

Supplementary materials

Figure S1. MI-CAT(V) refined version composed of four sub-sections.

Montreal Instrument for Cat Arthritis Testing, for Veterinarian use [MI-CAT(V)]

Evaluation Procedure

Perform the evaluation by observing the cat from a distance. Place the cat on the floor and observe its undisturbed behavior, posture, and movements.

Stimulate walking, running, jumping, playing, *etc.* Toss treats or use toys (*e.g.* cotton ball, strings) for it to chase. Call, gesture enticingly or pet the cat to encourage it to approach the evaluator.

Criterion 1. Assess **Body Posture** both with the cat standing still and during locomotion.

Criterion 2. Observe **Gait** from all perspectives (including from above). If needed, use encouragement to stimulate the cat to walk, run and turn.

Do not physically push or pull the cat, nor guide it by a leash or collar, nor startle it. These will interfere with natural movements.

Criterion 3. Assess **Obstacles** by encouraging the cat to pass under a low and adjustable overhead obstacle of approx. its elbow height (*e.g.*, rungs of a cart or gurney...height around 12-17 cm). Encourage the cat to jump down using a raised horizontal surface (*e.g.*, bench, shelf, chair, low table ... height around 76 cm). Jump height measurement is a good discriminatory factor in discomfort as severely affected cats will lean on the vertical support with the thoracic limbs in the hope to reduce the jump size. A rescue stair could be available as alternative to give the choice to the osteoarthritic cat to either jump down or use the rescue stair.

Criterion 4. Complete the **Global Distance Exam** based on your global subjective impression.

NOTE: Cats with osteoarthritis do not necessarily demonstrate all of the abnormalities described below.

Scoring of Abnormality

Each item (criterion) should be scored in terms of **Degree of Alteration** as indicated for each criterion. If an item cannot be evaluated, its maximum score will be deducted from the criterion maximum score.

Assessment Criteria	Degree of Alteration			Score
1. Body Posture	Normal	Mild	(in intensity or duration) Clear/Obvious	
A. Stands with hind limbs held far forward under body	0	1	3	
B. Increased forelimb flexion	0	1	3	
C. Increased hind limb flexion	0	1	3	
D. Hind limb asymmetry (right to left)	0	1	3	
Total score (add items A to D)				

Assessment Criteria	Degree of Alteration				Score	
2. Gait	Normal	Possible	(or doubtful)	Clear/Obvious		
A. Appears to move slowly	0	1		3		
B. Forelimb stiffness/lameness	0	1		3		
C. Hind limb stiffness/lameness	0	1		3		
D. Forelimb joints – reduced range of motion	0	1		3		
E. Hind limb joints – reduced range of motion	0	1		3		
F. Lateral movements of spine at walk	0	1		3		
Total score (add items A to F)						
Maximum score = • • (subtract • for each unscored item)						
3. Obstacles						
A. Difficulty passing under an overhead obstacle	0 (easy)	1 (not so easy)	2 (hesitant)	3 (difficult)	4 (no attempt)	
Speed						
Willingness						
Scrape loudness						
B. Front feet land heavily (audibly/visibly) when jumping down	0 (not perceptible)	1 (noisy)	3 (loud)	4 (no attempt)		Preferential use of rescue stair 4
Hind feet land heavily (audibly/visibly) when jumping down	0 (not perceptible)	1 (noisy)	3 (loud)	4 (no attempt)		Preferential use of rescue stair 4
Total score (add items A to B)						
Maximum score = • • (subtract • for each unscored item)						
4. Global Distance Examination						
<div> <div>No mobility impairment</div> <div> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div>12345678910</div> </div> <div> <div>Worst possible OA-related mobility impairment</div> </div>						
Score						
Maximum score = 10						
(A) MI-CAT(V) Total score (add scores from criteria 1 to 4)						
(B) Maximum scale score = • • (subtract as needed for unanswered items)						
Maximum score = • • (subtract • for each unscored item)						

Figure S2. MI-CAT(V) Manual of Use.

Evaluator: _____ Cat: _____ Date: _____



MI-CAT(V) scoring sheet

Montreal Instrument for Cat Arthritis Testing, for Veterinarian use

Assessment Criteria

Degree of Alteration

1. Body Posture

	Normal	Mild	Severe/Obvious
A) Hindlimb placement	0	1	3
B) Forelimb flexion	0	1	3
C) Hindlimb flexion	0	1	3
D) Hindlimb weight bearing	0	1	3

2. Gait

A) Moves slowly with short uneven strides	0	1	3
B) Forelimb stiffness	0	1	3
C) Hindlimb stiffness	0	1	3
D) Forelimb range of motion	0	1	3
E) Hindlimb range of motion	0	1	3
F) Lateral spine movement	0	1	3

3. Obstacles

A) Overhead obstacle at elbow height of cat (no attempt)

Speed	0 (run)	1 (fast walk)	2 (slow walk)	3 (crawl)	4
Willingness	0 (immediate)	1 (1-2s pause)	2 (2-5s pause)	3 (>5s pause)	4
Scrape loudness	0 (no sound)	1 (slight scrape)	2 (moderate scrape)	3 (loud scrape)	4

[Assess when cat is chasing a highly desired object (e.g. treat) when the overhead obstacle]

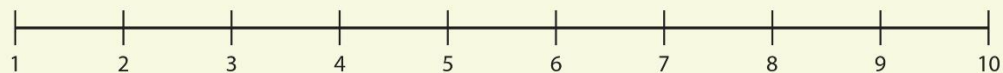
B) Jumping from raised obstacle (barely perceptible) (perceptible) (loud) (no attempt)

Front feet land heavily	0	1	3	4
Hind feet land heavily	0	1	3	4

4. Global distance exam

No mobility
impairment

Worst possible mobility

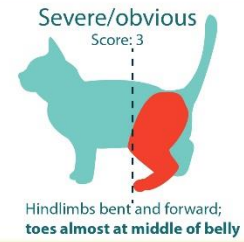
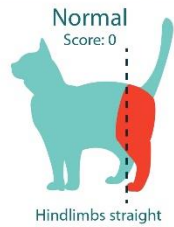


MI-CAT(V) total score = sum of all items

1. Body Posture

Observe when cat standing still. DO NOT assess when cat moving or rubbing itself against objects or evaluators, playing or any other behaviours that may affect scoring. If one side (left or right) seems differently affected, score the more severely affected side.

1A) Hindlimb placement



1B) Forelimb flexion



1C) Hindlimb flexion



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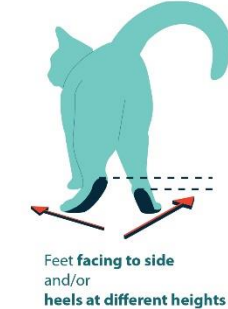
1. Body Posture

Observe when cat standing still. DO NOT assess when cat moving or rubbing itself against objects or evaluators, playing or any other behaviours that may affect scoring. If one side (left or right) seems differently affected, score the more severely affected side.

1D) Hindlimb weight

bearing




-observe if body weight is evenly distributed on both hindfeet




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2. Gait

Observe when cat is walking. DO NOT assess when cat is running (except for 2A), rubbing itself against objects or evaluators, playing or any other behaviours that may affect scoring. If one side (left or right) seems differently affected, score the more severely affected side.

	Normal Score: 0	Mild Score: 1	Severe/obvious Score: 3
2A) Moves slowly with short uneven strides -assess speed, quality of movement and overall willingness to move in general or chase desired object (e.g. treats)	 <p>Fast and smooth</p> <p>Cat runs or trots quickly with long smooth strides; high motivation to move</p>	 <p>Fast but uneven strides</p> <p>Cat runs or trots quickly with short uneven strides; high motivation to move</p>	 <p>Slow and/or very uneven strides</p> <p>Cat walks slowly or clumsily; low motivation to move</p>










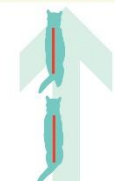


2B) Forelimb stiffness	 <p>Forelimb muscles contract to lift paw and metacarpal bends easily</p>	 <p>Forelimb muscles contract to lift paw and metacarpal bends slightly</p>	 <p>Forelimb muscles barely contract when lifting paw and metacarpal barely bends</p>
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2C) Hindlimb stiffness	 <p>Hindlimb stretches forward when taking a step; movement appears fluid</p>	 <p>Hindlimb stretches forward slightly when taking a step; movement appears slightly stiff</p>	 <p>Angle between tibia and metatarsus stays unchanged; cat appears to be waddling and movement is very stiff</p>
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2. Gait

Observe when cat is walking. DO NOT assess when cat is running (except for 2A), rubbing itself against objects or evaluators, playing or any other behaviours that may affect scoring. If one side (left or right) seems differently affected, score the more severely affected side.

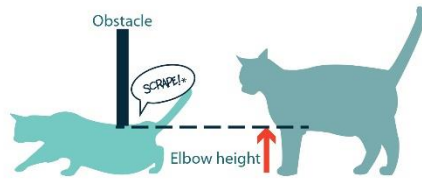
	Normal Score: 0	Mild Score: 1	Severe/obvious Score: 3
2D) Forelimb range of motion	 <p>Forelimb stretches as far as possible Wide distance between forepaws</p>	 <p>Forelimb can stretch further Smaller steps taken</p>	 <p>Forelimb barely stretches forward Small steps taken</p>
2E) Hindlimb range of motion	 <p>Wide distance between hindpaws</p>  <p>Very small or no gap between hind- and forepaw, hindpaw almost steps into place of forepaw</p>	 <p>Wide distance between hindpaws</p>  <p>Small noticeable gap between hind- and forepaw, hindpaw does not step into place of forepaw</p>	 <p>Small steps taken Small distance between hindpaws</p>  <p>Wide and very noticeable gap between hind- and forepaw, hindpaw steps a large distance from where forepaw was</p>
2F) Lateral spine movement -assess from behind while cat in motion	 <p>Spine remains rigid</p>	 <p>Hips sways slightly</p>	 <p>Hip sways very obviously</p>

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3. Obstacles

Encourage cat to pass under overhead obstacle (cat's elbow height) and jump from table height (approx. 76 cm)
DO NOT physically push or pull cat by leash or collar or startle it. Use of treats or food is recommended.

3A) Difficulty passing under obstacle



	Score 0	Score 1	Score 2	Score 3
Speed:	Run	Fast walk	Slow walk	Crawl
Willingness:	Immediate	1-2s pause	2-5s pause	>5s pause
Scrape loudness*:	No sound	Slight	Moderate	Loud

Right after throwing treat under overhead obstacle:

Speed = pace used to chase after treat

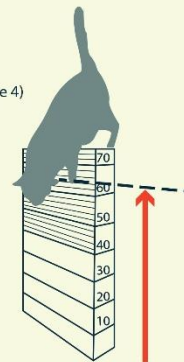
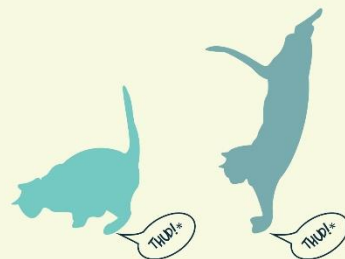
Willingness = reaction time to chase after treat and go under obstacle

Scrape loudness = sound of cat's back scrratching against obstacle as it goes under

Give score of 4 to each item if cat refuses to attempt

3B) Jumping from raised obstacle

*Assess loudness of landing for front and back feet:
not perceptible (score 0), perceptible (score 1), loud (score 3), did not try (score 4)



Measure height of cat's paw from ground right before jump**

**Recording and reviewing video footage (slow-motion feature) from a smart phone may be helpful.