One thing clinicians and investigators can agree upon is that finding valid, precise, reliable, and accurate measures of chronic pain in animals is a very tall order indeed. However, the effort is important—if we are to effectively manage patients with chronic pain, we have to be able to assess it, which also allows us to determine whether our interventions are therapeutic.

QUALITY OF LIFE
Chronic pain significantly impacts quality of life in animals, as it does in humans. In addition to the discomfort itself, there is diminished mobility and ability to perform normal activities of daily living. In humans, chronic pain is associated with cognitive deficits (learning, memory, etc) and increasingly understood to coexist with clinical depression.\(^1\,^2\) Other, nonpainful conditions can influence chronic pain assessment, including neurologic and metabolic disease.

PAIN ASSESSMENT METHODS
There are 5 prospective methods to assess and score chronic pain:
1. Veterinary examination
2. Physiologic biomarkers
3. Objective measurements of gait (eg, force plate) and/or activity and movement (eg, accelerometer)
4. Owner assessment of activities of daily living (ADL)
5. Multifactorial clinical measurement instruments.

VETERINARY EXAMINATION
Unfortunately, veterinarians have found chronic pain scoring based on physical examination disappointing. Reasons include:
• Variability among veterinary observers and even among examinations by the same veterinarian
• Variable expression of pain among patients
• Change of patient behavior in examination room versus at home
• Many different causes of chronic pain.

PHYSIOLOGIC BIOMARKERS
Currently there are no biomarkers (biochemical or physiologic parameters) that reliably correlate to chronic pain, although this is an area under active investigation. Physiologic biomarkers, such as blood pressure, heart rate, and cortisol levels, have very low specificity because circumstances other than pain (eg, fear, anxiety, stress) also affect these markers.

OBJECTIVE MEASUREMENTS OF GAIT
Objective measurements, such as force plate analysis or activity monitors, when properly utilized, are valid in the research setting but, at this time, have not translated into clinical practice. As technology advances, these may be promising clinical modalities in the near future.

OWNER ASSESSMENT OF ADL
Owner assessment of ADL is currently the most scientifically and clinically useful chronic pain scoring tool.

Pain Conditions
The most common chronic pain condition encountered in dogs and cats is osteoarthritis (OA); other conditions that can cause chronic pain include intervertebral disk disease, cancer, and nonmalignant neuropa-thies/myopathies.

Owner Observations
The clinical observations owners generally make are related to behavior changes in their pets. Clients most often notice the growing absence of behaviors once considered routine (diminished abilities or dis-ability); less often they notice onset of new behaviors (eg, lameness, vocalization).
Challenges

Several challenges exist when relying on owner observations to evaluate chronic pain in pets:

- Some behaviors associated with chronic pain, such as diminished abilities and mobility challenges, may also be attributed to nonpainful conditions, such as neurologic or metabolic disease.
- If a pet's pain is associated with OA, asking untrained owners to simply assign a visual analogue scale number of 0 to 10 to quantify pain is a poor tool because of inferior observational validity (ie, owners may not recognize certain behavior as signs of pain).
- Differences in manifestations of chronic pain among species—specifically OA-related behaviors—make it difficult to apply specific pain scoring systems to both dogs and cats.

CLINICAL MEASUREMENT INSTRUMENTS

Due to the limitations and challenges noted above, observation-based owner questionnaires and multifactorial clinical measurement instruments (CMIs) have been developed and validated in animals and humans, with the latter often inspiring the former.

Before questionnaires and CMIs are considered ready for clinical use, an extensive development process evaluates several levels and layers of validity. To learn more about this validation process, visit the North Carolina State University Comparative Pain Research Laboratory's webpage on Clinical Metrology Instruments at cvm.ncsu.edu/docs/cprl/cmi.html.

Several CMIs have been validated in dogs and others are under development in cats.

Helsinki Chronic Pain Index

The Helsinki Chronic Pain Index (HCPI) for dogs with OA was first described in 2003 and then validated in 2009.

For the HCPI, 11 items are scored 0 to 4, divided between a:
- **Simple Descriptive Scale** for demeanor, behavior, and locomotion
- **Visual Analog Scale** for pain and locomotion.

This system has also been used to assess response to nutritional therapy for OA. In one study, HCPI correlated well with improvements of objective gait assessments in the study group; however, improvement in HCPI was also seen in the placebo group while objective measurements worsened. The paradox of these results speaks to the inherent challenges and limitations of not only CMIs but also objective measurements.

Canine Brief Pain Index

The Canine Brief Pain Index (CBPI) was adapted from a human Brief Pain Index and validated for canine OA in 2007 and osteosarcoma in 2009.

The CBPI asks owners to assign a score to 11 domains.

- **Four domains involve pain severity:** the owner assigns a numerical rating score of 0 (no pain) to 10 (severe pain) to the pet's Worst, Least, Current, and Average pain over the previous 7 days.

- **Six domains involve pain interference with function:** the owner assigns a 0 (no interference) to 10 (complete interference) to General Activity, Enjoyment of Life, Ability to Rise to Standing, Ability to Walk, Ability to Run, and Ability to Climb Stairs.

- **The final domain involves quality of life:** the owner assesses the dog's general quality of life from 0 (poor) to 5 (excellent).

The patient score is the sum of these domains.

The CBPI has been successfully used to assess response to therapy for OA and, more recently, it has been shown to correlate with objective measurements of canine OA.

Cincinnati Orthopedic Disability Index

Developed in 2003, the Cincinnati Orthopedic Disability Index (CODI) uses client-specific outcome measures (CSOMs), making it different from other tools.

Instead of relying on the same standard questions for each patient, the CODI asks owners what difficulties they believe their dogs are exhibiting.

- For each activity, the owner notes if it is a Little Bit of a Problem, Quite a Bit of a Problem, a Severe Problem, or Impossible for the dog to do.

Answers are assigned a score of 1 to 4, respectively; then transformed into a 0 to 100 score, with 100 denoting a perfectly normal dog. The score decreases with increasing degrees of disability.

The CODI has been used to assess an adjunctive

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**CANINE CMIS: WHERE TO FIND THEM**

- **Helsinki Chronic Pain Index:** The second English translation of the HCPI can be found at http://www.vetmed.helsinki.fi/english/animalpain/hcpi/HCPI_E2.pdf.

- **Canine Brief Pain Index:** A PDF of the CBPI is available at https://centri.unipg.it/cesda/doc/files/Scale_del_dolore/Canine_Brief_Pain_Inventory.pdf.

- **Cincinnati Orthopedic Disability Index:** The CODI is available on the IVAPM’s website at ivapm.org (for members), and is also available at todaysveterinarypractice.com.

- **Health-Related Quality of Life:** The latest version of this CMI is described in Development, Validation and Reliability of a Web-Based Questionnaire to Measure Health-Related Quality of Life in Dogs, available at http://onlinelibrary.wiley.com/doi/10.1111/jasp.12059/abstract.

pain modifying drug” and, recently in a trial investigating a canine OA food, it correlated well with objective measurements (gait analyses) and outperformed CBPI and the Health-Related Quality of Life (HRQL) CMI in evaluating response to therapy.\textsuperscript{16} CSOMs may have cross-over application to assessing OA in cats.\textsuperscript{7}

Health-Related Quality of Life (Glasgow University Health-Related Dog Behaviour Questionnaire)
The Health-Related Quality of Life (HRQL) was developed specifically for veterinary patients versus being derived from an existing CMI for humans.

• The HRQL was first published to evaluate the impact of pain on quality of life in dogs with OA (2004, 2006),\textsuperscript{18,19} and osteosarcoma (2005).\textsuperscript{20}
• The OA HRQL asks owners to score 109 items (therefore, it is time-consuming) in 12 domains on a 1 to 7 scale, while the Osteosarcoma HRQL is simpler, with only 12 items to score, including:
  » Ability to play
  » Appetite
  » Gastrointestinal function
  » Hygiene
  » Interaction with family members
  » Presence of pain
  » Sleep.

The original OA HRQL was recently (2013) refined and reduced to include only 46 items that fall under 4 domains:\textsuperscript{21}
1. Anxiety: Feeling of worry, nervousness, or unease
2. Pain: An unpleasant sensory and emotional experience associated with actual or potential tissue damage
3. Vitality: Physical or mental vigor; capacity for survival or for the continuation of a meaningful or purposeful existence.
4. Sleep: Quality of resting or sleeping

Liverpool Osteoarthritis in Dogs
The Liverpool Osteoarthritis in Dogs (LOAD) CMI was first validated to evaluate canine elbow arthritis (2009)\textsuperscript{22} however, it also compares favorably with HRQL and CBPI and correlates (albeit weakly) with objective measurements (gait analyses).\textsuperscript{21} LOAD asks owners to assess their dogs’ mobility in 13 areas (5 General domains and 8 At Exercise domains) on a 0 to 4 Simple Descriptive Scale.

In the near future, practitioners can expect to see one or more of these chronic pain scoring tools adapted for use in the clinical setting. With widespread use, our ability to follow patients with chronic pain, and adjust their management accordingly, can be expected to improve significantly.

ADL = activities of daily living; CBPI = Canine Brief Pain Index; CMI = clinical measurement instrument; CODI = Cincinnati Orthopedic Disability Index; CSOM = client-specific outcome measures; HCPI = Helsinki Chronic Pain Index; HRQL = Health-Related Quality of Life; IVAPM = International Veterinary Academy of Pain Management; LOAD = Liverpool Osteoarthritis in Dogs; OA = osteoarthritis

References

Mark Epstein, DVM, Diplomate ABVP (Canine/Feline), CVPP, received his DVM from the University of Georgia and is the senior partner and medical director of TotalBond Veterinary Hospitals as well as Carolinas Animal Pain Management, a group of AAHA-accredited practices in the Charlotte and Gastonia, North Carolina, areas. He is certified by the American Academy of Pain Management and International Veterinary Academy of Pain Management, and a past president of the IVAPM and ABVP. Dr. Epstein is an author and frequent lecturer on the recognition, prevention, and treatment of pain in the veterinary clinical setting.
ASSESSING CHRONIC PAIN IN DOGS