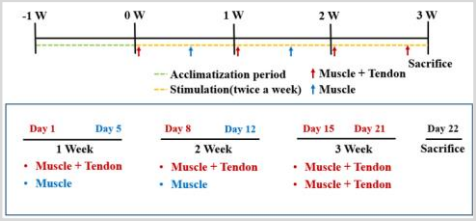


Introduction

- Non-surgical musculoskeletal (MSK) pain management – Hyperthermia, Electrotherapy, Light and laser, etc.
- Extracorporeal shock wave therapy (ESWT) : Therapeutic effects through shock wave transmission
- Radiofrequency (RF) : Deep heating modality – increases blood flow and promotes metabolism
- ESWT-RF combination stimulator (RSWT-7000™, ITC, Co., Ltd., Seoul, South Korea)
 - ✓ Simultaneous stimulation of ESWT and RF in one probe
 - ✓ Safety has not been established
- **The aim of this study : To confirm the safety of ESWT-RF combination therapy targeting tendons and muscles in a porcine model.**

Methods

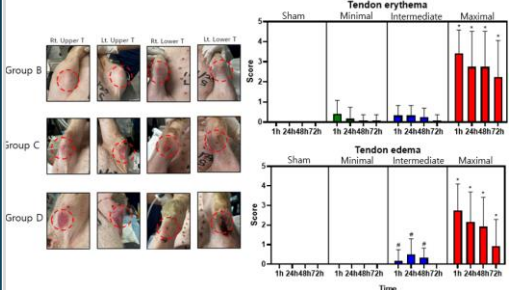
- **Subjects:** Four pigs weighing about 40kg
 - ✓ Group A: sham group
 - ✓ Group B: minimal intensity group (ESWT: 2Bar(0.1mJ), RF: 10Watt)
 - ✓ Group C: intermediate intensity group (ESWT: 3Bar(0.15mJ), RF: 15Watt)
 - ✓ Group D: maximal intensity group (ESWT: 4Bar(0.2mJ), RF: 20Watt)
- **Target:** Total 8 sites per a pig
 - ✓ Tendon - Both common wrist extensor tendon or Achilles tendon
 - Stimulation : once a week for 10 min (3000 shocks and 5Hz for ESWT)
 - ✓ Muscle - Both Triceps brachii or biceps femoris muscle
 - Stimulation : twice a week for 10 min (2700 shocks and 3Hz for ESWT)
- RF: Pulsed mode (1s on/1s off) with a frequency of 450kHz



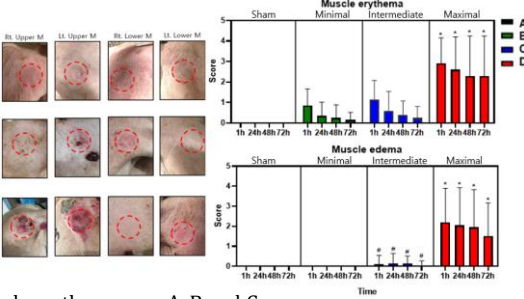
- **Assessment of the safety**
 - ✓ Test for skin sensitization and irritation: Erythema and edema at 1 hour, 24, 48 and 72 hours after stimulation.
 - ✓ Cytotoxicity test : H&E (Muscle, skin above muscle, tendon and skin above tendon)
- Tissue injury scoring system: Inflammation, necrosis and granulation tissue

Results

Result 1-1. Skin sensitization and irritation above tendon

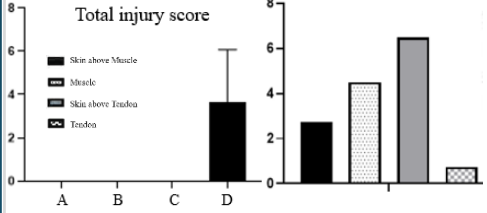


1-2. Skin sensitization and irritation above muscle



✓ Group D showed significant increase in erythema and edema than group A, B and C.

Result 2. Cytotoxicity test



	Group D Skin above Muscle	Skin above Tendon	Muscle	Tendon
Inflammation	0.75	2	1.5	0.75
Necrosis	1	2.5	1.5	0.75
Granulation tissue	3	2	1.5	0.75
Total injury score	2.75	6.5	4.5	0.75

- ✓ Groups B and C showed no abnormalities. Only group D showed histological damage.
- ✓ On the total injury score, skin above tendon was the highest at 6.5 and tendon was the lowest at 0.75.

Conclusion

Significant tissue damage was seen only with maximal intensity (4 Bar-20 Watt) stimuli, minimal intensity (2 Bar-10 Watt) or intermediated intensity (3 Bar-15 Watt) is recommended.