Graves orbitopathy is secondary to thyroid disease.
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Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not *caused* by it.
Graves orbitopathy is secondary to thyroid disease
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disease that is strongly associated with thyroid
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What does it mean to say Graves is associated with thyroid dz, but not caused by it?
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What does it mean to say Graves is associated with thyroid dz, but not caused by it? Thyroid eye dz (TED) is an autoimmune dz. Research suggests that, moreso than those elsewhere in the body, orbital fibroblasts are highly sensitive to circulating TSH-receptor antibodies (TSH-R Ab)--the same circulating antibodies implicated in many forms of autoimmune thyroid disease.
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Stimulation of orbital fibroblasts by TSH-R Ab has what effects on these cells?
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Stimulation of orbital fibroblasts by TSH-R Ab has what effects on these cells?

It induces them to secrete glycosaminoglycans (GAGs), as well as pro-inflammatory cytokines (which attract inflammatory cells to the orbit). Stimulation even causes some fibroblasts to differentiate into adipocytes. Thus, much of the histopathology of TED (ie, an orbit full of ground substance, inflammatory cells, etc) can be traced directly to the effects of TSH-R Ab on orbital fibroblasts.
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But to the original question: Note that the above activities are not caused by what’s going on in the thyroid gland itself. Thus, while TED often coincides with thyroid dysfunction, it does not result from it.
Graves orbitopathy is secondary to thyroid disease

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

Speaking of thyroid dysfunction…Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?
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Hyperthyroidism
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**Speaking of thyroid dysfunction…** Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?

Hyperthyroidism

*What percent of Graves cases are associated with hyperthyroidism at presentation?*
Graves orbitopathy is secondary to thyroid disease

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with **thyroid dysfunction**, but it is not caused by it.

---

**Graves aka Thyroid Eye Disease: True/False**

- Graves orbitopathy is secondary to thyroid disease: True

---

**Speaking of thyroid dysfunction…**

Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?
- Hyperthyroidism

What percent of Graves cases are associated with hyperthyroidism at presentation?
- About 90
Graves orbitopathy is secondary to thyroid disease

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with **thyroid dysfunction**, but it is not caused by it.

Speaking of thyroid dysfunction…Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?

Hyperthyroidism

Can Graves dz present in association with euthyroid status?

About 90%
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Speaking of thyroid dysfunction... Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?
Hyperthyroidism

Can Graves dz present in association with euthyroid status?
Yes, albeit uncommonly

About 90% of Graves cases are associated with hyperthyroidism at presentation.
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Speaking of thyroid dysfunction... Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?

Hyperthyroidism

Can Graves dz present in association with euthyroid status?

Yes, albeit uncommonly

What proportion of Graves pts are euthyroid at presentation?

About 6%

Of the euthyroid presentations, what percent will develop thyroid disease over the next 5 years?

About half
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Can Graves dz present in association with euthyroid status?
Yes, albeit uncommonly

What proportion of Graves pts are euthyroid at presentation?
About 6%

Of the patients with euthyroid Graves at presentation, what percent will develop thyroid disease over the next 5 years?
About half

Can Graves dz present in association with hypothyroidism?
Yes—the remaining 4% are hypothyroid
Most of these pts have a specific condition—what is it?
Hashimoto's thyroiditis
Graves orbitopathy is secondary to thyroid disease
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Can Graves dz present in association with hypothyroidism?
Yes—the remaining 4% are hypothyroid

Of the hypothyroid presentations, what percent will develop thyroid disease over the next 5 years?
About half

Graves aka Thyroid Eye Disease: True/False

Graves

True

Graves

False

Graves

True
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Speaking of thyroid dysfunction...Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?

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Most of these pts have a specific condition—what is it?

Of the hyperthyroid presentation?

Hashimoto's thyroiditis
Graves aka Thyroid Eye Disease: True/False

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Speaking of thyroid dysfunction…Is Graves more likely to be associated with hyperthyroidism, or hypothyroidism?
Hyperthyroidism

- Can Graves dz present in association with euthyroid status?
  Yes, albeit uncommonly

- What proportion of Graves pts are euthyroid at presentation?
  About 6%

- Of the hypothyroid pts, what proportion are euthyroid?
  About 90%

Can Graves dz present in association with hypothyroidism?
Yes—the remaining 4% are hypothyroid

Most of these pts have a specific condition—what is it?
Hashimoto’s thyroiditis
Graves orbitopathy is secondary to thyroid disease
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not \textit{caused} by it

Graves is aggravated by smoking
Graves orbitopathy is secondary to thyroid disease
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it

Graves is aggravated by smoking True; Graves patients should be urged to stop smoking
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- **Graves is aggravated by smoking** True; Graves patients should be urged to stop smoking.

*Smoking increases the likelihood of developing TED by how much?*
Graves orbitopathy is secondary to thyroid disease
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking

Smoking increases the likelihood of developing TED by how much?
A smoker is 7x more likely to develop TED than a nonsmoker!
Graves orbitopathy is secondary to thyroid disease
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it

Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking

Graves is associated with MS  (multiple sclerosis)
Graves orbitopathy is secondary to thyroid disease
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not *caused* by it

Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking

Graves is associated with MS  False; it is associated with *MG*
Graves orbitopathy is secondary to thyroid disease  
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not *caused* by it

- Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking
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Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking

Graves is associated with MS  False; it is associated with MG

What does MG stand for in this context?
Graves orbitopathy is secondary to thyroid disease
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not \textit{caused} by it.

Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking.

Graves is associated with MS  False; it is associated with \textbf{MG}.

What does MG stand for in this context? Myasthenia gravis.
Graves orbitopathy is secondary to thyroid disease
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Graves is aggravated by smoking True; Graves patients should be urged to stop smoking.

Graves is associated with MS False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia.
Graves orbitopathy is secondary to thyroid disease
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- Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking
- Graves is associated with MS  False; it is associated with MG
- Graves myopathy usually results in an ET and/or a hypotropia  True
Graves *aka* Thyroid Eye Disease: True/False

**Esotropia**

**Hypotropia**

TED: Strabismus
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Graves is associated with MS False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia True.

The medial rectus is more likely than the inferior rectus to be affected.
Graves orbitopathy is secondary to thyroid disease 
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- Graves is aggravated by smoking  True; Graves patients should be urged to stop smoking
- Graves is associated with MS  False; it is associated with MG
- Graves myopathy usually results in an ET and/or a hypotropia  True
- The medial rectus is more likely than the inferior rectus to be affected  False; the order (most to least likely) is

(all 4 rectus muscles)
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Men and women are at equal risk of TED.
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Men and women are at equal risk of TED  Nope
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Graves myopathy usually results in an ET and/or a hypotropia. True.

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Men and women are at equal risk of TED. Nope.
Graves aka Thyroid Eye Disease: True/False

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- Men and women are at equal risk of TED: Nope.

What is/are the diagnostic criteria for TED?

Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED.
Graves orbitopathy is secondary to thyroid disease
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Men and women are at equal risk of TED  Nope

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:

- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

How is this defined?

Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

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- Typical orbital signs of TED
- Imaging findings c/w TED

How is this defined?
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

What are the typical orbital signs?
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conjunctiva

Graves aka Thyroid Eye Disease: True/False
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- **Autoimmune thyroid dz**
- **Typical orbital signs of TED**
- **Imaging findings c/w TED**

**How is this defined?**
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

**What are the typical orbital signs?**

- Eyelid retraction
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- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)
Graves aka Thyroid Eye Disease: True/False

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How is this defined? Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

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- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?

'Temporal flare': The fact that the retraction is more pronounced at the temporal aspect of the lid

What does temporal flare refer to/mean?
Graves orbitopathy is secondary to thyroid disease

Sort of, but not really: Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

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- Graves is associated with MS: False; it is associated with MG.
- Graves myopathy usually results in an ET and/or hypotropia: True.
- The medial rectus is more likely than the inferior rectus to be affected: False; the order (most to least likely) is IR > MR > SR > LR.
- Men and women are at equal risk of TED: Nope.

**How is this defined?**
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

**What are the typical orbital signs?**
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**Is the eyelid retraction unilateral, or bilateral?**
It can be either.

**What are the diagnostic criteria for TED?**
Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

**Graves aka Thyroid Eye Disease: True/False**
Graves *aka* Thyroid Eye Disease: True/False

Unilateral*  Bilateral

TED: Lid retraction

*Or highly asymmetric, at least*
Graves orbitopathy is secondary to thyroid disease

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

Graves is aggravated by smoking. True; Graves patients should be urged to stop smoking.

Graves is associated with MS. False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia. True.

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Men and women are at equal risk of TED. Nope.

---

**Graves aka Thyroid Eye Disease: True/False**

**How is this defined?**
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

**What is/are the diagnostic criteria for TED?**
Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
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**What are the typical orbital signs of TED?**
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**Is the eyelid retraction unilateral, or bilateral?**
It can be either.

**TED is characterized by a particular pattern of retraction--what is it?**
'Temporal flare'

**What does temporal flare refer to/mean?**
The fact that the retraction is more pronounced at the temporal aspect of the lid.
Graves orbitopathy is secondary to thyroid disease, but it is not caused by it.

Graves is aggravated by smoking. True; Graves patients should be urged to stop smoking.

Graves is associated with MS. False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia. True.

The medial rectus is more likely than the inferior rectus to be affected. False; the order (most to least likely) is IR>MR>SR>LR.

Men and women are at equal risk of TED. Nope.

How is this defined? Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

What are the diagnostic criteria for TED? Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

What are the typical orbital signs? --Eyelid retraction --Proptosis

Is the eyelid retraction unilateral, or bilateral? It can be either.

TED is characterized by a particular pattern of retraction--what is it? ‘Temporal flare’
Graves aka Thyroid Eye Disease: True/False

**What is/are the diagnostic criteria for TED?** Pt must have at least two of the following:

- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

**Sort of, but not really.** Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not **caused** by it. Graves is aggravated by smoking. True; Graves patients should be urged to stop smoking.

- Graves is associated with MS  **False; it is associated with MG**
- Graves myopathy usually results in an ET and/or a hypotropia  **True**
- The medial rectus is more likely than the inferior rectus to be affected  **False; the order (most to least likely) is IR > MR > SR > LR**
- Men and women are at equal risk of TED  **Nope**

**How is this defined?** Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

**What are the typical orbital signs?**

- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**Is the eyelid retraction unilateral, or bilateral?** It can be either.

**TED is characterized by a particular pattern of retraction--what is it?** 'Temporal flare'

**What does temporal flare refer to/mean?**

'Temporal flare' refers to the fact that the retraction is more pronounced at the temporal aspect of the lid.
Graves aka Thyroid Eye Disease: True/False

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

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- The medial rectus is more likely than the inferior rectus to be affected False; the order (most to least likely) is IR>MR>SR>LR
- Men and women are at equal risk of TED Nope

How is this defined? Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

What are the orbital signs?
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral? It can be either

TED is characterized by a particular pattern of retraction--what is it? ‘Temporal flare’

What does temporal flare refer to/mean? The fact that the retraction is more pronounced at the temporal aspect of the lid
Graves *aka* Thyroid Eye Disease: True/False

TED: Lid retraction with temporal flare
Graves aka Thyroid Eye Disease: True/False

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:

- Autoimmune thyroid disease
- Typical orbital signs of TED
- Imaging findings c/w TED

What well-known brainstem syndrome is associated with lid retraction?

Parinaud syndrome

What are the typical orbital signs?

- Eyelid retraction
- Proptosis
- Restriction of gaze (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?

It can be either

TED is characterized by a particular pattern of retraction--what is it?

'Temporal flare'

What does temporal flare refer to/mean?

The fact that the retraction is more pronounced at the temporal aspect of the lid

How is this defined?

Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

What is/are the typical orbital signs?

- Eyelid retraction
- Proptosis
- Restriction of gaze (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?

It can be either

TED is characterized by a particular pattern of retraction--what is it?

'Temporal flare'

What does temporal flare refer to/mean?

The fact that the retraction is more pronounced at the temporal aspect of the lid
Graves orbitopathy is secondary to thyroid disease

Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

Graves is aggravated by smoking; True; Graves patients should be urged to stop smoking.

Graves is associated with MS; False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia; True.

The medial rectus is more likely than the inferior rectus to be affected; False; the order (most to least likely) is IR > MR > SR > LR.

Men and women are at equal risk of TED; Nope.

How is this defined?
- Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

What are the typical orbital signs?
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?
- It can be either

TED is characterized by a particular pattern of retraction--what is it?
- Temporal flare

What does temporal flare refer to/mean?
- The fact that the retraction is more pronounced at the temporal aspect of the lid

What well-known brainstem syndrome is associated with lid retraction?
- Parinaud syndrome

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
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Graves aka Thyroid Eye Disease: True/False

What well-known brainstem syndrome is associated with lid retraction?
- Parinaud syndrome

What is the eponymous name for lid retraction in Parinaud syndrome?
- Collier's sign

Parinaud's has four cardinal findings. What are the other three?
- Lid retraction
- Light-near dissociation
- Impaired upgaze
- Convergence-retraction nystagmus
Graves aka Thyroid Eye Disease: True/False

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:
- Autoimmune thyroid disease
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What well-known brainstem syndrome is associated with lid retraction? Parinaud syndrome

What is the eponymous name for lid retraction in Parinaud syndrome? Collier’s sign

What are the typical orbital signs?
- Eyelid retraction
- Proptosis
- Restriction of horizontal and vertical gaze c/w TED myopathy

Is the eyelid retraction unilateral, or bilateral?
It can be either

TED is characterized by a particular pattern of retraction--what is it?
Temporal flare

What does temporal flare refer to/mean?
The fact that the retraction is more pronounced at the temporal aspect of the lid

How is this defined?
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

What are the typical orbital signs?
--Eyelid retraction
--Proptosis
--Restriction of horizontal and vertical gaze c/w TED myopathy

Is the eyelid retraction unilateral, or bilateral?
It can be either

TED is characterized by a particular pattern of retraction--what is it?
‘Temporal flare’

What does temporal flare refer to/mean?
The fact that the retraction is more pronounced at the temporal aspect of the lid
Graves orbitopathy is secondary to thyroid disease. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

- Graves is aggravated by smoking: True; Graves patients should be urged to stop smoking.
- Graves is associated with MS: False; it is associated with MG.
- Graves myopathy usually results in an ET and/or a hypotropia: True.
- The medial rectus is more likely than the inferior rectus to be affected: False; the order (most to least likely) is IR > MR > SR > LR.
- Men and women are at equal risk of TED: Nope.

How is TED defined?

- Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

What are the typical orbital signs?

- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conjunctiva (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?

- It can be either.
- TED is characterized by a particular pattern of retraction—what is it?
  - Temporal flare

What does temporal flare refer to/mean?

- The fact that the retraction is more pronounced at the temporal aspect of the lid.

What is/are the diagnostic criteria for TED?

- Pt must have at least two of the following:
  - Autoimmune thyroid dz
  - Typical orbital signs of TED
  - Imaging findings c/w TED

Graves aka Thyroid Eye Disease: True/False

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Parinaud’s has four cardinal findings. What are the other three?

- Lid retraction
- Parinaud syndrome
- Imaging findings c/w TED
- Collier's sign

Autoimmune thyroid disease is strongly associated with which autoimmune disease?

- Thrombocytopenia
- MG
- Sjogren's syndrome
- PAN

What is the well-known brainstem syndrome associated with lid retraction?

- Parinaud syndrome

What is the eponymous name for lid retraction in Parinaud syndrome?

- Collier's sign
Graves aka Thyroid Eye Disease: True/False

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:

1. Autoimmune thyroid disease
2. Typical orbital signs of TED
3. Imaging findings c/w TED

What well-known brainstem syndrome is associated with lid retraction?
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Is the eyelid retraction unilateral, or bilateral?
It can be either

TED is characterized by a particular pattern of retraction--what is it?
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The fact that the retraction is more pronounced at the temporal aspect of the lid
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Is the eyelid retraction unilateral, or bilateral? It can be either

Is the eyelid retraction unilateral, or bilateral?

--Eyelid retraction

TED is characterized by a particular pattern of retraction--what is it? 'Temporal flare'

What does temporal flare refer to/mean?

The fact that the retraction is more pronounced at the temporal aspect of the lid
Parinaud syndrome. The combination of lid retraction + impaired upgaze gives rise to a characteristic appearance known as *setting sun sign*. 

**Graves aka Thyroid Eye Disease: True/False**
Collar or, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

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Men and women are at equal risk of TED. Nope.

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:

- Autoimmune thyroid dz
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How is this defined?
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

What are the typical orbital signs?
- Eyelid retraction
- Proptosis

There is an important exception to the ‘absence of lid retraction indicates it isn’t Graves dz’ contention--in fact, such pts can present with ptosis. Under what circumstance might a Graves pt present with no lid retraction, or even frank ptosis?

‘Temporal flare’

What does temporal flare refer to/mean?
The fact that the retraction is more pronounced at the temporal aspect of the lid.
Graves aka Thyroid Eye Disease: True/False

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:
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If the pt has concurrent myasthenia gravis.

What does temporal flare refer to/mean?
The fact that the retraction is more pronounced at the temporal aspect of the lid.
Graves aka Thyroid Eye Disease: True/False

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:

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- Typical orbital signs of TED
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What are the typical orbital signs?
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?
It can be either

TED is characterized by a particular pattern of retraction—what is it?
'Temporal flare'

What does temporal flare refer to/mean?
The fact that the retraction is more pronounced at the temporal aspect of the lid

There is an important exception to the ‘absence of lid retraction indicates it isn’t Graves dz’ contention—in fact, such pts can present with ptosis. Under what circumstance might a Graves pt present with no lid retraction, or even frank ptosis?
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Men and women are at equal risk of TED. Nope

What are some typical signs of TED? Eyelid retraction, proptosis, restrictive strabismus, compressive optic neuropathy, edema of the lids and/or conjunctiva.

There is an important exception to the ‘absence of lid retraction indicates it isn’t Graves dz’ contention—in fact, such pts can present with ptosis. Under what circumstance might a Graves pt present with no lid retraction, or even frank ptosis?
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- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?
It can be either

TED is characterized by a particular pattern of retraction—what is it?
'Temporal flare'

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Men and women are at equal risk of TED. Nope
Graves aka Thyroid Eye Disease: True/False

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- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the eyelid retraction unilateral, or bilateral?
It can be either

TED is characterized by a particular pattern of retraction—what is it?
'Temporal flare'

What does temporal flare refer to/mean?
The fact that the retraction is more pronounced at the temporal aspect of the lid

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:
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- Typical orbital signs of TED
- Imaging findings c/w TED

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If the pt has concurrent myasthenia gravis

What one word best characterizes the clinical course of ptosis in MG?
Variable. That is, one would expect the degree of ptosis to vary from exam to exam.

Men and women are at equal risk of TED

Graves is associated with MS
False; it is associated with MG

Graves myopathy usually results in an ET and/or a hypotropia
True

The medial rectus is more likely than the inferior rectus to be affected
False; the order (most to least likely) is IR>MR>SR>LR

Graves orbitopathy is secondary to thyroid disease
Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it

Graves is aggravated by smoking
True; Graves patients should be urged to stop smoking

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How is this defined? Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

What are the typical orbital signs? --Eyelid retraction --Proptosis

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

There is an important exception to the ‘absence of lid retraction indicates it isn’t Graves dz’ contention--in fact, such pts can present with ptosis. Under what circumstance might a Graves pt present with no lid retraction, or even frank ptosis? If the pt has concurrent myasthenia gravis.

What one word best characterizes the clinical course of ptosis in MG? Variable. That is, one would expect the degree of ptosis to vary from exam to exam.

What are the typical orbital signs? --Eyelid retraction --Proptosis

How is this defined? Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

Graves aka Thyroid Eye Disease: True/False
Graves aka Thyroid Eye Disease: True/False

**What is/are the diagnostic criteria for TED?** Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

**How is this defined?**
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

**What are the typical orbital signs?**
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**Is the proptosis unilateral, or bilateral?**

**Sort of, but not really.** Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not *caused* by it.

- Graves is aggravated by smoking True; Graves patients should be urged to stop smoking
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- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**Is the proptosis unilateral, or bilateral?**
It can be either.

#1 TED ranks as a cause of unilateral proptosis in adults.

#1 TED ranks as a cause of bilateral proptosis in adults.
Graves *aka* Thyroid Eye Disease: True/False

TED: Proptosis

*Or highly asymmetric, at least*
Graves aka Thyroid Eye Disease: True/False

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- Typical orbital signs of TED
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What are the typical orbital signs?
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the proptosis unilateral, or bilateral? It can be either.

Where does TED rank as a cause of unilateral proptosis in adults? #1.

Where does TED rank as a cause of bilateral proptosis in adults? #1.
Graves aka Thyroid Eye Disease: True/False

<table>
<thead>
<tr>
<th>What is/are the diagnostic criteria for TED? Pt must have at least two of the following:</th>
<th>Typical orbital signs of TED</th>
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</tr>
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<td>Autoimmune thyroid dz</td>
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- Men and women are at equal risk of TED. Nope.

How is this defined?
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

What are the typical orbital signs?
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the proptosis unilateral, or bilateral?
It can be either.

Where does TED rank as a cause of unilateral proptosis in adults?
#1
Graves **aka** Thyroid Eye Disease: True/False

**What is/are the diagnostic criteria for TED?** Pt must have at least two of the following:
- **Autoimmune thyroid dz**
- **Typical orbital signs of TED**
- **Imaging findings c/w TED**

---

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Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

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- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
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- Edema of the lids and/or conj (ie, chemosis)

**Is the proptosis unilateral, or bilateral?**
It can be either

**Where does TED rank as a cause of unilateral proptosis in adults?**
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**Where does TED rank as a cause of bilateral proptosis in adults?**
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- Men and women are at equal risk of TED. Nope
Graves orbitopathy is secondary to thyroid disease:

- Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.
- Graves is aggravated by smoking: True; Graves patients should be urged to stop smoking.
- Graves is associated with MS: False; it is associated with MG.
- Graves myopathy usually results in ET and/or a hypotropia: True.
- The medial rectus is more likely than the inferior rectus to be affected: False; the order (most to least likely) is IR > MR > SR > LR.
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How is this defined?

- Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

What is/are the diagnostic criteria for TED?

Pt must have at least two of the following:

- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

What are the typical orbital signs?

- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

Is the proptosis unilateral, or bilateral?

- It can be either.

Where does TED rank as a cause of unilateral proptosis in adults?

#1

Where does TED rank as a cause of bilateral proptosis in adults?

#1
**Graves aka Thyroid Eye Disease: True/False**

**What is/are the diagnostic criteria for TED?** Pt must have at least two of the following:
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**Where does TED rank as a cause of unilateral proptosis in adults?**
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**Where does TED rank as a cause of bilateral proptosis in adults?**
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**What about in the pediatric population—-is the relationship between proptosis and Graves dz as strong?**
No. Graves is rare in children, and when it does occur, only about 10% present with proptosis. (Rule of thumb: In children, proptosis is more likely to be infectious or neoplastic than to be inflammatory.)

**Graves aka Thyroid Eye Disease: True/False**

- Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.
- True; Graves patients should be urged to stop smoking.
- False; it is associated with MG.
- True.
- False; the order (most to least likely) is IR>MR>SR>LR.
- Nope.
Graves orbitopathy is secondary to thyroid disease

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The medial rectus is more likely than the inferior rectus to be affected  False; the order (most to least likely) is IR>MR>SR>LR

Men and women are at equal risk of TED  Nope

How is this defined?
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

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Autoimmune thyroid dz  Typical orbital signs of TED  Imaging findings c/w TED

What are the typical orbital signs?
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Is the proptosis unilateral, or bilateral?
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Graves aka Thyroid Eye Disease: True/False
Graves *aka* Thyroid Eye Disease: True/False

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**Sort of, but not really.** Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not *caused* by it.

- Graves is aggravated by smoking  **True;** Graves patients should be urged to stop smoking.
- Graves is associated with MS  **False;** it is associated with MG.
- Graves myopathy usually results in an ET and/or a hypotropia  **True.**
- The medial rectus is more likely than the inferior rectus to be affected  **False;** the order (most to least likely) is IR>MR>SR>LR.
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---

**How is this defined?**

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Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.
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- The medial rectus (MR) is more likely than the inferior rectus (IR) to be affected. False; the order (most to least likely) is IR > MR > SR > LR.
- Men and women are at equal risk of TED: False; Graves/tGzd is more common in women than in men.
- Graves aka Thyroid Eye Disease: True/False

How is this defined? Either the pt has a known autoimmune thyroid condition, or they test positive for one (or more) of a host of anti-thyroid antibodies.

Typical orbital signs of TED:
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conjunctiva (ie, chemosis)

What does this mean, 'in a manner c/w TED myopathy'? It means in this order:

Diagnostic criteria for TED:
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Graves thyroid dz
Graves orbitopathy is secondary to thyroid disease 

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Men and women are at equal risk of TED. Nope.

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**Which of these is the most common orbital sign in TED?**
- Lid retraction
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**Typical orbital signs of TED**

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**Imaging findings c/w TED**

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- Pt must have at least two of the following:
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**Autoimmune thyroid dz**
- Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

**Typical orbital signs of TED**
- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**Imaging findings c/w TED**

**Which of these is the most common orbital sign in TED?**
- Lid retraction

**What percent of TED pts will demonstrate lid retraction at presentation?**
- About 75
- Over 90
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- What is/are the diagnostic criteria for TED?
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- What percent of TED pts will demonstrate lid retraction at presentation?
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- What percent will demonstrate it at some point during the disease process?
  - Over 90

- What are the typical orbital signs?
  - **Eyelid retraction**
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  - **Edema of the lids and/or conj (ie, chemosis)**

- Graves aka Thyroid Eye Disease: True/False
### Graves aka Thyroid Eye Disease: True/False

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**Graves orbitopathy is secondary to thyroid disease**

- Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction.

**Graves is aggravated by smoking**

- True; Graves patients should be urged to stop smoking.

**Graves is associated with MS**

- False; it is associated with MG.

**Graves myopathy usually results in an ET and/or a hypotropia**

- True

**The medial rectus is more likely than the inferior rectus to be affected**

- False; the order (most to least likely) is IR>MR>SR>LR

**Men and women are at equal risk of TED**

- Nope

---

**How is this defined?**

- Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

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**What are the typical orbital signs?**

- **Eyelid retraction**
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- Proptosis
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*In the present context, to what does the term lid lag refer?*

*von Graefe’s sign*
Graves aka Thyroid Eye Disease: True/False

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- Compressive optic neuropathy
- Lid edema and/or conjunctival chemosis

In the present context, to what does the term lid lag refer?
When a person who *doesn’t* have TED moves into downgaze, their upper lid margin will follow the globe. In contrast, when a TED pt looks down, their upper lid remains elevated, ie, it ‘lags.’ This is a classic TED finding.
Graves *aka* Thyroid Eye Disease: True/False

Unilateral. Note how the normal right upper lid ‘follows’ the eye into downgaze

Bilateral

TED: Lid lag
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What is the eponymous name for lid lag?

von Graefe's sign
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What is the eponymous name for lid lag? von Graefe's sign.
**Graves aka Thyroid Eye Disease: True/False**

**What is/are the diagnostic criteria for TED?** Pt must have at least two of the following:

- Autoimmune thyroid dz
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**What is the eponymous name for lid lag?**
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---

**It may be classic for TED, but is it pathognomonic?**
No

---

**What is the eponymous name for lid lag when it is present in a non-TED pt?**
Pseudo-von Graefe's sign
Graves aka Thyroid Eye Disease: True/False

How is this defined?
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

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Typical orbital signs of TED

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Graves is associated with MG. False; it is associated with MG.

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Pseudo-von Graefe's sign

This is a classic TED finding.

Von Graefe's sign

In the present context, to what does the term lid lag refer?

When a person who *doesn't* have TED moves into downgaze, their upper lid margin will follow the globe. In contrast, when a TED pt looks down, their upper lid remains elevated, ie, it 'lags.' This is a classic TED finding.

What is the eponymous name for lid lag?

Von Graefe's sign

How is this defined?

Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

What are the typical orbital signs?

Eye lid retraction

Proptosis

Restrictive strabismus (in a manner c/w TED myopathy)

Compressive optic neuropathy

Edema of the lids and/or conj (ie, chemosis)

What is the eponymous name for lid lag?

Von Graefe's sign

Pseudo-

^
Graves *aka* Thyroid Eye Disease: True/False

**What is/are the diagnostic criteria for TED?** Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

**How is this defined?**
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

**What are the typical orbital signs?**
- Lid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**What is the eponymous name for lid lag?**
*von Graefe's sign*

**In the present context, to what does the term *lid lag* refer?**
When a person who *doesn't* have TED moves into downgaze, their upper lid margin will follow the globe. In contrast, when a TED pt looks down, their upper lid remains elevated, ie, it 'lags.' This is a classic TED finding.

**What is/are the diagnostic criteria for TED?**
- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

**There is a form of ptosis that is associated with lid lag—which one?**
Congenital myogenic ptosis. In downgaze, the 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).
Graves aka Thyroid Eye Disease: True/False

What is/are the diagnostic criteria for TED? Pt must have at least two of the following:
- Autoimmune thyroid dz
- Typical orbital signs of TED
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Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

- Graves is aggravated by smoking True; Graves patients should be urged to stop smoking
- Graves is associated with MS False; it is associated with MG
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- Men and women are at equal risk of TED Nope

How is this defined?
Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies

What are the typical orbital signs?
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How is this defined?
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What are the typical orbital signs? (You can circle any or all)
- Lid retraction
- Proptosis
- Lag
- Restrictive strabismus
- Compressive optic neuropathy
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What is/are the pathogenesis of congenital myogenic ptosis?

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Graves, aka Thyroid Eye Disease: True/False

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

With MC

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

Aberrant regeneration after CN3 palsy

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 associate with aberrant regeneration?

--Ischemic—most common; never associated with aberrant regeneration

--Traumatic--Compressive

What are the classic CN3 aberrant regeneration mis-connections?

--Attempted adduction or depression → eyelid retraction

--Attempted globe adduction, elevation or depression → miosis of the pupil
Graves, aka Thyroid Eye Disease: True/False

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Men and women are at equal risk of TED Nope.

What are the typical orbital signs?
- Eye lid retraction
- Proptosis
- Eye lag
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

What is/are the diagnostic criteria for TED?
Pt must have at least two of the following:
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- Typical orbital signs of TED
- Imaging findings c/w TED

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Men and women are at equal risk of TED? No
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What are the three potential mechanisms of CN3 palsy?
-- ?
-- ?
-- ?

Men and women are at equal risk of TED
Nope

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With MG

Graves myopathy is associated with TED and/or a

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What are the three potential mechanisms of CN3 palsy?
--Ischemic
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*What well-known phenomenon associated with a cranial-nerve palsy frequently manifests with lid lag?*  
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With MG...  

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What well-known phenomenon associated with a cranial-nerve palsy frequently manifests with lid lag?
Aberrant regeneration after CN3 palsy

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; never associated with aberrant regeneration
--Traumatic
--Compressive

What are the classic CN3 aberrant regeneration mis-connections?
--?
--?

There is a form of ptosis that is associated with lid lag—which one?
Congenital myogenic ptosis. In downgaze, the 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)
**Graves aka Thyroid Eye Disease: True/False**

- What well-known phenomenon associated with a cranial-nerve palsy frequently manifests with lid lag? Aberrant regeneration after CN3 palsy

- 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

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  - Traumatic
  - Compressive

- What are the typical orbital signs?
  - Lid lag
  - Eyelid retraction
  - Proptosis

- What are the classic CN3 aberrant regeneration mis-connections?
  - Attempted adduction or depression → eyelid retraction
  - Attempted globe adduction, elevation or depression → miosis of the pupil

- There is a form of ptosis that is associated with lid lag—which one? Congenital myogenic ptosis. In downgaze, the appearance will suggest lid retraction.

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- Men and women are at equal risk of TED Nope
Aberrant regeneration of the right third nerve. A, In primary gaze, there is mild ptosis, pupillary mydriasis, and exotropia, all on the right.
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.
Graves orbitopathy is secondary to thyroid disease. Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

- Graves is aggravated by smoking: True; Graves patients should be urged to stop smoking.
- Graves is associated with MS: False; it is associated with MG.
- Graves myopathy usually results in ET and/or hypotropia: True.
- The medial rectus is more likely than the inferior rectus to be affected: False; the order (most to least likely) is IR>MР>SР>LР.
- Men and women are at equal risk of TED: Nope.

**What is/are the diagnostic criteria for TED?**

Pt must have at least two of the following:

- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

**How is this defined?**

Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

**What are the typical orbital signs?**

- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
- Compressive optic neuropathy
- Edema of the lids and/or conj (ie, chemosis)

**What are these findings?**

Enlargement of the EOMs (in a manner c/w TED myopathy).
Graves aka Thyroid Eye Disease: True/False

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Enlargement of the EOMs (in a manner c/w TED myopathy)

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it. Graves is aggravated by smoking. Patients are urged to stop smoking.

- Graves is associated with MS False; it is associated with MG
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Autoimmune thyroid dz
Typical orbital signs of TED
Imaging findings c/w TED
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**Imaging findings c/w TED**

**What are these findings?**
- Enlargement of the EOMs (in a manner c/w TED myopathy)

**What does this mean, ‘in a manner c/w TED myopathy’?**
- Enlargement of the EOMs is fusiform or ‘tendon sparing’
- Involvement of the EOMs occurs in this order:
  - Eyelid retraction
  - Proptosis
  - Restrictive strabismus (in a manner c/w TED myopathy)
  - Compressive optic neuropathy
  - Edema of the lids and/or conj (ie, chemosis)
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What are these findings?

Enlargement of the EOMs (in a manner c/w TED myopathy)

What does this mean, ‘in a manner c/w TED myopathy’?

It means two things:
- Enlargement of the EOMs is fusiform or ‘tendon sparing’
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What are these findings?

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What are these findings?
Enlargement of the EOMs (in a manner c/w TED myopathy)

What does this mean, ‘in a manner c/w TED myopathy’?
It means two things:
--Enlargement of the EOMs is shape, aka ‘two words’

What are the typical orbital signs?
--Eyelid retraction
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--Restrictive strabismus (in a manner c/w TED myopathy)
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False; the order (most to least likely) is IR>MR>SR>LR

Men and women are at equal risk of TED
Nope
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What is/are the causes of TED?
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Graves *aka* Thyroid Eye Disease: True/False

TED: Tendon-sparing EOM enlargement
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Men and women are at equal risk of TED. Nope

What is/are the diagnostic criteria for TED?

Pt must have at least two of the following:

- Autoimmune thyroid dz
- Typical orbital signs of TED
- Imaging findings c/w TED

How is this defined?

Either the pt has a known autoimmune thyroid condition, or s/he tests positive for one (or more) of a host of anti-thyroid antibodies.

Autoimmune thyroid dz

What are these findings?

Enlargement of the EOMs (in a manner c/w TED myopathy)

What does this mean, ‘in a manner c/w TED myopathy’?

It means two things:

- Enlargement of the EOMs is fusiform, aka ‘tendon sparing’
- Involvement of the EOMs occurs…in this order:

IR > MR > SR > LR

What are the typical orbital signs of TED?

- Eyelid retraction
- Proptosis
- Restrictive strabismus (in a manner c/w TED myopathy)
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Graves aka Thyroid Eye Disease: True/False

TED: Tendon-sparing EOM enlargement involving the IR > MR
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Men and women are at equal risk of TED Nope.

What is the natural history of TED?

It is a self-limited disease that tends to 'burn itself out' over time.

How is TED managed?

Other than smoking cessation (which all TED pts should do), management depends upon disease severity:
- Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).
- Moderate disease requires more aggressive surface protection (eg, moisture goggles), and PO steroids.
- Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy. A last resort.
Graves orbitopathy is secondary to thyroid disease

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What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

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What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae

On average, how long does it take to burn itself out?

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  - For nonsmokers: ~1 year
  - For smokers: 2-3 years

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What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

On average, how long does it take to burn itself out? That depends on whether the pt is a smoker.

How long for nonsmokers? ~1 year.

How long for smokers? 2-3 years.

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Graves aka Thyroid Eye Disease: True/False
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What is the natural history of TED?
It is a self-limited disease that tends to *burn itself out* over time, but may leave disfiguring sequelae.

*On average, how long does it take to burn itself out?*
That depends on whether the pt is a *smoker*.

*How long for nonsmokers? ~1 year*
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How is TED managed? Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

--Mild disease can be managed (?).
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Graves aka Thyroid Eye Disease: True/False

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A biologic is now FDA-approved for TED. What is the brand name?

Tepezza

What is its trade name?
Teprotumumab

What does it target?
It binds to and blocks the receptor for insulin-like growth factor 1 (IGF-1)

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It binds to and blocks the receptor for insulin-like growth factor 1 (IGF-1).
Graves aka Thyroid Eye Disease: True/False

What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae

How is TED managed?
Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

--Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation)
--Moderate disease requires more aggressive surface protection (eg, moisture goggles), and PO steroids
--Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy. a last resort.

A biologic is now FDA-approved for TED. What is the brand name?
Tepezza

What is its trade name?
Teprotumumab

Graves myopathy usually results in an ET and/or a hypotropia True

The medial rectus is more likely than the inferior rectus to be affected False; the order (most to least likely) is IR>MR>SR>LR

Men and women are at equal risk of TED Nope
Graves aka Thyroid Eye Disease: True/False

What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

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--Severe disease results in an ET and/or a hypotropia. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy. A last resort.

A biologic is now FDA-approved for TED. What is the brand name?
Tepezza

What is its trade name?
Teprotumumab

What does the stem –mab indicate?
It indicates the med is a monoclonal antibody.

What does the substem –u- indicate?
That the antibody is human (ie, it didn’t derive from work done on another species).

What does the infix –tum- indicate?
That the molecule is used against tumors (teprotumumab was developed as an anti-cancer med).
Graves aka Thyroid Eye Disease: True/False

What is the natural history of TED?
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Two words
Graves aka Thyroid Eye Disease: True/False

What is the natural history of TED? It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

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---Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy. As a last resort.

A biologic is now FDA-approved for TED. What is the brand name? Tepezza

What is its trade name? Teprotumumab

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What does the infix –tum- indicate? That the molecule is used against tumors (teprotumumab was developed as an anti-cancer med)
Graves orbitopathy is secondary to thyroid disease. Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

Graves is aggravated by smoking. True; Graves patients should be urged to stop smoking.

Graves is associated with MS. False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia. True

The medial rectus is more likely than the inferior rectus to be affected. False; the order (most to least likely) is IR>MRI>SRI>LR.

Men and women are at equal risk of TED. Nope

What is the natural history of TED? It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed? Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

--Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation)
--Moderate disease requires more aggressive surface protection (eg, moisture goggles), and PO steroids
--Severe disease results in an ET and/or a hypotropia. If these do not resolve, ORR is indicated, and consideration should be given to the use of higher doses of PO steroids. As a last resort, a biologic is now FDA-approved for TED. What is the brand name? Tepezza

What is its trade name? Teprotum-\textit{u}-mab

What does the stem –mab indicate? It indicates the med is a monoclonal antibody

What does the substem –u- indicate? That the antibody is human (ie, it didn’t derive from work done on another species

What does the infix –tum- indicate? That the molecule is used against tumors (teprotumumab was developed as an anti-cancer med).
Graves orbitopathy is secondary to thyroid disease. 

- Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

- Graves is aggravated by smoking. True; Graves patients should be urged to stop smoking.

- Graves is associated with MS. False; it is associated with MG.

- Graves myopathy usually results in an ET and/or a hypotropia. True.

- The medial rectus is more likely than the inferior rectus to be affected. False; the order (most to least likely) is IR>MR>SR>LR.

- Men and women are at equal risk of TED. Nope.

What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed?
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- Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).
- Moderate disease requires more aggressive surface protection (eg, moisture goggles), and PO steroids.
- Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy as a last resort.

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Tepezza

What is its trade name?
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That the molecule is used against tumors (teprotumumab was developed as an anti-cancer med).
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- Graves is aggravated by smoking: True; Graves patients should be urged to stop smoking.
- Graves is associated with MS: False; it is associated with MG.
- Graves myopathy usually results in an ET and/or a hypotropia: True.
- The medial rectus is more likely than the inferior rectus to be affected: False; the order (most to least likely) is IR>MR>SR>LR.
- Men and women are at equal risk of TED: Nope.

**What is the natural history of TED?**
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

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- **Mild disease** can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation)
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A biologic is now FDA-approved for TED. **What is the brand name?**
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**What is its trade name?**
Tepro-tum-umab

**What does the stem –mab indicate?**
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Graves Orbitopathy is secondary to thyroid disease

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Graves is associated with MS False; it is associated with MG.

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Men and women are at equal risk of TED Nope.

What is the natural history of TED?
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A biologic is now FDA-approved for TED. What is the brand name? Teppezza

What is its trade name? Teprotumumab

What does the stem –mab indicate?
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- Men and women are at equal risk of TED. Nope

**What is the natural history of TED?**

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**A biologic is now FDA-approved for TED. What is the brand name?**

- **Tepezza**

**What is its trade name?**

- **Teprotumumab**

**What does it target?**

- It binds to and blocks the receptor for insulin-like growth factor 1 (IGF-1).
Graves aka Thyroid Eye Disease: True/False

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It binds to and blocks the receptor for insulin-like growth factor 1 (IGF-1)

- Graves myopathy usually results in an ET and/or a hypotropia  True
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- Men and women are at equal risk of TED  Nope
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What is the natural history of TED?
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- **Severe disease** involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

What about orbital surgery? Why not just bust up in there and address these issues directly?

- Surgery while the dz is active should be avoided if possible, because dz progression post-surgery may render the results medically or cosmetically unacceptable.
Graves orbitopathy is secondary to thyroid disease. 

- Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it. 
- Graves is aggravated by smoking. True; Graves patients should be urged to stop smoking. 
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- Men and women are at equal risk of TED. Nope.

### What is the natural history of TED?

It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

### How is TED managed?

Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

- **Mild disease** can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).
- **Moderate disease** requires more aggressive surface protection (eg, moisture goggles), and PO steroids.
- **Severe disease** involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

What about orbital surgery? Why not just bust up in there and address these issues directly?

Surgery while the dz is active should be avoided if possible, because dz progression post-surgery may render the results medically or cosmetically unacceptable.
Graves aka Thyroid Eye Disease: True/False

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--Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

If surgery during active TED is relatively contraindicated, when should it be considered?

Surgery while the dz is active should be avoided if possible, because dz progression post-surgery may render the results medically or cosmetically unacceptable.

--If surgery is necessary during active TED, it should be performed once the pt is euthyroid, and his/her orbital condition has been stable for at least 6 months.

Suppose a pt meeting those criteria needs orbital decompression, has strabismus, and also has malpositioned eyelids. What should the overall surgical strategy be?

Because orbital-decompression surgery will affect both EOM and lid position, the decompression surgery must precede strabismus and/or lid surgery. Likewise, because strabismus surgery will affect lid position, the strabismus surgery must precede the lid surgery. Putting it all together, the surgical order is as follows:

1. Decompression
2. Strabismus
3. Eyelids
Graves orbitopathy is secondary to thyroid disease

- Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.
- Graves is aggravated by smoking: True. Graves patients should be urged to stop smoking.
- Graves is associated with MS: False. It is associated with MG.
- Graves myopathy usually results in an ET and/or a hypotropia: True.
- The medial rectus is more likely than the inferior rectus to be affected: False. The order (most to least likely) is IR > MR > SR > LR.

What is the natural history of TED?

It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed?

Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

--Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).

--Moderate disease requires more aggressive surface protection (eg, moisture goggles), and PO steroids.

--Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

If surgery during active TED is relatively contraindicated, when should it be considered?

Once the pt is euthyroid, and his/her orbital condition has been stable for at least 6 months, surgery is considered.
What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed?
Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

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--Moderate disease requires surface protection (eg, moisture goggles), and PO steroids.

--Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

If surgery during active TED is relatively contraindicated, when should it be considered?
Once the pt is euthyroid, and his/her orbital condition has been stable for at least 6 months.
Graves aka Thyroid Eye Disease: True/False

What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed?
Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

--Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).

--Moderate disease may require some form of surface protection, such as tears or moisture goggle, and PO steroids.

--Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

If surgery during active TED is relatively contraindicated, when should it be considered?
Once the pt is euthyroid, and his/her orbital condition has been stable for at least 6 months.

Suppose a pt meeting those criteria needs orbital decompression, has strabismus, and also has malpositioned eyelids. What should the overall surgical strategy be?
Graves aka Thyroid Eye Disease: True/False

What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed?
Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

- **Mild disease** can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).

- **Moderate disease** needs more aggressive surface protection (eg, moisture goggles, artificial tears), and PO steroids may be needed (in a tapered fashion). A trial of low-dose prednisone (eg, 5 mg PO daily) for 6 months is reasonable, and blank charts should be given to the pt.

- **Severe disease** involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy. If surgery during active TED is relatively contraindicated, when should it be considered?
Once the pt is euthyroid, and his/her orbital condition has been stable for at least 6 months.

Suppose a pt meeting those criteria needs orbital decompression, has strabismus, and also has malpositioned eyelids. What should the overall surgical strategy be?
Because orbital-decompression surgery will affect both EOM and lid position, the decompression surgery must precede strabismus surgery and/or lid surgery. Likewise, because strabismus surgery will affect lid position, the strabismus surgery must precede the lid surgery.
Graves orbitopathy is secondary to thyroid disease. Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

Graves is aggravated by smoking. True; Graves patients should be urged to stop smoking.

Graves is associated with MS. False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia. True.

The medial rectus is more likely than the inferior rectus to be affected. False; the order (most to least likely) is IR>MR>SR>LR.

What is the natural history of TED? It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed? Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

--Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).

--Moderate disease: first line therapy is topical lubrication, and PO steroids may be added.

--Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

If surgery during active TED is relatively contraindicated, when should it be considered? Once the pt is euthyroid, and his/her orbital condition has been stable for at least 6 months.

Suppose a pt meeting those criteria needs orbital decompression, has strabismus, and also has malpositioned eyelids. What should the overall surgical strategy be? Because orbital-decompression surgery will affect both EOM and lid position, the decompression surgery must precede strabismus and/or lid surgery. Likewise, because strabismus surgery will affect lid position, the strabismus surgery must precede the lid surgery. Putting it all together, the surgical order is as follows: 1. Decompression 2. Strabismus 3. Eyelids.

Orbital surgery. Why not just bust up in there and address these issues directly? Surgery while the dz is active should be avoided if possible, because dz progression post-surgery may render the results medically or cosmetically unacceptable.
Graves orbitopathy is secondary to thyroid disease

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

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Graves is associated with MS False; it is associated with MG.

Graves myopathy usually results in an ET and/or a hypotropia True

The medial rectus is more likely than the inferior rectus to be affected False; the order (most to least likely) is IR>MR>SR>LR.

Men and women are at equal risk of TED Nope.
Graves orbitopathy is secondary to thyroid disease

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- Men and women are at equal risk of TED. Nope

What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed?
Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

- Mild disease can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation).

- Moderate disease requires more aggressive surface protection (eg, moisture goggles), and PO steroids.

- Severe disease involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

What about treating the concurrent thyroid disease?
Rendering the pt euthyroid is an important goal for TED pts (to be pursued by Endo/IM, of course).

Graves aka Thyroid Eye Disease: True/False
Graves orbitopathy is secondary to thyroid disease

Sort of, but not really. Graves is an autoimmune disease that is strongly associated with thyroid dysfunction, but it is not caused by it.

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Men and women are at equal risk of TED Nope.

What is the natural history of TED?
It is a self-limited disease that tends to ‘burn itself out’ over time, but may leave disfiguring sequelae.

How is TED managed?

- Other than smoking cessation (which all TED pts should do), management depends upon disease severity:

  - **Mild disease**
    - can be managed symptomatically (ie, maneuvers to lessen surface dryness/irritation)

  - **Moderate disease**
    - requires more aggressive surface protection (eg, moisture goggles), and PO steroids

  - **Severe disease**
    - involves sight-threatening complications such as corneal decompensation, and/or optic neuropathy. This necessitates more aggressive steroid therapy, and consideration should be given to the use of steroid-sparing IMT and/or orbital radiation therapy.

What about treating the concurrent thyroid disease?
Rendering the pt euthyroid is an important goal for TED pts (to be pursued by Endo/IM, of course). However, it is important to note that some treatments in this regard can aggravate the TED by increasing immune activity against the TSH-receptor antigens that are responsible for TED.