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Adipose-derived Stem Cell Therapy for Feline Chronic Kidney Disease: A Review of 40 Clinical Cases

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Purpose

To describe a retrospective analysis of 40 cases of feline chronic kidney disease and outcomes after therapy with adipose-derived stem cells.

Background/Objective

Chronic kidney disease (CKD) in the feline is a major cause of debilitation and death.[1] Recent reviews suggest that CKD may be the number one cause of morbidity and mortality in the aged cat. Therapies available include medical management, dietary control, dialysis and kidney transplant.[2] For most cat owners, dialysis and kidney transplant are beyond economic and practical reach. In the last decade, refereed journal articles have been published showing the possibility of using mesenchymal stem cells as a therapeutic option. [3-6] The authors hypothesized that intravenous mesenchymal stem cell therapy could improve the clinical course of CKD. This review will examine the data from 40 clinical cases treated by veterinarians using intravenous administration of adipose-derived stem cells for CKD.

Methods

A cell therapy protocol was developed for a clinical research program of cats with CKD. For enrollment in the program, the veterinarian submitted age, weight, breed, physical exam, CBC, clinical chemistry, and urinalysis. Some cases had blood pressure and renal ultrasound. Animals were excluded that had significant urinary tract infections, genetic renal disease, or significant non-renal disease(s). For each case, an intra-abdominal adipose sample was surgically collected and shipped refrigerated to a central processing laboratory where the stromal vascular fraction (SVF) was isolated from the sample by methods previously reported.[7] The initial dose (unfrozen) was returned in a 5ml volume of saline for infusion. Repeat doses were provided to the veterinarian based upon clinical response. All initial doses were fresh SVF except for one patient where cultured cells were used. Repeat doses were either frozen/thawed SVF or culture expanded as available.

Results

A total of 40 cats were treated and had adequate pre and post treatment data for analysis. The average age for cats was 12.2 years and the average body condition score was 3.0/5.0. The average dose was 4.92 x 10^6 nucleated cells using a Nucleocounter™ with an average number of initial doses per case of 1.8 and total doses of 3.3. Clinical pathology data is reported for pre-

treatment, at 180 days, and at 330 days, on average: BUN: 61.9, 52.0, 60.8, Creatinine: 3.96, 3.03, 3.78. By day 180, on average, BUN improved 16% and creatinine improved 23.5%.

Feline CKD Case Series	
# Cases Treated	40
Average Age (yrs)	12.2
Average Dose*	4.92 x 10(6)
Initial Doses	1.8
Total Doses	3.3
* Total nucleated cells, Nuclecounter	

Clinical Pathology Data		
Parameter	BUN	Creatinine
Pre-Rx	61.90	3.96
180 Days	52.00	3.03
Percent Improvement	16.0%	23.5%
330 Days Follow-up	60.80	3.78

Conclusions

There was a trend to significant improvement in BUN and creatinine at 180 days. Improvement in these parameters was seen through an average of 330 days in a population of significantly diseased patients in which these parameters would have been expected to deteriorate. There were no reported adverse events in the treated cats. This study was not blinded. This limitation makes outcome conclusions more difficult, however the study measures indicate that the therapy may be providing clinical benefit with low risk. Additional controlled studies are planned to further evaluate the benefit of cell therapy in CKD.

References

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