

Frailty in Senior and Geriatric Medicine

Frailty is an emerging topic that practitioners should be aware of in senior and geriatric veterinary medicine. Aging is the leading cause of disability, morbidity, and mortality in adult dogs. Despite this, there are limited ways to assess aging and its impact on survival and prognosis in veterinary patients. In human gerontology, the assessment of *frailty* plays a central role in evaluating the process of aging and predicting the development of disease and death. Frailty is a broad term that encompasses loss of strength and function, diminished resistance to stressors, and increased risk of disability, disease, and death. Although the underlying etiology has not been fully elucidated, frailty is believed to occur secondary to the dysregulation of multiple physiologic systems, leading to loss of reserves. Mechanisms may include loss of muscle, inflammation, immune dysregulation, endocrinopathies as well as genetic factors.

The concept of frailty has been well studied in human medicine, and it has been documented that frailty, even more so than chronological age, is associated with an increased risk of negative health outcomes and death. Frailty is, therefore, considered an important prognostic indicator. Additionally, human studies have shown that while the aging process cannot be reversed, early identification and targeted intervention of frailty can delay, prevent or even reverse progression in some cases. A number of “frailty instruments” have been developed to assess frailty in people. These instruments differ in the number and variety of domains that are assessed and vary from simple to complex.

As the geriatric veterinary population expands due to improved diagnostic and therapeutic capabilities, the need for a clinically applicable frailty score is evident. The ability to assess frailty could help provide important insights concerning the risk of age-related conditions and overall mortality. This information could help guide veterinarians select the best means to monitor and treat their geriatric patients. Additionally, the ability to stratify geriatric dogs into different risk profiles based on their frailty could also greatly impact prognostication and subsequent medical decision-making by owners (Example: decision to pursue treatment vs humane euthanasia, etc.) which is especially important in geriatric populations. Identification of frail dogs would also allow for direct intervention in the frailty state as seen in people, including treatments targeted at improving strength, muscle condition, balance, etc.

Although frailty has been studied to a very limited extent in dogs when compared to people, preliminary studies suggest that the concept can be adapted to canine geriatrics.^{1 2} In one study, a canine frailty index (CFI) was developed specifically for dogs, using the same principles behind the design of such indices in humans. Higher CFIs indicated a higher number of age-associated diseases, deficits, and overall greater frailty. The CFI score correlated appropriately with age and with 6-month mortality risk, validating the principle of using a frailty index to assess the health impact of aging in dogs. The Dog Aging Project (DAP) recently published a review on frailty, and the authors discussed a need for an accessible frailty

¹ Banzato, T., Franzo, G., Di Maggio, R., Nicoletto, E., Burti, S., Cesari, M., & Canevelli, M. (2019). A Frailty Index based on clinical data to quantify mortality risk in dogs. *Scientific Reports*, 9, 16749. <https://doi.org/10.1038/s41598-019-52585-9>

² Hua, J., Hoummady, S., Muller, C., Pouchelon, J. L., Blondot, M., Gilbert, C., & Desquilbet, L. (2016). Assessment of frailty in aged dogs. *American Journal of Veterinary Research*, 77(12), 1357-1364. <https://doi.org/10.2460/ajvr.77.12.1357>

instrument for companion dogs.³ The authors proposed a phenotypic frailty instrument utilizing components easily collected by owners in the general practice setting based on several domains, including physical condition, physical activity, mobility, strength, cognitive task performance, and social behavior.

The concept of frailty and its possible implications on decision-making and treatment represents an exciting chapter for the future of canine geriatric medicine!

Additional Frailty References:

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³ Melvin, R. L., Ruple, A., Pearson, E. B., Olby, N. J., Fitzpatrick, A. L., & Creevy, K. E. (2023). A review of frailty instruments in human medicine and proposal of a frailty instrument for dogs. *Frontiers in Veterinary Science*, 10, 1139308. <https://doi.org/10.3389/fvets.2023.1139308>