



**In the
blink
of an
eye**

**Digital Children Eye Strain and
AstaReal's world first clinical trial**

An evolving underrated issue: from CVS to DES

Originally computer vision syndrome (CVS) was only an issue for computer users but now it's affecting a wider population with digital devices at hand.

Digital eye strain (DES) ¹ is an entity encompassing visual and ocular symptoms arising due to the prolonged use of digital electronic devices it is characterized by:

- dry eyes
- itching
- foreign body sensation
- watering
- blurring of vision
- headache
- stiff neck
- general fatigue
- headache
- backache

A variable prevalence ranging from 5 to 65% has been reported in the **pre-COVID-19 era**

¹<https://pmc.ncbi.nlm.nih.gov/articles/PMC9434525/>

Not only adults now

With lockdown restrictions during the pandemic, outdoor activities were restricted for all age groups, and digital learning became the norm for almost 2 years.

While the DES prevalence amongst children alone rose to 50–60%¹, the symptoms expanded to include

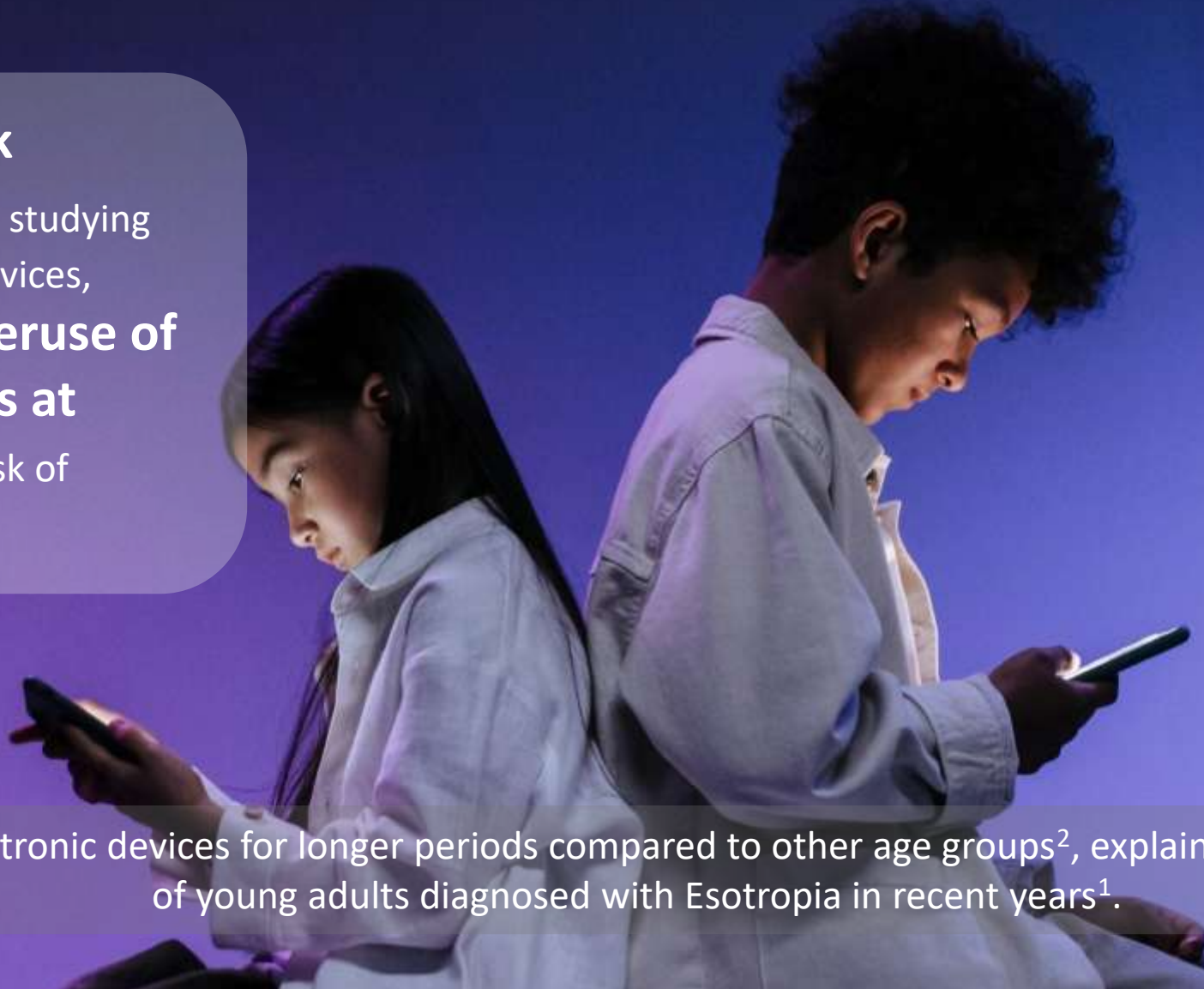
- **blurred vision**, headache, ocular discomfort, **ocular or systemic fatigue**, and loss of concentration during a task performance

New-onset myopia and increased progression of existing myopia became one of the most significant ocular health complications.

DES related eye symptoms

Esotropia (a type of strabismus) has significantly increased worldwide in recent years. This disease primarily affects adolescents and young adults.

Excessive **near-work activities**, including studying and using electronic devices, **especially the overuse of electronic devices at night**¹ increase the risk of Esotropia.



Young adults use electronic devices for longer periods compared to other age groups², explaining the higher proportion of young adults diagnosed with Esotropia in recent years¹.

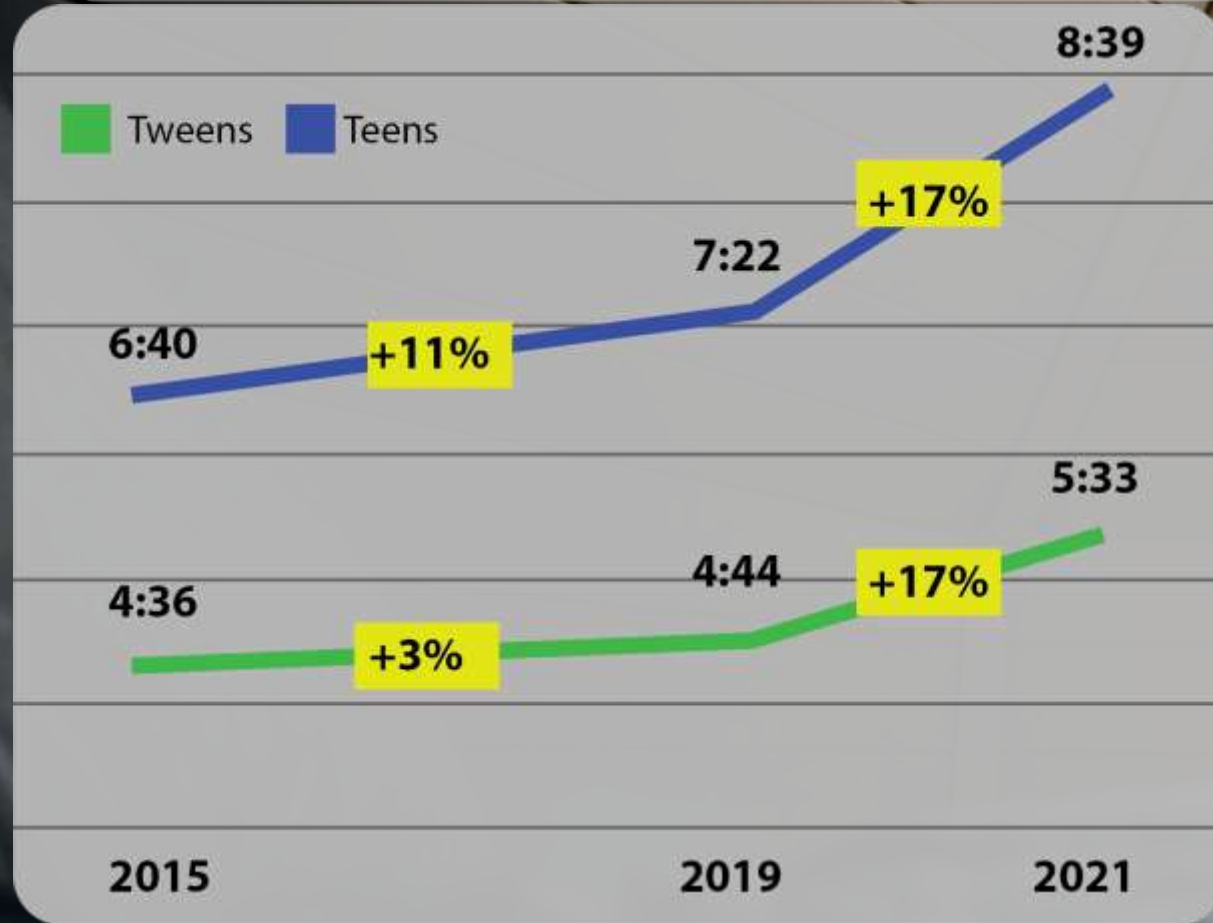
¹ <https://www.nature.com/articles/s41433-022-01939-1>

² <https://link.springer.com/article/10.1007/s10384-023-01023-5>

Screen time...squint time?

Use of screen media is up 17% for tweens (8-12 yrs) and teens since the start of the pandemic¹.

Total entertainment time on screen use per day (average)



Some reports state daily screen hours up to 16 hrs a day²

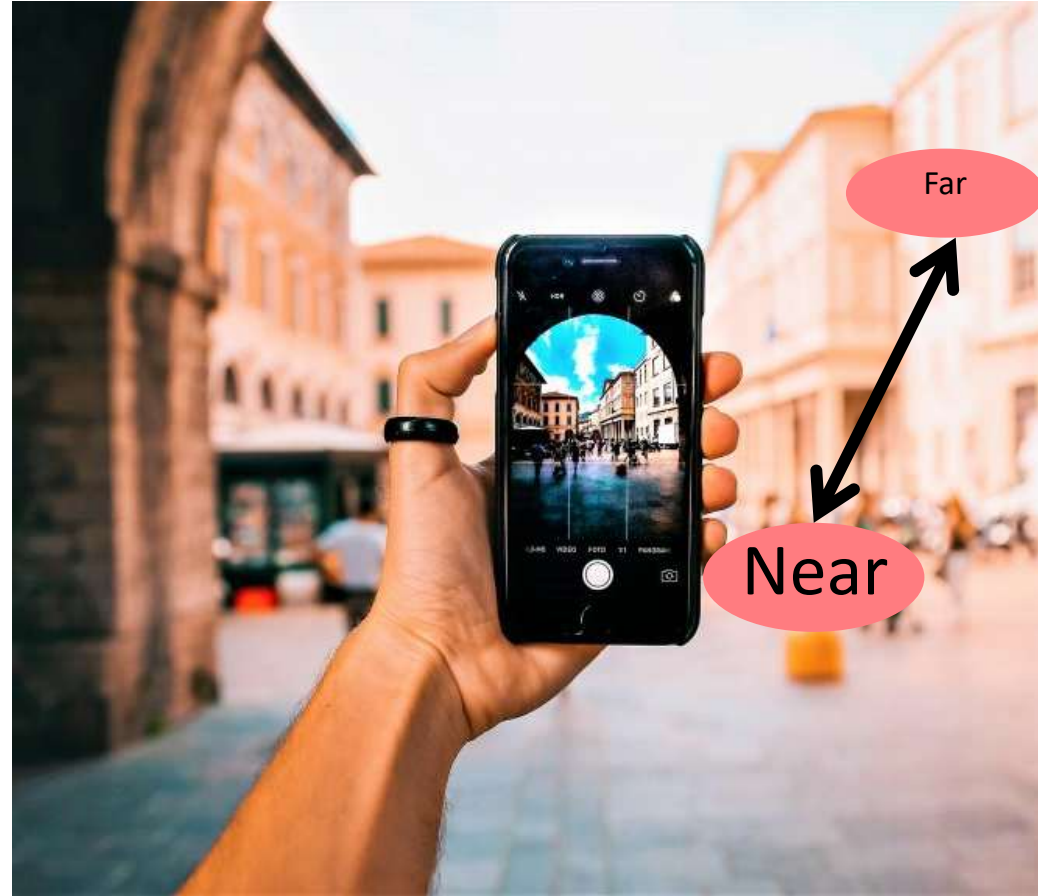
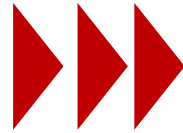
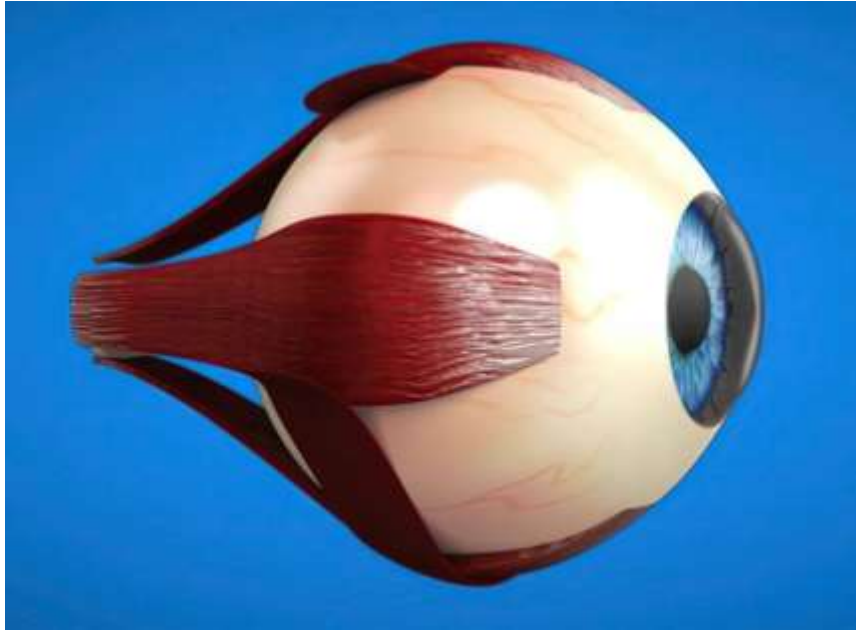


¹ https://www.commonsensemedia.org/sites/default/files/research/report/2022-infographic-8-18-census-web-final-release_0.pdf

² - https://www.commonsensemedia.org/sites/default/files/research/report/2023-cs-smartphone-research-report_final-for-web.pdf

The hardest working muscles in the body: the ciliary muscles

The ciliary muscle fibers have a greater abundance of mitochondria than any other muscle in the body, indicating the extraordinarily high energy demands and requirements of this muscle¹



Multiple clinical studies have shown that AstaReal astaxanthin improves accommodation speed in subjects with DES by **supporting performance and recovery of the ciliary body** (muscle).

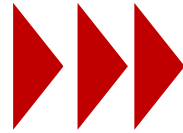
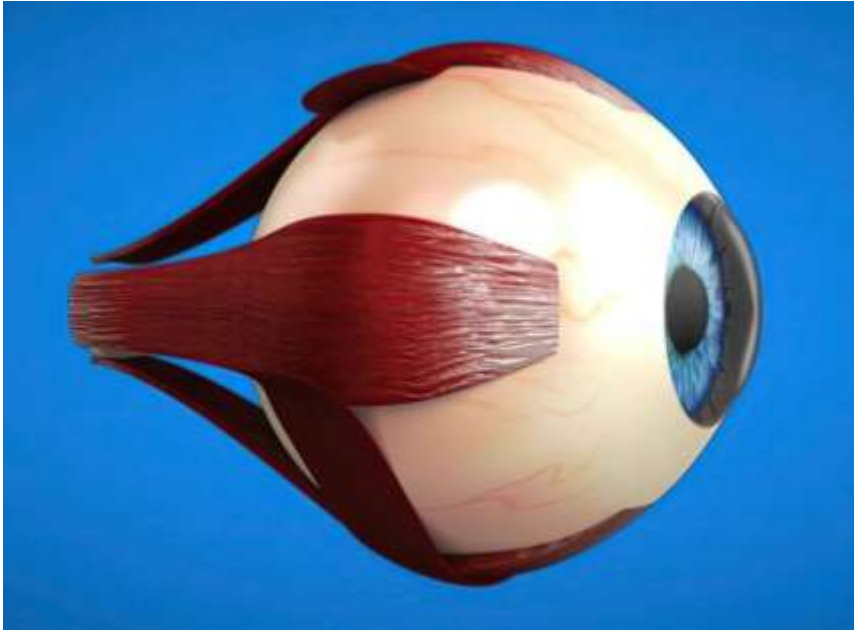


¹ <https://www.sciencedirect.com/topics/neuroscience/ciliary-muscle>
2Wolf et al (2010) J of Nutr Biochem vol 21;381-389



The hardest working muscles in the body: the ciliary muscles

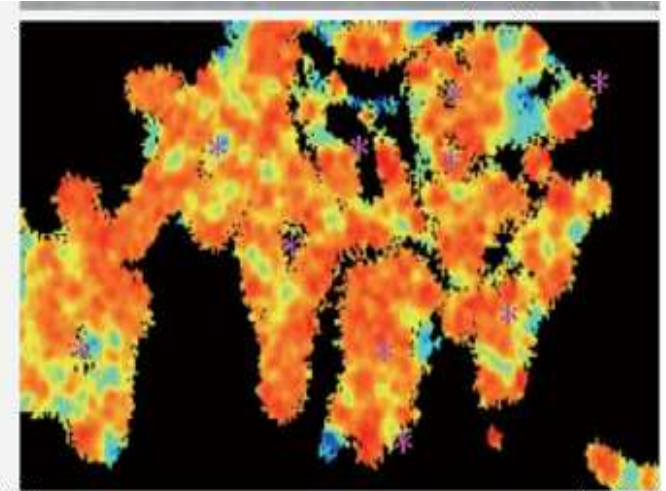
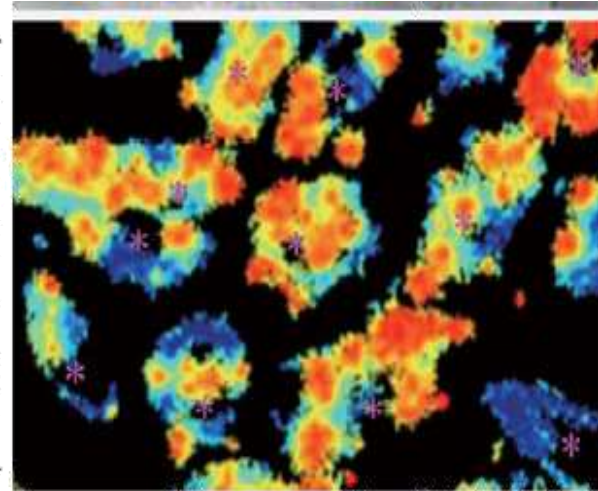
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Non-Treated Group

Astaxanthin-Treated Group

Membrane Potential
(JC-1 570/520 nm ratio)



Low  High

Mitochondrial membrane potential

Mitochondrial membrane potential images of human epithelial cells cultured for 2 days in the presence or absence of 800 nM Astaxanthin.²

Multiple clinical studies have shown that AstaReal astaxanthin improves accommodation speed in subjects with DES by **supporting performance and recovery of the ciliary body** (muscle).

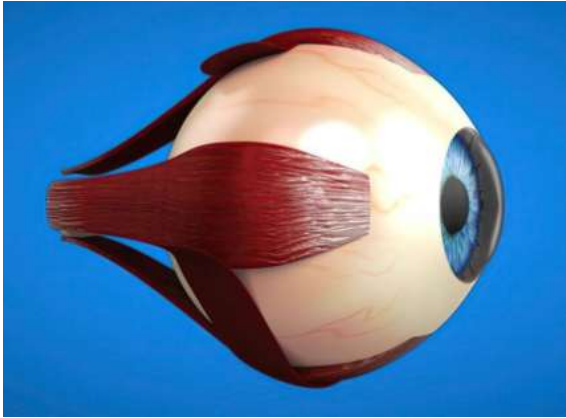


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² Wolf et al (2010) J of Nutr Biochem vol 21;381-389



The hardest working muscles in the body: a comparison

Daniel Scali (Australia) has broken the record for the longest time in the abdominal plank position (male) with an unbelievable time of 9 hours 30 minutes and 1 second.



<https://www.guinnessworldrecords.com/news/2021/9/longest-plank-record-smashed-with-staggering-new-time-674245>

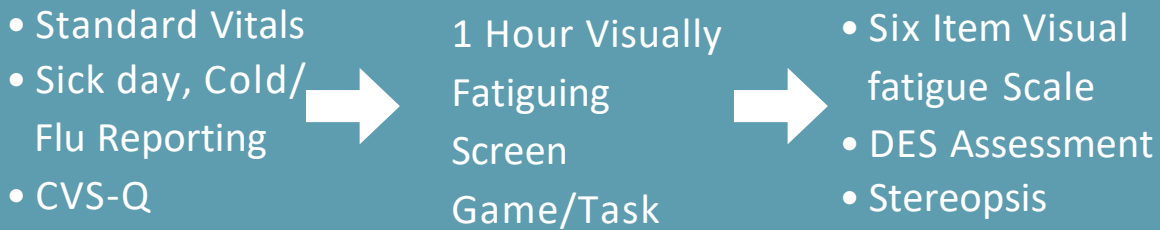


**Astaxanthin (AstaReal®)
Improved Acute and
Chronic Digital Eye Strain
in Children: A Randomized
Double-Blind
Placebo-Controlled Trial**



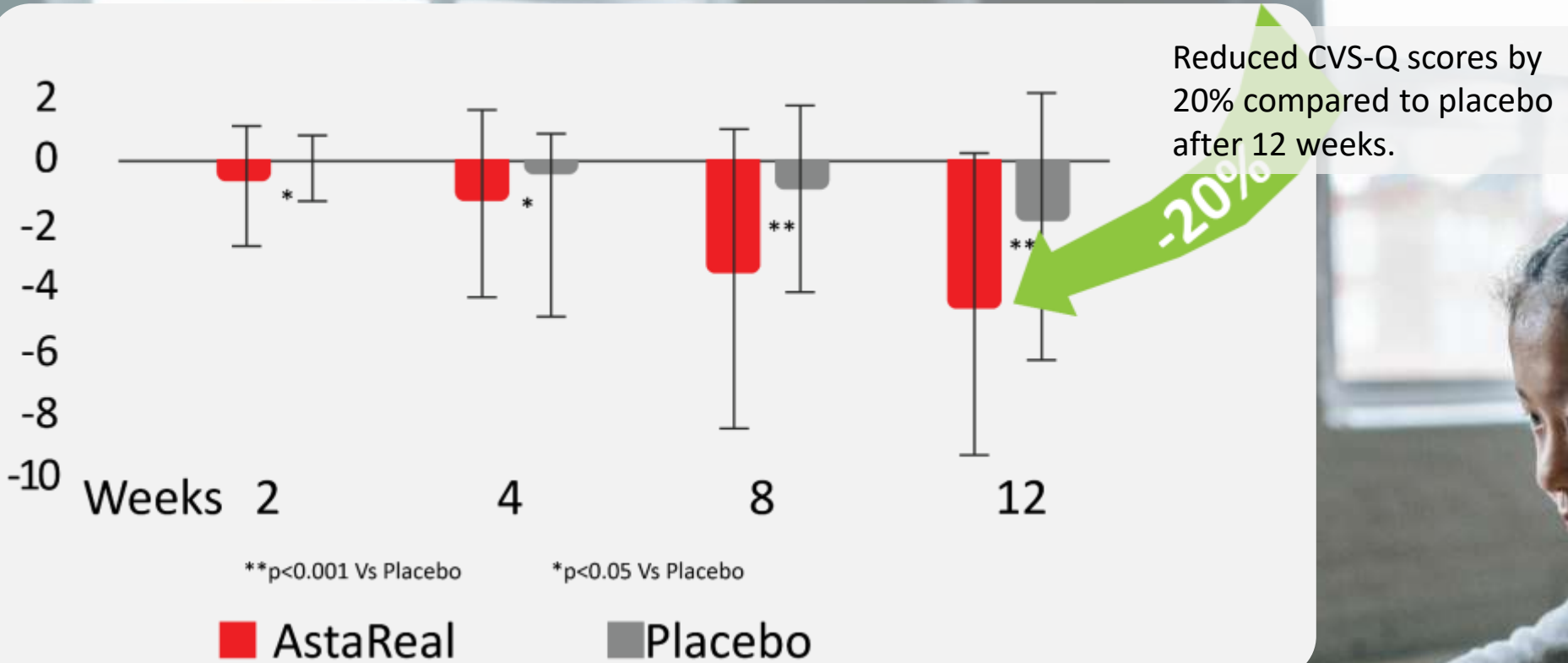
Clinical trial protocol

- Randomized double blind clinical trial
- Subjects: n=64 (35 male, 29 female)
- Age: **10-14 years**
- Dose: **4 mg** astaxanthin (AstaReal®) Vs placebo
- Duration: **84 days**
- Inclusion: mild to moderate eye strain per CVS-Q scores at baseline.
- Protocol:



Results: 4 mg of daily AstaReal reduces CVS-Q scores

Changes in the Computer Vision Syndrome Questionnaire scores from Baseline

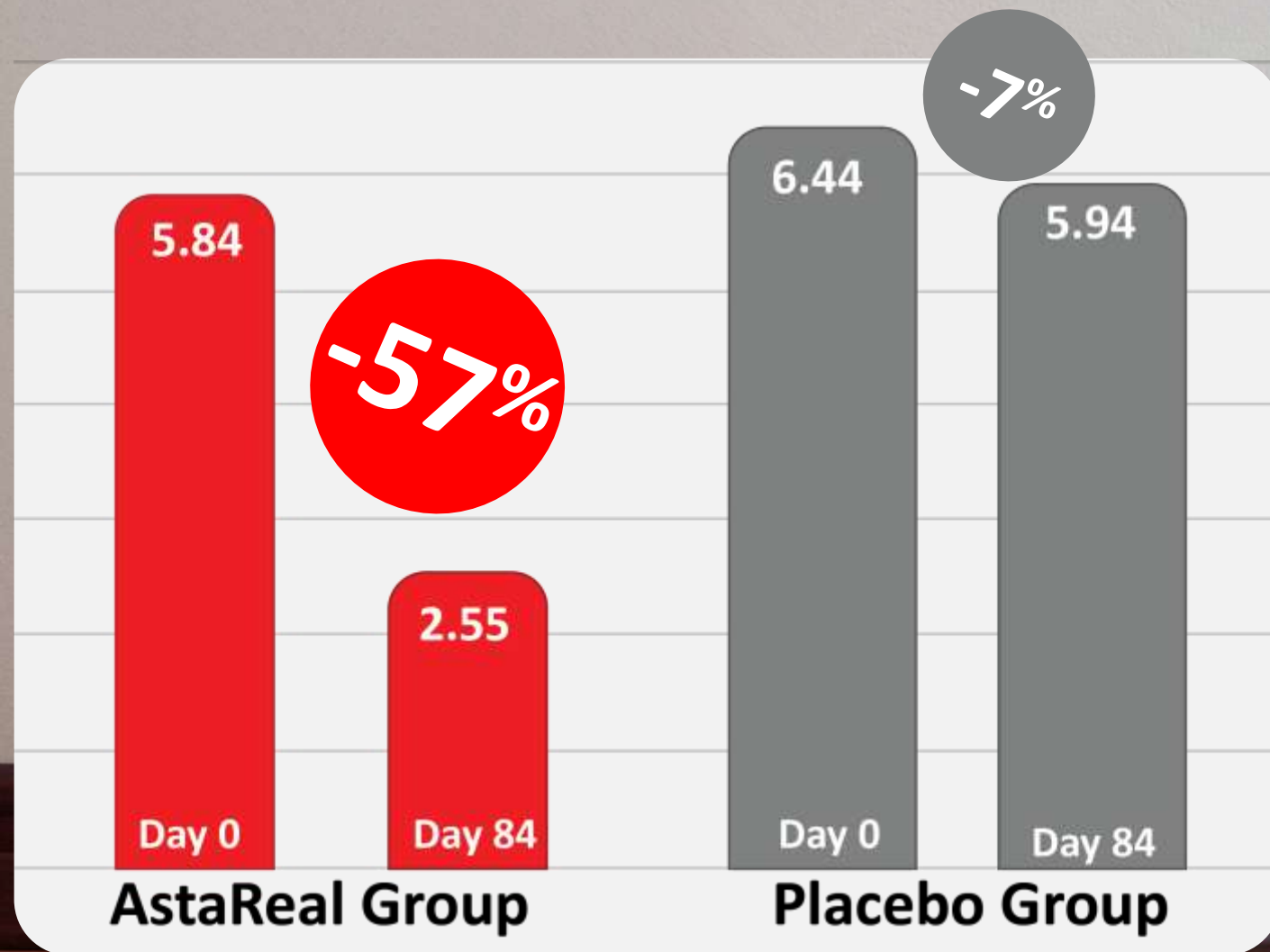


Reduced CVS-Q scores by **29% compared to baseline** after 12 weeks (p<0.05).



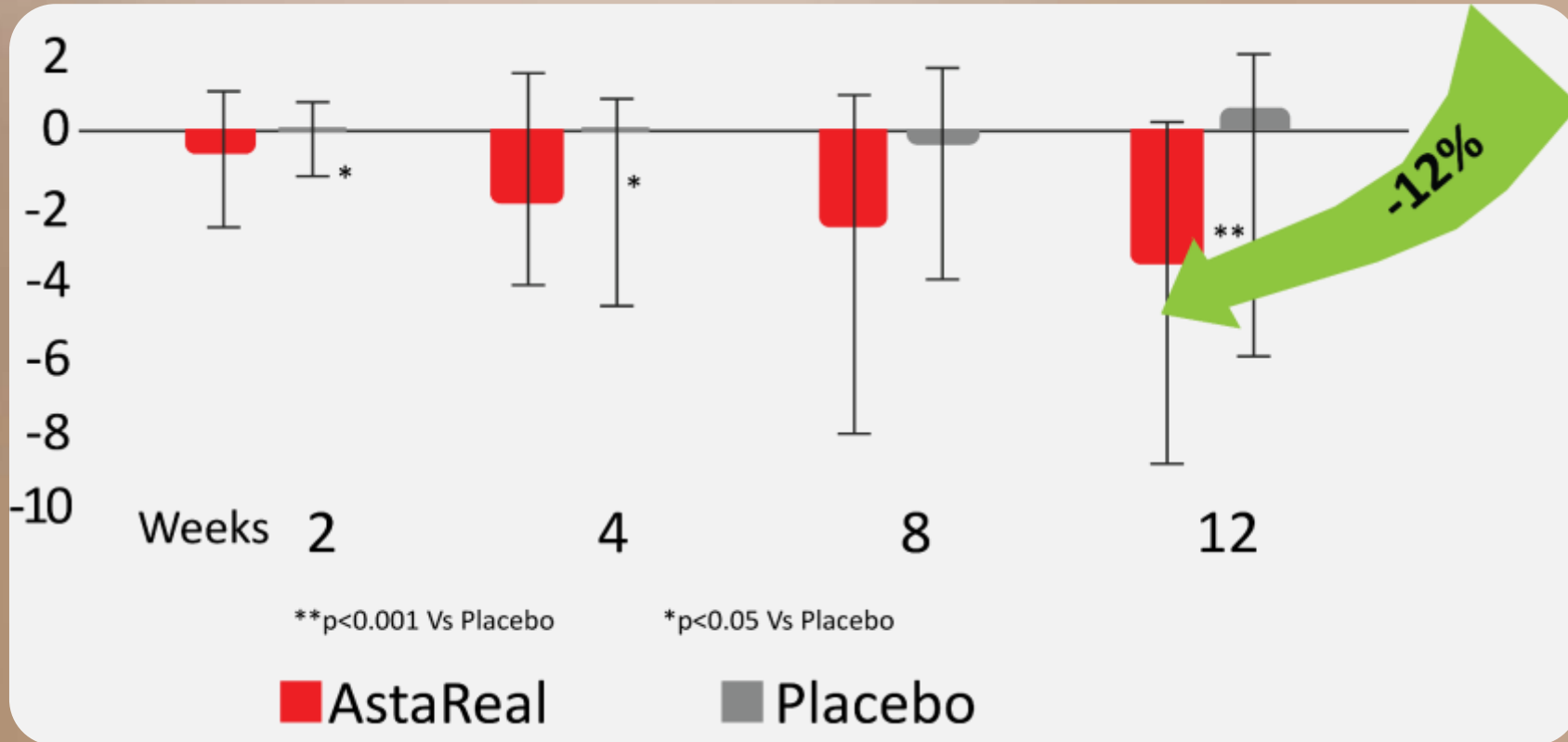
Results: 4 mg of daily AstaReal reduces acute eye strain

Mean change in the Visual Fatigue Likert Scale score triggered by digital activity



Results: 4 mg of daily AstaReal improves stereovision

Changes in Stereovision Score from baseline



- Significantly improved compared to baseline after 4, 8, and 12 weeks.
- Significantly improved compared to placebo after 2, 4, and 12 weeks.
- Improved by 12% compared to placebo after 12 weeks.



Results: 4 mg of daily AstaReal improves eye hydration

The Astaxanthin group showed significant improvement vs baseline at **6 and 12 weeks in ocular hydration after 1 hour of digital device use.**

Results were confirmed via Schirmer Test that measures reflex and basal tear secretion.



Efficacy on children and adults

AstaReal can protect eyes in children faster than in adults:

- 4 mg astaxanthin in kids – **14 days** to see significant difference
- 4 mg astaxanthin in adults – **28 days** to see significant difference

It works faster than lutein-zeaxanthin that have:
Significant improvement in digital eye strain
after **90 days**



AstaReal® Astaxanthin eye benefits at a *glance*

- AstaReal® Astaxanthin helps to focus and re-focus strained eyes ^{1, 2, 3, 4}
- AstaReal® Astaxanthin relieves tired eyes [eye fatigue] ^{5, 6, 7, 8}
- AstaReal® Astaxanthin helps alleviate eye strain ^{1, 3, 8,}
- AstaReal® Astaxanthin helps eyes resist and recover from screen time/symptoms of Computer Vision Syndrome (CVS)^{1, 3, 7, 9}
- AstaReal® Astaxanthin promotes good circulation and nourishment of eyes ^{6, 16}
- AstaReal® Astaxanthin alleviates oxidative stress in eyes ^{10, 11, 12, 13}
- AstaReal® Astaxanthin helps promote visual acuity ¹⁴
- AstaReal® Astaxanthin helps enhance depth perception ¹⁵
- AstaReal® Astaxanthin helps support tired eyes in children 10-14 years old¹⁷
- AstaReal® Astaxanthin helps developing eyes recover from acute and chronic digital eye strain ¹⁷
- AstaReal® Astaxanthin promotes healthy stereovision/depth perception in children 10-14 years old after screen time ¹⁷
- AstaReal® Astaxanthin promotes ocular hydration in children 10-14 years old after screen time¹⁷

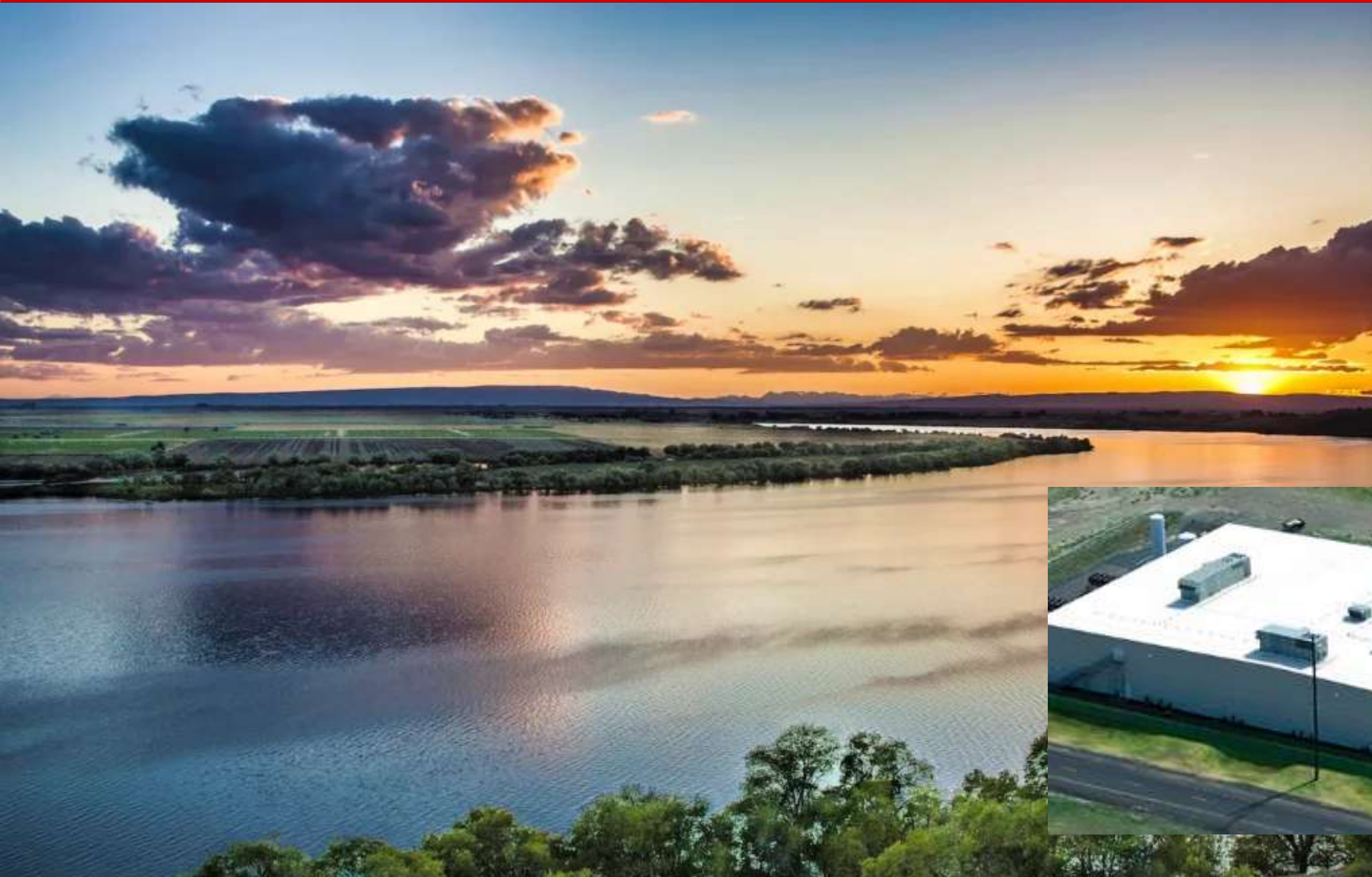
These are suggested structure/function claims based on AstaReal® studies and have not been verified for promotional use by a regulatory team. We encourage you to confirm regulatory compliance.



1-17: Sources available on request



AstaReal® Production facilities



Moses
Lake, WA.
USA



AstaReal® Production facilities



Gustavsberg,
Sweden. EU



AstaReal® Production facilities



Toyama.
Japan



AstaReal® The world's most studied natural astaxanthin

More than 85 Published Studies with
AstaReal® Astaxanthin in Humans

37
YEARS
of RESEARCH &
INNOVATION



Eye
Health

21 Clinical Studies
2-12 mg/daily



Muscle
&
Performance

22 Clinical Studies
4-12 mg/daily



Cognitive
Health

7 Clinical Studies
6-12 mg/daily



Skin
Health

7 Clinical Studies
2-12 mg/daily



Cardiovascular
Health

9 Clinical Studies
6-12 mg/daily

Trusted by
Researchers



We have more studies in fatigue, gut health, fertility, and bioavailability.



COMPLETE PROTECTION FOR YOUR EYES

LUTEIN AND
ZEAXANTHIN

ASTAREAL®
ASTAXANTHIN

- Help filter out harmful blue light
- Help night vision & contrast sensitivity

- Help reduce eye fatigue & strain
- Help focusing ability & depth perception

AstaReal® Raw material for your products



**CLEAR100, 1% and CLEAR300, 3%
Natural Astaxanthin water soluble
emulsions**

- › The best option for functional drinks
- › High bioavailability and low flavour profile



**LutaReal 100FC 1%
lutein Emulsion**

- › The best option for functional drinks.
- › High bioavailability and low flavour profile



AstaReal® Awards for co-branding partner's marketing

EDITORS' AWARD FOR INFANT
AND CHILD NUTRITION INITIATIVE



ASTAREAL® NATURAL ASTAXANTHIN
FOR CHILDREN DIGITAL EYE STRAIN
ASTAREAL® - FUJI CHEMICAL INDUSTRIES

WINNER
NUTRA
INGREDIENTS ASIA
AWARDS 2025



WINNER
NUTRA
INGREDIENTS ASIA
AWARDS 2022



AstaReal®
cognitive function
ingredient of the year

WINNER
NUTRA
INGREDIENTS ASIA
AWARDS 2023



AstaReal®
Beauty from within
ingredient of the year



Thank you for your
eye-ttention!

Carlo Alberto Muratore

Regional Sales Manager APAC

AstaReal® – **Fuji Chemical Industries**

