What five **dietary factors** are known to influence DES status?

- Hydration
- Antioxidant intake
- Omega-3 fatty acid intake
- Vitamin intake
- Carotenoid levels

*Mnemonic forthcoming*...
What five **dietary factors** are known to influence DES status?

- H
- A
- V
- O
- C

Imbalance with regard to these factors can wreak *havoc* with your DES status…
What five **dietary factors** are known to influence DES status?

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- **Antioxidant intake**
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The BCSC unpacks only one of these— which one?
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*The BCSC unpacks only one of these— which one? O3FA*
Biochemically speaking, what sort of molecules are the O3FAs?

- Omega-3 fatty acid intake
- Carotenoid levels
What five dietary factors are known to influence DES status?
- Hydration
- Antioxidant intake
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Biochemically speaking, what sort of molecules are the O3FAs? They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

In what foods can O3FAs be found?
- Fish, especially salmon, tuna, cod, and flounder
- Crustaceans (e.g., shrimp and crabs)
- Flaxseed oil
- Dark leafy greens
- Walnuts

In addition to being rich in O3FAs, these foods have something else in common vis a vis the American diet—what is that?
Most of us don't eat near as much of them as we should.
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- Omega-3 fatty acid intake
- Carotenoid levels
Diet and Dry Eyes

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Diet and Dry Eyes

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Omega-3 fatty acid intake
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**Omega-3 fatty acid intake**

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Can O3FAs be gotten through direct supplementation?
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Omega-3 fatty acid intake

What are the two basic forms of DES?
--Aqueous-deficient
--Evaporative
Diet and Dry Eyes

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Omega-3 fatty acid intake

What are the two basic forms of DES?

**Aqueous-deficient**
--Evaporative

In a nutshell, what is the pathogenesis of aqueous tear deficiency DES?
Biochemically speaking, what sort of molecules are the O3FAs? They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

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Omega-3 fatty acid intake

What are the two basic forms of DES?
- Aqueous-deficient
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In a nutshell, what is the pathogenesis of aqueous tear deficiency DES? The inflammation of the lacrimal glands leads to decreased tear production.
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Omega-3 fatty acid intake
What are the two basic forms of DES?
- Aqueous-deficient
- Evaporative

In a nutshell, what is the pathogenesis of aqueous tear deficiency DES?
Inflammation of the lacrimal glands leads to decreased tear production (the inflammation is mediated by cell type)
**Diet and Dry Eyes**

**Biochemically speaking, what sort of molecules are the O3FAs?**

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**Omega-3 fatty acid intake**

**What are the two basic forms of DES?**

- **Aqueous-deficient**
- Evaporative

**In a nutshell, what is the pathogenesis of aqueous tear deficiency DES?**

Inflammation of the lacrimal glands leads to decreased tear production (the inflammation is mediated by T-cells)
Biochemically speaking, what sort of molecules are the O3FAs? They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

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Omega-3 fatty acid intake

What are the two basic forms of DES?
--Aqueous-deficient
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In a nutshell, what is the pathogenesis of aqueous tear deficiency DES? Inflammation of the lacrimal glands leads to decreased tear production (the inflammation is mediated by T-cells)

Also nutshelled, what is the pathogenesis of evaporative dry eye?
Biochemically speaking, what sort of molecules are the O3FAs? They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

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Omega-3 fatty acid intake

What are the two basic forms of DES?
--Aqueous-deficient
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In a nutshell, what is the pathogenesis of aqueous tear deficiency DES?
Inflammation of the lacrimal glands leads to decreased tear production (the inflammation is mediated by T-cells)

Also nutshelled, what is the pathogenesis of evaporative dry eye?
Three words:
Biochemically speaking, what sort of molecules are the O3FAs? They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

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In a nutshell, what is the pathogenesis of aqueous tear deficiency DES? Inflammation of the lacrimal glands leads to decreased tear production (the inflammation is mediated by T-cells)

Also nutshelled, what is the pathogenesis of evaporative dry eye? Three words: Meibomian gland dysfunction (MGD)
What five dietary factors are known to influence DES status?

- Hydration
- Antioxidant intake
- Vitamin intake
- Omega-3 fatty acid intake
- Carotenoid levels

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Omega-3 fatty acid intake

What are the two basic forms of DES?

- Aqueous-deficient
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In a nutshell, what is the pathogenesis of aqueous tear deficiency DES?
Inflammation of the lacrimal glands leads to decreased tear production (the inflammation is mediated by T-cells).

Also nutshelled, what is the pathogenesis of evaporative dry eye?
Three words: Meibomian gland dysfunction (MGD). MGD leads to altered meibum composition, which in turn leads to gland obstruction.
Diet and Dry Eyes

Biochemically speaking, what sort of molecules are the O3FAs? They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

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Omega-3 fatty acid intake

What are the two basic forms of DES?
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Of the two, which can be improved via O3FA supps?
Biochemically speaking, what sort of molecules are the O3FAs? They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

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**Omega-3 fatty acid intake**

What are the two basic forms of DES?
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Of the two, which can be improved via O3FA supps? Both
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Omega-3 fatty acid intake

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Very broadly speaking, how do O3FAs help DES?
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They block proinflammatory molecules (eg, cytokines)
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Do O3FAs have other beneficial effects within the eye?
It was once believed to reduce ARMD progression; however, the AREDS2 looked at this and found no evidence to support it. There is evidence of a “slight benefit” of O3FA supps in RP.

Do O3FAs have systemic health-promoting effects?
Indeed they do—they may have salutary effects on CAD, CVA, RA, Ca, and other disorders
Diet and Dry Eyes

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diff Abb.
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Most of us don’t eat near as much of them as we should

Omega-3 fatty acid intake

What are the two basic forms of DES?
--Aqueous--
--Evaporative--

Do O3FAs have other beneficial effects within the eye?
It was once believed to reduce ARMD progression; however, the AREDS2 looked at this and found no evidence to support it

In this context AREDS stands for...

Both

Very broadly speaking, they block proinflammatory molecules (eg, cytokines)
**Diet and Dry Eyes**

*Biochemically speaking, what sort of molecules are the O3FAs?*
They are PUFAs, which stands for **polyunsaturated fatty acids**. And because their carbon chains are long, they are **long-chain** PUFAs (LCPUFAs).

*In what foods can O3FAs be found?*
-- Fish, especially salmon, tuna, cod, and flounder
-- Crustaceans (e.g., shrimp and crabs)
-- Flaxseed oil
-- Dark leafy greens
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*In this context AREDS stands for...* **Age-Related Eye Disease Study**

Both

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Omega-3 fatty acid intake

What are the two basic forms of DES?
--Aqueous-deficient
--Evaporative

Of the two, both

Very broadly speaking, how do O3FAs help DES?
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Do O3FAs have other beneficial effects within the eye?
It was once believed to reduce ARMD progression; however, the AREDS2 looked at this and found no evidence to support it. There is evidence of a “slight benefit” of O3FA supps in RP.

Do O3FAs have systemic health-promoting effects?
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Diet and Dry Eyes

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In this context RP stands for…?
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In this context RP stands for…Retinitis pigmentosa
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Do O3FAs have systemic health-promoting effects?
- Indeed they do—they may have salutary effects on CAD, CVA, RA, Ca, and other disorders
What five dietary factors are known to influence DES status?
- Hydration
- Antioxidant intake
- Vitamin intake
- Omega-3 fatty acid intake
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In addition to being rich in O3FAs, these foods have something else in common vis-à-vis the American diet—what is that? Most of us don't eat near as much of them as we should.

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Of the two, both

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A major clinical trial looked at O3FAs in DES—what was its name? The Dry Eye Assessment and Management (DREAM) Study.

The tx arm received O3FAs supps (duh); what did the control arm receive? Daily supplementation with olive oil.

What was the main finding? There was no statistical difference between the groups.

So, there was no improvement in DES symptoms? Oh no, there was improvement—but it was in both conditions, and to a statistically indistinguishable degree.

So then why are we talking about giving O3FAs to DES pts??!! Because there were confounding factors that cast doubt on the results (e.g., the use of other DES treatments such as tears was not controlled). Further, other studies have shown benefits. Finally, O3FAs have a pretty benign risk profile, so there’s not much downside to their use.
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--Flaxseed oil
--Dark leafy greens
--Walnuts

In addition to being rich in O3FAs, these foods have something else in common—What is that?
Most of us don’t eat near as much of them as we should
**Omega-3 fatty acid intake**

- **What are the two basic forms of DES?**
  - Aqueous-deficient
  - Evaporative

  Of the two, both are common in patients with dry eyes.

- **Do O3FAs have other beneficial effects within the eye?**
  - It was once believed to reduce ARMD progression; however, the AREDS2 looked at this and found no evidence to support it. There is evidence of a “slight benefit” of O3FA supps in RP.

- **Do O3FAs have systemic health-promoting effects?**
  - Indeed they do—they may have salutary effects on CAD, CVA, RA, Ca, and other disorders

**Biochemically speaking, what sort of molecules are the O3FAs?**

They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

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- Fish, especially salmon, tuna, cod, and flounder
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In addition to being rich in O3FAs, these foods have something else in common vis a vis the American diet—what is that?

Most of us don’t eat near as much of them as we should.

**What are the two basic forms of DES?**

- Aqueous-deficient
- Evaporative

Of the two, which can be improved via O3FA supps?

Both can be improved via O3FA supps.

**Very broadly speaking, how do O3FAs help DES?**

They block proinflammatory molecules (e.g., cytokines).

**Do O3FAs have other beneficial effects within the eye?**

It was once believed to reduce ARMD progression; however, the AREDS2 looked at this and found no evidence to support it. There is evidence of a “slight benefit” of O3FA supps in RP.

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The tx arm received O3FAs supps (duh); what did the control arm receive?

Daily supplementation with olive oil.

What was the main finding?

There was no statistical difference between the groups.

So, there was no improvement in DES symptoms?

Oh no, there was improvement—but it was in both conditions, and to a statistically indistinguishable degree.

So then why are we talking about giving O3FAs to DES pts?!!

Because there were confounding factors that cast doubt on the results (e.g., the use of other DES treatments such as tears was not controlled). Further, other studies have shown benefits. Finally, O3FAs have a pretty benign risk profile, so there’s not much downside to their use.
**Omega-3 fatty acid intake**

- Biological and biochemical details
  - **Biochemically speaking,** what sort of molecules are the O3FAs? They are PUFAs, which stands for *polyunsaturated fatty acids.* And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

- Distribution
  - In what foods can O3FAs be found?
    - --Fish, especially salmon, tuna, cod, and flounder
    - --Crustaceans (eg, shrimp and crabs)
    - --Flaxseed oil
    - --Dark leafy greens
    - --Walnuts

- Commonalities
  - In addition to being rich in O3FAs, these foods have something else in common vis à vis the American diet—what is that?
    - Most of us don't eat near as much of them as we should

- Disease associations
  - What are the two basic forms of DES?
    - --Aqueous-deficient
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  - Of the two, which can be improved via O3FA supps?
    - Both

  - Very broadly speaking, how do O3FAs help DES?
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    - Indeed they do—they may have salutary effects on CAD, CVA, RA, Ca, and other disorders

**Q&A**

- A major clinical trial looked at O3FAs in DES—what was its name?
  - The Dry Eye Assessment and Management (DREAM) Study

- The tx arm received O3FAs supps (duh); what did the control arm receive?
  - Daily supplementation with two words

**Drugs and lifestyle**

- A major clinical trial looked at O3FAs in DES—what was its name?
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- The tx arm received O3FAs supps (duh); what did the control arm receive?
  - [two words]
Diet and Dry Eyes

What five dietary factors are known to influence DES status?

- Hydration
- Antioxidant intake
- Vitamin intake
- Omega-3 fatty acid intake
- Carotenoid levels

Biochemically speaking, what sort of molecules are the O3FAs?
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In addition to being rich in O3FAs, these foods have something else in common vis a vis their prevalence in the American diet—what is that?
Most of us don't eat near as much of them as we should.

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Most of us don't eat near as much of them as we should.

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**What was the main finding?**

There was no statistical difference between the groups.

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- Omega-3 fatty acid intake
- Carotenoid levels

Biochemically speaking, what sort of molecules are the O3FAs?

They are PUFAs, which stands for polyunsaturated fatty acids. And because their carbon chains are long, they are long-chain PUFAs (LCPUFAs).

In what foods can O3FAs be found?

- Fish, especially salmon, tuna, cod, and flounder
- Crustaceans (eg, shrimp and crabs)
- Flaxseed oil
- Dark leafy greens
- Walnuts

In addition to being rich in O3FAs, these foods have something else in common vis a vis the American diet—what is that?

Most of us don’t eat near as much of them as we should.

What are the two basic forms of DES?

- Aqueous-deficient
- Evaporative

Of the two, which can be improved via O3FA supps?

Both

Very broadly speaking, how do O3FAs help DES?

They block proinflammatory molecules (eg, cytokines)

Do O3FAs have other beneficial effects within the eye?

It was once believed to reduce ARMD progression; however, the AREDS2 looked at this and found no evidence to support it. There is evidence of a “slight benefit” of O3FA supps in RP.

Do O3FAs have systemic health-promoting effects?

Indeed they do—they may have salutary effects on CAD, CVA, RA, Ca, and other disorders.

A major clinical trial looked at O3FAs in DES—what was its name? The Dry Eye Assessment and Management (DREAM) Study

The tx arm received O3FAs supps (duh); what did the control arm receive?

Daily supplementation with olive oil

What was the main finding?

There was no statistical difference between the groups

So, there was no improvement in DES symptoms?

Oh no, there was improvement—but it was in both conditions, and to a statistically indistinguishable degree

So then why are we talking about giving O3FAs to DES pts??!!

Because there were confounding factors that cast doubt on the results (eg, the use of other DES treatments such as tears was not controlled). Further, other studies have shown benefits. Finally, O3FAs have a pretty benign risk profile, so there’s not much downside to their use.