

INTERMITTENT EXOTROPIA TESTING PROCEDURES MANUAL

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BINOCULAR ALIGNMENT TESTING

General Instructions for all Cover Testing Procedures

- Cover testing must be performed by a pediatric ophthalmologist, pediatric optometrist, or a certified orthoptist.
- The patient should be wearing his/her optical correction.
 - If prism has been prescribed, testing should be performed without prism.
 - If deliberate overminus is currently prescribed, testing should be performed in trial frames *without* the overminus component of the prescription but with the lenses that correct the remaining refractive error to within study guidelines.
- If the patient has an anomalous head position (i.e., face turn, head tilt, chin tip), straighten the patient's head position for primary gaze measurements.
- Select an age-appropriate detailed target that has features to control the patient's attention and accommodation (e.g., Lang cube or small sticker for young children and single letter target for school-age children). If the patient has reduced visual acuity, select a threshold target for the amblyopic eye.
- Both distance and near target placement should be in the patient's primary gaze. Use normal room illumination.
- Alignment testing should be done in the following order:
 1. Cover-uncover
 2. Simultaneous Prism and Cover Test (SPCT)
 3. Prism and Alternate Cover Test (PACT)

General Instructions for Measurement With Prisms

- Alignment should be measured using plastic prisms (not glass).
- Loose prisms or prism bars may be used.
- Prisms should be held in the frontal plane position with patient looking in the straight ahead (primary) position.
- **A single (versus split) prism** should be used for measuring angles ≤ 50 PD (see Table 1).
- **Two nearly-equally-split prisms** (one prism over each eye) should be used for measuring angles > 50 PD (*applies to PACT only*) (see page 4).

41 Selection of Prism(s)

42 The prisms to be used for measuring ocular alignment are described in Table 1:

43

44 **Table 1: Measurements with Prisms**

Deviation Magnitude	Prism Measurement Steps	SPCT: Prism Measurement	PACT: Prism Measurement
1 – 10Δ	1Δ	Single prism*	Single prism
11 - 20Δ	2Δ	Single prism*	Single prism
21 – 50Δ	5Δ	Single prism*	Single prism
>50Δ	5Δ	Do not measure: Record “>50Δ”	Split prism OD/OS according to Table 2

45 *For SPCT, the single prism should be held over the deviating eye detected on the cover-
46 uncover test.

47

48 For measuring angles larger than 50PD by PACT:

49 Use two prisms with the total amount of prism nearly-equally split between the prisms to
50 be held over each eye. Because various combinations of prisms totaling the same amount
51 (i.e. 50 and 10, 35 and 25) represent different true deviations, a specific combination of
52 prisms should be used for each recorded value. Table 2 contains the appropriate
53 combinations of prisms to use. The specific combination should be two different prisms
54 which nearly-equally split their sum, with the sum being the recorded value.

55

56 **Table 2: Combinations of Split Prisms for Measuring Angles >50 PD by PACT**

Total	Prism 1	Prism 2
55	30	25
60	35	25
65	35	30
70	40	30
75	40	35
80	45	35
85	45	40
90	50	40
95	50	45

57

Prism 1 should be held over one eye and Prism 2 should be held over the other eye.

58

59 First column is the value to be data entered as the measurement (i.e., the sum of the
60 two labeled prisms).

61

62 **Cover-Uncover Test**

63

64 **Description**

65 The cover–uncover test is used to determine whether a tropia is present or not. If a tropia
66 is present, the direction, frequency, and eye laterality are determined. The test is
67 performed first at distance fixation (6 m) and then at near fixation (1/3 m or 33 cm).

68

69 **Procedure**

- 70 1. While the patient looks at a distance fixation target at 6 meters, the examiner covers
71 one eye with an opaque occluder. While covering the eye, the examiner looks for any
72 re-fixational movements of the fellow eye. If the unoccluded eye moves to take up
73 fixation, a manifest deviation (i.e., a tropia) of that eye is present.
- 74 • The occluder should be held in front of the eye, allowing time for re-fixational
75 movements before removing the occluder, after which the occluder is
76 removed to allow binocular viewing conditions.
 - 77 • This procedure should be repeated several times to rule out false-positive
78 movements due to poor fixation or inattention.
- 79 2. The test is repeated covering the other eye at distance.
- 80 a. If sometimes the left eye is observed to be tropic and sometimes the right
81 eye is observed to be tropic, the tropia is defined as alternating.
- 82 3. Testing is repeated for near fixation at 1/3 meter (33cm).

83

84 **Simultaneous Prism and Cover Test (SPCT)**

85

86 **Description**

87 The Simultaneous Prism and Cover Test (SPCT) is used to measure a tropia under
88 binocular viewing conditions. The SPCT is performed at both distance (6 m) and near
89 (1/3 m or 33 cm) fixation using an accommodative target (never a fixation light). Plastic
90 (not glass) loose prisms or a prism bar should be held in the frontal plane position.

91

92 **Procedure**

- 93 1. Determine the fixating eye by a cover-uncover test.
- 94 2. Rapidly and simultaneously, position a cover paddle before the fixating eye while
95 placing a single appropriately-oriented prism before the deviating eye.
- 96 3. As the paddle and prism are introduced, watch for movement of the deviating eye.
- 97 4. Remove the cover paddle and prism quickly to reestablish the binocular state.
- 98 5. Repeat steps #2-4, increasing the power of the prism until no movement of the
99 deviated eye is seen. Continue increasing the magnitude of prism until a reversal of
100 the movement of the deviating eye is seen i.e., the prism overcorrects the deviation.
101 Record the magnitude of prism that is closest to producing no movement (neutral).

102

103 Note: If the patient has an intermittent tropia which is not of sufficient duration to
104 measure the SPCT, the type of tropia will be recorded and the size of the SPCT
105 measurement will be recorded as 0 PD.

106

107 If both SPCT and prism and alternate cover test (PACT) are to be completed, SPCT
108 should always be performed before PACT.

109

110

111 **Prism and Alternate Cover Test (PACT)**

112

113 **Description**

114 The Prism and Alternate Cover Test (PACT) is used to measure the full magnitude of a
115 patient's strabismus, which includes the manifest tropia and any latent deviation. The
116 PACT is performed at distance (6 m) and near (1/3 m or 33 cm) fixation (sometimes at
117 remote distance fixation also) using an accommodative target (never a fixation light).
118 Plastic (not glass) loose prisms or a prism bar should be held in the frontal plane position.

119

120 **Procedure**

- 121 1. Place a single appropriately-oriented prism in the frontal plane position before one
122 eye.*
- 123 2. Alternately occlude the eyes with a cover paddle and observe the re-fixation
124 movement of the just-unoccluded eye.
- 125 3. Incrementally increase the prism amount until reversal of the deviation is seen.
126 Record the magnitude of prism that is closest to producing no movement (neutral).

127

128 *When measuring angles larger than 50PD by PACT, use two prisms with the total
129 amount of prism nearly-equally split between the prisms to be held over each eye. See
130 Table 2 (page 4) for the specific combination of prisms that should be used for each
131 recorded value.

132

133 When both the simultaneous prism and cover test (SPCT) and PACT testing are to be
134 completed, PACT should always be performed after SPCT.

135

136 **Reminder: PACT Testing for Patients with Pseudo-divergence Excess Type IXT**

137 Because some IXT patients have pseudo-divergence excess type IXT, we would like
138 to remind investigators that it is important to uncover the full magnitude of the near
139 deviation during PACT. In cases in which the investigator suspects pseudo-divergence
140 excess type IXT, the full magnitude of the near exodeviation may be more likely to be
141 uncovered by using a prolonged (i.e., slower) PACT or by measuring the deviation first
142 by PACT at distance, then leaving the cover in place when switching to measure the
143 deviation by PACT at near (i.e., patient is not allowed to re-establish fusion in between
144 distance and near testing).

145 In IXT1, some patients with pseudo-divergence excess type IXT may initially appear
146 to be ineligible for the study because their near deviation appears to be less than 10 PD.
147 Integrating either of the above approaches into your routine PACT testing of patients
148 with suspected pseudo-divergence excess type IXT may reveal that the near deviation
149 truly is 10 PD or more and that the patient is eligible.

150

151 **Assessment of Deviation Throughout Exam**

152 The deviation will be recorded as constant if a manifest tropia is present 100% of the time
153 during the examination, determined by at least 3 cover/uncover tests (one must be before
154 any dissociation), or intermittent if a manifest tropia is present (including after
155 dissociation) but is not present 100% of the time during the entire exam. The magnitude
156 of the deviation may change (vary) independently of the frequency of the deviation;
157 frequency of tropia (constant vs. intermittent) is determined solely by whether the tropia
158 is present all or some of the time. If a tropia is not observed at any time but a phoria is
159 present, then the deviation will be recorded as not tropic (phoric only).

160

161 **Deviation Definitions:**

162

163 Constant tropia: Manifest tropia that is present 100% of the time during the
164 examination. **NOTE:** If the child appears to have a constant tropia
165 but shows excellent stereoacuity (may be inconsistent with the
166 diagnosis of constant tropia), the examiner should look over the
167 child's polarized glasses to determine whether the child is indeed
168 constantly tropic (by direct observation by cover/uncover test). If
169 the child is not constantly tropic, the tropia should be recorded as
170 intermittent.

171

172 Intermittent tropia: Manifest tropia which is present some (less than 100%) of the
173 time during the examination. A tropia is defined as a manifest
174 deviation with duration of at least 1 second, including after
175 dissociation. A cover/uncover test must be used to verify that the
176 child is nonstrabismic (fusing) at least some of the time.

177

178 Not tropic (phoric only): Tropia is not observed at any time but a phoria is present.

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CLASSIFICATION OF INTERMITTENT EXOTROPIA

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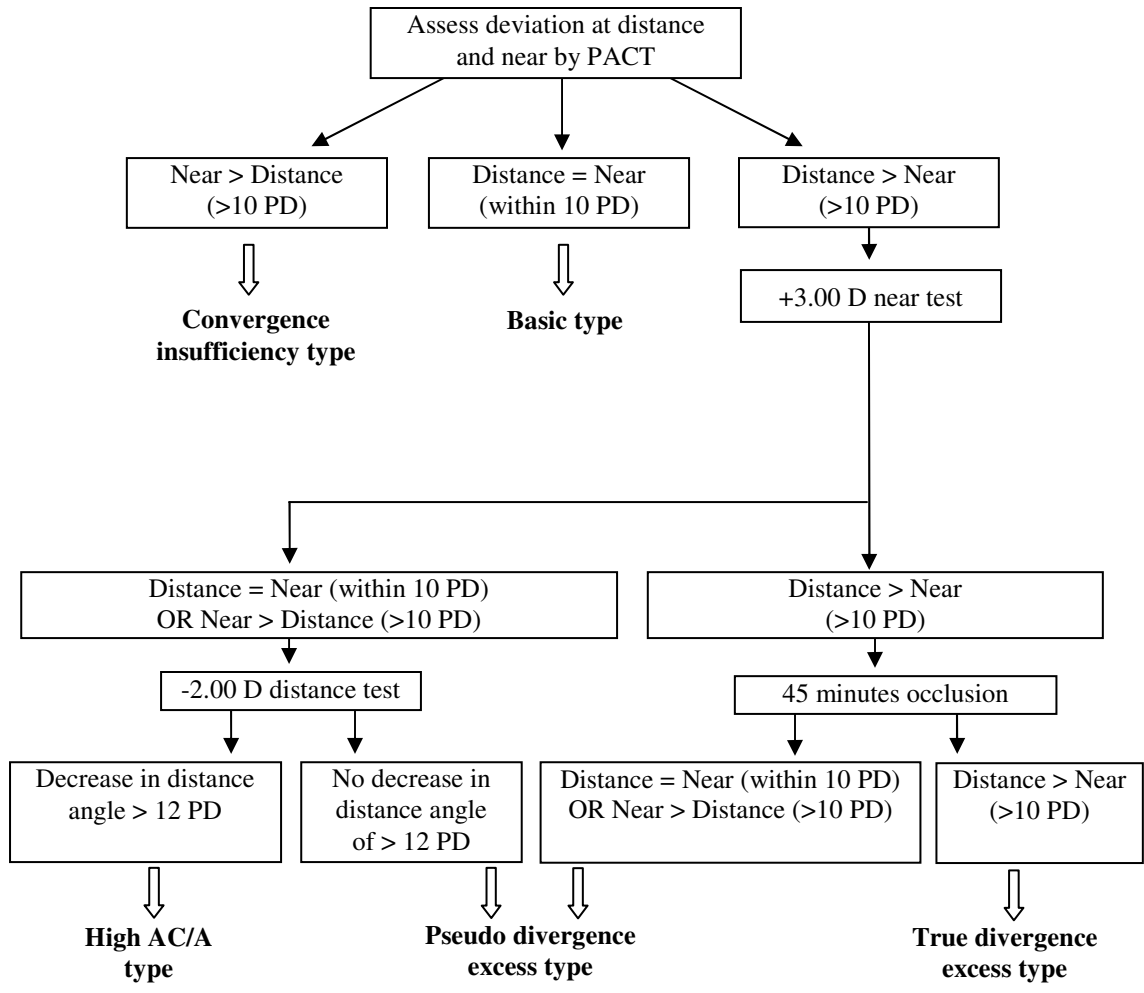
IXT will be classified into one of five types:

- Basic
- Pseudo Divergence Excess
- True Divergence Excess
- Convergence Insufficiency
- High AC/A

Classification of IXT type will be done as follows (also see flow chart on next page):

Using the PACT at distance (6 m) and near (1/3 m or 33cm) fixations:

- If the measured deviation at near is more than 10 PD larger than at distance, the IXT is classified as **convergence insufficiency type**.
- If the distance and near deviations are within 10 PD of one another, the IXT is classified as **basic type**.
- If the measured deviation at distance is >10 PD larger than at near, +3.00 D lenses should be placed over the current correction (using trial frames or Halberg clips) and the deviation at near should be re-measured by the PACT.
 - If the angles equalize (distance and near within 10 PD) or near exceeds distance by >10 PD, the +3.00 D lenses at near should be removed and -2.00 D lenses should be placed over the current correction (using trial frames or Halberg clips) and the deviation at distance should be re-measured.
 - If the distance angle decreases by >12 PD with the -2.00 D lenses (compared to the distance measure without the -2.00 D lenses), the IXT type is classified as **high AC/A type**; otherwise the IXT type is classified as **pseudo divergence excess type**.
 - If the angles do not equalize (difference between distance and near angles >10 PD) when measured with the +3.00 D lenses at near, the patient should be occluded for 45 minutes, after which the distance and near deviations should be measured again in the current refractive correction. If the near and distance deviations equalize (within 10 PD) or if near exceeds distance, the type of IXT is classified as **pseudo divergence excess type**. Otherwise the type IXT is classified as **true divergence excess type**.



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CONTROL OF EXODEVIATION

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Purpose: Assess the level of control of an exodeviation in patients with intermittent exotropia.

Control of exodeviation: Control of exodeviation will be measured at distance and near using the Office Control Score (Mohny and Holmes, *Strabismus* 2006;14:147-150).

- Distance (6 meters \pm 1 meter) fixing on an accommodative target such as a video for younger children or reading optotype letters for older children
- Near (1/3 meter – fixing on Lang-near viewing stick or similar accommodative target)

The scale below applies to both distance and near separately.

Intermittent Exotropia Control Scale¹

5 = Constant Exotropia

4 = Exotropia > 50% of the 30-second period before dissociation

3 = Exotropia < 50% of the 30-second period before dissociation

2 = No exotropia unless dissociated, recovers in >5 seconds

1 = No exotropia unless dissociated, recovers in 1-5 seconds

0 = No exotropia unless dissociated, recovers in <1 second (phoria)

- Levels 5 to 3 are assessed during a 30-second period of observation first at distance fixation and then assessed at near fixation for another 30-second period. Both distance and near are tested before any dissociation (i.e., before levels 2 to 0 are assessed).
- If no exotropia is observed during the 30-second period of observation, levels 2 to 0 are then graded as the worst of 3 rapidly successive trials for both the distance and near deviation:
 1. An occluder is placed over the right eye for 10 seconds and then removed, measuring the length of time it takes for fusion to become re-established.
 2. The left eye is then occluded for a 10-second period and the time to re-establish fusion is similarly measured.
 3. A third trial of 10-second occlusion is performed, covering the eye that required the longest time to re-fuse.
- The worse level of control observed following the three 10-second periods of occlusion should be recorded. If the patient has a micro-esotropia by SPCT but an exodeviation by PACT, the scale applies to the exodeviation.
- Testing of control must be performed by a pediatric ophthalmologist, pediatric optometrist, or a certified orthoptist.
- Testing must be done prior to dissociation or at least 10 minutes after any dissociation.

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273 **MEASURING ACCOMMODATIVE CONVERGENCE /**
274 **ACCOMMODATION (AC/A) RATIO USING THE**
275 **GRADIENT METHOD**

276
277 The AC/A ratio is determined by determining the change in magnitude (in prism
278 diopters) of the ocular deviation measured using current correction and the ocular
279 deviation measured using a specific lens-induced accommodative demand. The test is
280 performed by measuring the prism and alternate cover test (PACT) with current
281 correction with the patient fixating on a 20/50 or smaller Snellen letter at distance. PACT
282 measurement is then repeated by adding a -2.00D lens over the current correction for
283 each eye. Patients should be encouraged to try and keep the letter target clear throughout
284 testing. The formula for calculating the AC/A ratio is:

285
286 $AC/A = (\text{deviation in current correction} - \text{deviation with } -2.00D \text{ lens over current}$
287 $\text{correction}) /$
288 $-2.00 \text{ D (the power of the added lens in diopters)}$

289
290 For example, if the distance PACT without the -2.00D lens is 28 XT and with the -2.00
291 lens is 10 XT, then the AC/A ratio = $[28 - (10)] / 2 = 18/2 = 9:1$ (9 PD:1 D, which is an
292 example of a high AC/A ratio)

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STEREOACUITY TESTING

297
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299

Distance Randot Stereotest

301

Description

302 The Distance Randot stereoacuity test is a random dot stereogram test performed at 3
303 meters.
304

305

Directions

306 The Distance Randot must be administered with normal room lighting while the patient
307 wears Polarized glasses over his or her refractive correction. The test should be done
308 prior to dissociation. If the patient has been dissociated, a 10 minute break without any
309 dissociation must be provided prior to testing stereoacuity.
310

311

312 The test is administered by first asking the patient to identify or name the shapes on the
313 matching card or to point to the specific shapes when asked (e.g., “triangle.”). Patients
314 unable to identify or name the shapes are considered to be untestable. Testing proceeds
315 for patients who correctly identify or name the shapes.
316

317

318 Polarized glasses are placed over the patient’s refractive correction (if worn) and the
319 examiner holds the test booklet open at a distance 3 meters from the patient and at the
320 patient’s eye level. The test booklet should be tilted forward slightly and may need to be
321 rocked back and forth slightly to minimize glare on the surface of the stereogram from
322 overhead lights. Testing begins at the 400 arcsecond level. The patient is asked to
323 identify the shapes present in both the “A” and “B” panels. Both shapes must be
324 correctly identified to pass a given disparity level. If both shapes at a disparity level are
325 identified correctly, testing proceeds to the next finer level. Testing ends when a shape is
326 incorrectly identified or when both shapes at the 60 arcsecond level are correctly
327 identified. The stereoacuity is recorded as the finest level where both shapes were
328 correctly identified. If the patient fails to correctly identify both of the 400 arcsec targets
329 but passed the pretest, the stereoacuity is recorded as “nil”.

329

330 Testable thresholds with the Distant Randot stereoacuity test include nil, 400, 200, 100
331 and 60 arcseconds.
332

332

333

Randot Preschool Stereotest

334

Description

335 The Randot Preschool Stereotest measures random dot stereoacuity from 800 to 40 arc
336 seconds (800, 400, 200, 100, 60, 40) at a test distance of 40 cm.
337

338

339 The Randot Preschool Stereotest consists of 3 booklets each with 2 sets of 4 random dot
340 shapes (one is blank, 3 are actual figures), which can be matched to non-stereo shapes on

341 the opposite side of the booklets. There are six levels (seconds of arc) in the test with
342 two levels in each book. Each level has 4 rectangles that contain 3 shapes and one blank.
343

344 **Specifications**

- 345 • Testing order is Book 3, Book 1, Book 2.
346

347 **Procedure**

- 348 1. As a pretest, use Book #3 (800"/400").
349 2. Point to the top 4 panels of non-stereo side (black on white shapes/pictures) and ask,
350 "Can you point to the duck?" If the child cannot correctly identify the duck, do not
351 proceed with the rest of the test.
352 3. Starting with Book 3, turn to the Randot side of the test booklet starting with the top
353 level and point to one of the boxes containing a Randot shape, asking the subject what
354 shape is in the box. The child should be encouraged to match one of the black and
355 white shapes to the Randot shape.
356 4. Continue by pointing to another shape at the same level.
357 5. If 2 shapes are identified correctly at a level, testing will proceed to the next level.
358 6. If 2 shapes are identified incorrectly at a level, testing will stop at the current level.
359 7. The final score will be calculated as the finest level (lowest of seconds of arc)
360 measured at which 2 shapes were correctly identified.
361

362 An instructional video for certifying administration of the Randot Preschool Stereotest is
363 available on the PEDIG website, filed under Certification Materials > Stereoacuity
364 Testing Certification.
365

366 <https://studies.jaeb.org/pedig/ats/rdocs/StudyDocs/Certifications/RandotVideo.php>

367 **Titmus Stereotest**

368

369 **Description**

370 The Titmus Stereoacuity test is a contour stereoacuity test performed at a near (40 cm).
371 The study will require administering only 2 of the 3 subtests 1) Stereo fly, subtending
372 3000 arcseconds and 2) Circles, which has 9 groupings of 4 circles each, subtending 800,
373 400, 200, 140, 100, 80, 60, 50, and 40 arcseconds. The Animals subtest will not be
374 administered. With the fly target, the wings of the fly appear to stand up off the page to
375 subjects with stereopsis. With the circles, one of the circles appears to stand up off the
376 page to those with stereopsis at least as good as the level being tested.

377

378 **Directions**

379 The Titmus Stereotest is administered at a test distance of 40 cm and prior to dissociation.
380 If the patient has been dissociated, a 10 minute rest period must be observed. Test
381 stereoacuity in current correction. Place Polaroid glasses (over spectacles or contact
382 lenses, if worn) before opening the test booklets.

383

384 The testing order is 1) Titmus Fly, 2) Titmus Circles. Titmus Animals will not be tested
385 – go directly to the circles after testing the fly.

386

387 Titmus Fly

388 Present the fly target first, asking the child if he/she can grab the tips of the wings. If the
389 child pinches the tip of the fly's wings above the surface of the stereogram, the test is
390 scored as positive (3000 arcseconds). If the child grabs the wings on the surface of the
391 stereogram, the test is scored as negative (nil stereoacuity).

392

393 Titmus Circles

394 Next, present the circles section of the test, starting with the 800 arcsec target. Instruct
395 the child to point to the circle that appears to jump off the page or appears to stick out or
396 float up off the page closer to them. If the child identifies the correct circle, proceed to
397 the next finer disparity level. Testing stops when a target is incorrectly identified or
398 when the last of the 9 sets of circles (the 40 arcsec set of circles) is correctly identified.
399 The stereoacuity is recorded as the finest disparity identified correctly.

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404 **INTERMITTENT EXOTROPIA QUESTIONNAIRE (IXTQ)**

405

406 The Intermittent Exotropia Questionnaire (IXTQ) has been developed to assess the
407 impact of intermittent exotropia (IXT) on both the child with IXT and the parent of the
408 child with IXT. The IXTQ is comprised of 3 parts:

409 1) Child questionnaire (assessment by the child- see pages 16-17): Assesses the
410 impact of IXT on health-related quality of life (HRQOL) of children ages 5 to
411 17 years. There are separate questionnaires for children aged 5 to 7 years and
412 children aged 8 to 17 years.

413 2) Proxy questionnaire (assessment by the parent- see page 15): Assesses the
414 impact of IXT on HRQOL of children ages 2 to 17 years with IXT.

415 3) Parent questionnaire (see page 15): Assesses the impact of IXT on HRQOL
416 of the parent or legal guardian of children with IXT.

417 The IXTQ is intended to be completed by the child and the parent in a supervised clinical
418 setting.

419

420

421

422 **Parent and Parent Proxy IXT Questionnaires**

423

424

- 425 • Parents will complete 2 questionnaires:
- 426 1) Proxy questionnaire
- 427 2) Parent questionnaire
- 428 • Both parent questionnaires are self-administered.
- 429 • The instructions are below and are included with each questionnaire.

430

431

432 **Instructions for Parent or Legal Guardian**

433

434 **Parent Proxy Questionnaire**

435 The PROXY Intermittent Exotropia Questionnaire is a short questionnaire with
436 statements about how you think your child’s eye condition affects your child in their
437 everyday life.

438

439 If you are unable to complete this on your own, please ask for someone to assist you.

440

441 **Instructions:**

- 442 • On the following page is a list of things that might be a problem for your child.
- 443 • Please respond to EACH statement by circling the response that best reflects how you
444 think your child feels.
- 445 • Circle only ONE response for each statement.
- 446 • Please answer based on experiences during the past month.

447

448 If you are not sure how to respond, please circle the response you think is most
449 appropriate.

450

451 **Parent Questionnaire**

452 The PARENT Intermittent Exotropia Questionnaire is a short questionnaire with
453 statements about how your child’s eye condition may affect you in your everyday life.

454

455 If you are unable to complete this on your own, please ask for someone to assist you.

456

457 **Instructions:**

- 458 • On the following page is a list of things that might be a problem for you.
- 459 • Please respond to EACH statement by circling the response that best reflects how you
460 feel.
- 461 • Circle only ONE response for each statement.
- 462 • Please answer based on your experiences during the past month.
- 463 • If you are not sure how to respond, please circle the response you think is most
464 appropriate.

465

466

467 **Child IXT Questionnaire**

468

- 469 • Children ages 5 to 17 years complete the Child questionnaire.
- 470 • The Child questionnaire (version for ages 5 to 7 years) will be administered verbally
- 471 to children ages 5 to 7 years by clinical staff (see instructions below). Children ages 5
- 472 to 7 years should be allowed to use the accompanying matching card (page 17).
- 473 • Children 8 years and older will complete the child questionnaire (version for children
- 474 8 years and older) on their own. If a child 8 years and older is unable to complete the
- 475 child questionnaire on his/her own, it may be administered verbally by clinical staff.
- 476 (Note that there is not a matching card for the IXTQ questionnaire for children 8
- 477 years and older.)
- 478 • If possible, children should be positioned such that they are unable view their parents
- 479 during testing and parents should be advised not to influence their child’s responses.
- 480 If a child does not appear to understand a question, repeat the question verbatim. Do not
- 481 try to explain the question or elaborate on the question.

482

483

484 **IXTQ Instructions for Interviewers (for Child Questionnaire for 5 to <8 Year**

485 **Olds)**

486

487 I am going to ask you some questions about some things that might be a problem for
488 some children. I would like to know how much of a problem any of these things might be
489 for you.

490 If something is not at all a problem for you, point to the smiling face



491 If something is sometimes a problem for you, point to the middle face



492 If something is a problem for you a lot, point to the sad face



493




494 I am going to read each question and then you can point to the picture to show me how
495 much of a problem it is for you.

496

497 Let’s try a practice question:

498

499 Is it hard for you to ride a bike?

Not at all	Sometimes	A lot
		

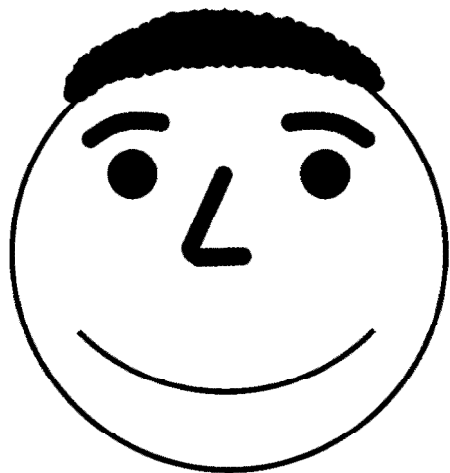
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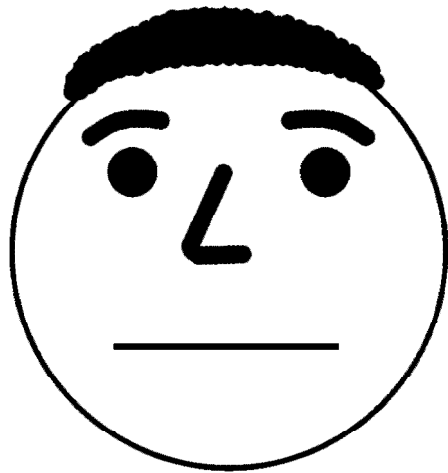
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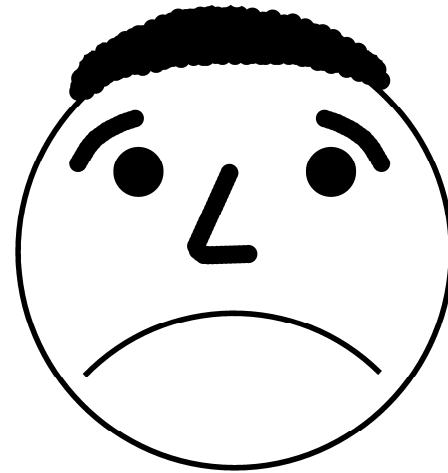
Intermittent Exotropia Questionnaire (IXTO) Matching Card



Not at all



Sometimes



A lot

MEASUREMENT OF AMOUNT OF SURGERY

The magnitude of deviation for which to perform surgery will be the largest preoperative deviation recorded at near, distance, or remote distance fixation by PACT. The recommended surgical doses are listed in the following tables and are based on the largest angle. For recessions, the measurement should be made from the insertion of the muscle after muscle disinsertion. For resections, the measurement should be made from the insertion of the muscle prior to muscle disinsertion. Surgeons may adjust the surgical dose within 1.0 mm for each muscle at their discretion to account for individual patient variables, such as lateral incomitance and age.

Bilateral lateral rectus recession (BLRrec):

Angle of largest deviation	Amount to recess each LR
15 PD	4.0 mm
20 PD	5.0 mm
25 PD	6.0 mm
30 PD	7.0 mm
35 PD	7.5 mm
40 PD	8.0 mm
45 PD	8.5 mm
50 PD	9.0 mm

LR = lateral rectus

Unilateral lateral rectus recession with medial rectus resection (R&R):

Angle of largest deviation	Amount to recess LR	Amount to resect MR
15 PD	4.0 mm	3.0 mm
20 PD	5.0 mm	4.0 mm
25 PD	6.0 mm	5.0 mm
30 PD	7.0 mm	5.5 mm
35 PD	7.5 mm	6.0 mm
40 PD	8.0 mm	6.5 mm
45 PD	8.5 mm	6.5 mm
50 PD	9.0 mm	7.0 mm

LR = lateral rectus MR = medial rectus

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OCULOMOTOR ASSESSMENTS

Inferior Oblique Overaction (IOOA)

While having the patient fixate a near target as it is moved into the six cardinal positions of gaze, the examiner observes for symmetry of ocular rotations. Inferior oblique overaction (IOOA) is defined as over-elevation of the eye in the field of action of the IO when fixing with the fellow eye.

Superior Oblique Overaction (SOOA)

While having the patient fixate a near target as it is moved into the six cardinal positions of gaze, the examiner observes for symmetry of ocular rotations. Superior oblique overaction (SOOA) is defined as over-depression of the eye in the field of action of the SO when fixing with the fellow eye.

Dissociated Vertical Deviation (DVD)

DVD is a slow upward drift of one eye, with excyclotorsion, that may be manifest or latent.

If the DVD is manifest, it may be observed and documented before ductions and versions are assessed or during the Simultaneous Prism and Cover Test (SPCT).

If the DVD is latent, complete the Prism and Alternate Cover Test (PACT). Then, while the prism is still in place, observe each eye under cover. A dissociated movement of the eye (usually some combination of elevation, excyclotorsion, and abduction) indicates the presence of DVD.

- DVD is usually bilateral, but may be asymmetric.

Nystagmus

If the nystagmus is manifest, its presence can be documented by simply observing the patient.

If the nystagmus is latent, it can be observed and documented by occlusion of one eye. The fast phase will be in the direction of the fixing eye. Occlude the fellow eye to observe if there is a similar nystagmus in that eye.

Pattern Testing

The procedures by which patterns are assessed are not mandated by protocol. The following procedures are recommendations only.

If PACT measurements are possible in upgaze and downgaze, then A, V, X, Y and lambda patterns are defined as follows:

A-pattern: at least 10 PD more XT in downgaze than in upgaze

V-pattern: at least 15 PD more XT in upgaze than in downgaze

X-pattern: both of the following:

- at least 10pd more XT in downgaze than in primary gaze
- at least 10 pd more XT in upgaze than in primary gaze

Y-pattern: both of the following:

- at least 10 PD more XT in upgaze than in primary gaze
- XT in downgaze and in primary are within 10PD of each other

Lambda (Λ) pattern: both of the following:

- at least 10 PD more XT in downgaze than in primary gaze
- XT in upgaze and in primary are within 10PD of each other

If PACT measurements are NOT possible in upgaze and downgaze, then patterns will be assessed by gross inspection.

Abduction Deficits

Abduction is assessed in each eye monocularly with the other eye covered and abduction deficits are graded in each eye on a scale of 0 to -5:

- 0 = no deficit
- trace = slight abduction deficit (<25% beyond midline)
- 1 = 25% abduction deficit beyond midline
- 2 = 50% abduction deficit beyond midline
- 3 = 75% abduction deficit beyond midline
- 4 = just to midline
- 5 = unable to get to midline

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