

Dyskinesia Impairment Scale (DIS)

The Dyskinesia Impairment Scale is developed to evaluate dystonia and choreoathetosis in dyskinetic cerebral palsy.¹ The DIS consists of dystonia (DIS-D) and choreoathetosis (DIS-CA) subscales discriminating the presence and rating the severity (amplitude and duration) of either movement disorder in twelve body regions during activity and rest.

Definitions:

Definition Dyskinetic Cerebral Palsy (CP)²: Dyskinetic CP is characterized by involuntary, uncontrolled, recurring occasionally stereotyped movements, where the primitive reflex patterns predominate, and the muscle tone is varying. Two movement disorder patterns are dominantly present: dystonia and choreoathetosis

Dystonia in CP refers to abnormal postures and/or involuntary or distorted voluntary twisting and repetitive movements due to sustained or intermittent muscle contractions.

Choreoathetosis in CP is dominated by hyperkinesia and tone fluctuating (but mainly decreased). It can be differentiated in chorea, i.e. rapid involuntary, jerky and often fragmented movements, and athetosis, i.e. slower, constantly changing, writhing or contorting movements.

Region descriptions in the Dyskinesia Impairment Scale:

Region	DYSTONIA	CHOREOATHETOSIS
Eye	Dystonia around the eyes, eyelids, eyebrow, forehead : e.g. sustained muscle contractions (blepharospasms) around the eyes and/or the eyelid (open/closed) and/or forced eye movement deviations for example during eye tracking movement of fixation.	Choreoathetosis around the eyes, eyelids, eyebrows, forehead : e.g. constantly, fragmented movements around the eyes and/or blinking eyelid (open/closed) and/or variable (saccadic) eye movements for example during eye tracking movement of fixation.
Mouth	Dystonia around the lips, jaw, cheeks, tongue : e.g. sustained muscle contraction resulting in grimacing movement, clenched or deviated jaw, forced open mouth and/or forceful tongue thrusting.	Choreoathetosis lips, jaw, cheeks; tongue : e.g. constantly changing, fragmented movements in the lower face like grimacing, mouth movements and tongue protrusion movements.
Neck	Dystonia in the neck : sustained muscle contraction resulting in pulling neck movements and/or posture into any plane of motion: extension, flexion, lateral flexion, rotation.	Choreoathetosis in the neck : e.g., constantly changing fragmented or contorting neck movements (wagging) into any plane of motion: extension, flexion, lateral flexion, rotation.
Trunk	Dystonia in the trunk : e.g. sustained muscle contraction resulting in pulling trunk movements and/or posture into any plane of motion: extension, flexion, lateral flexion, rotation.	Choreoathetosis in the trunk : e.g. constantly changing fragmented or contorting trunk movements (wagging) into any plane of motion: extension, flexion, lateral flexion, rotation.
Arm Proximal	Dystonia in the shoulder girdle, upper arm, elbow : e.g. sustained muscle contractions causing abnormal posturing, involuntary and/or distorted voluntary movements of the proximal arm.	Choreoathetosis in the shoulder girdle, upper arm, elbow : e.g. constantly changing fragmented or contorting movements of the proximal arm: jerky, stormy (choreo) and/or wriggling, contorting (athetosis).
Arm Distal	Dystonia in the forearm, wrist, hand : e.g. sustained muscle contractions causing abnormal posturing, involuntary and/or distorted voluntary movements of the distal arm.	Choreoathetosis in the forearm, wrist, hand : e.g. constantly changing fragmented or contorting neck movements of the distal arm: jerky, stormy (chorea) and/or wriggling, contorting (athetosis).
Leg Proximal	Dystonia in the hip girdle, upper leg, knee : e.g. sustained muscle contractions causing abnormal posturing and/or distorted voluntary movements of the proximal leg.	Choreoathetosis in the hip girdle, upper leg, knee : e.g. constantly changing fragmented or contorting movements of the proximal leg: jerky, stormy (chorea) and/or wriggling, contorting (athetosis).
Leg Distal	Dystonia in the lower leg, ankle, foot : e.g. sustained muscle contractions causing abnormal posturing and/or distorted voluntary movements of the distal leg.	Choreoathetosis in the lower leg, ankle, foot : e.g. constantly changing fragmented or contorting movements of the distal leg: jerky, stormy (chorea) and/or wriggling, contorting (athetosis).

References:

¹ Monbaliu E, Ortibus E, De Cat J, Dan B, Heyrman L, Prinzie P, De Cock P, Feys H. The Dyskinesia Impairment Scale: a new instrument to measure dystonia and choreoathetosis in Cerebral Palsy. *Dev Med Child Neurol* 2012; 54:278-283.

² Krägeloh-Mann I, Petrucci U, Weber P-M. SCPE Reference and Training Manual (R&TM). Grenoble: Surveillance of Cerebral Palsy in Europe 2007.

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SCORE FORM (1/2):

Duration Factor	Amplitude Factor
0 = D/CA is absent 1 = D/CA is occasionally present 2 = D/CA is frequently present 3 = D/CA is mostly present 4 = D/CA is always present	0 = D/CA is absent 1 = D/CA in small range of motion 2 = D/CA in moderate range of motion 3 = D/CA in submaximal range of motion 4 = D/CA in maximal range of motion
<10% ≥10 <50% ≥50 <90% ≥90%	<10% ≥10 <50% ≥50 <90% ≥90

Region	Action			Rest		
	Single activity	Duration factor	Amplitude factor	Single position	Duration factor	Amplitude factor
Eye Dystonia	eye tracking	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	eye blinking	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
Eye Choreo-athetosis	eye tracking	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	eye blinking	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
Mouth Dystonia	mouth open/close	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	speech	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
Mouth Choreo-athetosis	mouth open/close	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	speech	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
Neck Dystonia	lateroflexion right/left	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	rotation left/right	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
Neck Choreo-athetosis	lateroflexion right/left	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	rotation left/right	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
Trunk Dystonia	active sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	forward flexion	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
Trunk Choreo-athetosis	active sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	forward flexion	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
R Arm prox Dystonia	arm abduction	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	grasp and move a pen	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
R Arm prox Choreo-athetosis	arm abduction	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	grasp and move a pen	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
L Arm prox Dystonia	arm abduction	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	grasp and move a pen	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			
L Arm prox Choreo-athetosis	arm abduction	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4	sitting position	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4
	grasp and move a pen	0 - 1 - 2 - 3 - 4	0 - 1 - 2 - 3 - 4			

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SCORE FORM (2/2):

Region	Action				Rest					
	Single Activity	Duration factor		Amplitude factor		Single Position	Duration factor		Amplitude factor	
R Arm dist Dystonia	grasp and move a cup grasp and move a pen	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		sitting position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
R Arm dist Choreo-athetosis	grasp and move a cup grasp and move a pen	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		sitting position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
L Arm dist Dystonia	grasp and move a cup grasp and move a pen	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		sitting position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
L Arm dist Choreo-athetosis	grasp and move a cup grasp and move a pen	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		sitting position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
R leg prox Dystonia	rolling standing	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
R leg prox Choreo-athetosis	rolling standing	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
L leg prox Dystonia	rolling standing	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
L leg prox Choreo-athetosis	rolling standing	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
R leg dist Dystonia	rolling heel/toe raising	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
R leg dist Choreo-athetosis	rolling heel/toe raising	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
L leg dist Dystonia	rolling heel/toe raising	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	
L leg dist Choreo-athetosis	rolling heel/toe raising	0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4 0 - 1 - 2 - 3 - 4		lying position	0 - 1 - 2 - 3 - 4		0 - 1 - 2 - 3 - 4	

Abbreviations score form: D, dystonia; CA, choreoathetosis; R, right; L, left; prox, proximal; dist, distal

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FILM PROTOCOL:

A: General view	1. entering the room (walking or with wheelchair)	F - general view
B: Sitting - comfort position	2. sitting in rest (chair or wheelchair)	F - general view
	3. sitting in rest (chair or wheelchair)	F - close-up
	4. eyes tracking movement	F - close-up
	5. eyes blinking (10x)	F - close-up
	6. opening and closing mouth (10x)	F - close-up
	7. speech -interview ^a	F - bust
	8. turn head to right then to left (5x)	F - bust
	9. lateroflexion of the head to the left (5x) and right (5x) (=bring your ear to your shoulder on each side)	F - bust
	10. elevate arms sideways (5x)	F - general view
	11. alternating heel to toe taps right (5x)	F - close-up lower limbs
	12. alternating heel to toe taps left (5x)	F - close-up lower limbs
	13. take a cup with your right hand on the left corner and bring it to the right corner of the table and bring it back to the left corner of the table (2x)	F - general view
	14. take a cup with your left hand on the right corner and bring it to the left corner of the table and bring it back to the right corner of the table (2x)	F - general view
	15. take a pen with your right hand on the left corner and bring it to the right corner of the table and bring it back to the left corner of the table (2x)	F - general view
	16. take a pen with your left hand on the right corner and bring it to the left corner of the table and bring it back to the right corner of the table (2x)	F - general view
C: Sitting - active position	17. active sitting on a bench	F - general view P - general view
	18. bend trunk forwards and back (5x)	P - general view
D: Lying position	19. lying on a mat in rest	F - general view
	20. grasping/reaching a pen with right arm from lying position (4x: aside / over the head / over the midline / to the limbs)	F - general view
	21. grasping/reaching a pen with left arm from lying position (4x: aside / over the head / over the midline / to the limbs)	F - general view
	22. rolling over right	F - general view
	23. rolling over left	F - general view
E: Standing position	24. stand upright	F - general view
	25. stand upright	P - general view right
	26. stand upright	P - general view left

Abbreviations: F=frontal view; P=profile view

Duration of recording for each task is 30 seconds

Practice trial(1x)

^aSpeech interview (standard questions) - e.g. - What is your name? How do you come to school? By car or by bus? Is your teacher a man male or female? Do you sleep at school? On which days?