GRÖNEMEYER INSTITUT FÜR MIKROTHERAPIE

Intradiscal Injections of Orthokine™-derived Autologous Conditioned Serum (ACS) for Lumbar Disc Pain

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Objective

Biology offers several strategies for restoring the degenerating disc, including the use of natural proteins that increase matrix accumulation and assembly, enhance the number of disc cells, or in other ways lead to restoration of the native healthy disc. Based on what is known so far about the mechanisms involved in processes leading to inflammation the inhibition of catabolic cytokines, the local administration of autologous anabolic growth factors, or both together appear to be logical and promising approaches to therapy. Based on these observations, a therapy using Orthokine™-derived Autologous Conditioned Serum (ACS, Figure 1). was developed.

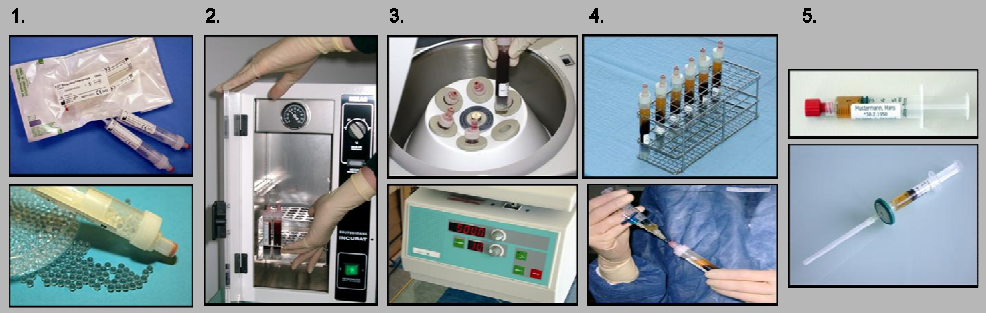

Figure 1. ACS-Production: ACS is generated by incubating venous blood with medical grade glass beads (*1+2*). Peripheral blood leukocytes produce elevated amounts of endogenous anti-inflammatory cytokines, such as interleukin-1 receptor antagonist (IL-1Ra), that are recovered in the serum. Following centrifugation and extraction (*3+4*), autologous conditioned cell free serum (ACS) is then portioned and either stored until needed or directly injected into the affected region of the patient. Injections (*5*) are given once or twice weekly, in series of three to six (for spinal and muscle injuries) or six to eight (joint diseases).

	IL-1Ra	IL-6	IL-10	FGF β	VEGF	HGF	IGF1	PDGF AB	TGF β
Mean	2015[pg]	28,7 pg]	33,4 [pg]	27 [pg]	509 [pg]	1339 [pg]	117209 [pg]	39026 [ng]	97939 [ng]

Table 1. Cytokines and growth factors present in autologous conditioned serum (ACS) produced using the 10ml Orthokine system. Abbr.: IL-1Ra = interleukin-1 receptor antagonist; IL-6 = interleukin-6; IL-10 = interleukin-10; FGF β = fibroblast growth factor-β; VEGF = vascular endothelial growth factor, HGF = hepatocyte growth factor; IGF1= insulin-likegrowth-factor-1; PDGF = platelet derived growth factor, TGF-β = transforming growth-factor-β. There is no noticeable induction of the proinflammatory IL-1 β or TNF-α. Measurements from ELISA kits (R&D Systems).

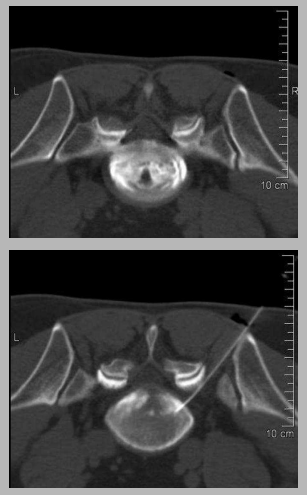

Figure 2. (a) discography showing contained disc and (b) intradiscal injection

Methods

A non-blinded, prospective study was conducted to evaluate feasibility and efficacy of ACS injections in patients suffering from lumbar disc pain (verified by anamnesis and clinics, MRI scan and distension tests, no relieve after 8 weeks of well conducted conservative treatment, pain reduction less than 50% VAS, after periradicular infiltration procedures). 19 patients had a discography and three intradiscal injections of ACS once per week for three consecutive weeks and were followed for six months (Figure 2). Outcome was measured by patient administered outcome instruments (VAS, Oswestry Disability Index).

Results

Patients with showed a clinically remarkable and significant reduction in pain and disability after the ACS injection series. Mean improvement was 58% in VAS. 11 out of 19 patients reported at least 50% pain improvement. No serious side effects occurred. There were no infections in this series.

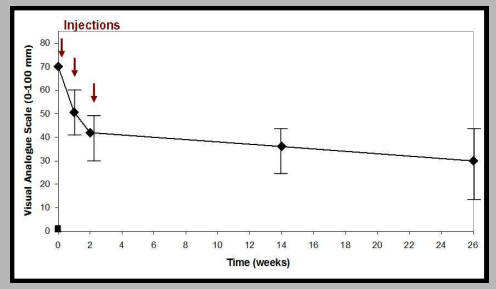

Figure 3. VAS Pain scores as a function of time. p<0.05 at each follow-up time point for the comparison with baseline values.

Conclusion

Although, these results must be confirmed in larger clinical trails and with objective assessments like quantitative MRI scans, the use of ACS in the intervertebral disc could be worthy of consideration given its impressive safety record and rich mixture of growth factors, cytokine antagonists, and, possibly, additional helpful agents.

References: Meijer H, Reinecke J et al.. Inflamm Res 2003;52(10):404-7. Wehling P, Moser C et al. Biodrugs. 2007;21(5):223-32

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