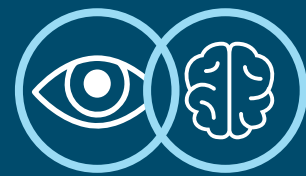


# DHA AND LUTEIN: NUTRIENTS VITAL TO EYE AND BRAIN DEVELOPMENT



DHA and lutein are a power team of nutrients, especially for infants and children. Emerging evidence suggests that DHA and lutein are important to normal visual and cognitive function.

Compared to children who routinely eat a complete and balanced diet, some youngsters don't eat DHA- and lutein-rich foods, thus predisposing them to lower amounts of DHA and lutein in the eyes and brain.

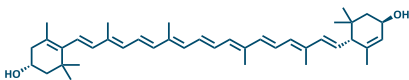
## What is DHA?

- Docosahexaenoic acid (DHA) is a long-chain, polyunsaturated, omega-3 fatty acid.
- Because of this structure, the DHA molecule is vulnerable to oxidative damage.
- DHA is typically found in the brain's and eye's cell membranes, where it helps transmit signals for development and function.<sup>1</sup>
- DHA is especially important in infancy and childhood when visual and cognitive functions are developing rapidly.<sup>1</sup>



## What is Lutein?

- Lutein is a plant-derived carotenoid pigment that can be found in regions of the eye and brain.
- Lutein is found in the same eye and brain regions as DHA. Experts describe lutein as nature's way to protect DHA from damage, thus supporting healthy eye and brain development.
- Lutein is known for its protective role in the eye—absorbing potentially damaging light and acting as an antioxidant.<sup>2</sup>
- Lutein may likewise help protect against oxidative damage in a metabolically-active, rapidly-growing brain.
- Like DHA, lutein helps ensure healthy eye and brain development in infancy and childhood.<sup>3</sup>



COMPARED TO OTHER BODY TISSUES, THE HUMAN BRAIN AND RETINA CONTAIN A HIGH PROPORTION OF DHA.

DHA comprises up to **25%** of the fatty acids in the brain.<sup>4,5</sup>

DHA constitutes up to **70%** of the fatty acids in parts of the eye's retina.<sup>1</sup>

LUTEIN IS LIKEWISE HIGHLY ENRICHED IN SPECIFIC REGIONS OF THE EYE AND BRAIN.

Lutein concentration in the retina is

**1,000x**  
greater than in the blood.<sup>6,7</sup>

LUTEIN LEVELS IN THE INFANT BRAIN ARE HIGHEST IN REGIONS ASSOCIATED WITH MEMORY, EXECUTIVE FUNCTION, VISION, AND HEARING.<sup>8,9</sup>

## HOW DO DHA AND LUTEIN FUNCTION AS A POWER TEAM?

DHA is important for normal visual and cognitive development.<sup>1</sup>

Oxidation can easily damage DHA's double-bond structures. With high DHA content and elevated metabolic activity, a child's developing eyes and brain are vulnerable to oxidative damage.<sup>2</sup>



Lutein is a particularly strong antioxidant and can help lessen inflammation.<sup>2</sup>

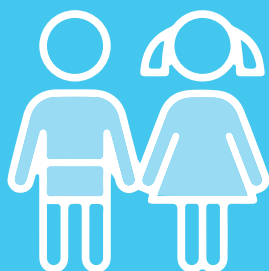
Lutein helps protect oxidation-sensitive DHA so it can continue to regulate function of the developing eyes and brain of infants and children.<sup>2,10</sup> Lutein also helps protect ocular and cognitive function in aging adults.<sup>2,3,10</sup>

DHA and lutein overlap in specific regions of the eye and brain, where they work together to modulate development and maintain function.<sup>9-11</sup>

# CLINICAL EVIDENCE ON THE IMPORTANCE OF DHA AND LUTEIN IN INFANCY AND CHILDHOOD

Emerging evidence suggests that low dietary intake of DHA and lutein may increase risk for abnormal visual and cognitive development.

## DHA



- A systematic review supported using omega-3 long-chain fatty acids supplements, including DHA, to help drive positive behavioral changes in children with attention deficit-hyperactivity disorder (ADHD).<sup>12</sup>
- In a review paper on DHA and cognition in children, 2 of 15 studies showed DHA-related improvements in school performance. In particular, reading performance improved in DHA-supplemented children with poor reading, while spelling performance was maintained.<sup>13</sup>
- Results from a recent review and meta-analysis showed that omega-3 polyunsaturated fatty acid supplementation (including DHA) in infancy could improve childhood psychomotor and visual development.<sup>14</sup>

## LUTEIN



- Researchers found the amounts of lutein and a related compound zeaxanthin (measured as macular pigment optical density, MPOD) were related to cognitive function.<sup>15</sup> MPOD was positively associated with academic performance in pre-adolescent children, particularly for math and written language.<sup>15</sup>

## DHA + LUTEIN



- In infants who were exclusively breastfed for the first 3 or more months of life, there was a positive association between motor skill development and breastmilk levels of long-chain polyunsaturated fatty acid and carotenoids.<sup>16</sup>
- Dietary supplementation with lutein and omega-3 fatty acids helped to increase retinal pigmentation and encourage improved visual processing speed, even in young adults with already-efficient visual processing.<sup>17</sup>

# HOW DO DIETARY SHORTFALLS OF DHA AND LUTEIN OCCUR?

For infants and children, DHA and lutein must become part of their regular diet. While DHA can be synthesized from diet-derived fatty acids, it is predominantly sourced directly from the diet.

Infants consume DHA and lutein in human milk of mothers with healthy diets or in infant formulas supplemented with these ingredients.<sup>1,18</sup>

For toddlers and children, DHA and lutein must be supplied through regular foods. Fish such as mackerel, salmon, or trout have relatively high DHA content.<sup>1</sup> The best sources of lutein are leafy green vegetables such as spinach, kale, and broccoli.<sup>2</sup>



Unfortunately, many toddlers and children consume few or no leafy greens and fish in their diets, so they are at risk for low DHA and lutein intake.

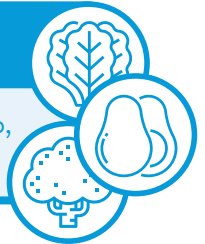
## FOODS RICH IN DHA

Mackerel, Salmon, Trout, Tuna, Flax seeds, Chia seeds, Walnuts, Soy beans



## FOODS RICH IN LUTEIN

Kale, Spinach, Broccoli, Peas, Avocado, Corn, Egg yolk, Brightly colored fruits



## HOW CAN WE ENSURE THAT CHILDREN GET DIETARY DHA AND LUTEIN?



Breastfeeding mothers can help ensure their babies receive lutein and DHA by eating a complete and balanced diet, including leafy green vegetables and fish. For infants who are not breastfed, consider a formula containing DHA and lutein.



Parents can encourage their toddlers and young children to eat food rich in DHA and lutein.



For children at risk of low DHA and lutein intake, parents can consider providing a dietary nutritional supplement that includes DHA and lutein.

## KEY TAKE-HOME MESSAGES ON DHA AND LUTEIN



- DHA and lutein are vital to normal eye and brain development.
- Young children may not consume enough DHA- and lutein-rich foods to support healthy eye and brain development.
- Available data demonstrate that DHA and lutein supplementation can enhance visual, motor, and mental performance.<sup>12-18</sup>

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