Ultrasonographic evaluation of treatment of superficial digital flexor tendinitis with autologous mesenchymal stem cells in horse

M. Masoudifard1, M.M. Dehghan1, H. Kazemi Mehrjardi2, M.R. Baghban Eslaminejad3, D. Sharifi1, A.R. Vajhi1
1 Department of Clinical Science, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
2 Department of Clinical Science, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Iran
3 Stem Cell Department, Royan Institute, Tehran, Iran

INTRODUCTION
Injuries to the superficial digital flexor tendon (SDFT) in racing horses are common and a significant cause of wastage. Many treatment modalities have been used to facilitate healing of these lesions, but currently no treatments enhance healing on a consistent basis. Recently, the potential advantages of mesenchymal stem cells has been taken into consideration for the healing of different tissue injuries. Furthermore, ultrasonography is one of the most accurate tools to evaluate the tendon structure after an injury and during the healing process. It is widely used in equine practice, for diagnostic purposes and follow-up. The aim of the present study was to evaluate the ultrasonographic findings after SDF tendonitis treatment with autologous mesenchymal stem cells in horse.

MATERIALS AND METHODS
Five clinically normal cross-bred horses with average age of 4.3 years (2-6) and average weight of 368.5 kg (350-400) were used. Bone marrow was taken from horse’s sternum and their mesenchymal stem cells were isolated and cultured in the lab. Experimental tendinitis was induced with injection of 2000 IU collagenase in the centre of the left and right SDFT of the mid-metacarpal region using ultrasound guide to confirm intratendineous needle placement. Two weeks later 15x10⁶ autologous mesenchymal stem cells with plasma were injected within the lesion in the SDFT and the other limb just plasma was injected as a control group. Ultrasonographic images of the SDFT were obtained from 4 to 24 cm distal to the accessory carpal bone prior and 1, 3, 5, 7 days and then once a week until 70 days after collagenase injection with each level distance of 2 cm. Tendon cross sectional area (TCSA), lesion cross sectional area (LCSA), percentage of tendon injury (PTI) using LCSA / TCSA, echogenicity score (ES) and fiber alignment score (FS) at the maximum injury zone (MIZ) and at all levels were obtained in both groups and compared.

RESULTS
One day after collagenase injection, transverse and sagittal ultrasonographic images revealed presence of core lesion and increased TCSA of the SDFT. The most severe lesions were identified between the 5th and the 7th day after the injection of collagenase. TCSA at MIZ in 7 and 70 days post injection in the treatment group were 101.54 ± 32.13 mm² and 88.75 ± 24.66 mm² respectively, while in the control group were as 102.12 ± 34.22 and 93.80 ± 23.92 mm². PTI at MIZ in days 7 and 70 post injection were 19.5 ± 3.65 and 1.21 ± 0.31 respectively in the treatment group; and 19.14 ± 2.64 and 3.83 ± 1.53 in the control group. Ultrasound evaluations indicated that decrease in TCSA and LCSA, and increase of the ES and improvement of FS at MIZ and at all levels were obtained in both groups and compared.

CONCLUSION
With regard to the results of this study, it was concluded that mesenchymal stem cell application in acute and subacute stages of tendinitis may help to improve healing of SDFT lesions. Since the differences were not statistically significant, ultrasonographic and histological studies may help to give more information of the effects of mesenchymal stem cells in tendon healing.

REFERENCES