

# Why lutein is important for the eye and the brain

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The aim of this presentation is to review the current knowledge about the role of lutein on visual function and cognition. We will learn from what is known in adults to find out its potential implication on brain development in infants.

Carotenoids are naturally occurring pigments that produce the red, orange, and yellow colors of fruits and vegetables. Carotenoids are comprised of two subclasses: xanthophylls (lutein, zeaxanthin, and -cryptoxanthin) and carotenes ( -carotene, -carotene, and lycopene).

Lutein and zeaxanthin accumulate in the macula. The macula is a yellow spot near the center of the retina that is responsible of high resolution vision. Macular pigment acts as a natural blue light filter and protects the eye from damage. Macular pigment optical density (MPOD) increases with lutein administration and is related to visual function and to the prevention of age-related macular degeneration. MOPD can be measured non-invasively and has been related to better cognitive performance. Moreover, compositional analyses of centenarian brains have shown that lutein is the main carotenoid in brain although not in plasma, pointing out a preferential accumulation in neural tissues, and that carotenoids status correlated with some functional outcomes.

Carotenoids are present in human milk with higher concentration in colostrum than in transitional and mature milk. Formula fed-infants have less plasma lutein concentration than breast fed infants. Analyses of brain from infants who died during the first year of life showed that lutein is also the predominant carotenoid of brain. Studies in non-human primates revealed that carotenoids are determinant in the formation of the retinal epithelia. In vitro studies showed that lutein stimulates the differentiation of human stem cells to neural progenitor cells.

All this findings together, namely presence of lutein in breast milk, plasma concentration in breast-fed *vs* formula fed infant, preferential accumulation in brain and evidences of influence on retina and brain functionality point out the importance of the role of lutein and zeaxanthin on visual maturation and brain development.