



**Outcome of 42 Horses with Stifle Injuries Treated with Adipose-Derived Regenerative Cells & IRAP**  
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**1. Introduction/Hypothesis:** Stifle injuries/lesions causing ongoing lameness are relatively common in performance horses and have prematurely ended many equine athlete's careers. Stifle problems can be refractory to treatment and have long recovery times. Previous studies evaluating treatment of stifle abnormalities with regenerative/stem cells had low case numbers and limited athletic performance follow-up (Frisbie 2011, Fortier 2010). Our hypothesis was that treatment of stifle injuries with Adipose-Derived Regenerative Cells (ADRC's) & IRAP could improve their athletic outcomes, athletic longevity, and shorten recovery times when compared to other treatment methods.

**2. Materials & Methods:** This was a single-center retrospective study, from 2005 to 2011, of 42 horses that were lame from stifle injuries/lesions and no longer able to perform their athletic discipline (representing 80 stifles, and 132 distinct stifle lesions). All were treated with ADRC's & IRAP, with or without arthroscopy-assisted treatment. Arthroscopy was performed in horses for which more diagnostic information was needed, or debridement and/or microfracture was felt to be necessary for treatment of the more severe cases. 64 horses with stifle injuries were treated with ADRC's & IRAP during this time period, but complete follow-up data were only available for 42 horses. 37 horses (88.1%) had bilateral stifle problems. All stifle lamenesses were diagnosed by dynamic lameness examination, diagnostic anesthesia, radiographs, ultrasound, nuclear scintigraphy, and/or MRI, and were classified by severity, location, number and types of lesions per stifle, and chronicity. Intralesional and/or intra-articular injections of the abnormal stifles with ADRC's & IRAP were performed using ultra-sonographic and/or arthroscopic guidance. All horses completed a standardized, 6 month post-treatment rehabilitation program. Horses that returned to and stayed in full work (RFW) for >1 year, without recurrent stifle lameness, was our measure of success. Horses were considered a failure if they required analgesics or ongoing treatment with intra-articular medications to RFW for >1 yr., or if they did not RFW for >1 year. **3. Results:** 64.3% of horses (27/42 horses) RFW-Prior/Higher level of performance for >1 year. 28.5% (12/42 horses) RFW-Lower level for >1 year. 7.2% (3/42 horses) did not RFW. All horses that RFW-Lower or Prior/Higher level were sound on the affected limb(s) when they returned to full work in their athletic discipline. Some of the horses in the RFW-Lower level group, initially competed at their Prior/Higher level, but then decreased to a lower level during the first year of RFW, and were eventually classified as RFW-Lower level. None of these horses displayed any obvious recurrent lameness while RFW in their athletic disciplines (importance of long-term follow-up). Age, breed, and discipline had little to no effect on successful outcome. Chronicity, severity, and type of stifle injury had negative effects on outcome. 69.0% of horses had acute stifle injuries ( $\leq 3$  mo.), 31% were chronic (>3 mo.).

Table 1 shows outcomes for all 42 horses, and for the injured stifles (n=80). Lesions, in order of decreasing frequency, included injuries to articular cartilage of the femoral & tibial condyles, femoral condyle osseous cyst-like lesions, medial menisci, meniscotibial ligaments, cranial cruciate ligaments, femoral condyle subchondral fatigue fractures & cyst formation, femoral trochlear ridge & patellar OCD, and patellar ligament. 18/42 horses were treated with ADRC's & IRAP alone, and 24/42 with Arthroscopy, ADRC's, & IRAP. No adverse reactions from treatment with ADRC's & IRAP occurred in any of the 42 horses.

TABLE 1 – Treatment outcomes for all 42 horses, and all 80 stifles: Arthroscopy, ADRC's, IRAP vs. ADRC's & IRAP

RFW- Level of Performance >1 yr.	HORSES n=42		STIFLES n=80	
	ADRC/IRAP Alone n=18	Arthroscopy ADRC/IRAP:n=24	ADRC/IRAP Alone n=34	Arthroscopy ADRC/IRAP: n=46
Prior or Higher Level	11 (61.1%)	15 (62.5%)	22 (64.7%)	28 (61.0%)
Lower Level	6 (33.3%)	7 (29.1%)	10 (29.4%)	14 (30.4)
Breeding		1 (4.2%)		2 (4.3%)
Retired: Ongoing Stifle Problems		1 (4.2%)		2 (4.3%)
Retired: Unrelated Problems	1 (5.6%)		2 (5.9%)	

**4. Discussion:** This study demonstrates good to excellent, athletic long-term RFW, in horses with lameness caused by stifle injuries/lesions treated with Arthroscopy, ADRC's, & IRAP; or with ADRC's & IRAP alone. Decision making for the treatment method for each horse was based on diagnostic information (radiographs,

ultrasound, nuclear scintigraphy, MRI) obtained from each horse's stifle. Findings in this study support the continued use of these treatment methods for successful treatment of bone, cartilage, and ligament injuries/lesions of the equine stifle. Future work could include prospective controlled studies. This study focused on a fairly large series of clinical cases, with a standardized rehabilitation program, and a stringent, long-term criterion for success. RFW-Lower/Prior/Higher level of performance for >1 year without recurrent stifle lameness (92.8%) compares favorably to other reported treatments: Arthroscopy alone 37% (Cohen, 2009), 54.5% (Schneider 1997), 35% (Smith 2005).