

Convergence Insufficiency

- Symptoms of eye strain, double vision with near work, headaches, asthenopia worse with prolonged near work
- Abnormally far [near point of convergence](#)
- Common accompanying signs:
 - exophoria greater at near than distance
 - decreased or absent [fusional convergence](#)
 - normal divergence
 - Low [AC/A](#)
 - accommodative insufficiency
- Uncommon accompanying signs:
 - orthophoria
 - esophoria at near

Near Point of convergence

- Point at which a person can no longer hold convergence at near
- Testing procedure
 - Proper correction should be worn
 - Use accommodative target (20/40 image or similar)
 - Patient focuses the target that slowly moves towards the nose
 - Where diplopia occurs is the “break point”
- **>6 cm** from the nose in non-presbyopes and **>10 cm** for presbyopes is probably abnormal

Convergence Amplitudes

- Testing procedure
 - Should be wearing proper correction
 - Measure with base out prism on distance (6 m) then near target (1/3 m)
 - Use accommodative target 20/40 or similar
 - Move the prism bar to the point where patient can no longer maintain single vision on the object, this is the **break point**.
 - Before reaching the break point, the patient may note a point where the image blurs, the patient can no longer use fusional convergence and resorts to accommodative convergence which may improve convergence but causes a blurred image due to over-convergence
 - Reduce the base out prism until the patient recovers single vision, this is the **recovery point**.
 - if exotropia present ensure not worse XT in downgaze.
 - Encouragement often improves convergence and should be provided to every patient.

- Testing convergence after testing divergence amplitudes will reduce convergence.

Normal Convergence Amplitudes reported by Several Authors

Prism Diopters	Parks (1976)	Duane (1933)	Fray (2017)	Ferrari (2019)
Near				
Break Point	20-25	38-51	35	45
Recovery Point	18-22			40
Distance				
Break Point	15		26	25
Recovery Point	12			20

Convergence Amplitudes in Convergence Insufficiency

Most studies would include patients with ≤ 15 PD break point

Other Signs of CI

- Low AC/A ratio of $<2:1$
- Esophoria larger at near than at distance
- High CI symptom survey score of ≥ 16

Convergence Insufficiency Symptom Survey

1. Do your eyes feel tired when reading or doing close work?
2. Do your eyes feel uncomfortable when reading or doing close work?
3. Do you have headaches when reading or doing close work?
4. Do you feel sleepy when reading or doing close work?
5. Do you lose concentration when reading or doing close work?
6. Do you have trouble remembering what you have read?
7. Do you have double vision when reading or doing close work?
8. Do you see the words move, jump, swim or appear to float on the page when reading or doing close work?
9. Do you feel like you read slowly?
10. Do your eyes ever hurt when reading or doing close work?
11. Do your eyes ever feel sore when reading or doing close work?
12. Do you feel a "pulling" feeling around your eyes when reading or doing close work?
13. Do you notice the words blurring or coming in and out of focus when reading or doing close work?
14. Do you lose your place while reading or doing close work?
15. Do you have to re-read the same line of words when reading?

Scoring

1. Collect response to each question from one of the 5 possible responses:
 1. "Never" = 0 points
 2. "Infrequently" = 1 point
 3. "Sometimes" = 2 points
 4. "Fairly Often" = 3 points
 5. "Always" = 4 points
2. Tally points from each question- the total will be from 0-60 points

Analysis of Score

If score is ≥ 16 CI is likely

- Convergence Insufficiency mean= 30.8 ± 8.4
- Normal mean = 8.4 ± 6.4
- Cut of value of **16** gives sensitivity of 95.7% and specificity of 87.5%



[Go to the Convergence Insufficiency Symptom Score Calculator](#)

Resources

- Marshall Parks. Vergences in Duane's Ophthalmology Chapter 7
- Duane, A. The Convergence Index as a Measure of Converging Power. Trans Am Ophthalmology Soc. 1914;13(Pt3):851-8
- Study of normative values of the fusional amplitudes of ocular convergence and divergence. Ferrari et al. eOftalmo 2019;5(4):167-72
- Fusional Amplitudes: Developing Testing Standards. Fray K. Strabismus 2017;25(3):145-155

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