

Q

Parinaud Syndrome

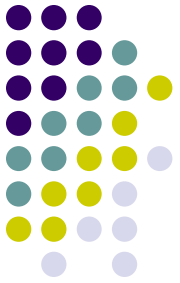


If you were limited to using just two words, how would you describe Parinaud syndrome; ie, in general terms, what sort of condition is it?

It is a

A

Parinaud Syndrome

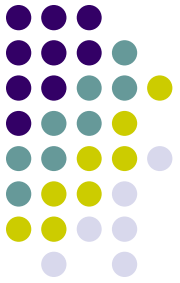


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It is a gaze palsy



Parinaud Syndrome



If you were limited to using just two words, how would you describe Parinaud syndrome; ie, in general terms, what sort of condition is it?

It is a gaze palsy

A gaze palsy is a limitation of extraocular motility that has two specific characteristics—what are they?

--?

--?



If you were limited to using just two words, how would you describe Parinaud syndrome; ie, in general terms, what sort of condition is it?

It is a gaze palsy

A gaze palsy is a limitation of extraocular motility that has two specific characteristics—what are they?

--The limitation must involve only one eye, or both

--?

A

Parinaud Syndrome



If you were limited to using just two words, how would you describe Parinaud syndrome; ie, in general terms, what sort of condition is it?

It is a gaze palsy

A gaze palsy is a limitation of extraocular motility that has two specific characteristics—what are they?

--The limitation must involve both eyes

--?

A

Parinaud Syndrome



If you were limited to using just two words, how would you describe Parinaud syndrome; ie, in general terms, what sort of condition is it?

It is a gaze palsy

A gaze palsy is a limitation of extraocular motility that has two specific characteristics—what are they?

--The limitation must involve both eyes

--The limitation is in the same direction of gaze bilaterally (eg, both eyes can't look up; both eyes can't look to the left; etc)

Parinaud Syndrome



If you were limited to using just two words, how would you describe Parinaud syndrome; ie, in general terms, what sort of condition is it?

It is a gaze palsy

A gaze palsy is a **limitation of extraocular motility** that has two specific characteristics—what are they?

Before we get into Parinaud syndrome specifically, let's first create a frame for thinking about extraocular motility limitation generally.

can't look up;

(No question—proceed when ready)

Parinaud Syndrome



If you were limited to using just two words, how would you describe Parinaud syndrome; ie, in general terms, what sort of condition is it?

It is a gaze palsy

A gaze palsy is a **limitation of extraocular motility** that has two specific characteristics—what are they?

Before we get into Parinaud syndrome specifically, let's first create a frame for thinking about extraocular motility limitation generally.

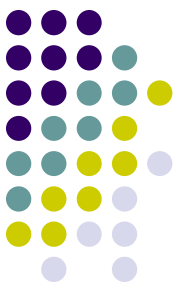
Once we have this general understanding we will see where Parinaud syndrome fits within it.

't look up;

(No question—proceed when ready)

Q

Parinaud Syndrome



9

CN...

CN...

CN...

Which cranial nerves innervate the extraocular muscles (EOMs)?

A

Parinaud Syndrome



CN3

CN6

CN4

Which cranial nerves innervate the extraocular muscles (EOMs)?

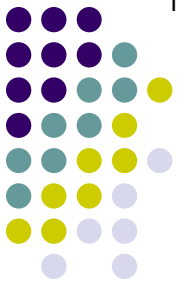


CN3
?

CN6
?

CN4
?

What is the name for the collections of neurons that give rise to each of these cranial nerves? (This is not a trick question--the answer is as obvious as it seems.)



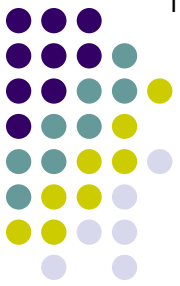
**CN3
Nucleus**

**CN6
Nucleus**

**CN4
Nucleus**

What is the name for the collections of neurons that give rise to each of these cranial nerves? (This is not a trick question--the answer is as obvious as it seems.)

Parinaud Syndrome



Nuclear

CN3
Nucleus

CN6
Nucleus

CN4
Nucleus

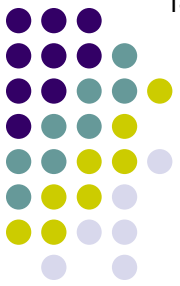
As will be apparent shortly, the 'nuclear level' is the locus around which we organize our understanding of extraocular motility control (and limitations thereof)

(No question—proceed when ready)

Q

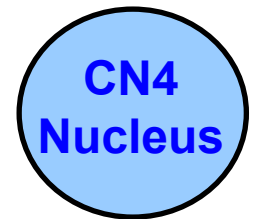
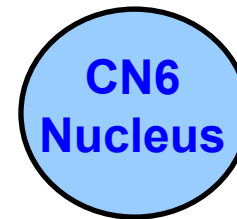
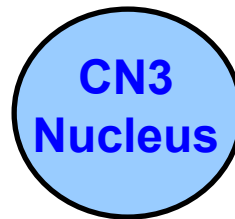
?

Parinaud Syndrome



?

Nuclear



?

With respect to pathology of the EOM control pathways, there are four major 'locations.' One of these (the nuclear) has been identified already. What are the other three? (Hint: Their names reflect the relationship each has to the nuclear level.)

Q/A

?

Parinaud Syndrome

Note: While you're familiar with these terms...

?

Nuclear

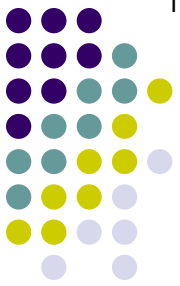
CN3
Nucleus

CN6
Nucleus

CN4
Nucleus

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Q/A

Parinaud Syndrome

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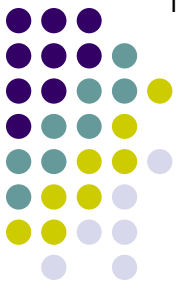
Nuclear

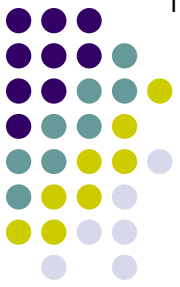
CN3
NucleusCN6
NucleusCN4
Nucleus

With respect to pathology of the EOM control pathways, there are four major 'locations.' One of these (the nuclear) has been identified already. What are the other three? (Hint: Their names reflect the relationship each has to the nuclear level.)

?

...you may not be with this one, although you'll agree it makes sense in context.
(Further, and importantly, it is used in the BCSC *Neuro* book.)





Parinaud Syndrome

A
Supranuclear

Note: While you're familiar with these terms...

Internuclear

Nuclear

CN3
Nucleus

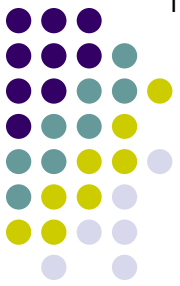
CN6
Nucleus

CN4
Nucleus

Infranuclear

With respect to pathology of the EOM control pathways, there are four major 'locations.' One of these (the nuclear) has been identified already. What are the other three? (Hint: Their names reflect the relationship each has to the nuclear level.)

...you may not be with this one, although you'll agree it makes sense in context.
(Further, and importantly, it is used in the BCSC *Neuro* book.)



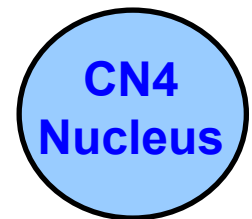
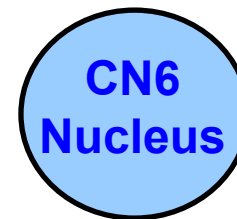
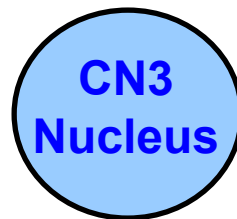
Parinaud Syndrome

Supranuclear

The ***supranuclear pathways*** consists of inputs to the nuclei from centers in the cortex, cerebellum, vestibular system, etc.

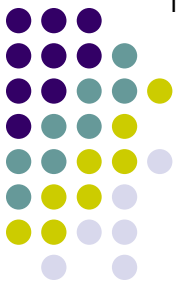
Internuclear

Nuclear



Infranuclear

(No question—proceed when ready)



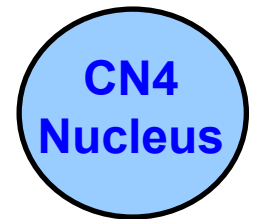
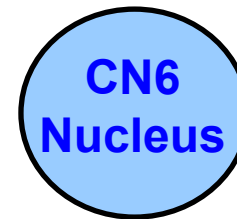
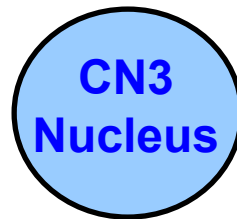
Parinaud Syndrome

Supranuclear

The ***supranuclear pathways*** consists of inputs to the nuclei from centers in the cortex, cerebellum, vestibular system, etc. These locations are 'supra' in that they carry signals to the nuclei.

Internuclear

Nuclear



Infranuclear

**Q**

Parinaud Syndrome

Supranuclear

Internuclear

Nuclear

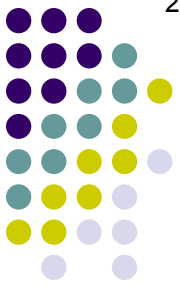
**CN3
Nucleus**

**CN6
Nucleus**

**CN4
Nucleus**

*Are lesions of the CN3 nucleus
commonly encountered in
clinical practice?*

Infranuclear

**A**

Parinaud Syndrome

Supranuclear

Internuclear

Nuclear

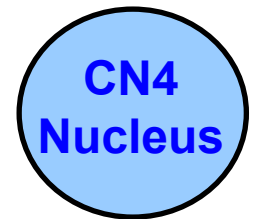
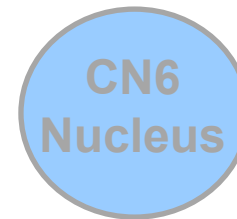
**CN3
Nucleus**

**CN6
Nucleus**

**CN4
Nucleus**

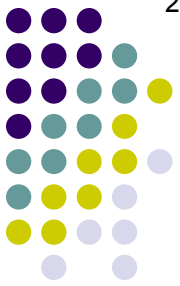
*Are lesions of the CN3 nucleus
commonly encountered in
clinical practice?*
No, they are rare

Infranuclear

**Q***Supranuclear***Parinaud Syndrome***Internuclear****Nuclear***

*Are lesions of the CN4 nucleus
commonly encountered in
clinical practice?*

Infranuclear

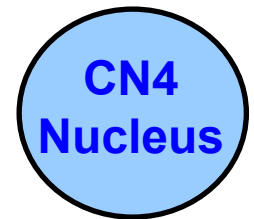
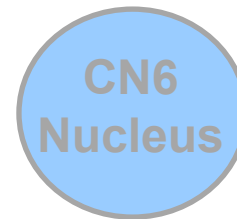


Parinaud Syndrome

A
Supranuclear

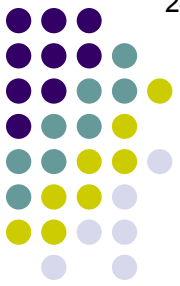
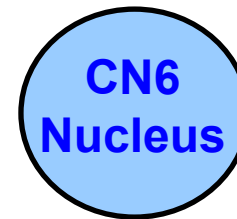
Internuclear

Nuclear



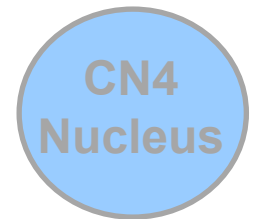
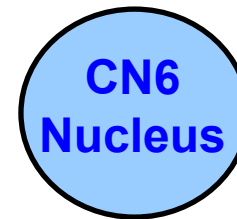
*Are lesions of the CN4 nucleus
commonly encountered in
clinical practice?*
No, these are even rarer

Infranuclear

**Q***Supranuclear***Parinaud Syndrome***Internuclear****Nuclear***

*Are lesions of the CN6 nucleus
commonly encountered in
clinical practice?*

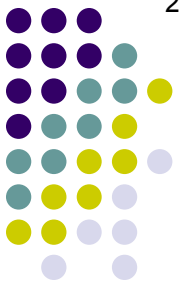
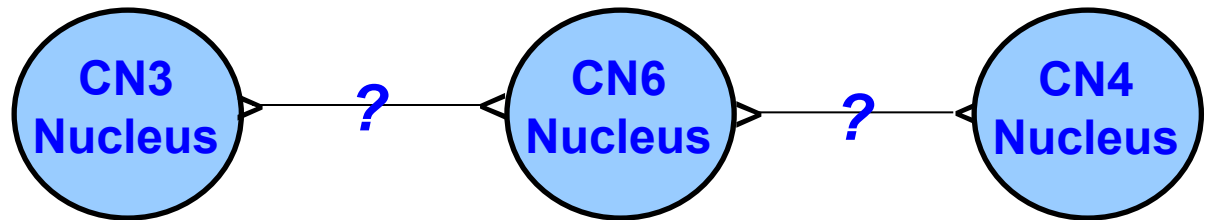
Infranuclear

**A***Supranuclear***Parinaud Syndrome***Internuclear****Nuclear***

*Are lesions of the CN6 nucleus
commonly encountered in
clinical practice?*

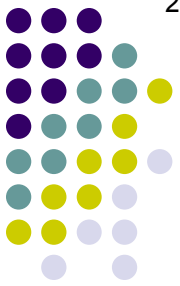
**While not common, they are
a well-known clinical entity**

Infranuclear

**Q***Supranuclear***Parinaud Syndrome***Internuclear**Nuclear*

Which two nuclei share an internuclear connection that is of well-established clinical importance?

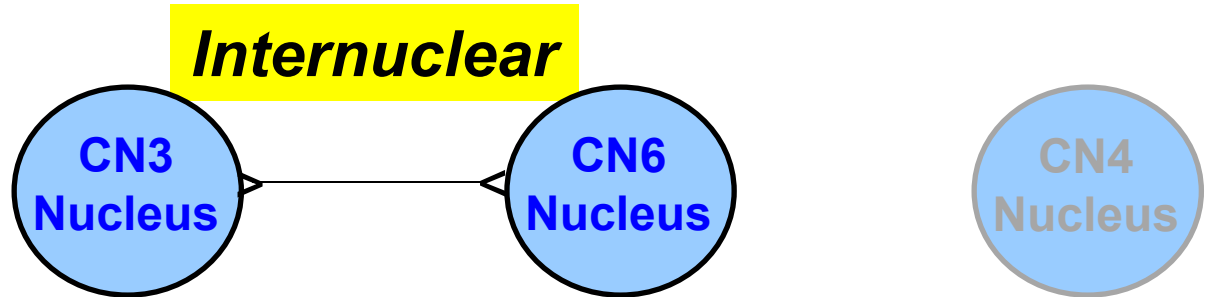
Infranuclear

**A**

Supranuclear

Parinaud Syndrome

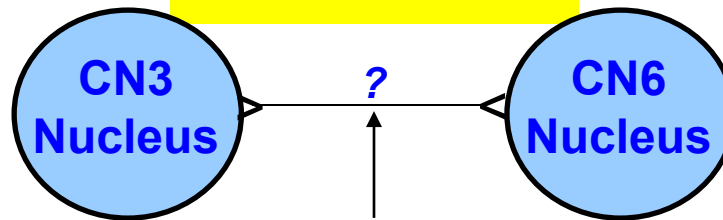
Nuclear



Which two nuclei share an internuclear connection that is of well-established clinical importance?

3 and 6

Infranuclear

**Q***Supranuclear***Parinaud Syndrome*****Internuclear****Nuclear*

What is the name of the internuclear pathway connecting the CN3 and CN6 nuclei?

Infranuclear

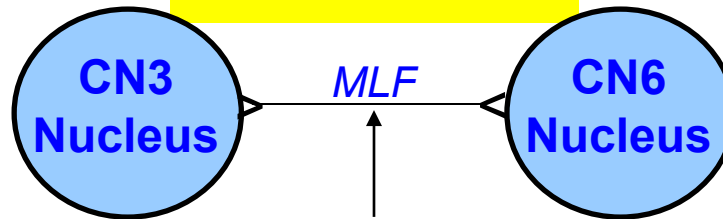


Parinaud Syndrome

A
Supranuclear

Nuclear

Internuclear

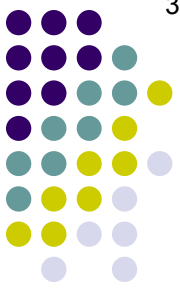


**CN4
Nucleus**

What is the name of the internuclear pathway connecting the CN3 and CN6 nuclei?

The **medial longitudinal fasciculus (MLF)**

Infranuclear

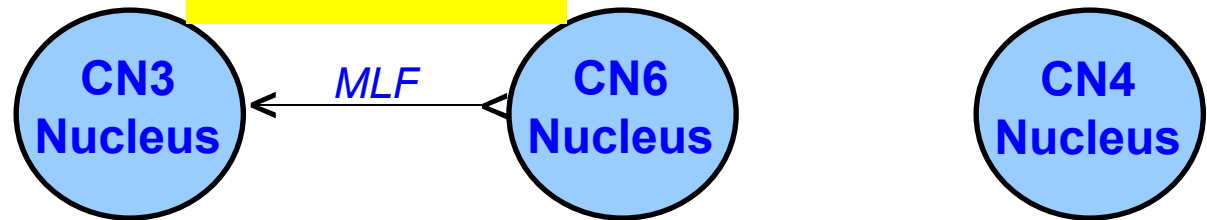


Parinaud Syndrome

Supranuclear

Nuclear

Internuclear

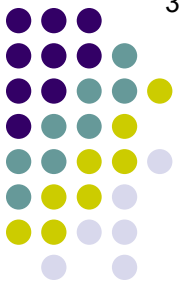


Infranuclear

The ***infranuclear pathway*** consists of everything below the nuclei: the axons as they run from the nuclei to the neuromuscular junction; the junction itself; and finally the EOMs themselves.

Extraocular muscle

(No question—proceed when ready)



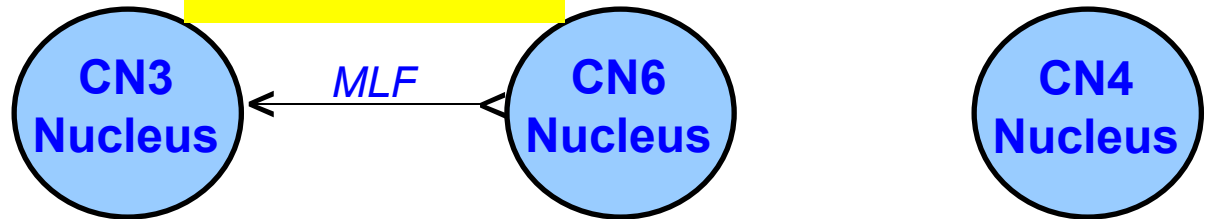
Parinaud Syndrome

Supranuclear

Nuclear

Infranuclear

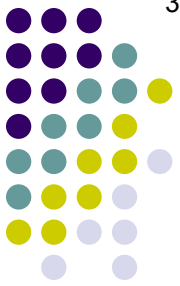
Internuclear



Extraocular muscle

*This slide summarizes our
general framework for
understanding limitation of
extraocular motility*

(No question—proceed when ready)

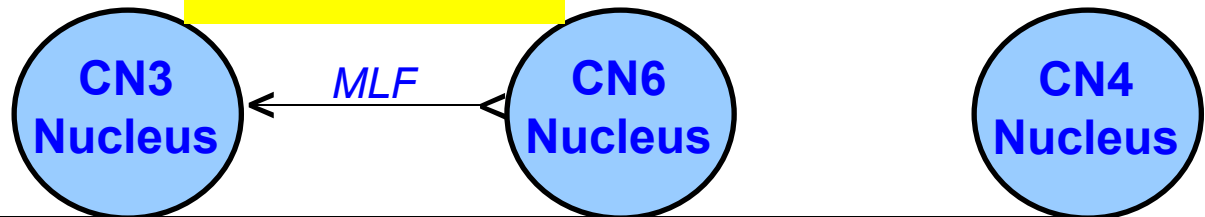


Parinaud Syndrome

Supranuclear

Internuclear

Nuclear



When you encounter a pt with a motility issue, you want to determine its status, ie, is it **nuclear**, **supranuclear**, **internuclear**, or **infranuclear**

Infranuclear

Extraocular muscle

*This slide summarizes our
general framework for
understanding limitation of
extraocular motility*

(No question—proceed when ready)



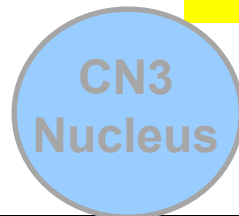
Q

Supranuclear

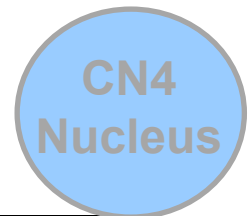
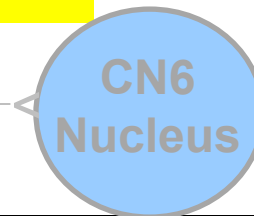
Parinaud Syndrome

Internuclear

Nuclear

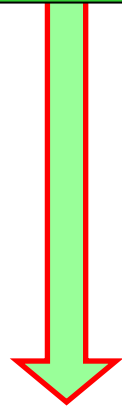


MLF

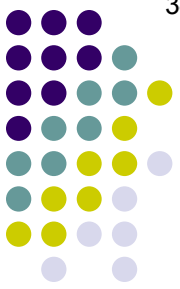


Is Parinaud syndrome with a motility issue, you want to determine its status, [^]nuclear, supranuclear, internuclear, or infranuclear?

Infranuclear



Extraocular muscle



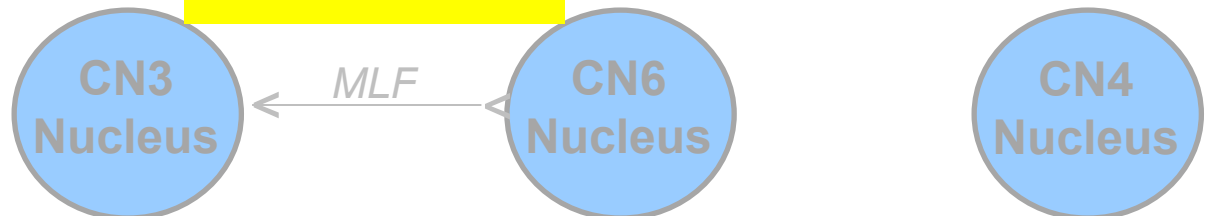
Parinaud Syndrome

A Supranuclear

Parinaud syndrome is a *supranuclear palsy*

Internuclear

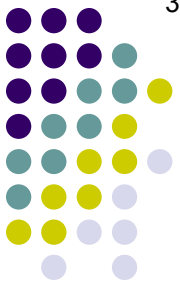
Nuclear



Is Parinaud syndrome with a motility issue, you want to determine its status, *nuclear, supranuclear, internuclear, or infranuclear?*

Infranuclear

Extraocular muscle



Q

Supranuclear

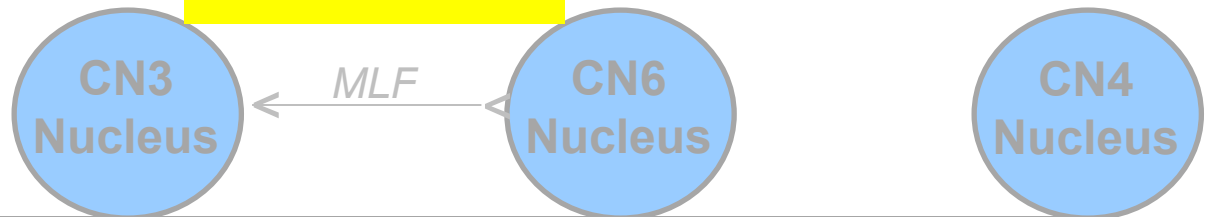
Parinaud Syndrome

Recall we said Parinaud syndrome is a gaze palsy.
Are all gaze palsies supranuclear?

Parinaud syndrome is a ^{gaze} ~~supranuclear~~ palsy

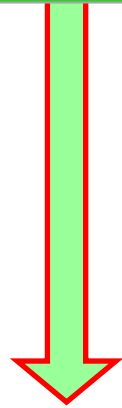
Internuclear

Nuclear

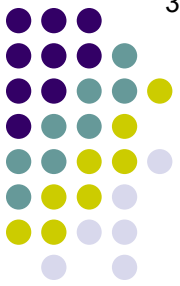


Is Parinaud syndrome with a motility issue, you want to determine its status,
a nuclear, supranuclear, internuclear, or infranuclear?

Infranuclear



Extraocular muscle



Parinaud Syndrome

Recall we said Parinaud syndrome is a gaze palsy.
Are all gaze palsies supranuclear?
No (although many are)

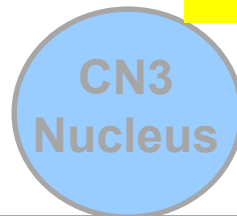
A

Supranuclear

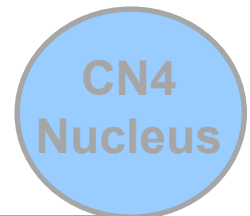
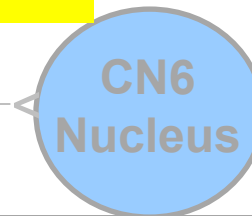
Parinaud syndrome is a ^{gaze} ~~supranuclear~~ palsy

Internuclear

Nuclear

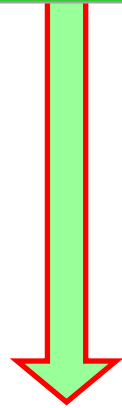


MLF



Is Parinaud syndrome with a motility issue, you want to determine its status, [^] nuclear, supranuclear, internuclear, or infranuclear?

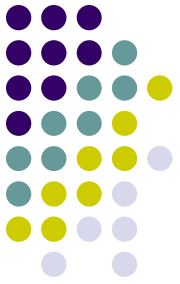
Infranuclear



Extraocular muscle

Q

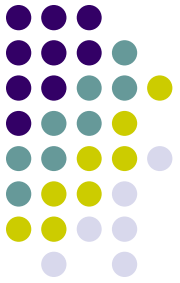
Parinaud Syndrome



- Parinaud syndrome has four main features:
 - ?
 - ?
 - ?
 - ?

A

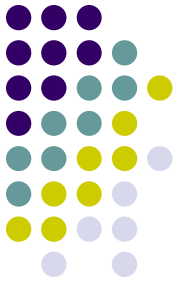
Parinaud Syndrome



- Parinaud syndrome has four main features:
 - Impaired upgaze
 - Lid retraction
 - Convergence-retraction nystagmus
 - Light-near dissociation

Q

Parinaud Syndrome



- Parinaud syndrome has four main features:
 - Impaired upgaze
 - Lid retraction
 - Convergence-retraction nystagmus
 - Light-near dissociation

Do all Parinaud pts manifest all four features?



- Parinaud syndrome has four main features:
 - Impaired upgaze
 - Lid retraction
 - Convergence-retraction nystagmus
 - Light-near dissociation

Do all Parinaud pts manifest all four features?
No

Q

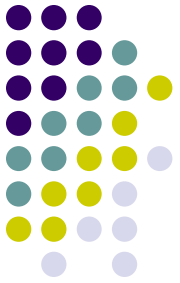
Parinaud Syndrome



- Parinaud syndrome has four main features:
 - Impaired upgaze
 - Lid retraction
 - Convergence-retraction nystagmus
 - Light-near dissociation

Do all Parinaud pts manifest all four features?
No

Is it common, or rare, for a pt to present with just a subset of them?



- Parinaud syndrome has four main features:
 - Impaired upgaze
 - Lid retraction
 - Convergence-retraction nystagmus
 - Light-near dissociation

Do all Parinaud pts manifest all four features?
No

Is it common, or rare, for a pt to present with just a subset of them?
It is fairly common

Q

Parinaud Syndrome



- Parinaud syndrome has four main features:
 - Impaired upgaze?
 - Lid retraction?
 - Convergence-retraction nystagmus?
 - Light-near dissociation?

Do all Parinaud pts manifest all four features?
No

Is it common, or rare, for a pt to present with just a subset of them?
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Of the four, which is the one most likely to be present?



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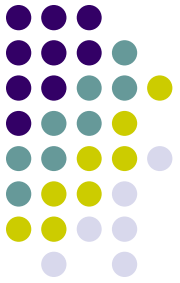
Parinaud Syndrome



Impaired upgaze in Parinaud's

Q

Parinaud Syndrome



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- C

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(No question yet—keep going)

Q

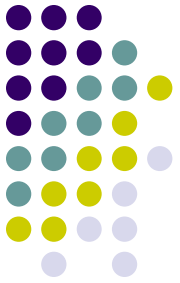
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What is this condition?

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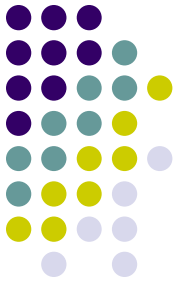


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Oculogyric crisis

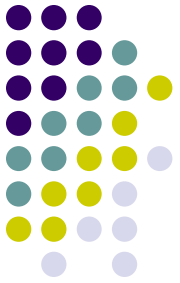
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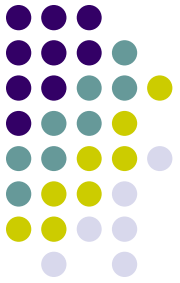
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What is the classic cause of oculogyric crisis?



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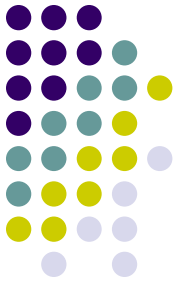
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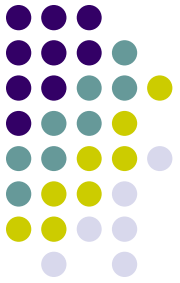
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Which two classes of drugs are most commonly implicated and which is number one?

The neuroleptics (#1), and the antiemetics

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Haloperidol

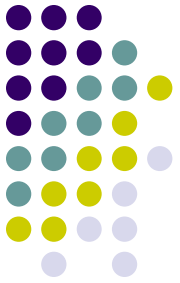
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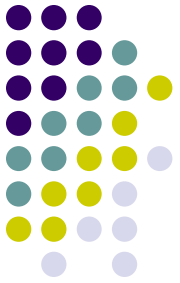
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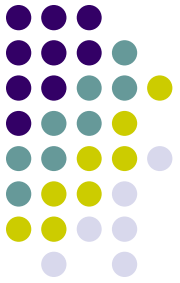


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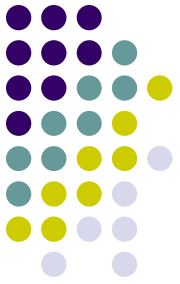
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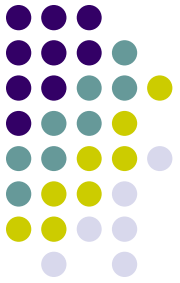
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TED: Lid retraction

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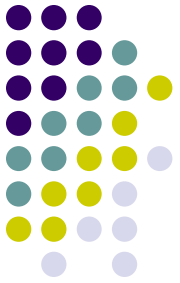
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Lid lag

Parinaud Syndrome



Unilateral lid lag in TED. Note how the normal right upper lid has 'followed' the globe into downgaze

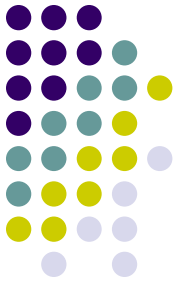


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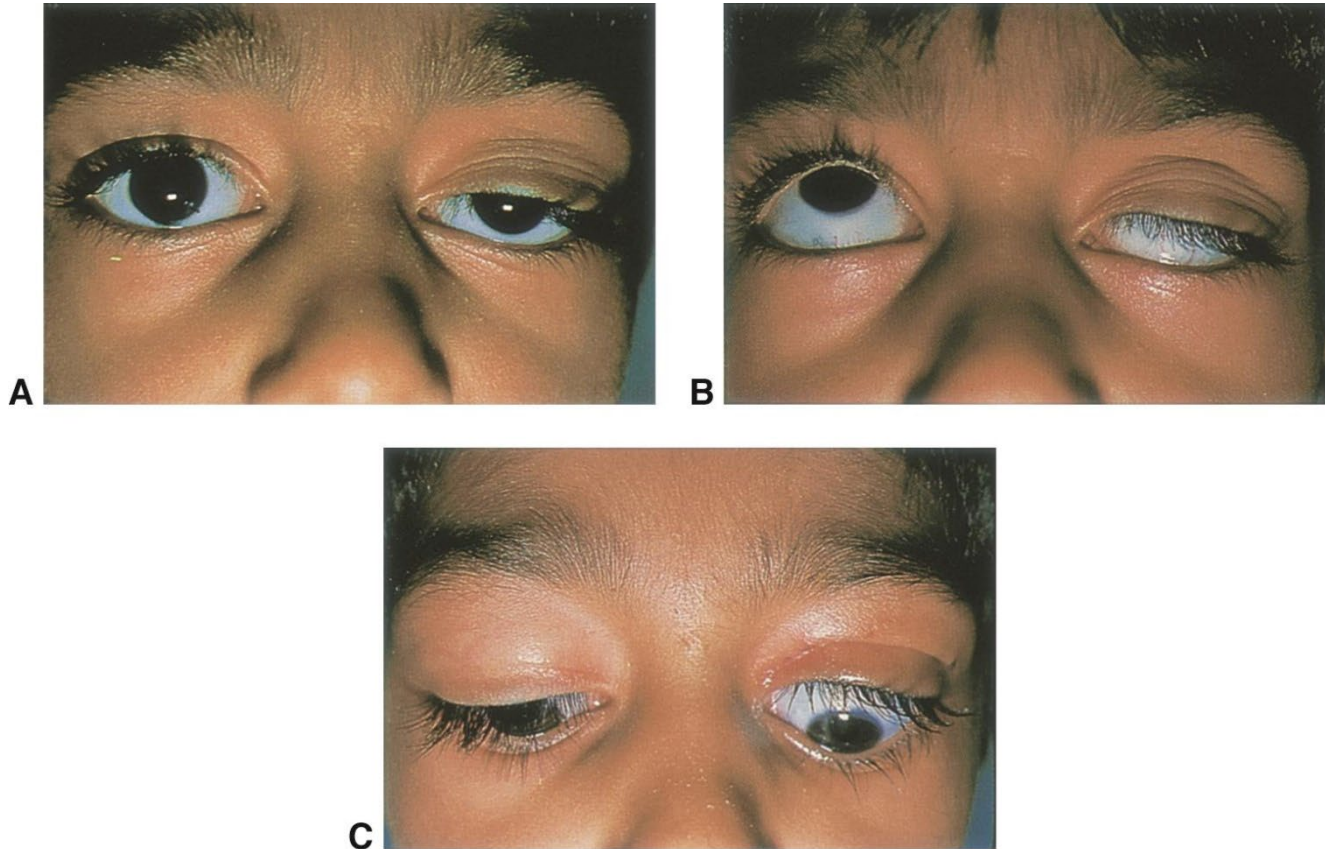
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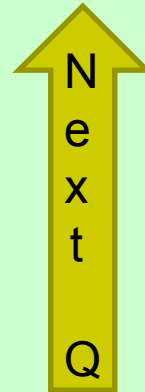
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Parinaud Syndrome



Congenital myogenic ptosis. A, ptosis in primary. B, failed elevation in upgaze. C, lid lag in downgaze.

What well-known phenomenon associated with a cranial-nerve palsy frequently manifests with lid lag?



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- Compressive

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What the heck is aberrant regeneration?

A phenomenon in which healing nerve fibers form incorrect connections, resulting in impulses intended for one muscle stimulating a different one

What are the three potential mechanisms of CN3 palsy? Which is the most common cause? Which cause is never associated with aberrant regeneration?

--Ischemic—most common

--Traumatic

--Compressive

First, what is the most common cause of lid retraction?

Thyroid eye dz (TED). When you hear 'lid retraction,' think TED first.

A related TED lid issue: When TED pts move their eyes into downgaze, the upper lid will fail to follow the globe down. What is the name for this phenomenon?

Lid lag

*There is a form of **ptosis** that has a strong association with lid lag—which one?*

Congenital myogenic ptosis. In downgaze, their appearance will suggest lid retraction.

In a nutshell, what is the pathogenesis of congenital myogenic ptosis?

The levator fails to develop properly, with some or all of its muscle fibers replaced by fibrofatty tissue

OK, I can see how a lack of functioning levator leads to ptosis, but why do these pts have lid lag?

Because the fibrofatty tissue can neither contract (causing ptosis) nor relax (causing lid lag)

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What is the classic CN3 aberrant regeneration mis-connection that produces lid lag?

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Attempted adduction or depression

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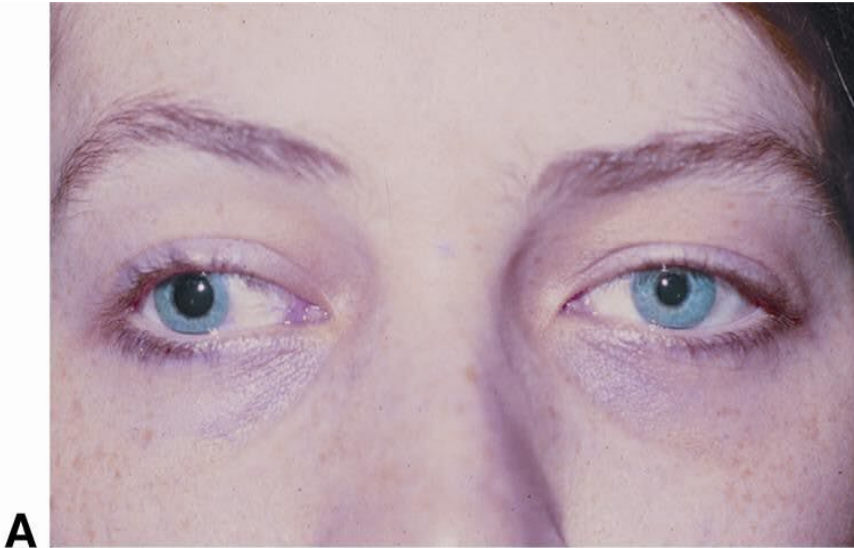
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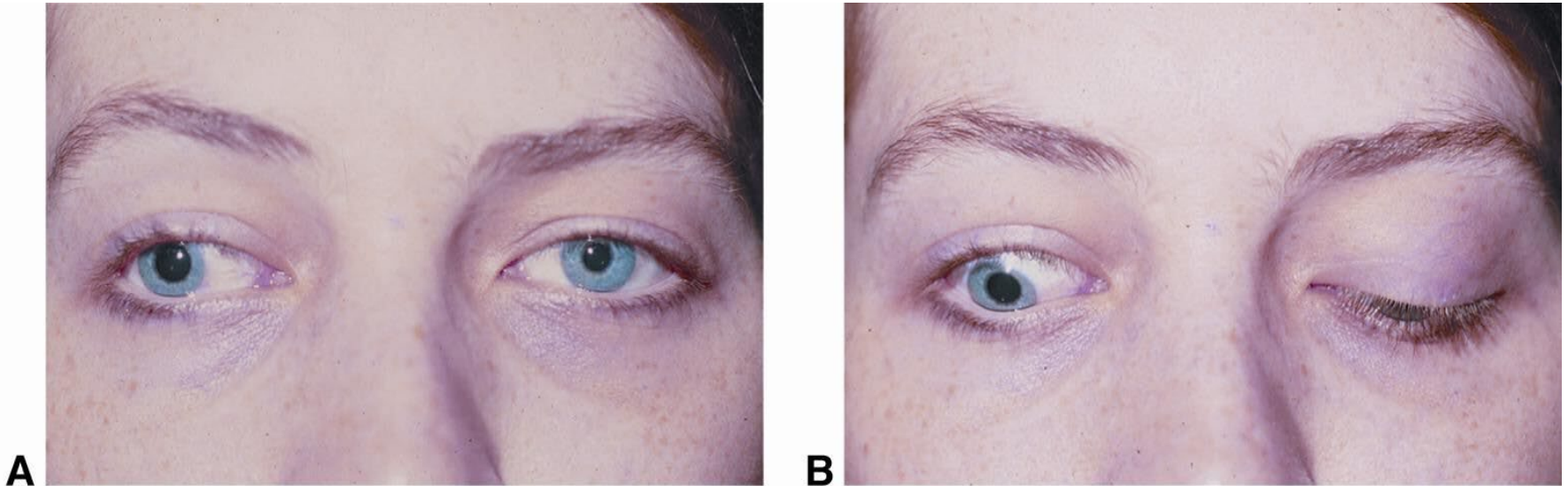
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Parinaud Syndrome



Aberrant regeneration of the right third nerve. A, In primary gaze, there is mild ptosis, pupillary mydriasis, and exotropia, all on the right.

Parinaud Syndrome



Aberrant regeneration of the right third nerve. A, In primary gaze, there is mild ptosis, pupillary mydriasis, and exotropia, all on the right. B, With attempted downward gaze, the right eyelid retracts as fibers of the right third nerve supplying the inferior rectus now also innervate the levator muscle

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More info: Slide-set N13

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What are the three potential mechanisms of CN3 palsy? Which is the most common cause? Which cause is never associated with lid lag?

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These are some of the other conditions that must be considered when faced with a case of lid retraction

What is the classic CN3 aberrant regeneration mis-connection that produces lid lag?

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More info: Slide-set O5

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More info: Slide-set O2

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Q

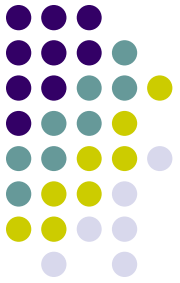
Parinaud Syndrome



- Parinaud syndrome has four main features:
 - **Impaired upgaze**
 - **Lid retraction**
- The combination of downward-deviated eyes + lid retraction produces an appearance that has resulted in this being known as the **two-words** *sign*
- Convergence-retraction nystagmus
- Light-near dissociation

A

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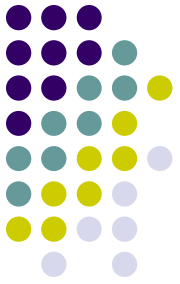
Parinaud Syndrome



Parinaud syndrome. The combination of lid retraction + impaired upgaze gives rise to a characteristic appearance known as *setting sun sign*

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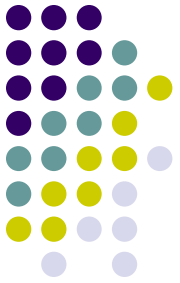
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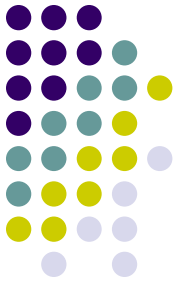
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Because the movement disorder it is not a true nystagmus

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Parinaud Syndrome



Duane syndrome: Globe retraction

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OK, but why do the eyes converge?



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What causes the eyes to retract?

Attempted elevation causes both the superior *and* inferior recti muscles to fire, the net result of which is the globes are pulled back into the orbits—retracted, in other words

OK, but why do the eyes converge?

Because the medial recti contract as well, unopposed by the lateral recti

Q

Parinaud Syndrome

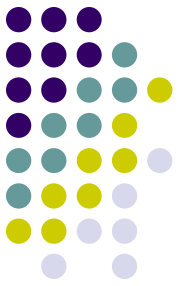


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 - **Light-near dissociation**

What is light-near dissociation?

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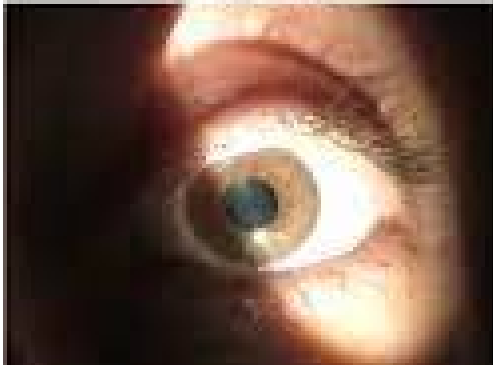
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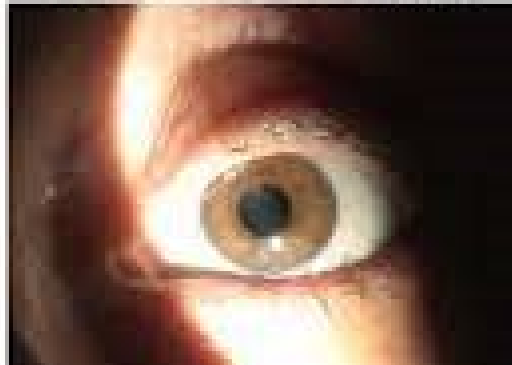
Parinaud Syndrome



Left eye



Response to light



**Response to a
near target**



Light-near dissociation in Parinaud's

Q

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- Afferent
- Central
- Peripheral

Q

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Anywhere in the anterior visual pathway

Damage to which type/location is implicated in the light-near dissociation associated with Parinaud's?

Central

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A phenomena in which pupils constrict less robustly in response to light than they do as part of the near response.

*Where is the lesion in **peripheral** near-light dissociation?*

What are the types of light-near dissociation?

--Afferent

--Central

--**Peripheral**

Damage to which part of the visual pathway is associated with Parinaud's syndrome?
Central

associated

A

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The ciliary ganglion, or the long ciliary nerves

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Damage to what structures is associated with Parinaud's syndrome?

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What is the pathophysiology of ciliary ganglion damage in Adie's?

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(Hint: It's iatrogenic)*

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(Hint: It's iatrogenic)

Panretinal photocoagulation (PRP)

Q

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What common condition is associated with ciliary ganglion damage?

Adie's syndrome

What is the pathophysiology of ciliary ganglion damage in Adie's?

Autonomic dysregulation of the ciliary ganglion

Damage to the ciliary ganglion can result in light-near dissociation. Central and peripheral light-near dissociation are the two types of light-near dissociation. Central light-near dissociation is caused by damage to the ciliary ganglion. Peripheral light-near dissociation is caused by damage to the long ciliary nerves.

How does PRP result in damage to the long ciliary nerves?

Panretinal photocoagulation (PRP)

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*Damage to the long ciliary nerves with Parinaud's syndrome is usually **Central***

How does PRP result in damage to the long ciliary nerves?

These nerves run fairly close to the inner wall of the eye, and thus are frequently impacted by thermal laser procedures that cover extensive portions of the retinal periphery

Panretinal photocoagulation (PRP)

Q

Parinaud Syndrome



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 - Impaired upgaze
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 - Light-near dissociation

What is light-near dissociation?

A phenomenon where the light reflex is preserved but the near reflex is impaired. More precisely, where does Parinaud syndrome localize to?

as

What

--Afferent

--Central

--Efferent

Damage to which type/location is implicated in the light-near dissociation associated with **Parinaud's**?

Central

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Q

Parinaud Syndrome



- Parinaud syndrome has four main features:
 - Impaired upgaze
 - Lid retraction
 - Convergence-retraction nystagmus
 - Light-near dissociation

What is light-near dissociation?

A phe
part c

More precisely, where does Parinaud syndrome localize to?
The dorsal midbrain

as

What

--Affe
--Cen
--Peri

Damage to what dorsal midbrain structure is causative in Parinaud syndrome?

*Damage to which type/location is implicated in the light-near dissociation associated with **Parinaud's**?*

Central

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What are the two noneponymous names for Parinaud syndrome?

- 1)
- 2)

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What are the two noneponymous names for Parinaud syndrome?

1) **Dorsal midbrain syndrome**

2) **Pretectal syndrome**

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Parinaud Syndrome



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*The etiology of a Parinaud syndrome is often a function of who the pt is.
For each of these pts with Parinaud's, state the most likely cause:
--A child:*



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--A child: **Hydrocephalus**

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The etiology of a Parinaud syndrome is often a function of whether the patient is an adult or a child.
For each of these pts with Parinaud syndrome, what other signs will be present in an infant with hydrocephalus?

--A child: **Hydrocephalus**

--?

--?

--?



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For each of these pts with P
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What other signs will be present in an infant with hydrocephalus?

--Enlarged

--?

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Parinaud Syndrome



Hydrocephalus: Enlarged head



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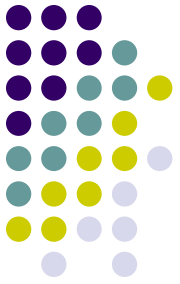
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--Bulging fontanelle

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Parinaud Syndrome



Hydrocephalus: Bulging fontanelle



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--Bulging fontanelle
--Dilated

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- Bulging fontanelle
- Dilated scalp vessels

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Hydrocephalus: Dilated scalp vessels



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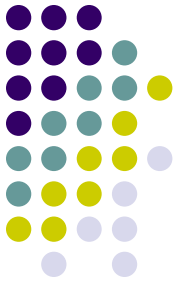
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--An **older** man:

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- A young woman: **MS**
- An **older** man: **CVA**