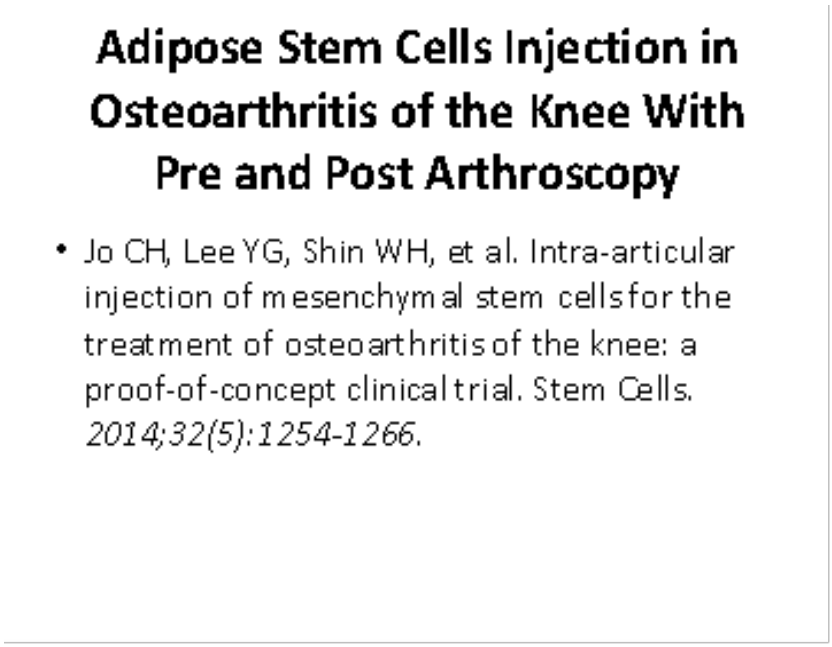
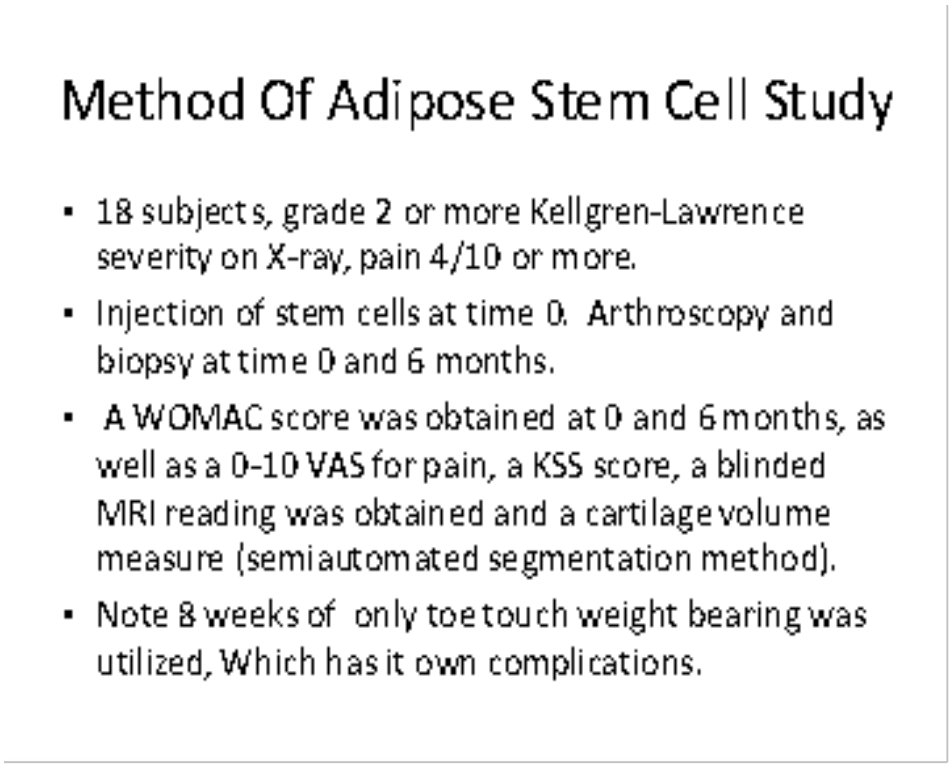


[Commentary by K. Dean Reeves, M.D. www.DrReeves.com]

This is a level II study, although merely consecutive subject because of the objective evidence of cartilage growth by pre and post arthroscopy and merits discussion for that reason.



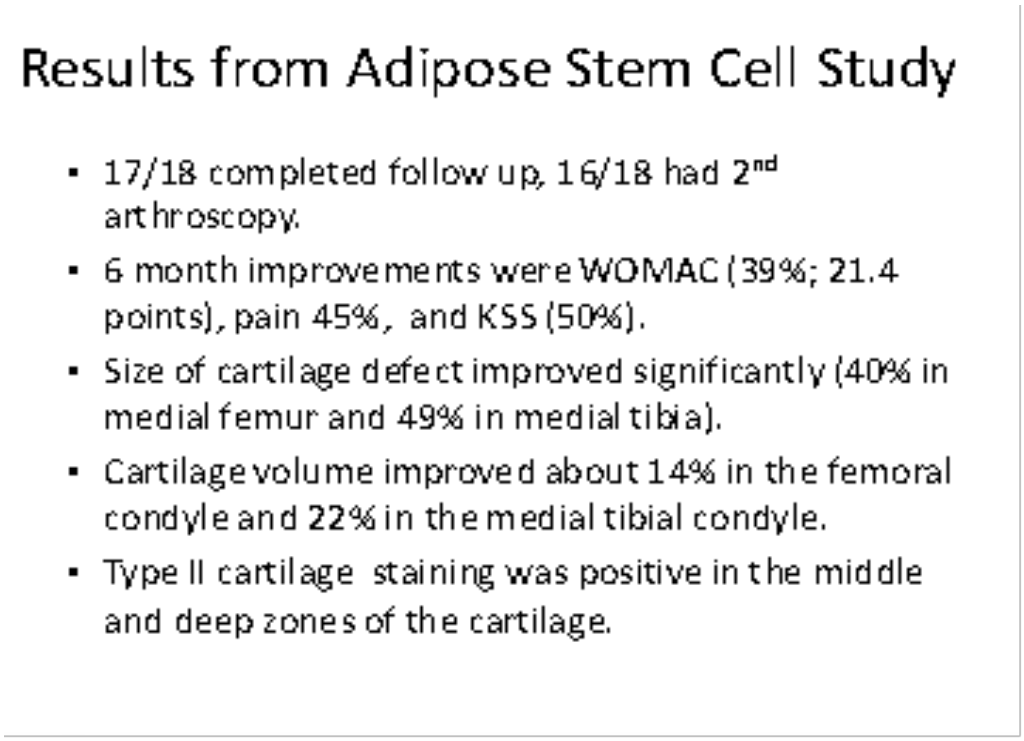
There were 9 subjects in a dosage escalation safety study. Three received10,000,000 stem cells in 3 ml saline, three received 50,000,000 and three received 100,000,000.

Then, with safety shown, 9 additional subjects received 100,000,000 stem cells.

Fat was aspirated, and then stem cells were grown for 3 weeks to achieve cell concentrations for injection.

Follow up was at time of injection and 1,2,3 and 6 months after injection. Second look arthroscopy was performed 6 months after injection and a 2 mm punch biopsy was obtained from the center of the cartilage defect of the medial femoral condyle at first arthroscopy and from the adjacent area at second arthroscopy in those who gave consent.

WOMAC (Western Ontario and McMaster Osteoarthritis Index) was also performed at 0 and 6 months as a standardized measure of clinical improvement. Other testing at 0 and 6 months included a pain measure (visual analog score from 0 to 10), MRI general readings and volume analysis and histology with appropriate stains and cartilage typing.



18 enrolled. 1 dropped out after firsst injection, 1 did not consent to second arthroscopy and 16/16 completed 6 months and 2nd arthroscopy.

Notable is that all had osteoarthritis of the knee of Kellgren-Lawrence grade 3 or 4.

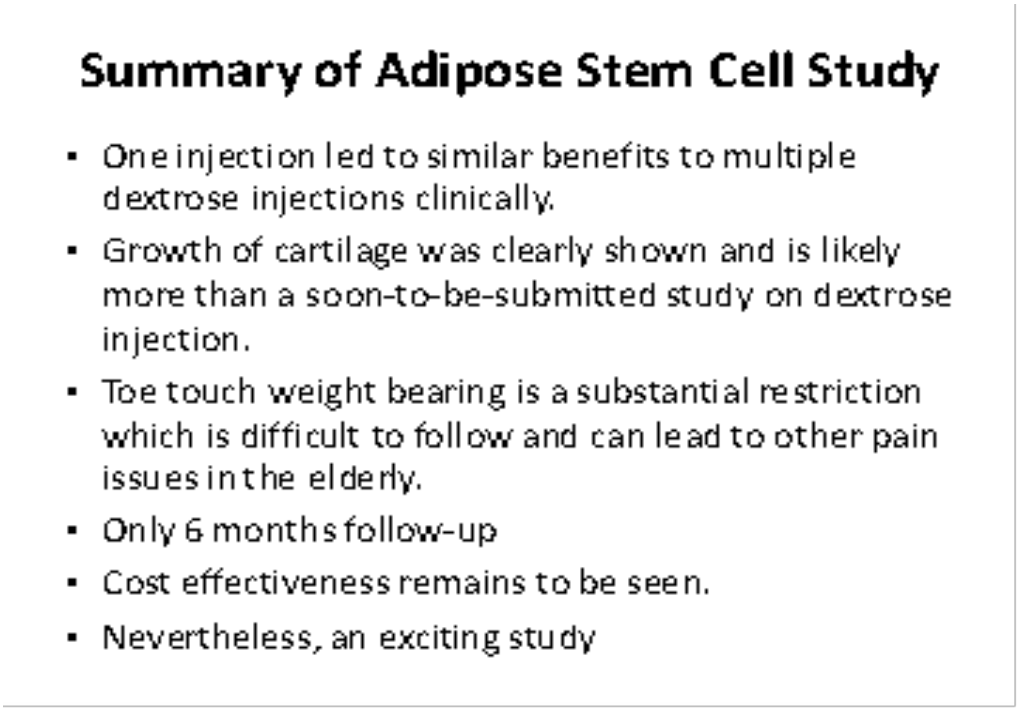
WOMAC improvements were not seen in the low or mid range stem cell group.

In the high range stem cell group WOMAC improved from 54.2(5.2) to 32.8(6.3). Pain improved from 8.0(2.2) to 4.4(6.3). KSS score increased from 41(6.8 to 79(12.5).

Radiographic changes did not change but serial MRI examinations showed gradual regeneration with thin cartilage noted at 3 months that thickened and bacame mature with isointensity at 6 months. The cartilage defect improved in size by 40% (497mm² to 298 mm²) in the femoral condyle and by 49% in the tibial condyle(333mm² to 171mm²) although the depth of the defect did not show significant changes.

Cartilage volume improvements are noted as above.

The ICRS grade improved in the medial tibial and femoral dondyle.



Key Features	CP Obj Data: 2014 Stem Cell Journal	
Good Size	Small	
Sig Clinically	Yes in both groups.	
Sig Statistically	No control group.	
Adequate F-UP	6 months.	
Data Capture	Good to 6 months.	
Accepted Tool	Standard biopsy, cartilage typing, WOMAC,etc	
Simple	No, but only one treatment.	
Inexpensive	No.	
Min invasive	No. Harvesting of stem cells required.	
Practical PC	High technology.	
Grade	II	

Small study with significant clinical benefit and significant benefits statistically in multiple areas.

Somewhat short follow up at 6 months. Data capture was good. Good tools. This was by no means a simple study as it required culture of stem cells, and of course the related expense is high.

Clearly grade II with the degree of objective data available for this consecutive patient study with good data capture.