CISA Student Showcase

# Stem Cell Therapy for Feline Chronic Kidney Disease: Examining the Evidence and a Proposed Study

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## Introduction

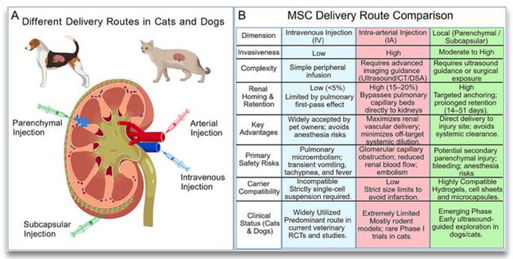
### Kidney Disease

Chronic kidney disease (CKD) is a common condition in older cats, characterized by a slow decline in kidney function over time (Sparkes et al., 2016; Vertloo, 2025). Clinical signs often vary but include increased thirst and urination, dehydration, weight loss, vomiting, and diarrhea that can significantly decrease quality of life (Vertloo, 2025). The disease is diagnosed via laboratory testing on both blood and urine. Prognosis rapidly declines in later stages, therefore early intervention is critical for slowing the progression of CKD (Sparkes et al., 2016; Vertloo, 2025). The current treatment standard (e.g. fluid therapy, renal diets, and medication) focus primarily on managing symptoms and improving quality of life (Sparkes et al., 2016).

Intravenous MSC injection to a feline patient. Photo by Jessica Quimby.

### Stem Cell Therapy

Stem cell therapy is an emerging treatment for various inflammatory and degenerative diseases in companion animals, and is currently being investigated for use in feline CKD (Quimby & Borjesson, 2018; Yu et al. 2026). Mesenchymal stem cells (MSCs) or adult stem cells are of particular interest due to their strong regenerative properties and regulatory roles in the immune response (Quimby, 2019; Yu et al., 2026). These cells are self-renewing and can differentiate into many effector tissue cells to stimulate healing. They are primarily found in the bone marrow, fat, and amniotic tissues (Quimby, 2019). For feline CKD, stem cell therapy may be administered intravenously, intra-arterially, or intrarenally (Yu et al., 2026).




B MSC Delivery Route Comparison

| Dimension | Intravenous Injection (IV) | Intra-arterial Injection (IA) | Local (Parenchymal / Subcapsular) |
|---|---|---|---|
| Invasiveness | Low | High | Moderate to High |
| Complexity | Simple peripheral infusion | Requires advanced imaging guidance (Ultrasound/CT/DSA) | Requires ultrasound guidance or surgical exposure |
| Renal Homing & Retention | Low (<5%) Limited by pulmonary first-pass effect | High (15–20%) Bypasses pulmonary capillary beds directly to kidneys | High Targeted anchoring; prolonged retention (14–51 days) |
| Key Advantages | Widely accepted by pet owners; avoids anesthesia risks | Maximizes renal vascular delivery; minimizes off-target systemic dilution. | Direct delivery to injury site; avoids systemic clearance. |
| Primary Safety Risks | Pulmonary microembolism; transient vomiting, tachypnea, and fever | Glomerular capillary obstruction; reduced renal blood flow; embolism | Potential secondary parenchymal injury; bleeding; anesthesia risks |
| Carrier Compatibility | Incompatible Strictly single-cell suspension required. | Low Strict size limits to avoid infarction. | Highly Compatible Hydrogels, cell sheets and microcapsules. |
| Clinical Status (Cats & Dogs) | Widely Utilized Predominant route in current veterinary RCTs and studies. | Extremely Limited Mostly rodent models; rare Phase I trials in cats. | Emerging Phase Early ultrasound-guided exploration in dogs/cats. |

**(A)** MSCs injection routes for cats and dogs; **(B)** comparisons, key benefits, and limitations of each route (Yu et al., 2026).

## Examining the Evidence

**Quimby et al. (2016)**

A placebo-controlled partial crossover study (Quimby et al., 2016) tested the efficacy of intravenous infusion of adipose-derived allogeneic MSCs in 8 cats with stage II or III CKD. No adverse effects were observed, and no significant improvement to kidney function was found within the 8-week study period. While this study is rigorous and provides strong objective evidence, it is limited by a small sample size distributed between the treatment and control groups.

**Vidane et al. (2017)**

A non-controlled study (Vidane et al., 2017) tested the effects of intrarenal MSC therapy in one healthy cat and intravenous amniotic MSC therapy in 8 cats with stage II or III CKD. The cat receiving intrarenal injection required extensive sedation due to stress, while no adverse effects were observed with intravenous infusion. Significant improvements in kidney function were found with concurrent treatments and at 1-year follow-up, suggesting that MSCs may provide long-term rather than immediate benefits. Although the results of this study are promising, the absence of a control group limits the ability to draw definitive conclusions on how it affects feline CKD.

**Thomson et al. (2019)**

A short-term cohort study (Thomson et al., 2019) administered adipose-derived donor MSCs to the renal arteries of 5 cats with stage III CKD. Only two moderate complications were reported involving bruising and discomfort around the incision; no other adverse effects were noted. One cat proceeded to stage IV, while the rest remained at stage III. This study suggests that intra-arterial injection may be safe in cats with CKD, although its effects on kidney function are unclear. A small sample size, short study duration, and observational design are the main limitations of this study.

## Gaps in the Literature

Despite growing interest in MSC therapy for feline kidney disease, evidence surrounding its ability to alter renal function remains limited. Current studies are constrained by small sample sizes, short study periods, lack of blinding, absence of control groups, and non-standardized treatment protocols (e.g. dosage, infusion route, and cell sourcing). Although some suggest benefits for owner-subjective quality of life, consistent data regarding kidney function is lacking (Yu et al., 2026).

Studies indicate that MSC infusion is safe for short-term use in cats with CKD (Quimby et al., 2016; Vidane et al., 2017; Thomson et al., 2019), although improvements to kidney function parameters (e.g. creatinine, glomerular filtration rate) and quality of life are often statistically insignificant (Yu et al., 2026). Overall, these limitations highlight a need for rigorous, large-scale future studies to provide reliable evidence and minimize bias for MSC therapy in cats with CKD..

## Looking to the Future

To better understand future research directions for MSC therapy in cats with CKD, we propose an original study design to address the limitations found in the literature:

**Research Question:** In cats with CKD, does stem cell therapy paired with standard treatments (e.g. fluid therapy, renal diets, medication) improve long-term kidney function more than standard treatments alone?

To answer this question, a study may investigate the efficacy of MSC therapy in the form of a randomized, double-blinded, placebo-controlled trial. This design offers strong evidence and minimal bias, suitable for implementation to veterinary practice.

Client-owned domestic cats with stage II or III CKD (mild or moderate severity) would be recruited across several veterinary hospitals, broadening the sample size. To enforce inclusion criteria, diagnoses would be confirmed at initial evaluation, which would involve a comprehensive physical examination and estimation of kidney function. Following randomization into either the treatment or control group, each cat would undergo multiple infusions of either MSCs or placebo spaced two weeks apart, with rechecks occurring at 2, 6, 12, and 24 months. To ensure proper blinding and minimization of bias, treatments would be made visibly identical. In addition to monitoring laboratory parameters to gauge treatment success, owners would be asked to track clinical signs and quality of life throughout the study period. While owner surveys may introduce reporting bias due to subjectivity, it can verify the presence of effects that may not always be found in laboratory results.

In summary, rigorous controlled trials are necessary to determine the efficacy of MSC therapy in cats with CKD and establish standardized treatment protocols. Future research should follow each cat longitudinally to confirm evidence of long-term disease outcomes.

## Literature Cited

Quimby, J. M. (2019). Stem cell therapy. *Veterinary Clinics of North America: Small Animal Practice, 49*(2), 223–231. https://doi.org/10.1016/j.cvsm.2018.10.001

Quimby, J. M., & Borjesson, D. L. (2018). Mesenchymal stem cell therapy in cats: Current knowledge and future potential. *Journal of Feline Medicine and Surgery, 20*(3), 208–216. https://doi.org/10.1177/1098612X18758590

Quimby, J. M., Webb, T. L., Randall, E., Marolf, A., Valdes-Martinez, A., & Dow, S. W. (2016). Assessment of intravenous adipose-derived allogeneic mesenchymal stem cells for the treatment of feline chronic kidney disease: A randomized, placebo-controlled clinical trial in eight cats. *Journal of Feline Medicine and Surgery, 18*(2), 165–171. https://doi.org/10.1177/1098612X15576980

Sparkes, A. H., Caney, S., Chalhoub, S., Elliott, J., Finch, N., Gajanayake, I., Langston, C., Lefebvre, H. P., White, J., & Quimby, J. (2016). ISFM consensus guidelines on the diagnosis and management of feline chronic kidney disease. *Journal of Feline Medicine and Surgery, 18*(3), 219–239. https://doi.org/10.1177/1098612X16631234

Thomson, A. L., Berent, A. C., Weisse, C., & Langston, C. E. (2019). Intra-arterial renal infusion of autologous mesenchymal stem cells for treatment of chronic kidney disease in cats: Phase I clinical trial. *Journal of Veterinary Internal Medicine, 33*(3), 1353–1361. https://doi.org/10.1111/jvim.15486

Vertloo, L. V. (2026, March). *Renal dysfunction in dogs and cats*. Merck Veterinary Manual. https://www.merckvetmanual.com/urinary-system/noninfectious-diseases-of-the-urinary-system-in-small-animals/renal-dysfunction-in-dogs-and-cats

Vidane, A., Pinheiro, A., Casals, J., Passarelli, D., Hage, M., Bueno, R., Martins, D., & Ambrósio, C. (2017). Transplantation of amniotic membrane-derived multipotent cells ameliorates and delays the progression of chronic kidney disease in cats. *Reproduction in Domestic Animals, 52*(S2), 316–326. https://doi.org/10.1111/rda.12846

Yu, Y., Wang, Y., Mu, Y., Wang, S., Zhang, X., & Song, Y. (2026). Advancing mesenchymal stem cell therapy for kidney diseases in companion animals: From mechanisms to clinical application. *Frontiers in Veterinary Science, 13*. https://doi.org/10.3389/fvets.2026.1771337