We'll get to **Lenses** f*or Retinal* **Laser** *Photocoagulation* in a few. But first, let's review a little bit…

Q

Laser

What are the five modes of laser-tissue interaction?

? ***?*** ***?*** ***?*** ***?***

A

Laser

What are the five modes of laser-tissue interaction?

Photo-chemical	Thermal	Photo-ablation	Plasma-induced ablation	Photo-disruption
aka *photoactivation*				aka *plasma-induced disruption*

Q

Laser

What are the five modes of laser-tissue interaction?

- Photo-chemical
  - aka *photoactivation*
- Thermal
- Photo-ablation
- Plasma-induced ablation
- Photo-disruption
  - aka *plasma-induced disruption*

Are these thrown up here rando, or are they in an order of some sort?

Q/A

Laser

What are the five modes of laser-tissue interaction?

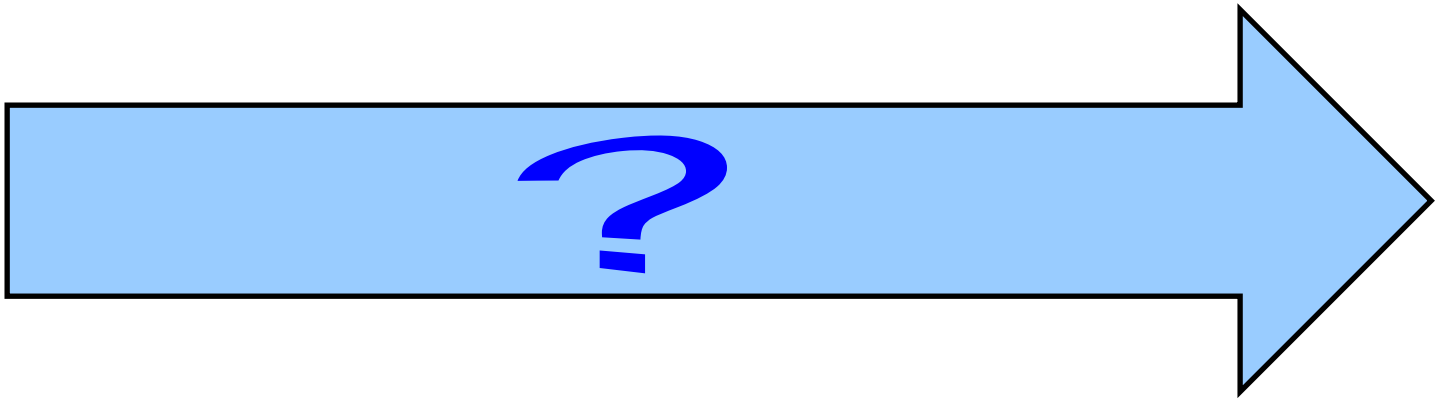
Photo-chemical
aka *photoactivation*

Thermal

Photo-ablation

Plasma-induced ablation

Photo-disruption
aka *plasma-induced disruption*



Are these thrown up here rando, or are they in an order of some sort?
Not rando. Although there is some overlap (especially between *plasma-induced ablation* and *photodisruption*), overall these are listed in order of increasing [redacted].

A

Laser

What are the five modes of laser-tissue interaction?

Photo-chemical
aka *photoactivation*

Thermal

Photo-ablation

Plasma-induced ablation

Photo-disruption
aka *plasma-induced disruption*

Are these thrown up here rando, or are they in an order of some sort?
Not rando. Although there is some overlap (especially between *plasma-induced ablation* and *photodisruption*), overall these are listed in order of increasing **intensity .**

Q

Laser

What are the five modes of laser-tissue interaction?

Photo-chemical **?** *Thermal* **?** *Photo-ablation* **?** *Plasma-induced ablation* **?** *Photo-disruption* **?**

Of the modes, which is by far the most commonly employed during laser procedures involving the retina?

A

Laser

The five modes of laser-tissue interaction:

Photo-chemical | **Thermal** | Photo-ablation | Plasma-induced ablation | Photo-disruption

Of the modes, which is by far the most commonly employed during laser procedures involving the retina?
Thermal

Q

Laser

The five modes of laser-tissue interaction:

Photo-chemical | **Thermal** | Photo-ablation | Plasma-induced ablation | Photo-disruption aka *plasma-induced disruption*

Thermal effects on tissue exist on a continuum. What are the five degrees (see what I did there?) of thermal effects?

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--

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--

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A

Laser

The five modes of laser-tissue interaction:

Photo-chemical | **Thermal** | Photo-ablation | Plasma-induced ablation | Photo-disruption aka *plasma-induced disruption*

Thermal effects on tissue exist on a continuum. What are the five degrees (see what I did there?) of thermal effects?

--Hyperthermia
--Coagulation
--Vaporization
--Carbonization
--Melting

Q

Laser

The five modes of laser-tissue interaction:

Photo-chemical | **Thermal** | Photo-ablation | Plasma-induced ablation | Photo-disruption aka *plasma-induced disruption*

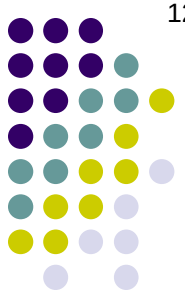
Thermal effects on tissue exist on a continuum. What are the five degrees (see what I did there?) of thermal effects?

--Hyperthermia?
--Coagulation?
--Vaporization?
--Carbonization?
--Melting?

Which thermal effect is employed most frequently?

A

Laser *Photocoagulation*



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Which thermal effect is employed most frequently?

Coagulation

Q

Laser *Photocoagulation*

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Which thermal

Coagulation

What does it mean to say that tissue has 'coagulated'?

A

Laser *Photocoagulation*

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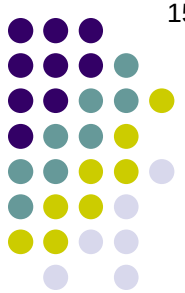
Which thermal
Coagulation

What does it mean to say that tissue has 'coagulated'?
It means the proteins have been denatured

Q

Laser *Photocoagulation*



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OK, what does it mean to say a protein has been 'denatured'?
It means the protein has been forced out of its native conformation by some sort of applied stress (in this case, heat). Because a protein's function is inextricably tied to its shape, denatured proteins do not behave as they do in their native form.

Q

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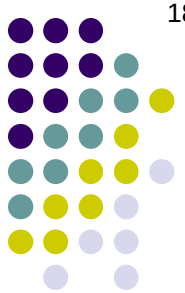
Can you give an example of protein denaturation?

A

Laser *Photocoagulation*



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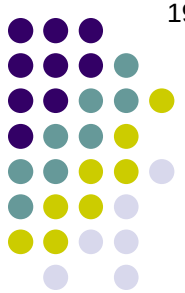
Can you give an example of protein denaturation?
Consider egg albumin. In its native state, it's a clear liquid. But if sufficient heat is applied, it becomes a white solid. (And if sufficient salsa is applied to the white solid, it becomes delish.)

Q

Laser *Photocoagulation*



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At what temperature does retinal tissue start to coagulate?

Can you give an example of protein denaturation?
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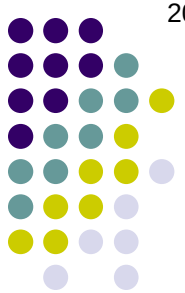
Laser *Photocoagulation*



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OK, what does it mean to say a protein has been 'denatured'?
It means th
conformati ase, heat).
Because a hape,
denatured proteins do not behave as they do in their native form.

At what temperature does retinal tissue start to coagulate?
65°C

Can you give an example of protein denaturation?
Consider egg albumin. In its native state, it's a clear liquid. But if sufficient heat is applied, it becomes a white solid. (And if sufficient salsa is applied to the white solid, it becomes delish.)

Q

Retinal **Laser** *Photocoagulation*

The five modes of laser-tissue interaction:

Photo-chemical

Thermal
Coagulation

Photo-ablation

Plasma-induced ablation

Photo-disruption
aka *plasma-induced disruption*

1st
2nd
3rd

(What happens first) ***?***

In a nutshell, what is the process by which laser photocoagulation proceeds?

A

Retinal **Laser** *Photocoagulation*

The five modes of laser-tissue interaction:

Photo-chemical

Thermal

Coagulation

Photo-ablation

Plasma-induced ablation

Photo-disruption

aka *plasma-induced disruption*

1st

2nd

3rd

Laser energy is absorbed→

In a nutshell, what is the process by which laser photocoagulation proceeds?

Q

Retinal **Laser** *Photocoagulation*

The five modes of laser-tissue interaction:

Photo-chemical

Thermal
Coagulation

Photo-ablation

Plasma-induced ablation

Photo-disruption
aka *plasma-induced disruption*

1st
2nd
3rd

Laser energy is absorbed→
(What had happen next) ***?***

In a nutshell, what is the process by which laser photocoagulation proceeds?

A

Retinal **Laser** *Photocoagulation*

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1st

2nd

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Laser energy is absorbed→ transforms into heat→

In a nutshell, what is the process by which laser photocoagulation proceeds?

Q

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aka *plasma-induced disruption*

1st
2nd
3rd

Laser energy is absorbed→ transforms into heat→ *(The result)* ***?***

In a nutshell, what is the process by which laser photocoagulation proceeds?

A

Retinal **Laser** *Photocoagulation*

The five modes of laser-tissue interaction:

Photo-chemical

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Coagulation

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1st

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Laser energy is absorbed→ transforms into heat→ local thermal damage

In a nutshell, what is the process by which laser photocoagulation proceeds?

Retinal **Laser** *Photocoagulation*

The five modes of laser-tissue interaction:

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1st
2nd
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Laser energy is absorbed→ transforms into heat→ local thermal damage

In a nutshell, what is the process by which laser photocoagulation proceeds?

For more on Lasers, see slide-set FELT26

Q

Lenses *for Retinal* **Laser** *Photocoagulation*

(Finally!)

Two basic types of lenses employed				
?				
?				

A

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed				
Plano-concave (high-minus)				
High-Plus-Power				

Q

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)			
Plano-concave (high-minus)	***?***			
High-Plus-Power	***?***			

A

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)			
Plano-concave (high-minus)	**Upright**			
High-Plus-Power	**Inverted**			

Q

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)		
Plano-concave (high-minus)	**Upright**	***?***		
High-Plus-Power	**Inverted**	***?***		

A

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)		
Plano-concave (high-minus)	**Upright**	**Superior**		
High-Plus-Power	**Inverted**	**Inferior**		

Q

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	
Plano-concave (high-minus)	**Upright**	**Superior**	***?***	
High-Plus-Power	**Inverted**	**Inferior**	***?***	

A

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	
Plano-concave (high-minus)	**Upright**	**Superior**	**Small**	
High-Plus-Power	**Inverted**	**Inferior**	**Wide**	

Q

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	Burn size (relative to size set on laser)
Plano-concave (high-minus)	**Upright**	**Superior**	**Small**	***?***
High-Plus-Power	**Inverted**	**Inferior**	**Wide**	***?***

A

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	Burn size (relative to size set on laser)
Plano-concave (high-minus)	**Upright**	**Superior**	**Small**	**Same as set**
High-Plus-Power	**Inverted**	**Inferior**	**Wide**	**1.5-2x set size**

Q

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	Burn size (relative to size set on laser)
Plano-concave (high-minus)	**Upright**	**Superior**	**Small**	**Same as set**
High-P Pow				

This constellation of features makes planoconcave lenses the preferred choice for what common retinal laser procedure?

A

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	Burn size (relative to size set on laser)
Plano-concave (high-minus)	**Upright**	**Superior**	**Small**	**Same as set**
High-P Pow				

This constellation of features makes planoconcave lenses the preferred choice for what common retinal laser procedure?
Focal macular laser (FML)

Q

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	Burn size (relative to size set on laser)
Plano-concave (high-minus)	**Upright**	**Superior**	**Small**	**Same as set**
High-Plus-Power	**Inverted**	**Inferior**	**Wide**	**1.5-2x set size**

This constellation of features makes high-plus lenses the preferred choice for what common retinal laser procedure?

A

Lenses *for Retinal* **Laser** *Photocoagulation*

Two basic types of lenses employed	Image orientation (*upright* vs *inverted*)	Resolution (*superior* vs *inferior*)	Field of view (*wide* vs *small*)	Burn size (relative to size set on laser)
Plano-concave (high-minus)	**Upright**	**Superior**	**Small**	**Same as set**
High-Plus-Power	**Inverted**	**Inferior**	**Wide**	**1.5-2x set size**

This constellation of features makes high-plus lenses the preferred choice for what common retinal laser procedure?
Panretinal photocoagulation (PRP)