 

# THE EFFECT OF TRODE AND HOOF PREPARATION ON TRANSCUNEAL EXTRACORPOREAL SHOCK WAVE DELIVERY TO THE EQUINE NAVICULAR BONE

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## ABSTRACT

**Background:** Extracorporeal shock wave therapy (ESWT) is a promising treatment option for equine navicular syndrome; however, there is little information regarding optimal ESWT protocols.
**Objective:** To determine the effect of hoof soaking and trode on transcuneal shock wave transmission to the navicular bone. We hypothesized that readings would be highest for soaked feet treated with a 35 mm trode.
**Methods:** The distal forelimbs of donated equine cadavers (n=12) were used for testing. One randomly chosen hoof was soaked in room temperature water for 12 hours and the contralateral hoof was left unsoaked. A piezoelectric sensor was inserted along the flexor surface of the navicular bone, and feet were treated using an electrohydraulic ESWT unit. A two-factor analysis was used to investigate the effect of trode, soaking, and their interaction by treating both feet with a 20 mm and 35 mm trode. Data logging was accomplished with a digital oscilloscope and data were converted to megapascals (MPa). The effect of trode and condition on log 10 MPa was assessed using linear mixed models. Significance was set at $p<0.05$.
**Results:** The trode by condition interaction was significant ($p=0.0363$). The mean log 10 MPa for the unsoaked feet treated with the 20 mm trode was significantly lower than for the unsoaked feet treated with the 35 mm trode ($p<0.0001$), but no difference was detected between the trodes in soaked limbs.
**Conclusions:** Based on these results, a 35 mm trode performs better than a 20 mm trode when the hoof is not soaked.

**Keywords:** Extracorporeal shock wave therapy, Equine navicular syndrome, Navicular disease, Shock wave, Hoof, Horse

## INTRODUCTION

Equine navicular syndrome (ENS) is a progressive, debilitating disorder involving the equine distal sesamoid bone and its associated soft tissue structures and is one of the most common causes of forelimb lameness in predisposed breeds [1]. Extracorporeal shock wave therapy (ESWT) has been described as a treatment option for ENS and originates from technology used for renal calculus lithotripsy [1,2]. At the tissue level, shock waves combine pressure and acoustic energy to create stresses on the border zones of tissues with different acoustic impedances. The resultant energy is transmitted to underlying tissues (bone, ligamentous structures) resulting in microdisruption of cells and cell death, creating a controlled inflammatory process that promotes neovascularization and healing [4]. Incidental treatment of the afferent nerves may also provide a mode of analgesia [5,6]. The effects of shock waves on bone are dose-dependent [7]. There are two approaches to the equine navicular bone for ESWT: through the frog (the transcuneal approach) and between the heel bulbs [1,6]. In addition to treatment of ENS, shock wave treatment has been used anecdotally for treatment of other injuries within the hoof capsule such as