

ISMST

The International Society
for Medical Shockwave
Treatment



18th ISMST Congress, 16th - 18th April 2015, Mendoza - Argentina

The influence of medical shockwaves on muscle activation patterns and performance in healthy athletes: a preliminary report

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Conflict of Interest Declaration

Royalties & stock options – NONE

Consulting Income – NONE

Research & Education Support – Delsys Inc. USA

Other support - NONE



AIM

To discuss and invite more research in this area

- Sports is a highly lucrative and demanding occupation
- Subject to both acute and overuse injuries & syndromes
- Overuse syndromes remains a challenge to manage
- Performance impacted by injury
- Can we help prevent injuries?
- Can we effectively and safely influence performance capacity?





ESWT in sports medicine

- Proven safe and effective in multiple sports pathologies
- Personal use in sports-med since 2001
- Noticed performance improvements post Tx.
- Can healthy tissue be made more resilient against injury?
- What influence can ESWT have on muscle output?
- Can it impact / influence performance?
- To what level?



Project Sample

Gender	Males (n=8)
Mean Avg Age	23.12 yrs
Sport	Golf (n=4); Weightlifting (n=4)
Level	Elite high-performance amateur athletes
Injury status	Uninjured
Project duration	12 weeks



Material & Method: Golf	
Handed	Right (n=4)
Handicap Avg	4.25
Equipment	7 iron
Baseline	20 shots after warm-up
Ball type	Actual match-play ball of individual preference
Measurement Inst. 1	FlightScope™ (Golf Technologies)
Measurement Inst. 2	Delsys wireless Trigno sEMG sensors (6 channel)
Muscles tested	Ant. delt.; pect. maj.; Upp. Trap (bilat); & lat dorsi (bilat)





CARRY 87.2 m

ROLL 4.4 m

TOTAL 91.5 m

CLUB 107.4 km/h

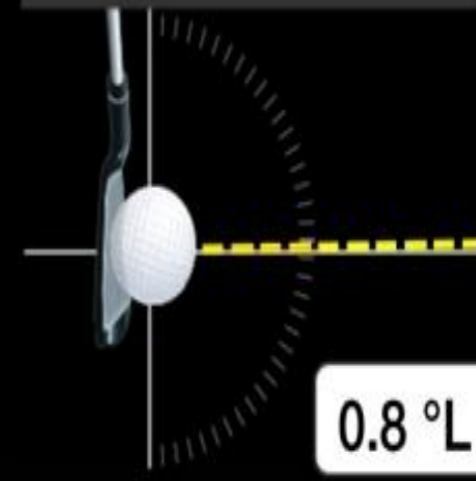
BALL 129.0 km/h

SMASH 1.20

Vertical Launch



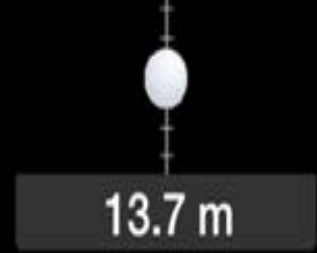
Horizontal Launch



Angle of Descent



Height

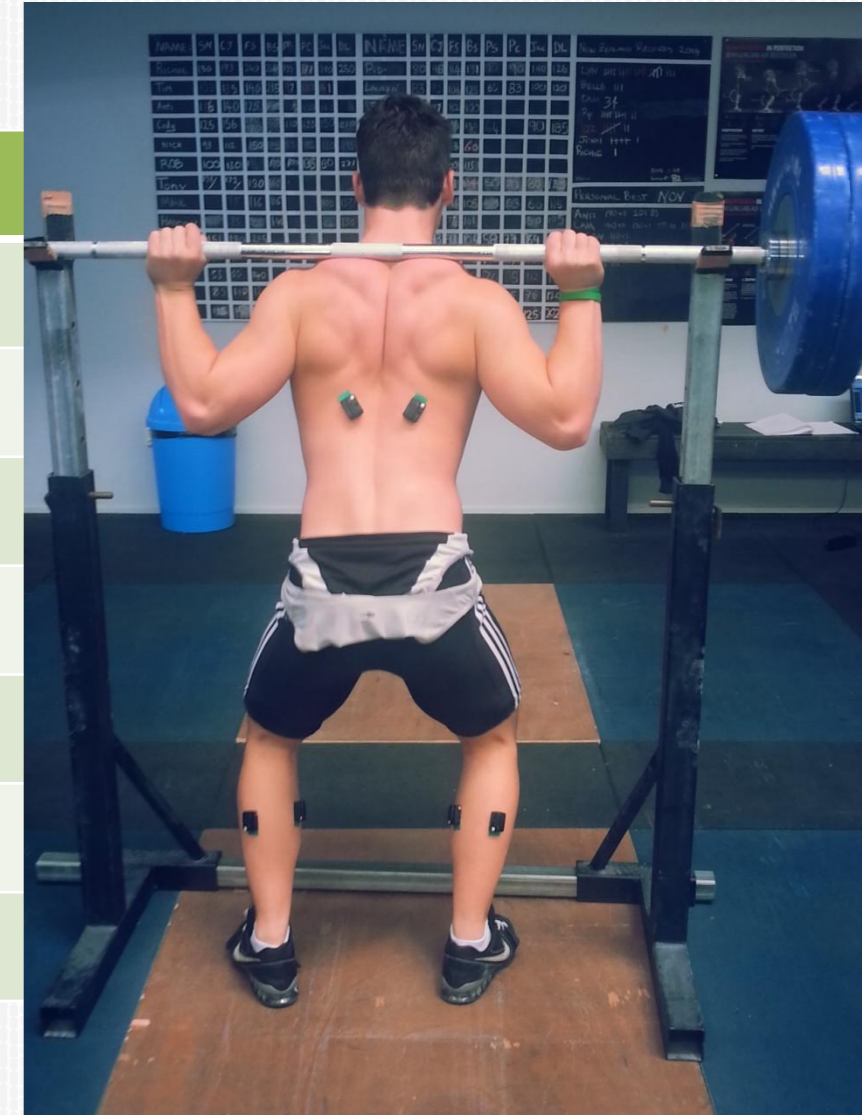


Flight Time



Material & Method: Weightlifting

Gender	Male (n=4)
Lift protocol	120kg loaded back squat
# of Reps	5 Loaded squats
Measurement Inst	Delsys wireless Trigno™ sEMG sensors
Measurement 2	Current Personal Best lift
Tabulation Software	EMG Works version 4.1.7
Muscles tested	Lats; bicep-fem; gastrocs





	ESWT Protocol
Device	Electrohydraulic
# of Tx	3 at 1 week intervals
# of impulses	500 over the course of each muscle
Energy density	0.10mj/mm ²
Golf muscle Tx	Lats; lead deltoid; upper traps
Weightlifting Muscles Tx	Lats; hamstrings; gastrocs



Results

Golf Data (mean avgs.) @ wk12	Baseline	Post-ESWT	% of change
Swing speed	140.21 km/h	147.12 km/h	+10.49%
Club interface (Smash factor)	1.32 m/sec	1.46 m/sec	+11.06%
Ball distance	143.25m	167.40m	+11.6%
Muscle activation onset	1.35 sec	0.89 sec	
Energy output throughout the swing	497.44üv/swing	573.93üv/swing	+8.46%

Weightlifting Data (mean avgs) @wk12	Baseline	Post-ESWT	% of change
Muscle activation onset	1.02 sec	0.92 sec	
Energy output throughout the lift	4,043.03üv/squ	5394.36üv/squ	+33.45%
Personal Best	655kgs	738kgs	11.2%



Discussion & Conclusion

From what has been elucidated about the influence of ESWT on tissue suggests:

Acoustic mechanotransduction influences the cellular-matrix via a myriad of:

- receptors
- sensory substances

Promoting favourable cellular communication, interaction and integrity.

Our investigation suggests that this favourable cascade may not be restricted in pathology but in healthy subjects as well.

The sustained muscular response and performance improvements (>20 weeks) yielded from this investigation asks the question:

Can we prevent overuse syndromes by increasing muscle resilience?

Can we assist athletes achieve their goals more safely and effectively?



Discussion & Conclusion

The systemic neutrality of ESWT provides a safe treatment option – to be explored further.

This begs the question: What other population groups can we apply this potential to?

Can we introduce ESWT in a healthy or even in a slight compromised aging population to optimise muscular function and improve quality by:

- reducing age related muscle atrophy?
- improve balance and prevent falls?
- enhance mobility in older adult and compromised populations?
- enhance & improve activities of daily living?

More research in this area is certainly warranted.

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THANK YOU

