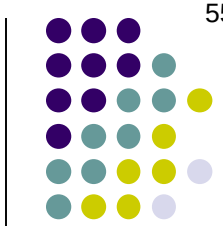
Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**

Which appears first--foveal atrophy, or the flecks?
In most cases, the atrophy

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**

Which appears first--foveal atrophy, or the flecks?
In most cases, the atrophy

The classic appearance of the fovea in Stargardt is described with a two-word alliteration. What is it?

A

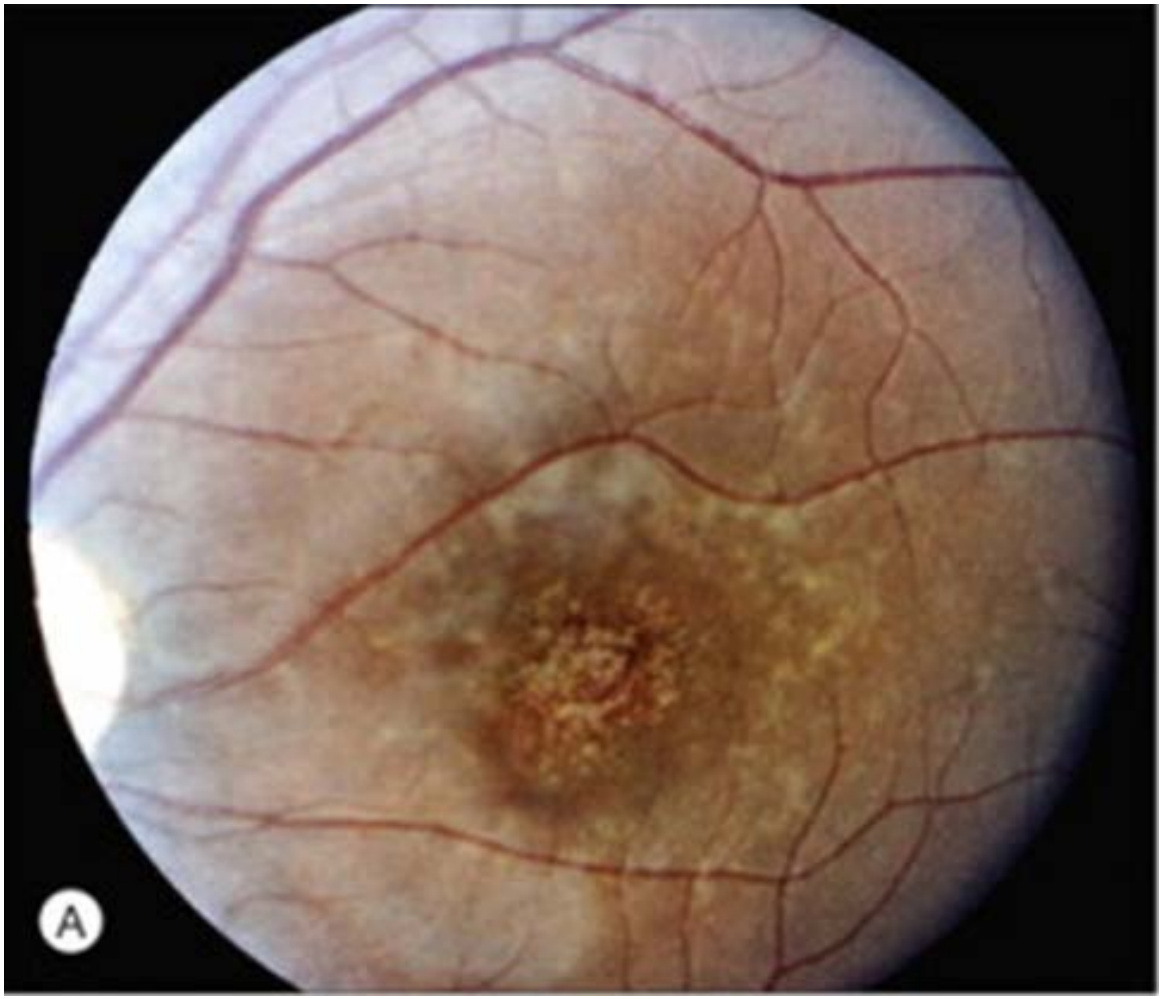
Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**

Which appears first--foveal atrophy, or the flecks?
In most cases, the atrophy

The classic appearance of the fovea in Stargardt is described with a two-word alliteration. What is it?
'Beaten bronze'

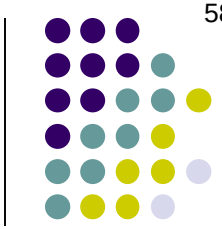
Stargardt Disease/Fundus Flavimaculatus



Stargardt—*beaten bronze* appearance

Q

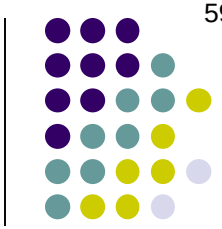
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt vs FF
  - If they are widely scattered, is Stargardt vs FF

A

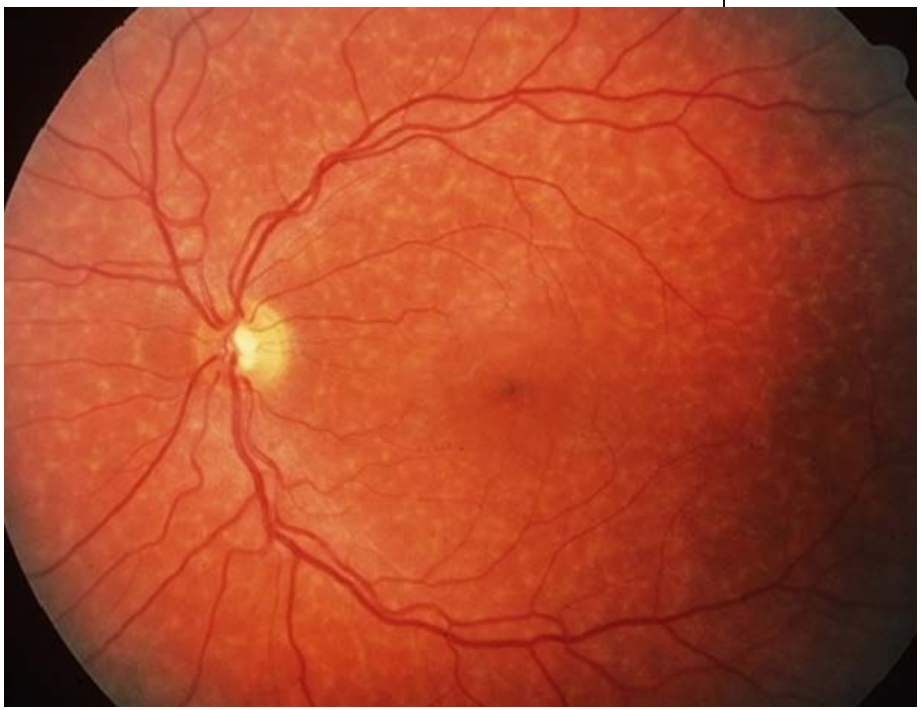
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus

Stargardt Disease/Fundus Flavimaculatus

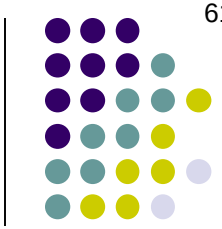
Stargardt



Fundus flavimaculatus

Q

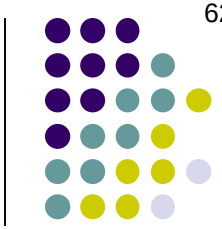
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o [ ], usually in [life period]

A

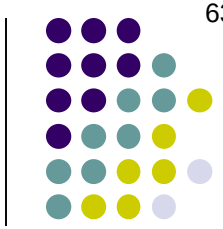
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood

Q

Stargardt Disease/Fundus Flavimaculatus

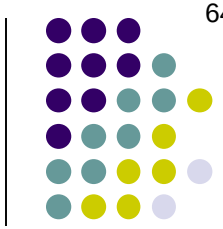


- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o **decreased vision**, usually in childhood

Which appears first--changes in the fundus, or decreased vision?

A

Stargardt Disease/Fundus Flavimaculatus

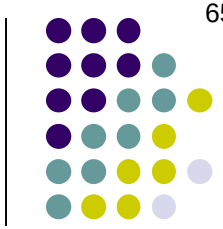


- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o **decreased vision**, usually in childhood

Which appears first--changes in the fundus, or decreased vision?
Usually the decreased vision (especially in childhood onset cases)

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o **decreased vision**, usually in childhood

Which appears first--changes in the fundus, or decreased vision?

Usually the decreased vision (especially in childhood onset cases)

What is the classic scenario you should be on the lookout for?

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o **decreased vision**, usually in childhood

Which appears first--changes in the fundus, or decreased vision?

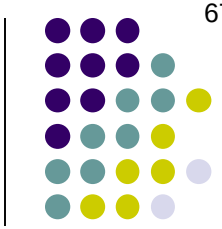
Usually the decreased vision (especially in childhood onset cases)

What is the classic scenario you should be on the lookout for?

That of a child with a 'normal' eye exam who 'refuses' to read the Snellen chart (not uncommonly, such cases are labelled 'functional vision loss' until the appearance of their fundus changes)

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o **decreased vision**, usually in childhood

Which appears first--changes in the fundus, or decreased vision?

Usually the decreased vision (especially in childhood onset cases)

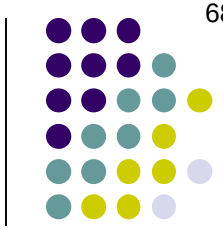
What is the classic scenario you should be on the lookout for?

That of a child with a 'normal' eye exam who 'refuses' to read the Snellen chart (not uncommonly, such cases are labelled 'functional vision loss' until the appearance of their fundus changes)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: **Atrophic fovea** surrounded by white-yellow **pisciform flecks**
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o **decreased vision**, usually in childhood

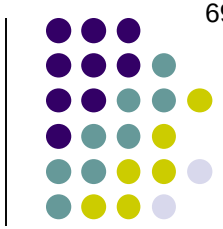
Which appears first--changes in the fundus, or decreased vision?
Usually the decreased vision (especially in childhood onset cases)

What is the classic scenario you should be on the lookout for?
That of a child with a 'normal' eye exam who 'refuses' to read the Snellen chart (not uncommonly, such cases are labelled 'functional vision loss' until the appearance of their fundus changes)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be 'order an FA,' so we'll address that first…

Q

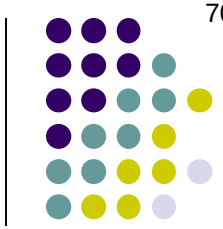
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: two words

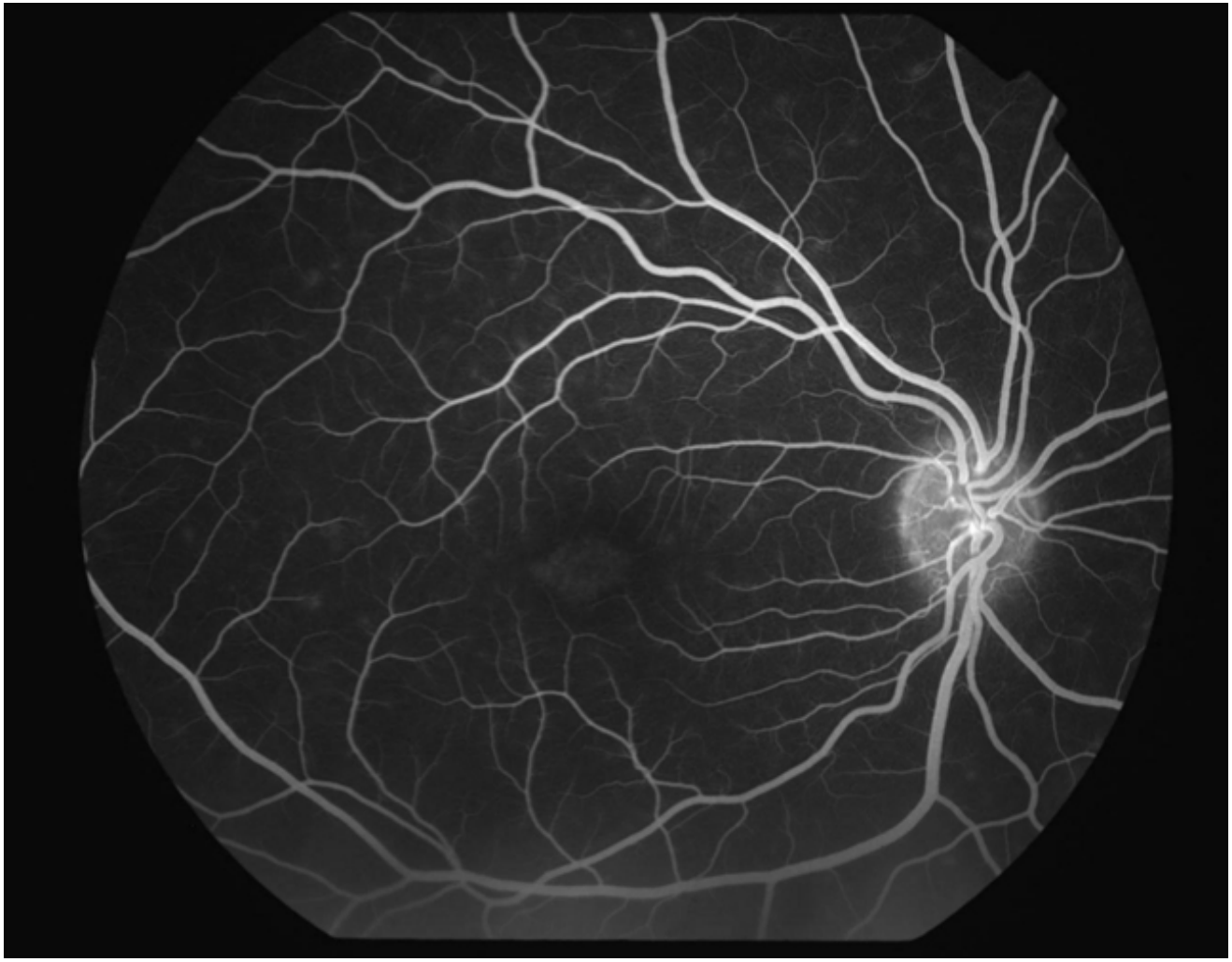
A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

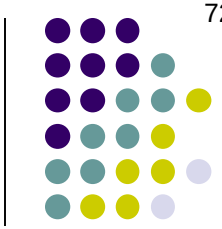
Stargardt Disease/Fundus Flavimaculatus



Stargardt—*dark choroid* appearance on FA

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

'Dark choroid'--what does that mean?

Q/A

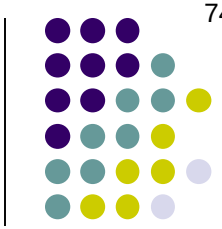
Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, the choroid is [redacted])

A

Stargardt Disease/Fundus Flavimaculatus

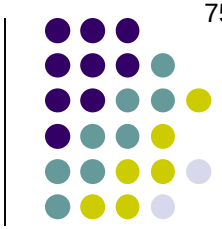


- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, the choroid is *hypofluorescent*)

Q

Stargardt Disease/Fundus Flavimaculatus



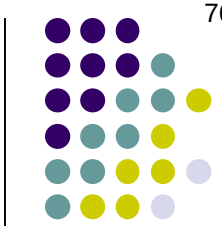
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: ***dark choroid***

'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, **the choroid is *hypofluorescent***)

Again, in FA parlance--is the choroidal hypofluorescence secondary to blocking*, or to a* filling defect*?*

A

Stargardt Disease/Fundus Flavimaculatus



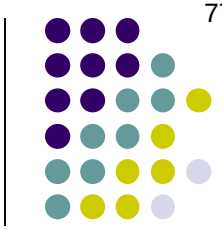
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: ***dark choroid***

'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, **the choroid is *hypofluorescent***)

Again, in FA parlance--is the choroidal hypofluorescence secondary to blocking*, or to a* filling defect*?*
Blocking

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: ***dark choroid***

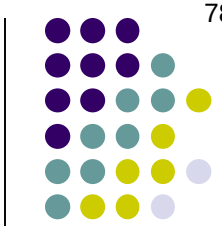
'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, **the choroid is *hypofluorescent***)

Again, in FA parlance--is the choroidal hypofluorescence secondary to blocking*, or to a* filling defect*?*
Blocking

At what level of the retina is blocking occurring?

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

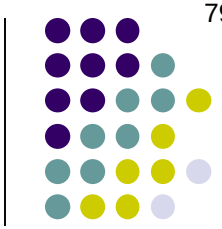
'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, **the choroid is *hypofluorescent***)

Again, in FA parlance--is the choroidal hypofluorescence secondary to blocking*, or to a* filling defect*?*
Blocking

At what level of the retina is blocking occurring?
The RPE

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: ***dark choroid***

'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, **the choroid is *hypofluorescent***)

In Stargardt, what causes the RPE to block choroidal FA fluorescence?

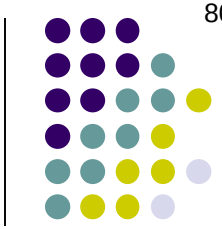
Again, in FA parlance--is the choroidal hypofluorescence secondary to blocking*, or to a* filling defect*?*
Blocking

At what level of the retina is blocking occurring?

The RPE

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: ***dark choroid***

'Dark choroid'--what does that mean?
It means the normal FA 'glow' of the choroid is absent
(in FA parlance, **the choroid is *hypofluorescent***)

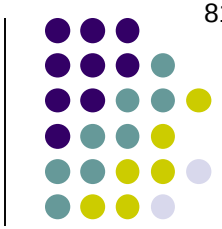
In Stargardt, what causes the RPE to block choroidal FA fluorescence?
The accumulation of abnormal lipofuscin/A2E within RPE cells

Again, in FA parlance--is the choroidal hypofluorescence secondary to blocking*, or to a* filling defect*?*
Blocking

At what level of the retina is blocking occurring?
The RPE

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

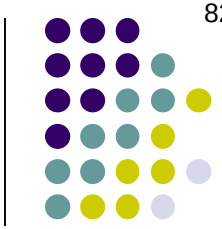
What test has supplanted FA for working up suspected Stargardt?

hart (not uncommonly, fundus changes)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an**^**?** FA,' so we'll address that first…

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

What test has supplanted FA for working up suspected Stargardt?
Fundus autofluorescence (FAF)

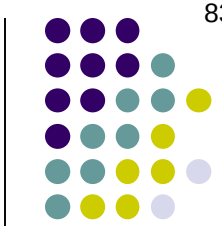
hart (not uncommonly,
fundus changes)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FA,' so we'll address that first…

FAF

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

What test has supplanted FA for working up suspected Stargardt?
Fundus autofluorescence (FAF)

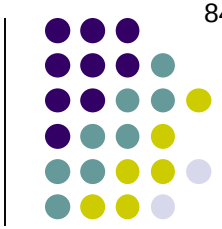
Why is FAF preferred?

hart (not uncommonly,
fundus changes)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FA,' so we'll address that first…
FAF

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*

What test has supplanted FA for working up suspected Stargardt?
Fundus autofluorescence (FAF)

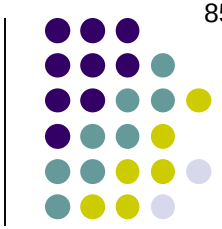
Why is FAF preferred?
It is more reliable (not all Stargardt eyes manifest the dark choroid phenomenon)

hart (not uncommonly,
fundus changes)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FAF FA,' so we'll address that first…

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic ~~FA~~ FAF appearance: ~~*dark choroid*~~ *?*

What is the classic FAF appearance of Stargardt?

What tes
Fundus a

hart (not uncommonly,
fundus changes)

Why is FAF preferred?
It is more reliable (not all Stargardt eyes manifest the dark choroid phenomenon)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FAF FA,' so we'll address that first…

Q/A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic ~~FA~~ FAF appearance: ~~dark choroid~~ Bull's eye

What is the classic FAF appearance of Stargardt?
A bull's eye maculopathy--a ring of perifoveal hypo- vs hyperfluorescence surrounding a central foveal area of hypo- vs hyperfluorescence

What tes
Fundus a

hart (not uncommonly, fundus changes)

Why is FAF preferred?
It is more reliable (not all Stargardt eyes manifest the dark choroid phenomenon)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FAF FA,' so we'll address that first…

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic ~~FA~~ FAF appearance: ~~dark choroid~~ Bull's eye

What is the classic FAF appearance of Stargardt?
A bull's eye maculopathy--a ring of perifoveal hyperfluorescence surrounding a central foveal area of hypofluorescence

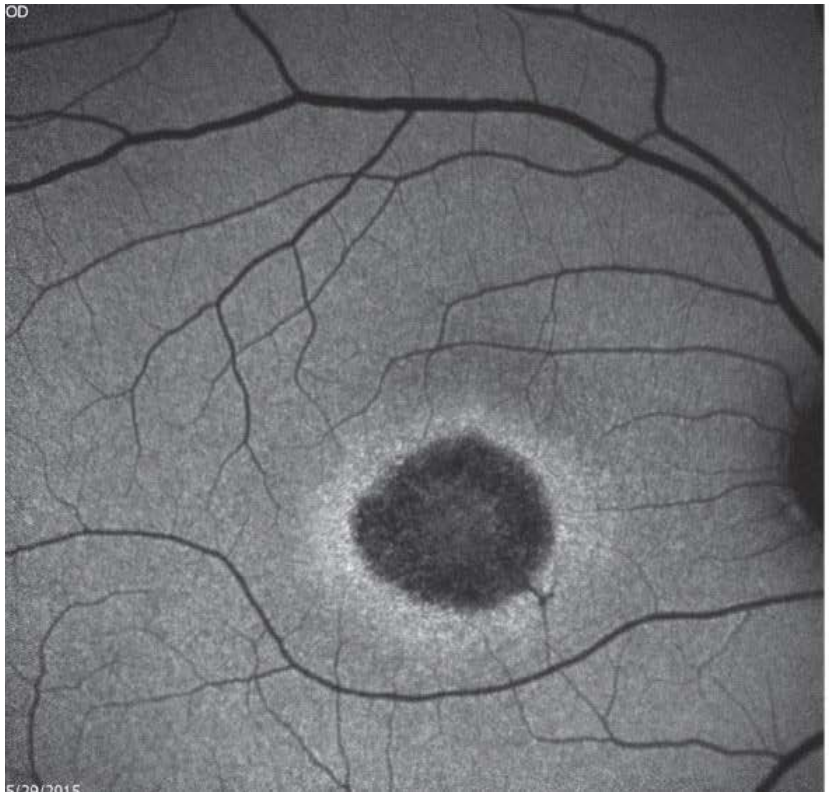
What tes
Fundus a

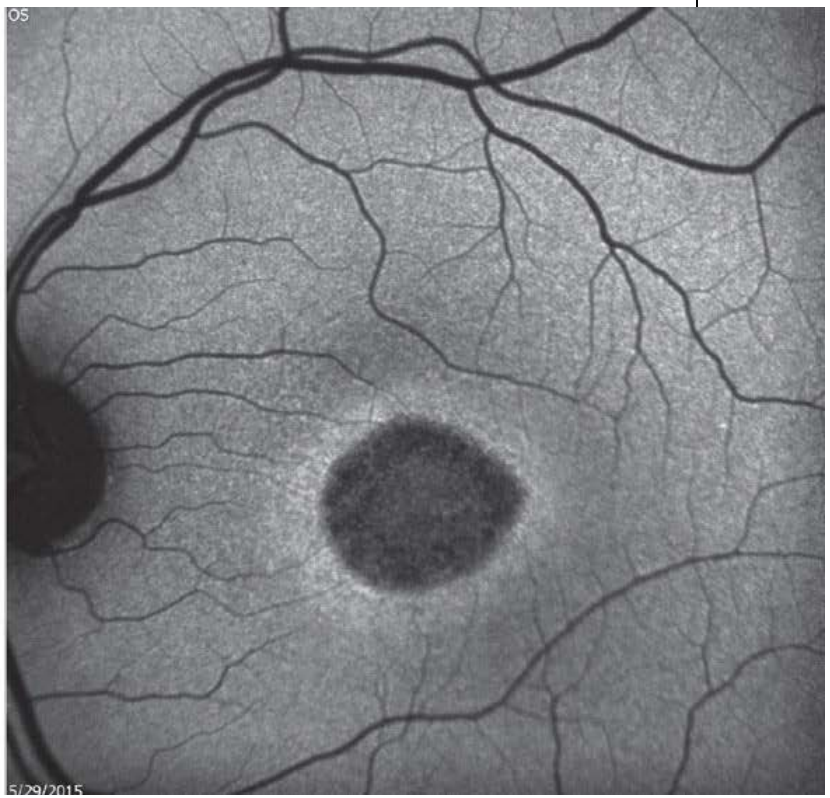
Why is FAF preferred?
It is more reliable (not all Stargardt eyes manifest the dark choroid phenomenon)

hart (not uncommonly, fundus changes)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FAF FA,' so we'll address that first…

Stargardt Disease/Fundus Flavimaculatus

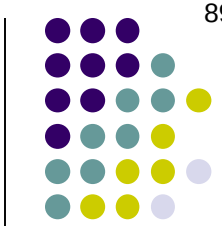




Stargardt—hyper/hypopigmentation on FAF

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic ~~FA~~ FAF appearance: ~~dark choroid~~ Bull's eye

What is the classic FAF appearance of Stargardt?
A bull's eye maculopathy--a ring of **perifoveal hyperfluorescence** surrounding a central foveal area of hypofluorescence

What tes
Fundus a

Why is FAF preferred?
It is more reliable (not all Sta

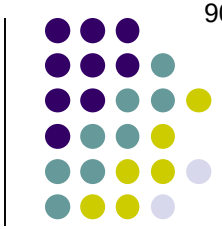
Why does the perifoveal macula hyperfluoresce?

ommonly,
ges)

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FAF FA,' so we'll address that first…

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic ~~FA~~ FAF appearance: ~~dark choroid~~ Bull's eye

What is the classic FAF appearance of Stargardt?
A bull's eye maculopathy--a ring of **perifoveal hyperfluorescence** surrounding a central foveal area of hypofluorescence

What tes
Fundus a

Why is FAF preferred?
It is more reliable (not all Sta

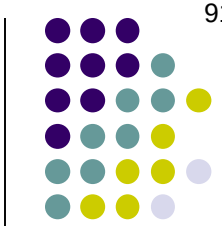
ommonly,
ges)

Why does the perifoveal macula hyperfluoresce?
Because its RPE cells are stuffed with lipofuscin-containing A2E, a substance that autofluoresces particularly well

What should you do if/when encountering such a child (either on the OKAP/Boards or IRL)?
The answer **used** to be '**order an** FAF FA,' so we'll address that first…

Q

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic ~~FA~~ FAF appearance: ~~dark choroid~~ Bull's eye

What is the classic FAF appearance of Stargardt?
A bull's eye maculopathy - a ring of perifoveal hyperfluorescence surrounding **a central foveal area of hypofluorescence**

What tes
Fundus a

hart (not uncommonly,
fundus changes)

Why is FAF pre
It is more reliab

*OK, but then why does the central foveal area hyp**O**fluoresce?*

What should
Boards or IRL)?
The answer **used** to be '**order an** FA,' so we'll address that first…

A

Stargardt Disease/Fundus Flavimaculatus

- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic ~~FA~~ FAF appearance: ~~dark choroid~~ Bull's eye

What is the classic FAF appearance of Stargardt?
A bull's eye maculopathy - a ring of perifoveal hyperfluorescence surrounding **a central foveal area of hypofluorescence**

What tes
Fundus a

Why is FAF pre
It is more reliab

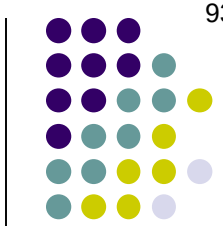
hart (not uncommonly,
fundus changes)

What should
Boards or IRL)?
The answer **used** to be '**order an** FA,' so we'll address that first…

*OK, but then why does the central foveal area hyp**O**fluoresce?*
Because its RPE cells are dead and gone, leaving little lipofuscin in that area to fluoresce

Q

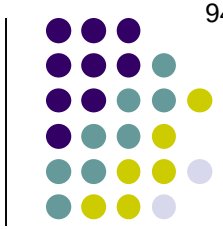
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the Snellen - Snelllen range

A

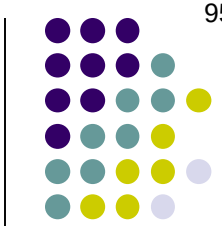
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range

Q

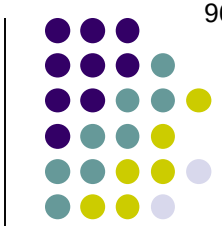
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include two words, same first word-hyphenated another word, then same second word and abb.

A

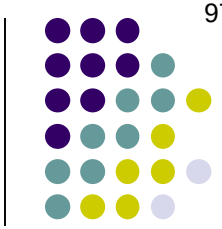
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include cone dystrophy, cone-rod dystrophy and RP

Q

Stargardt Disease/Fundus Flavimaculatus

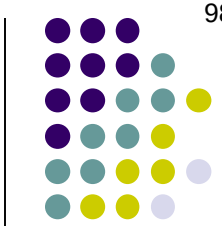


- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include **cone dystrophy**, **cone-rod dystrophy** and **RP**

How can one dysfunction of a single protein cause such a variety of pathology?

A

Stargardt Disease/Fundus Flavimaculatus

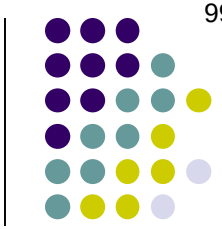


- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include **cone dystrophy**, **cone-rod dystrophy** and **RP**

How can one dysfunction of a single protein cause such a variety of pathology?
Because it is not the case that the ABCA4 transporter is either fully functional or completely dysfunctional.

A

Stargardt Disease/Fundus Flavimaculatus

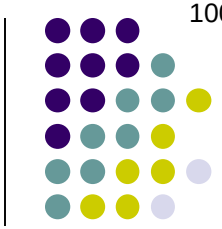


- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include **cone dystrophy**, **cone-rod dystrophy** and **RP**

How can one dysfunction of a single protein cause such a variety of pathology? Because it is not the case that the ABCA4 transporter is either fully functional or completely dysfunctional. Rather, ABCA4 function exists on a *continuum*, from completely intact (= normal/non-diseased) to mildly impaired (= mild Stargardt) to moderately impaired (= worse Stargardt) to severely impaired (= cone-rod dystrophy) to completely nonfunctional (= RP).

Q

Stargardt Disease/Fundus Flavimaculatus



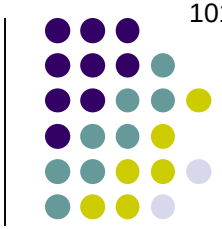
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include **cone dystrophy**, **cone-rod dystrophy** and **RP**

So, all of these conditions are caused by mutations on ABCA4?

ety of pathology?
fully functional
a *continuum*,
from completely intact (= normal/non-diseased) to mildly impaired (= mild Stargardt) to moderately impaired (= worse Stargardt) to severely impaired (= cone-rod dystrophy) to completely nonfunctional (= RP).

A

Stargardt Disease/Fundus Flavimaculatus



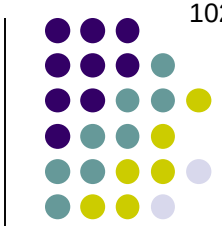
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include **cone dystrophy**, **cone-rod dystrophy** and **RP**

So, all of these conditions are caused by mutations on ABCA4?
Yes and no. All of these conditions can be caused by ABCA4 mutations. But all of them can be caused by mutations to *other* genes as well.

ety of pathology?
fully functional
a *continuum*, from completely intact (= normal/non-diseased) to mildly impaired (= mild Stargardt) to moderately impaired (= worse Stargardt) to severely impaired (= cone-rod dystrophy) to completely nonfunctional (= RP).

Q

Stargardt Disease/Fundus Flavimaculatus



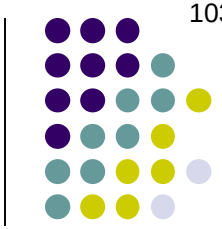
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include **cone dystrophy**, **cone-rod dystrophy** and **RP**

So, all of th
Yes and no
But all of th
from co
Stargar
(= cone-rod dystrophy) to completely nonfunctional (= RP).

For each condition, what percent of cases are caused by ABCA4 mutation?
--Stargardt:
--Cone dystrophy:
--Cone-rod dystrophy:
--RP:

A

Stargardt Disease/Fundus Flavimaculatus



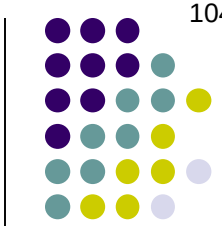
- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include **cone dystrophy**, **cone-rod dystrophy** and **RP**

So, all of th
Yes and no
But all of th
from co
Stargar
(= cone-rod dystrophy) to completely nonfunctional (= RP).

For each condition, what percent of cases are caused by ABCA4 mutation?
--Stargardt: **>95**
--Cone dystrophy: don't have a number for this
--Cone-rod dystrophy: **30-50**
--RP: **5-10**

Q

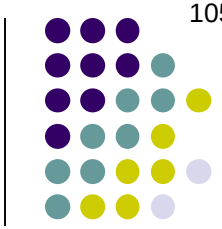
Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include cone dystrophy, cone-rod dystrophy and RP
- Treatment?

A

Stargardt Disease/Fundus Flavimaculatus



- Inheritance? AR (in most cases; a small % are AD)
- Gene responsible for most cases? ABCA4
- Fundus appearance: Atrophic fovea surrounded by white-yellow pisciform flecks
  - If pisciform lesions are in macula only, is Stargardt
  - If they are widely scattered, is fundus flavimaculatus
- Pts present with c/o decreased vision, usually in childhood
- Classic FA appearance: *dark choroid*
- Ultimate vision is usually in the 20/50 – 20/200 range
- Other diseases associated with ABCA4 dysfunction include cone dystrophy, cone-rod dystrophy and RP
- Treatment? No effective treatments are available