Stemcelltheraphy from bone marrow vs. fat tissue

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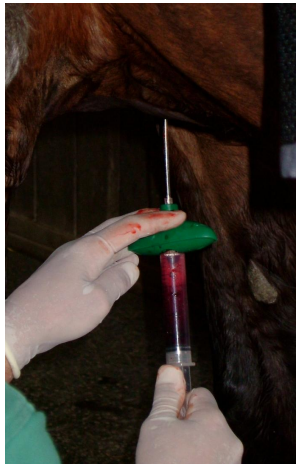
Cellular Basics

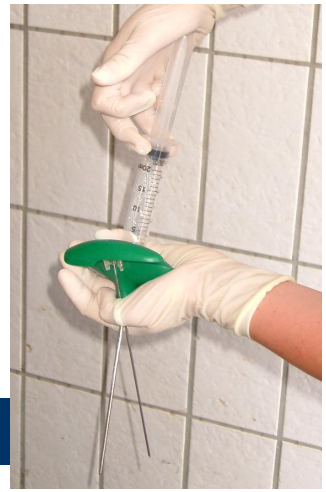
- Stemcells are undifferanciated cells, which are able to differenciate themselves into special tissue by replication and selfrenewing
- Adult mesenchymal pluripotent stemcells are in the bone marrow and in the fatty tissue
- In bone marrow are as well many growth factors
- The goal is to ensure tissue regeneration without scar formation
- Healed tissue has better biomechanical und structural abilities than scar tissue

Indications



- High suspensory insertion desmitis
- Flexor tendon tendinitis
- Desmitis of check ligament
- Desmitis of collateral ligaments at different joints
- Insertiondesmitis of the spavin tendon
- Arthrosis in different joints

Instruments for bone marrow aspiration



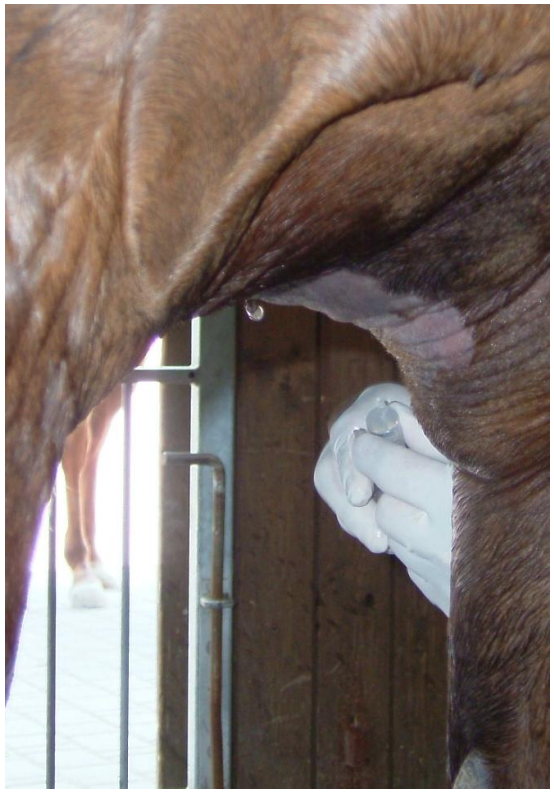
- Sharp surgical knife
- Trokar with Obturator
- 5 Luer-Lock Syringes
- Anticoagulants (Natriumcitrat)

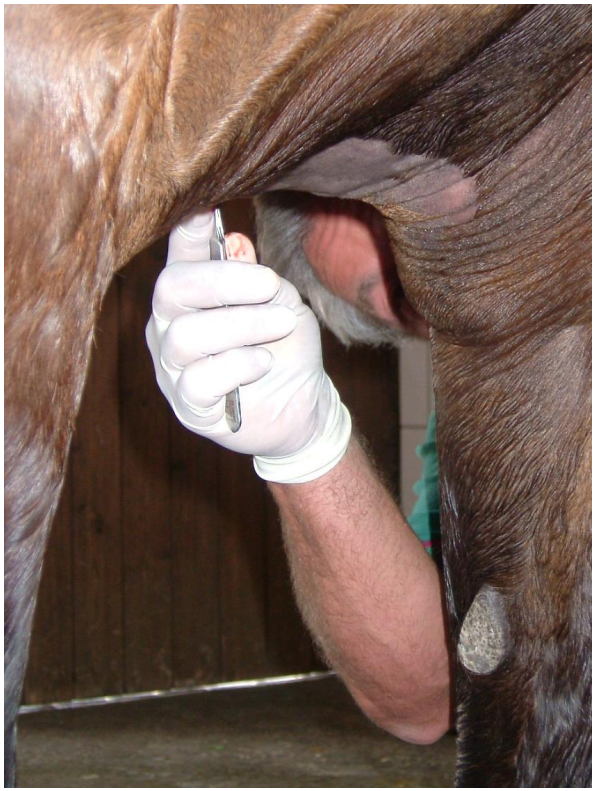
How to do bone marrow aspiration

- Tranquilize the horse with Detomidin and Butorphanol
- Cut through skin and muscles in the median line behind elbow joint after local anasthesia of this region
- Insertion of the trokar by turning movements
- Release the obturator
- Slow aspiration of the bone marrow
- Filling of syringes prepared with anticoagulants (40-100 ml)
- Local injektion of a part of the sample and sending the rest to the laboratory for cultivating

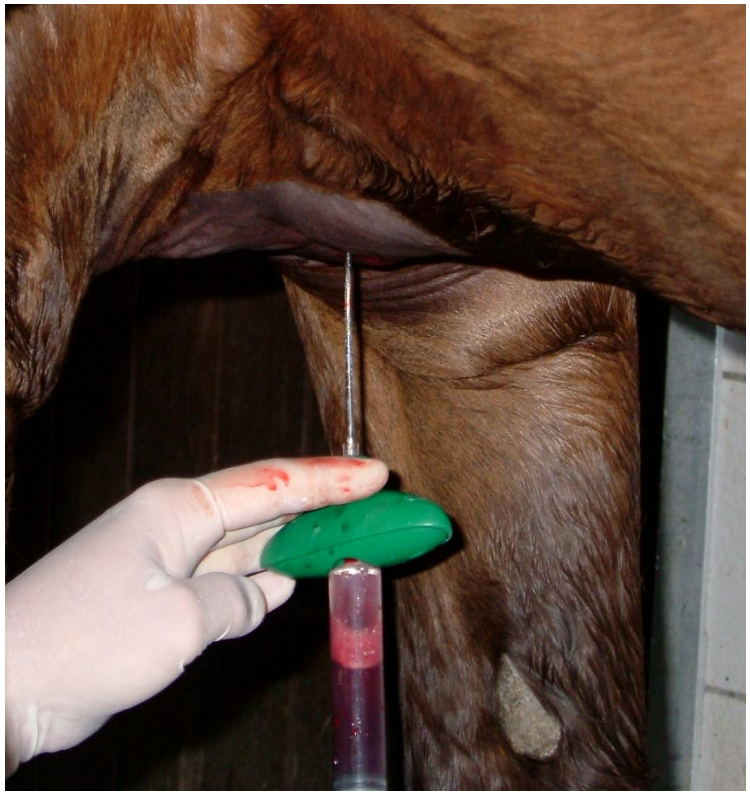
Preparation of the patient

Sternal punkture I



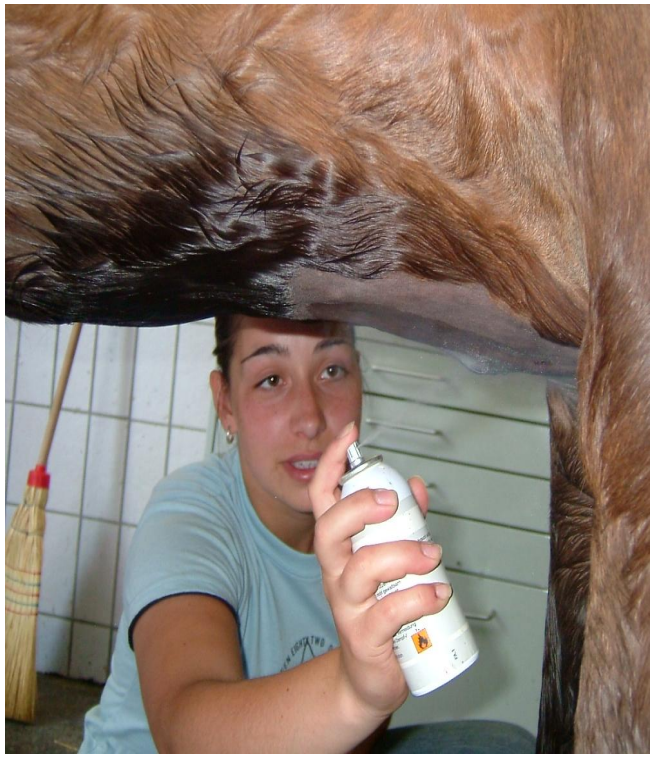


Sternal punkture II



Local injection of bone marrow

aftercare



Topical spray closure

bandage of treated area

Advantage

- No adverse reactions against autologous stemcells
- Growth factors
- Low cost procedure
- More expensive if culture of the cells is needed

Riskfactors

Puncture of the pleura or heart

Hyperreaction at injection area with serious pain

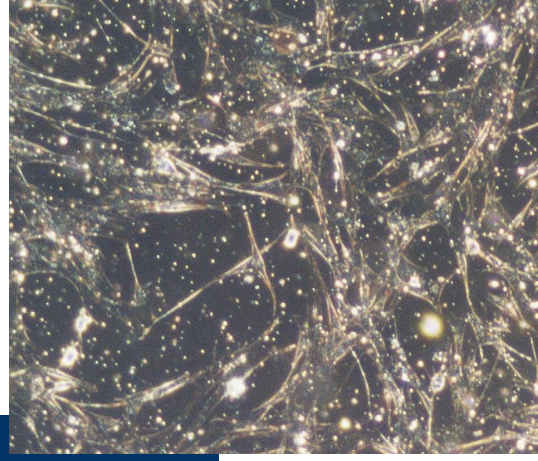
anaphylactic shock reaction

infection

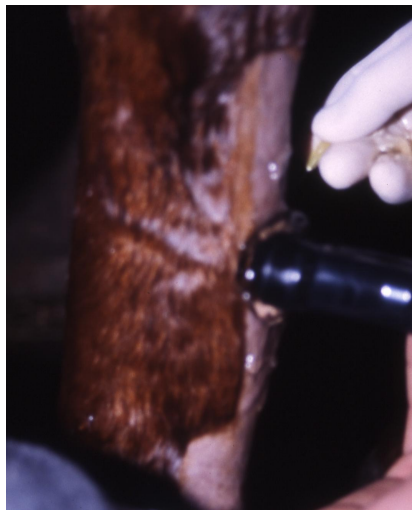
Cellculture

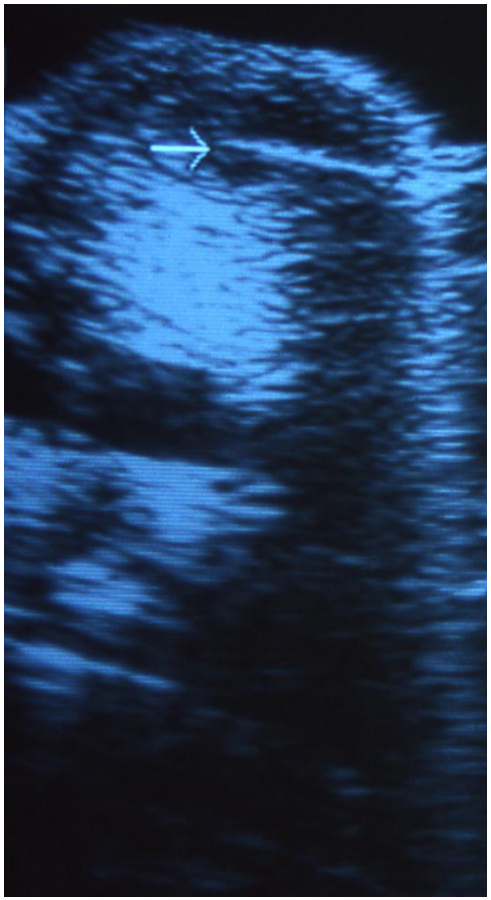
- After adding 20 % Citratsolution as an anticoagualnt around 100cc of the aspirated bone marrow is sent to the lab in stabilsed temperatur between +2°C und 8°C
- Culturing over 3-5 weeks
- Cultered cells are suspended in 5 cc NaCL or serum of the host animal

Injection of the cultivated stemmcells



- Ultrasound guided
- Aseptic injection side
- Intralesional injection
- Sterile padding





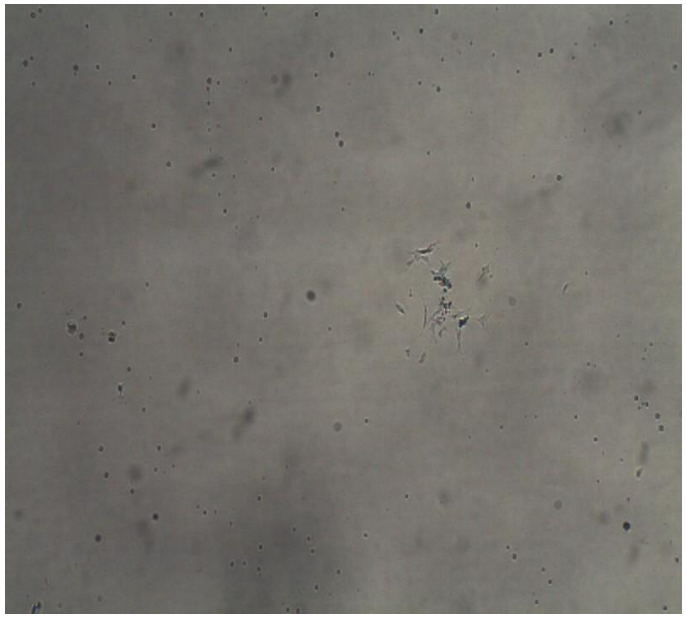
Stemcells from fat tissue

- Quality in the tail area is better than the neck
- More mesenchymal stem cells than in bone marrow
- Higher purity of the initial isolate
- Easy and risk free collecting
- No growth factors
- Treatment after cultivating
  (Around 2 weeks)

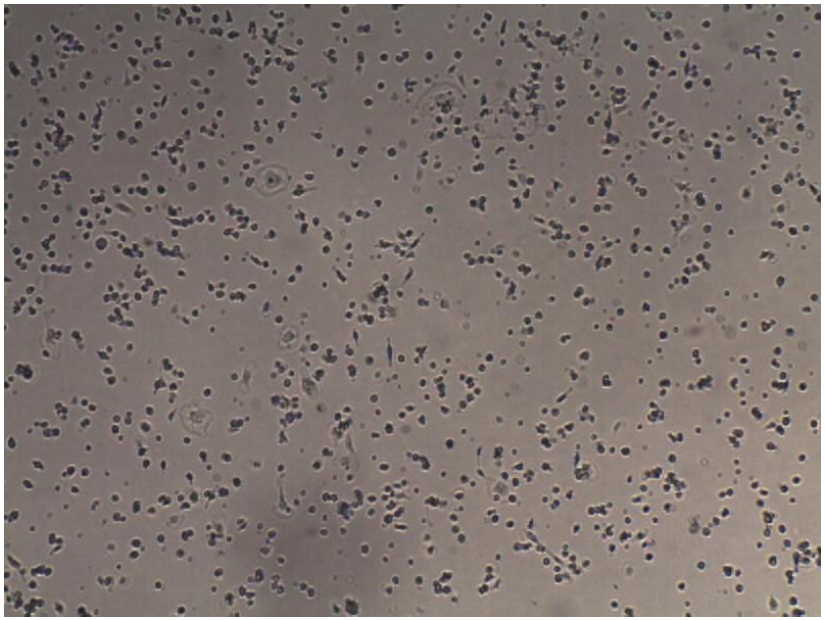
Treatment for Tendon Injuries in human medicin (Dr.Müller-Wohlfahrt, München

- Local Infiltrations
- Mepivacain, Traumeel, Heparin,
- Medivitan, Actovegin, Zeel,Coenzym
- Stimulation of the healing process

Cellculture of stemcells

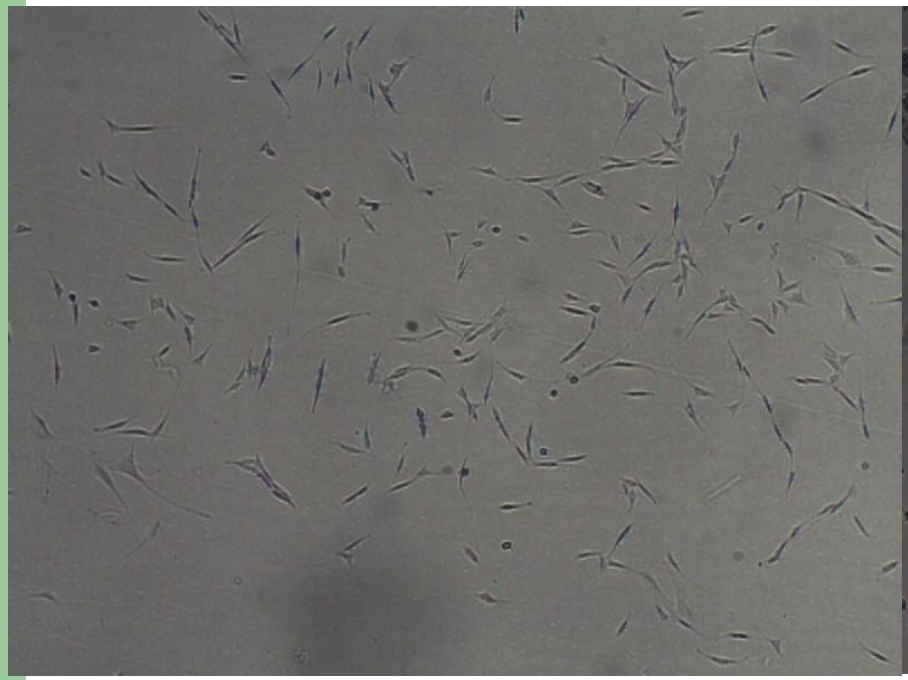


After 4 days fatculture

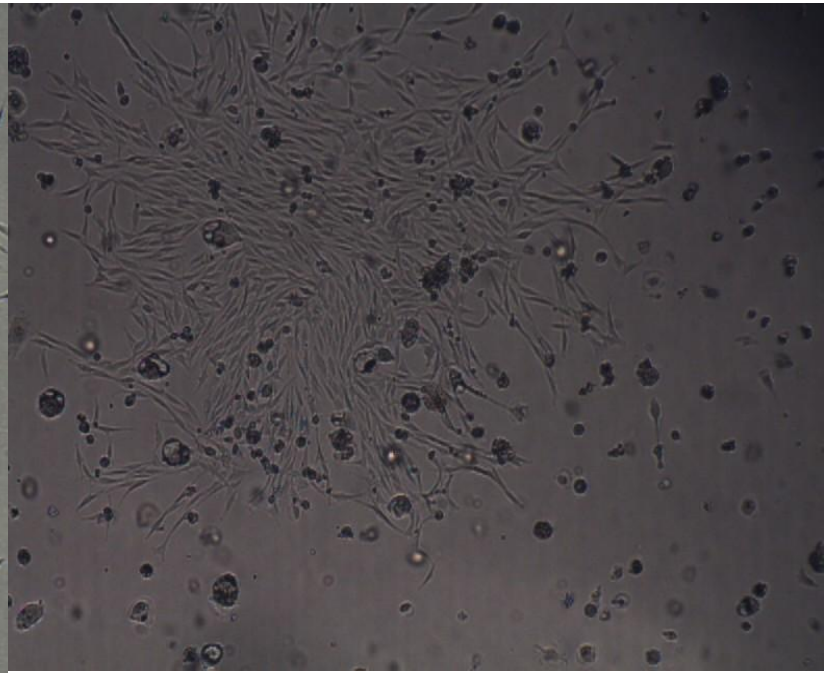


bone marrow culture

Cellculture of stemcells



After 10 days fat culture



bone marrow culture

10 horses monitored (n=10)

- Dressage and jumping horses with similar
- High suspensory lesions

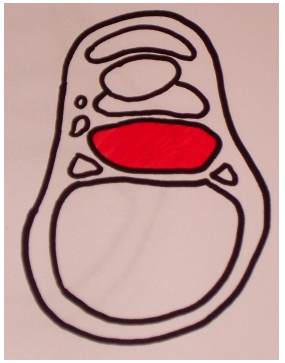
Cases with High Suspensory lesions

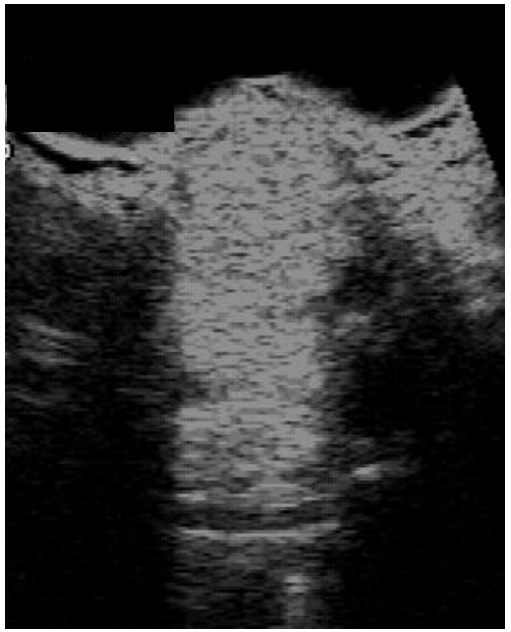
- 6 dressage and 4 jumping horses with similar lesions
- 3 dressage and 2 jumping horses are treated with fat cultivated stemmcells and with an initial injection of activating agents
- 3 dressage and 2 jumping horses are treated with bone marrow and cultivation of that

Case I

Dressagehorse

stemcells from fat tissue





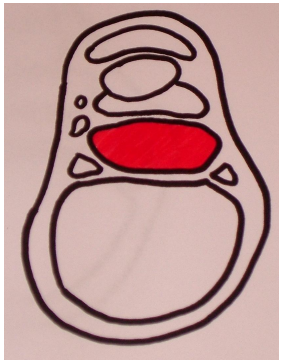
initial

after 2 weeks

after 2 months

Case II bone marrow stem cells

High Suspensory lesion, dressagehorse



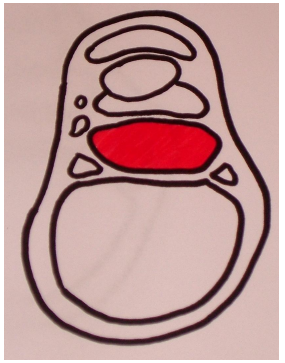
initial

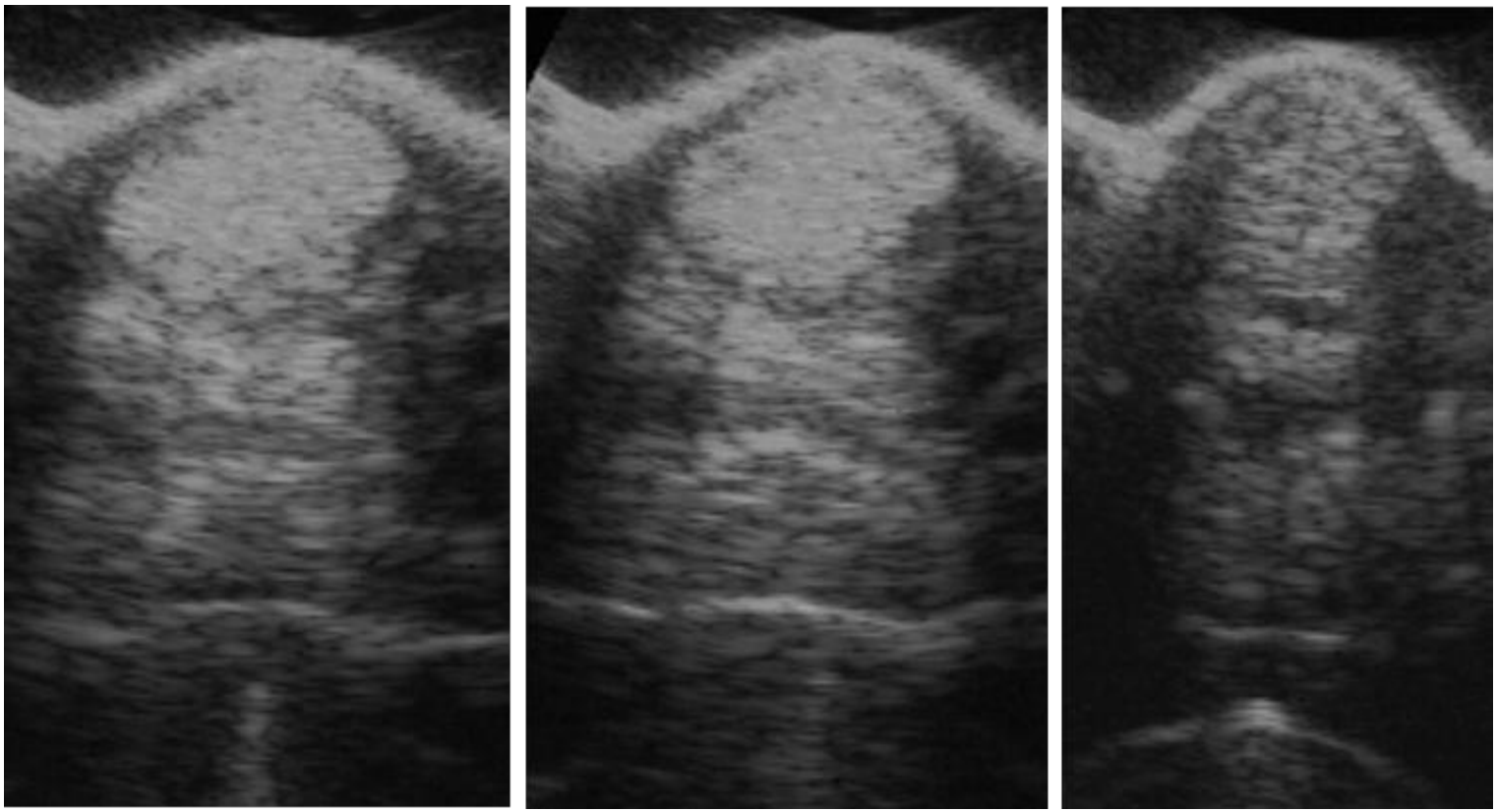
after 2 weeks

after 2 months

Case III Jumping horse

fat tissue stemcells High suspensory desmitis

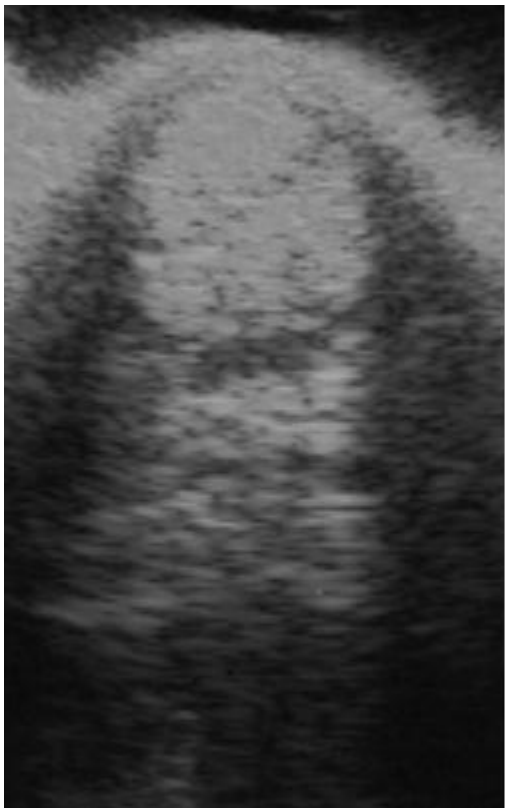




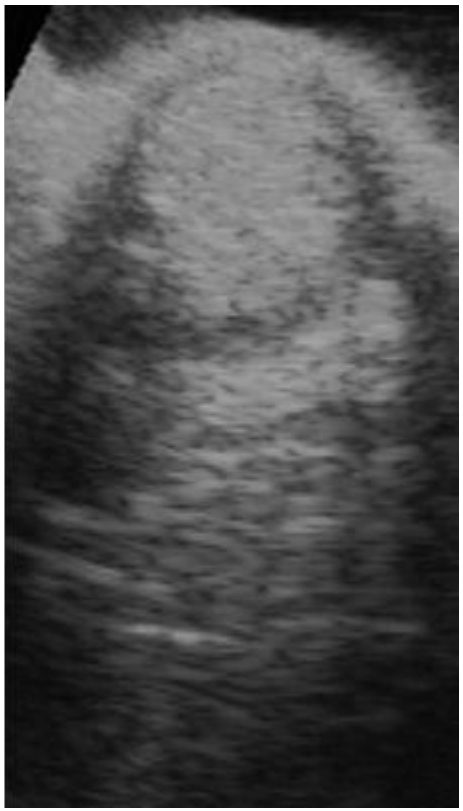
initial

Z1A Z1B Z2A

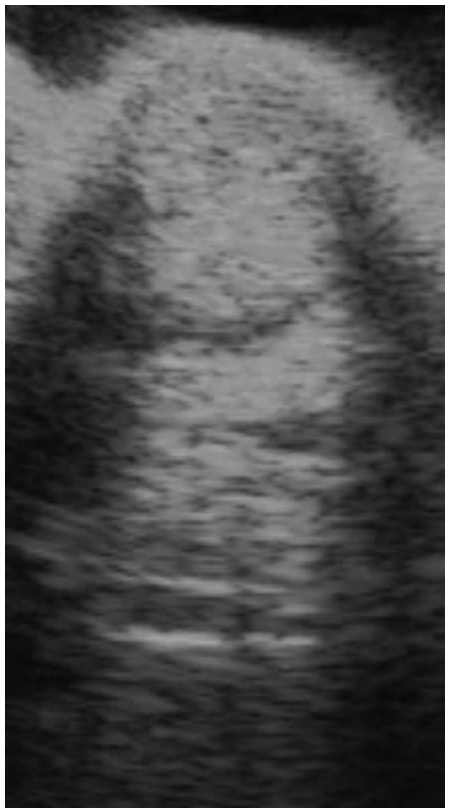
Case III after 2 weeks



Z1A



Z1B



Z2A

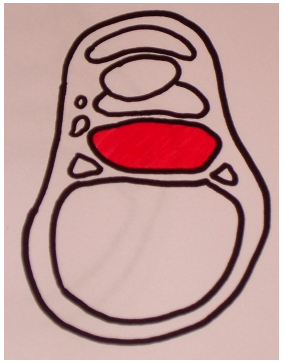
Case III -after 2 months

High Suspensory lesion,Jumping horse

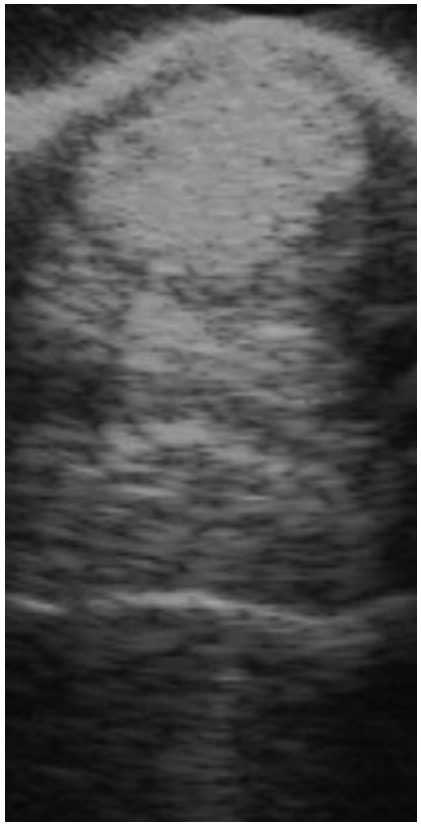
Z1A Z1B Z2A

Case IV bone marrow stem cells

High suspensory, jumping horse



initial



After 2 weeks

after 4 weeks

after 8 weeks

Results

- Succesrate more than 80% in tendon lesions
- Improvement of the healed structures in ultrasound controlls
- Improvement of clinical signs
- 8 of 10 horses are stabil, from each group one horse did fail
- No different results between bone marrow and fat cultivated stemcells

- Multiplicated action of stemcells and growth factors with bone marrow injection

Conclusion

- Advantage of the better growing of fat cultured stemcells seems to compensate the advantage of the growth factors in bone marrow injection
- Faster treatment gives better healing results

Improved therapy

- Bone marrow aspiration and injection
- Fat tissue use for cultivating of the stemcells

Thank You for Your attention