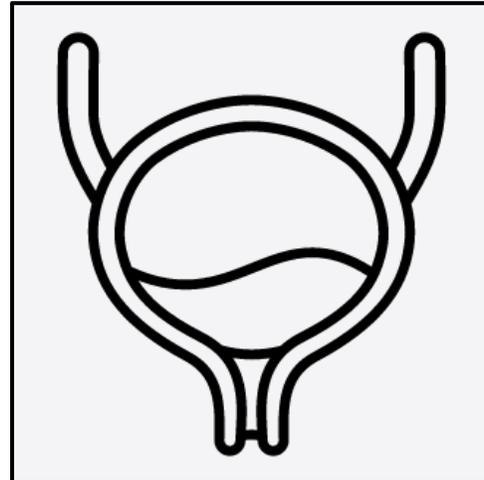
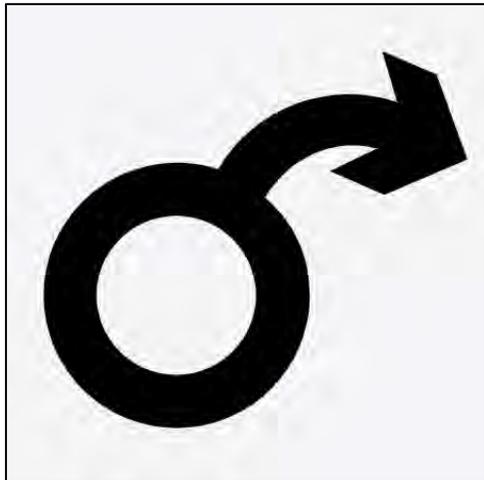
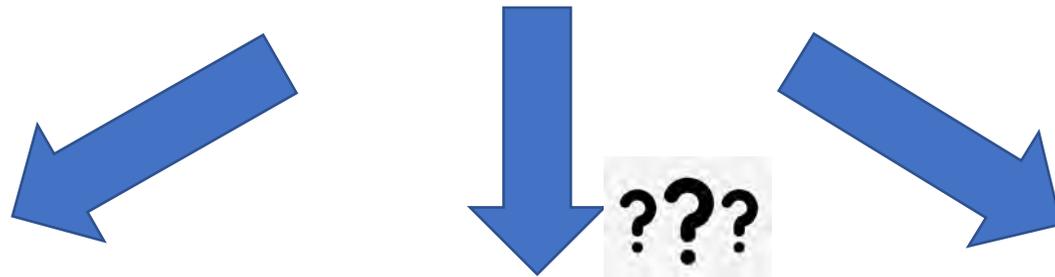
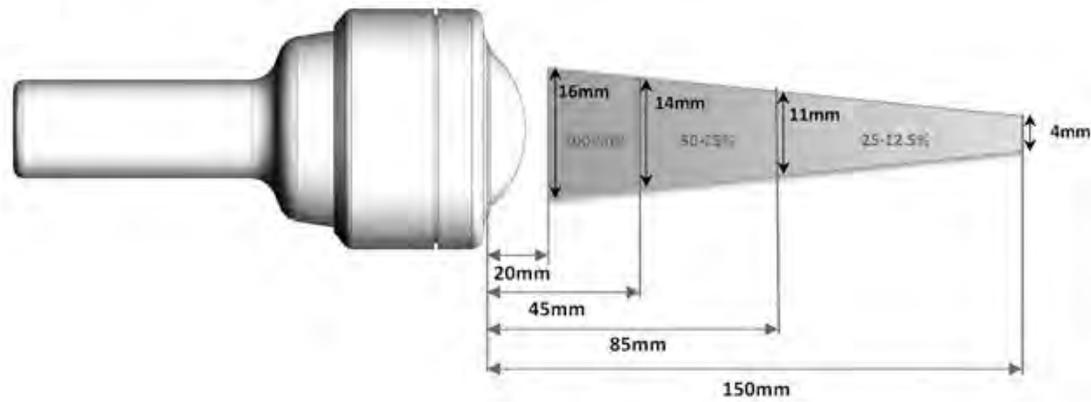




LiESWT for stress urinary incontinence

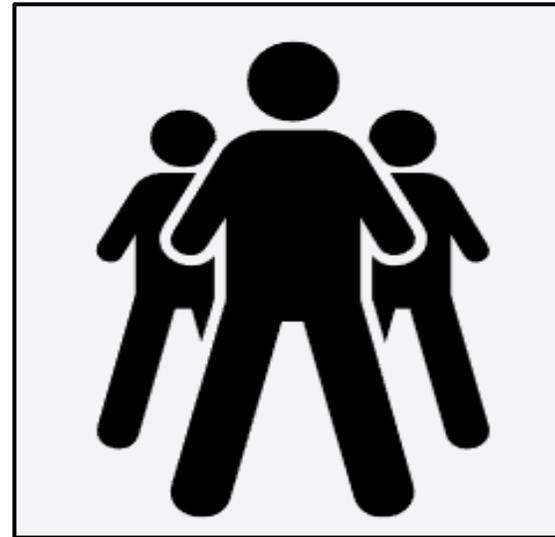
大同醫院 關光瞬

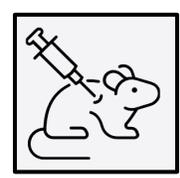
LiESWT在泌尿科的應用



LiESWT for bladder

Stress urinary incontinence





LiESWT for Stress urinary incontinence

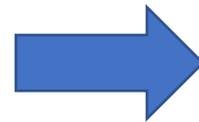
TAU TRANSLATIONAL ANDROLOGY AND UROLOGY
A RISING JOURNAL FOR THE SCIENCE AND ART OF ANDROLOGY AND UROLOGY



Original Article

Treatment of stress urinary incontinence with low-intensity extracorporeal shock wave therapy in a vaginal balloon dilatation induced rat model

Alex K. Wu, Xiaoyu Zhang, Jianwen Wang, Hongxiu Ning, Uwais Zaid, Jaqueline D. Villalta, Guifang Wang, Lia Banie, Guiting Lin, Tom F. Lue

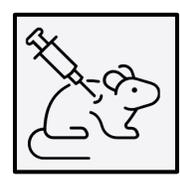


Control

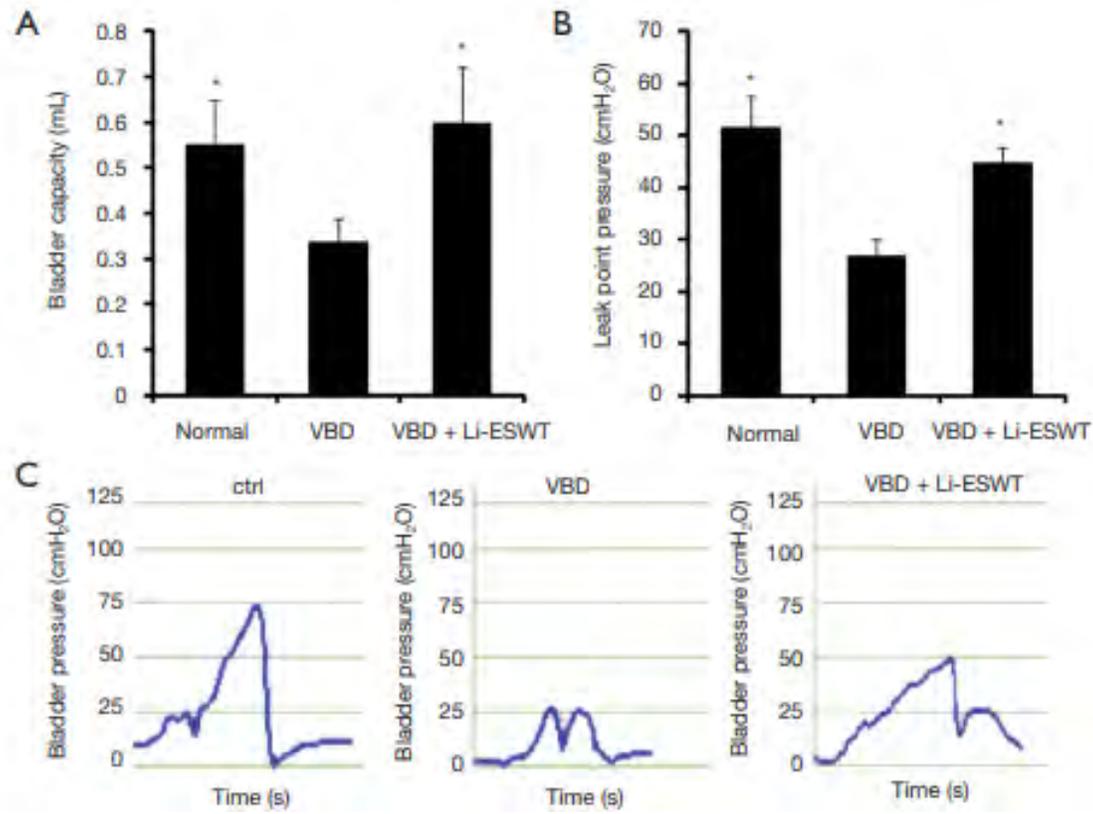
Vaginal balloon dilatation (VBD)

VBD + LiESWT

16Fr catheter
4mL balloon



Functional



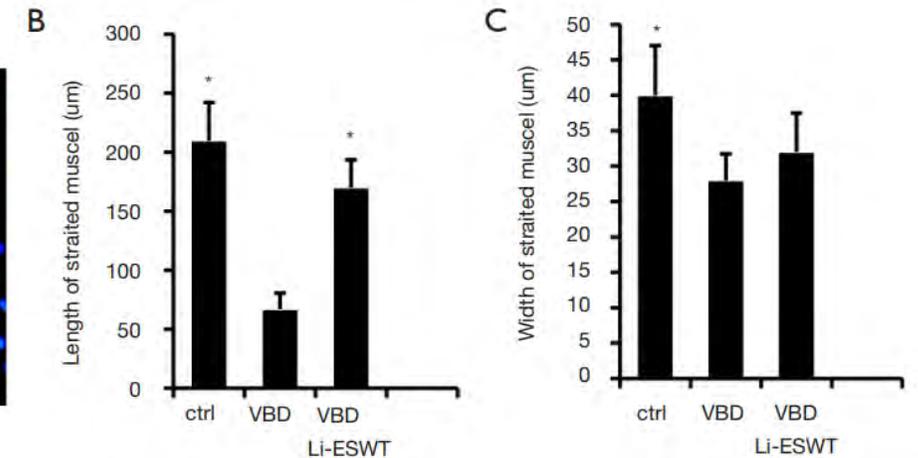
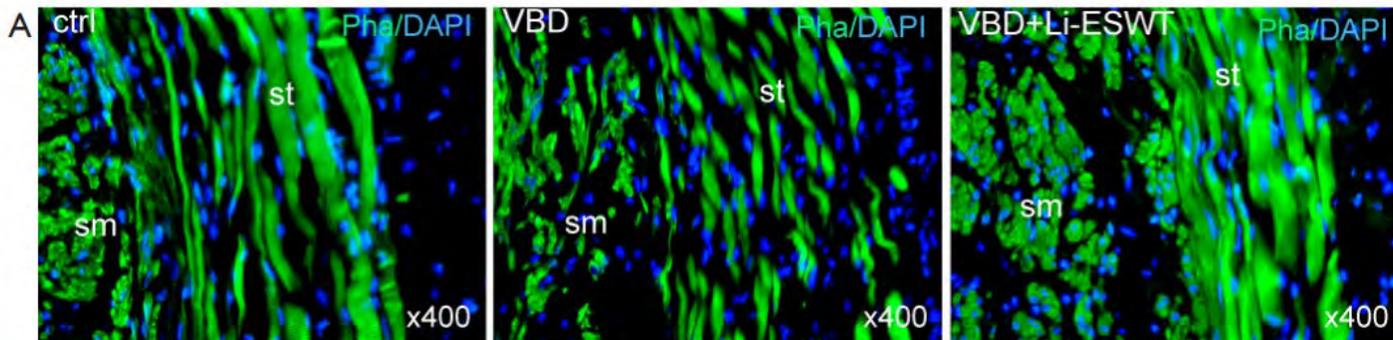
VBD:

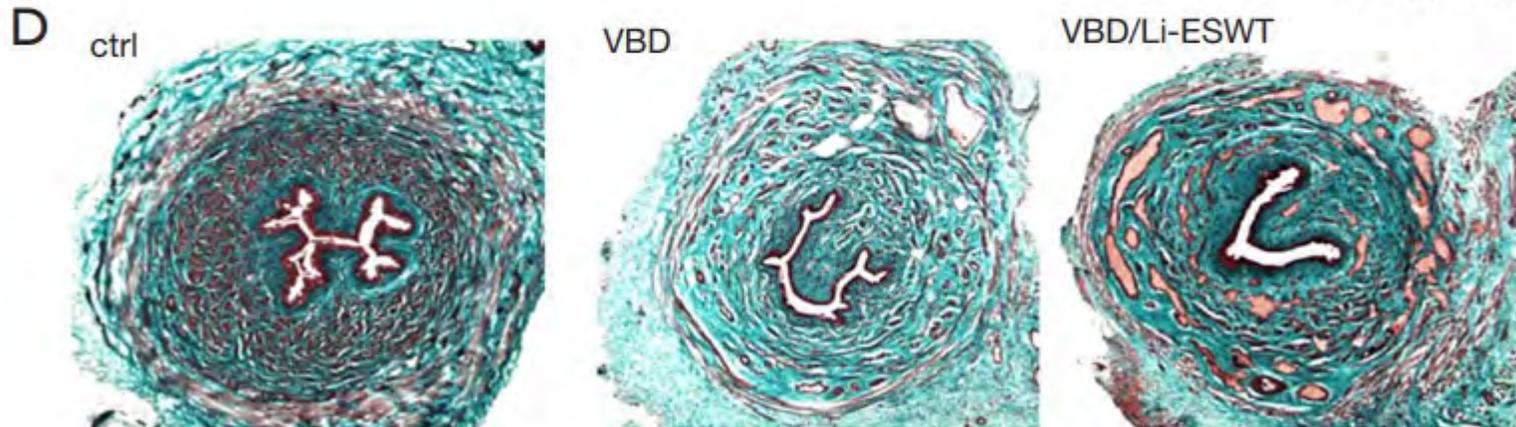
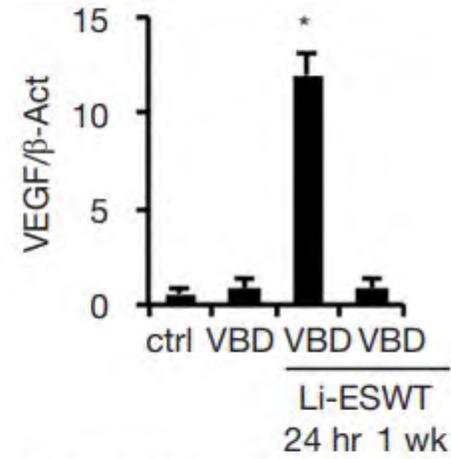
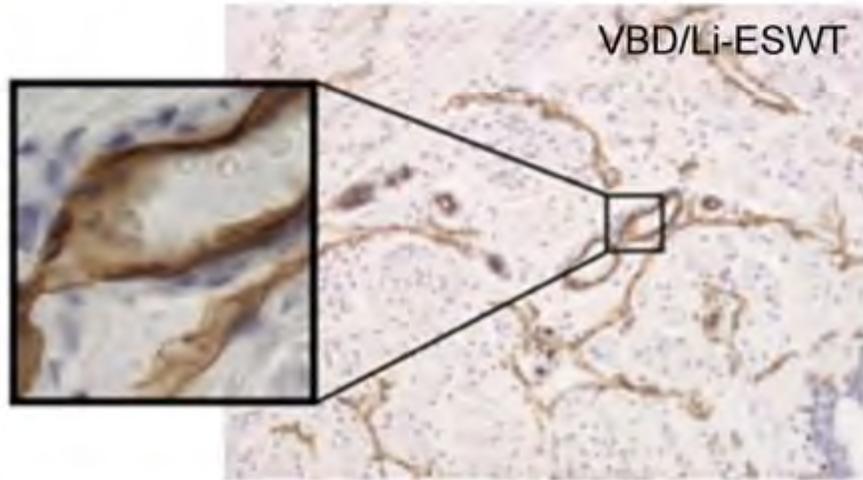
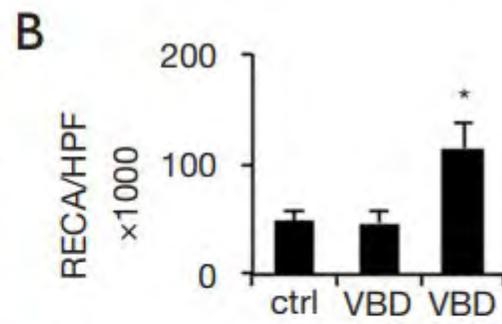
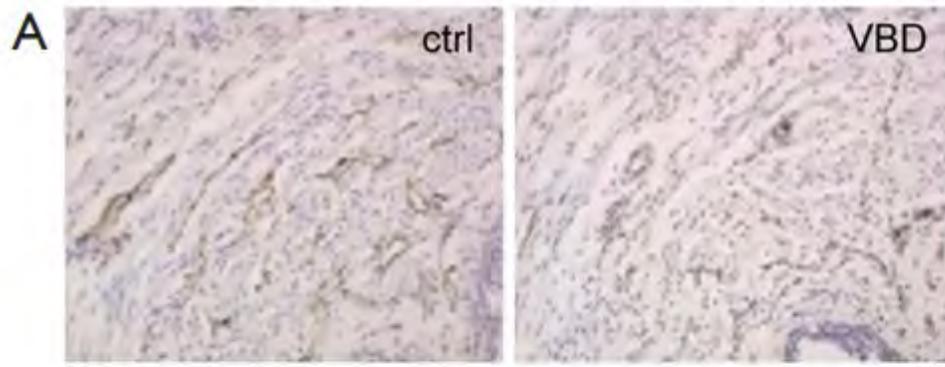
- Bladder capacity ↓
- Leak point pressure ↓
- Bladder pressure ↓
- Length of straited muscle ↓
- Width of straited muscle ↓

VBD + LiESWT:

- Bladder pressure ↑
- Leak point pressure ↑
- Bladder pressure ↑
- Length of straited muscle ↑
- Width of straited muscle ↑

Histologic





VBD + LiESWT:
RECA (endothelial cell antibody) \uparrow
VEGF \uparrow

\rightarrow LiESWT可幫助血管增生



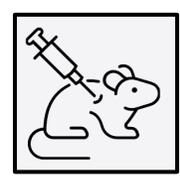
LiESWT for Stress urinary incontinence

LiESWT ameliorate SUI:

Promoting angiogenesis.

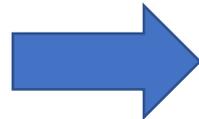
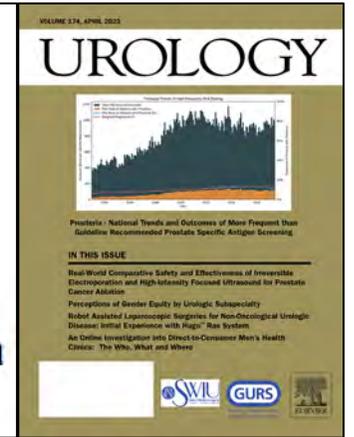
Progenitor cells activation.

Sphincter regeneration.



Delayed Treatment with Low-Intensity Extracorporeal Shock Wave Therapy in an Irreversible Rat Model of Stress Urinary Incontinence

Xiaoyu Zhang, Yajun Ruan, Alex K. Wu, Uwais Zaid, Jaqueline D Villalta, Guifang Wang, Lia Banie, Amanda B. Reed-Maldonado, Guiting Lin, Tom F Lue

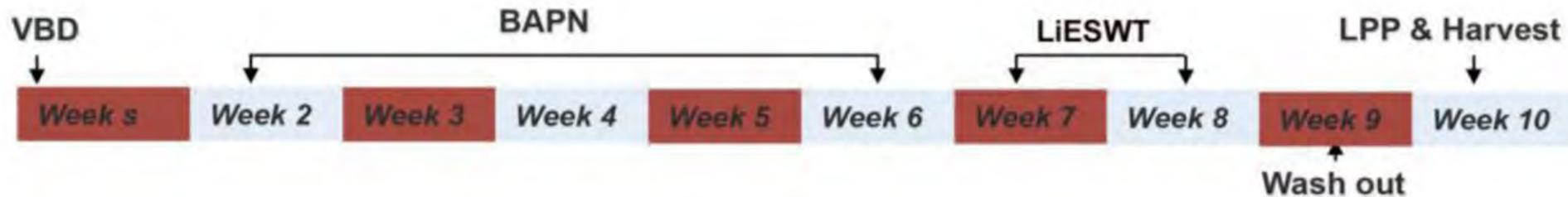


Sham

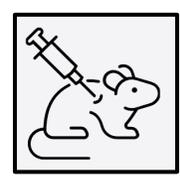
Vaginal balloon dilatation (VBD)
+ β -aminopropionitrile (BAPN)

VBD + LiESWT + BAPN

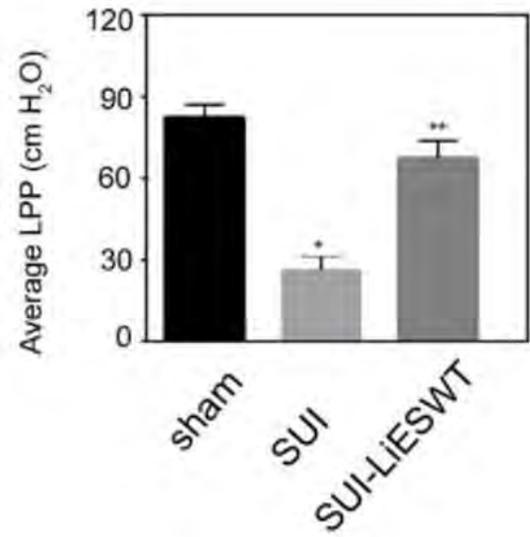
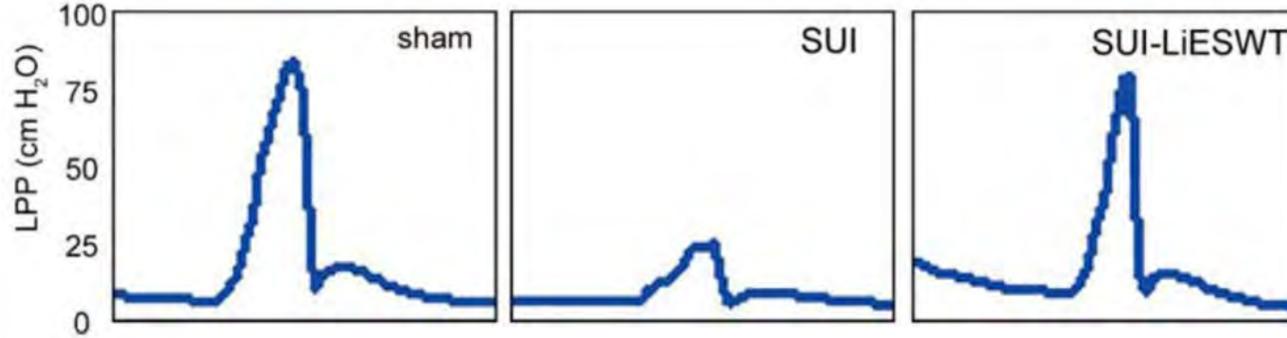
18Fr catheter
4mL balloon



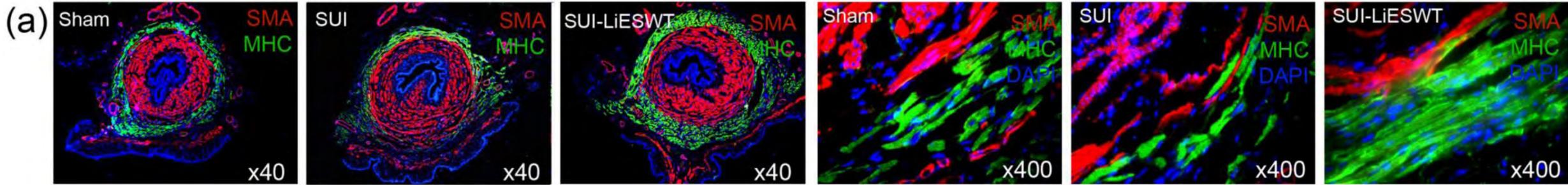
BAPN: A lysyl oxidase inhibitor. Able to create a highly reproducible model of irreversible SUI.



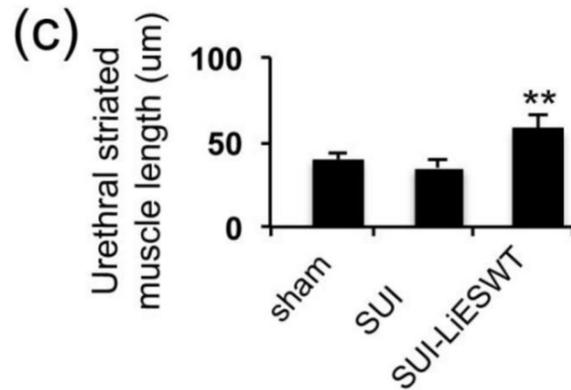
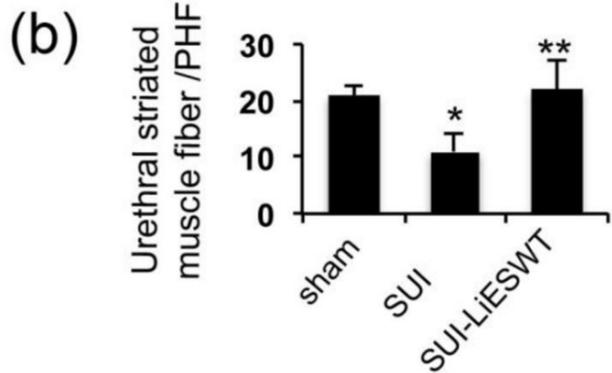
Functional



Histologic



MHC: myosin heavy chain, marker for strained muscles.



VBD + BAPN:

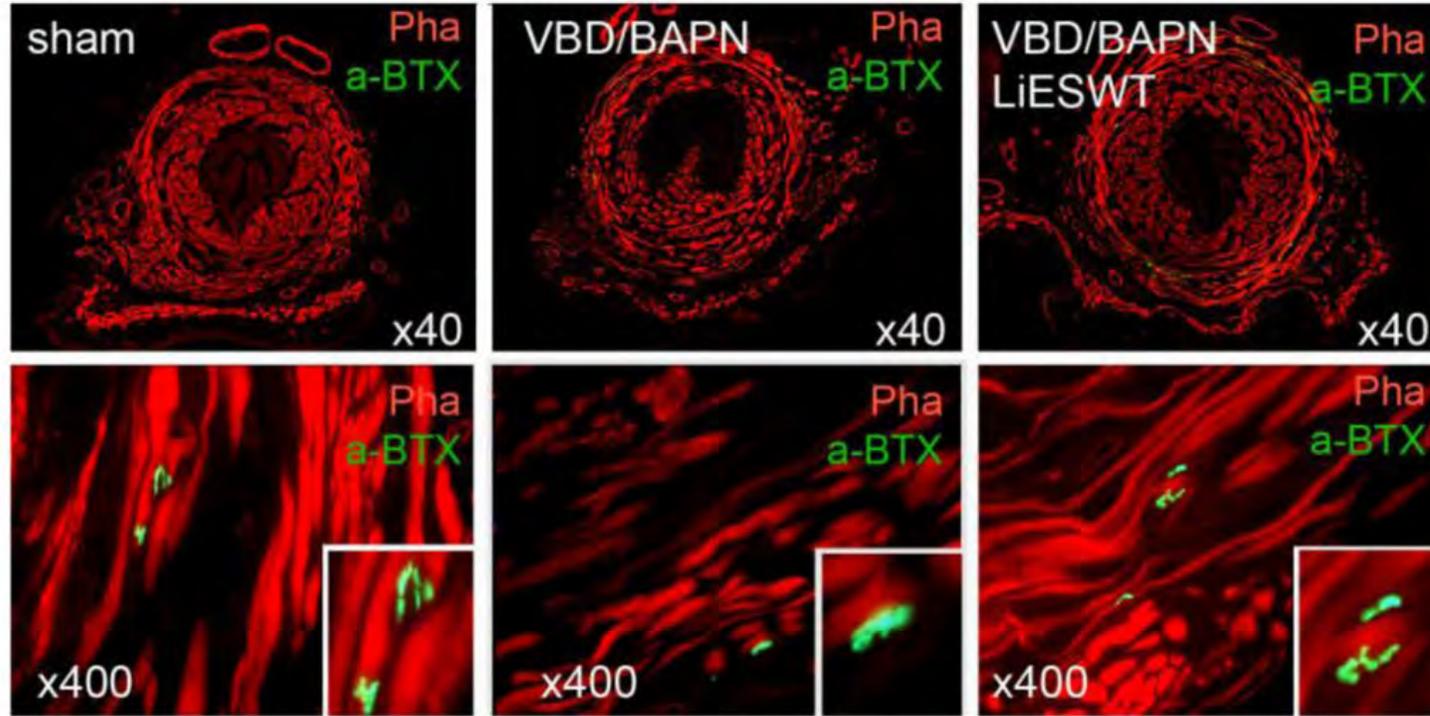
Leak point pressure ↓
Number of strained muscle ↓

VBD + BAPN + LiESWT:

Leak point pressure ↑
Number of strained muscle ↑
Length of strained muscle ↑

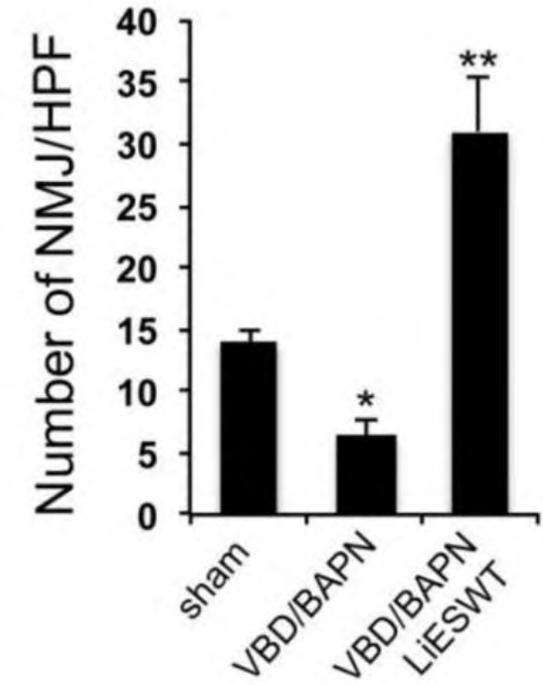


(a)

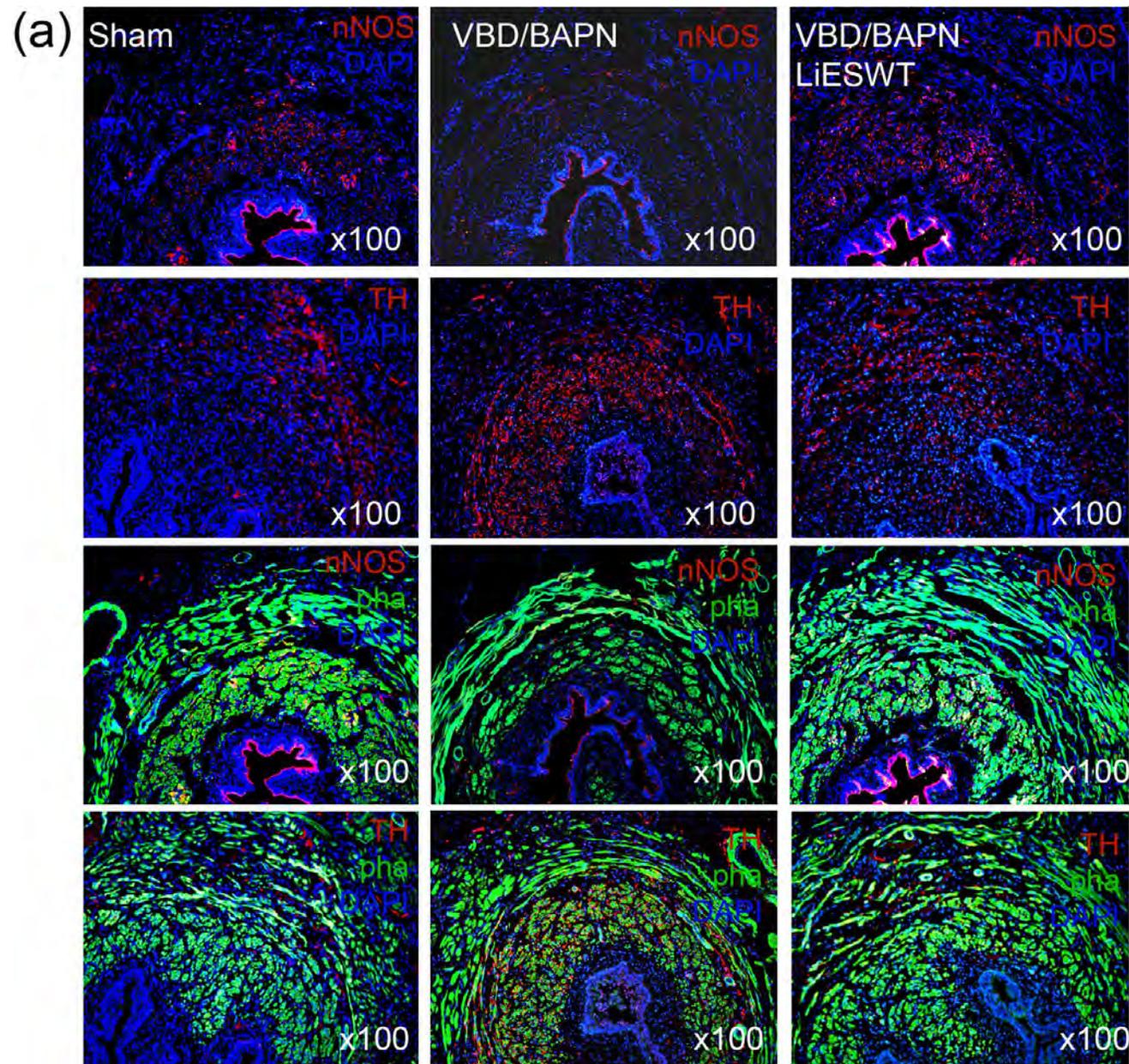


Pha: Phalloidin, marker for F-actin, muscle fibers.
 α -BTX: α -bungarotoxin, marker for neuromuscular junctions.

(b)

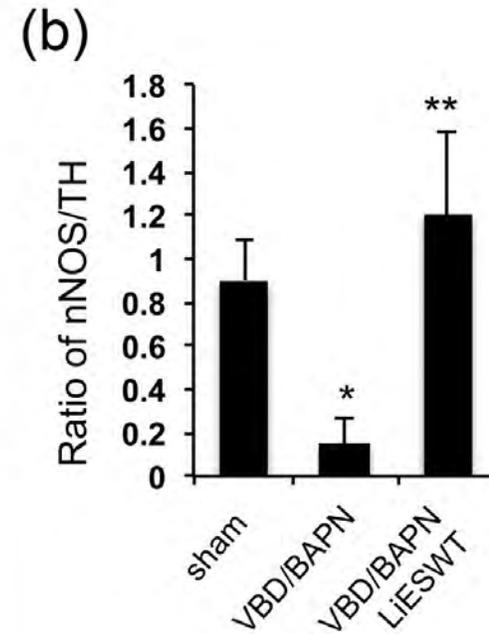


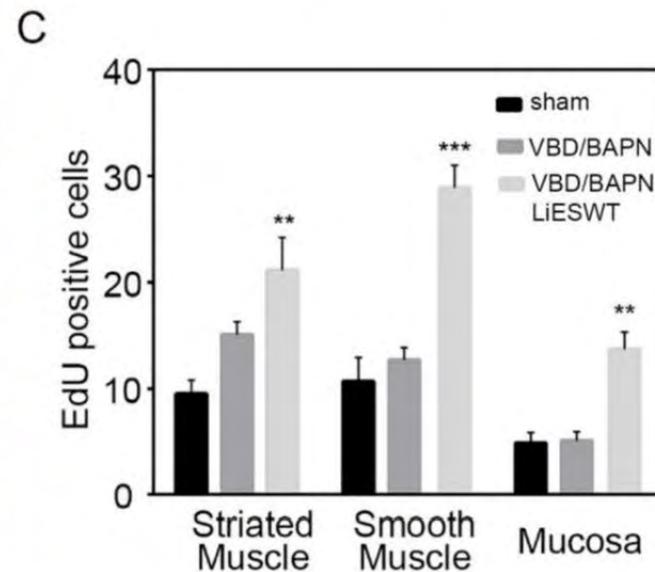
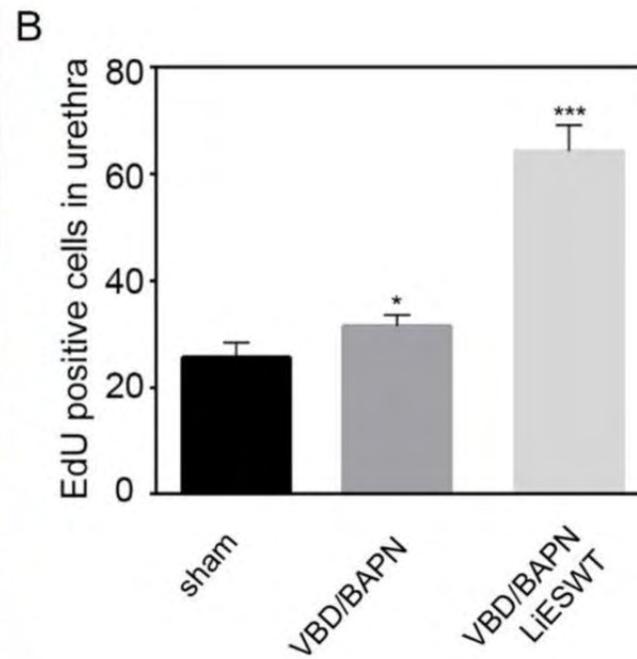
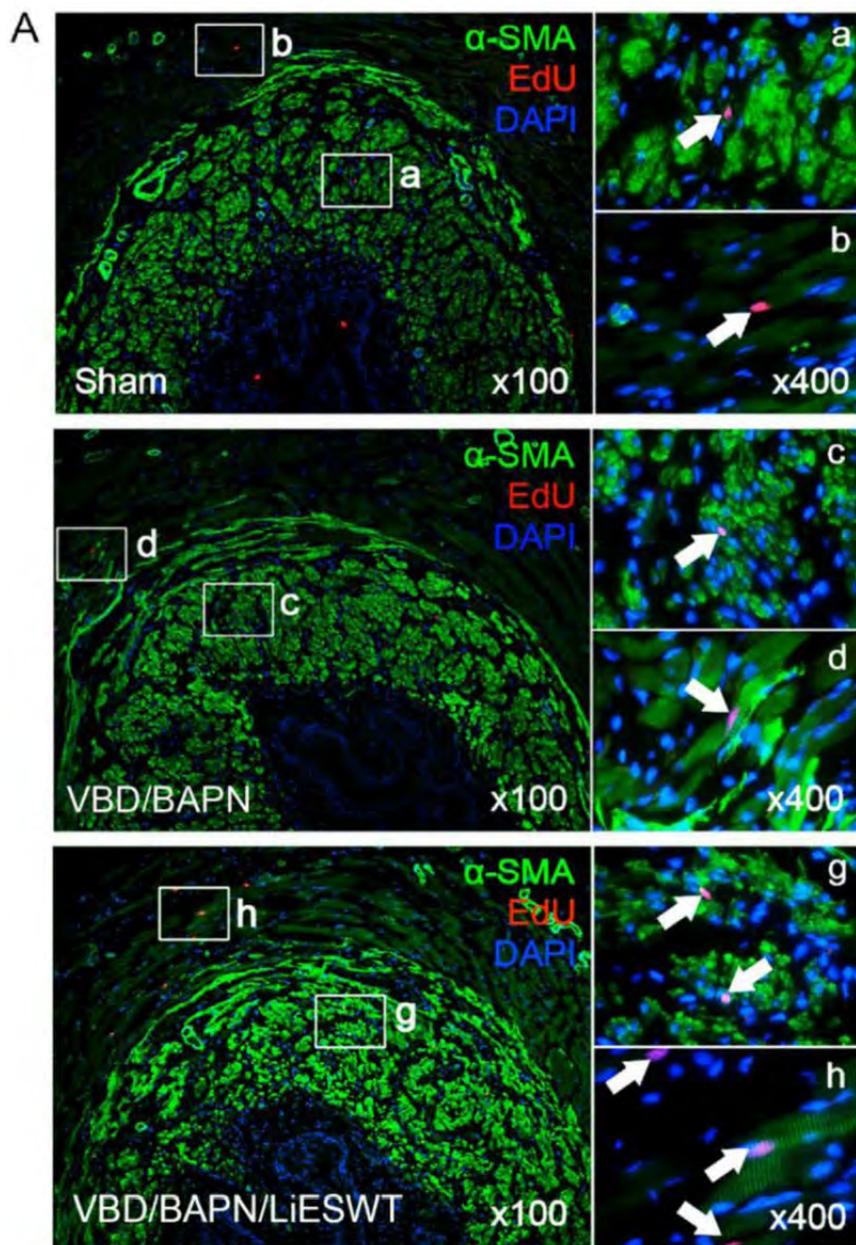
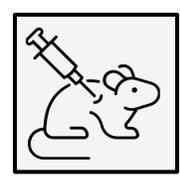
Li-ESWT Reversed the Decrease of Urethral Neuromuscular Junctions.



TH: Tyrosine hydroxylase, marker of oxidative stress.

Li-ESWT:
nNOS+ nerve fibers \uparrow
TH+ nerve fibers \downarrow





LiESWT:
 EdU positive cells \uparrow

\rightarrow **LiESWT promote proliferation.**

EdU: 5-Ethynyl-2-deoxyuridine, marker for nascent DNA (cell proliferation).



LiESWT for Stress urinary incontinence

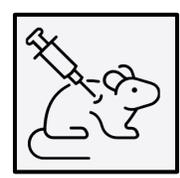
LiESWT ameliorate SUI:

Promoting proliferation.

Promoting muscle regeneration.

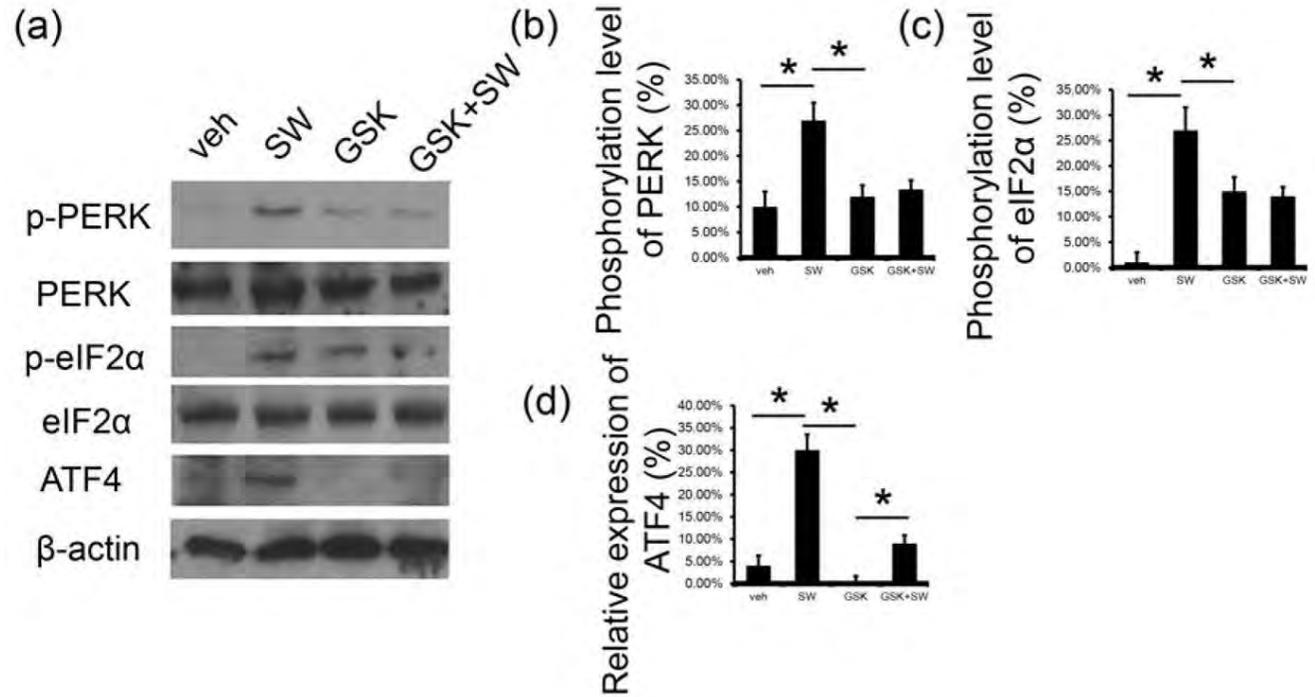
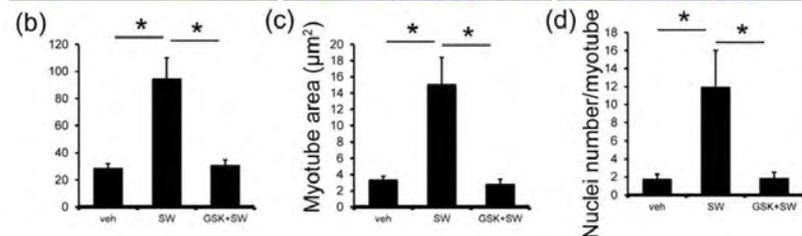
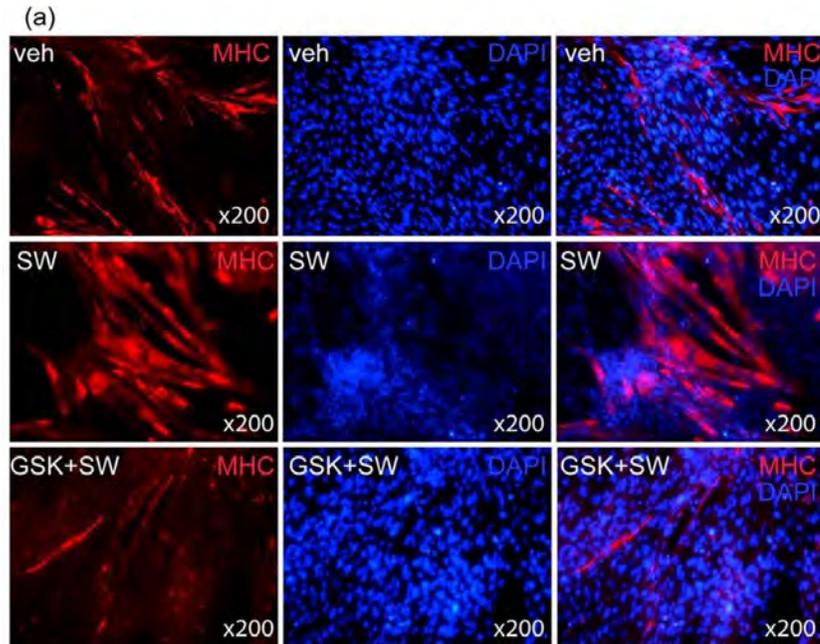
Promoting nerve regeneration.

Promoting NMJ regeneration



Low-Intensity Extracorporeal Shock Wave Therapy Promotes Myogenesis Through PERK/ATF4 Pathway

Bohan Wang^{1,2}, Jun Zhou¹, Lia Banie¹, Amanda B. Reed-Maldonado¹, Hongxiu Ning¹, Zhihua Lu¹, Yajun Ruan¹, Tie Zhou¹, Hsun Shuan Wang¹, Byung Seok Oh¹, Guifang Wang¹, Stanley Lei Qi³, Guiting Lin¹, and Tom F Lue^{1,*}



GSK2656157: an inhibitor of PERK pathway



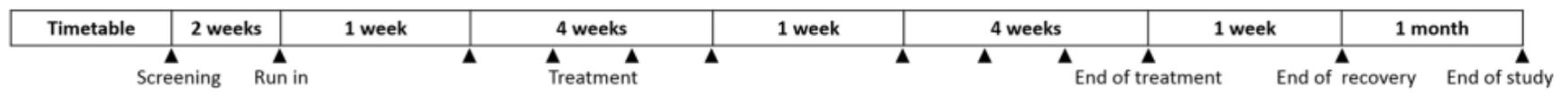
LiESWT for Stress urinary incontinence

SCIENTIFIC REPORTS

nature research

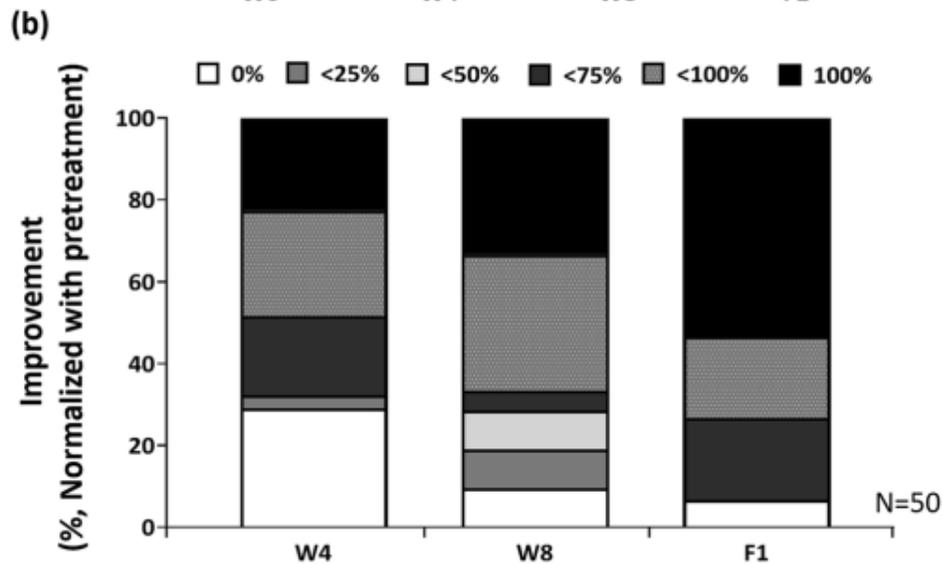
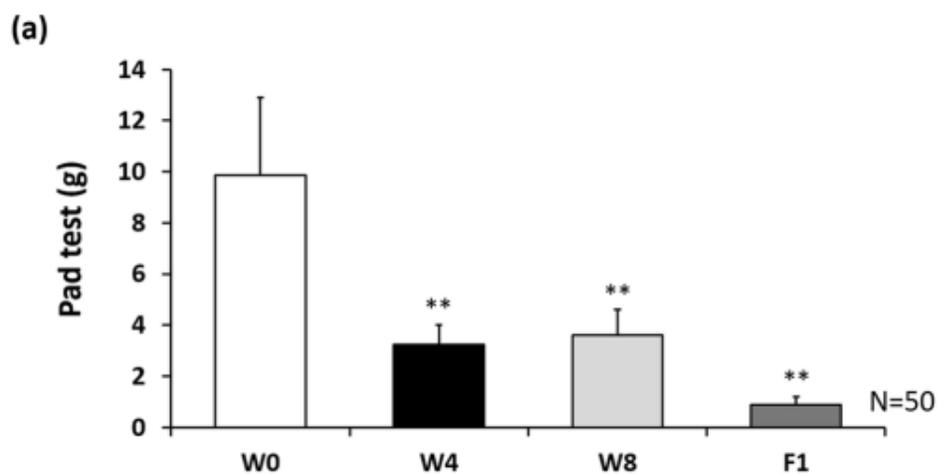
Therapeutic effects of Low intensity extracorporeal low energy shock wave therapy (LiESWT) on stress urinary incontinence

Cheng-Yu Long ^{# 1 2 3 4}, Kun-Ling Lin ^{# 1 4}, Yung-Chin Lee ^{5 6 7}, Shu-Mien Chuang ^{5 8}, Jian-He Lu ^{5 7}, Bin-Nan Wu ⁹, Kuang-Shun Chueh ^{5 10}, Chin-Ru Ker ¹, Mei-Chen Shen ⁵, Yung-Shun Juan ^{11 12 13 14}

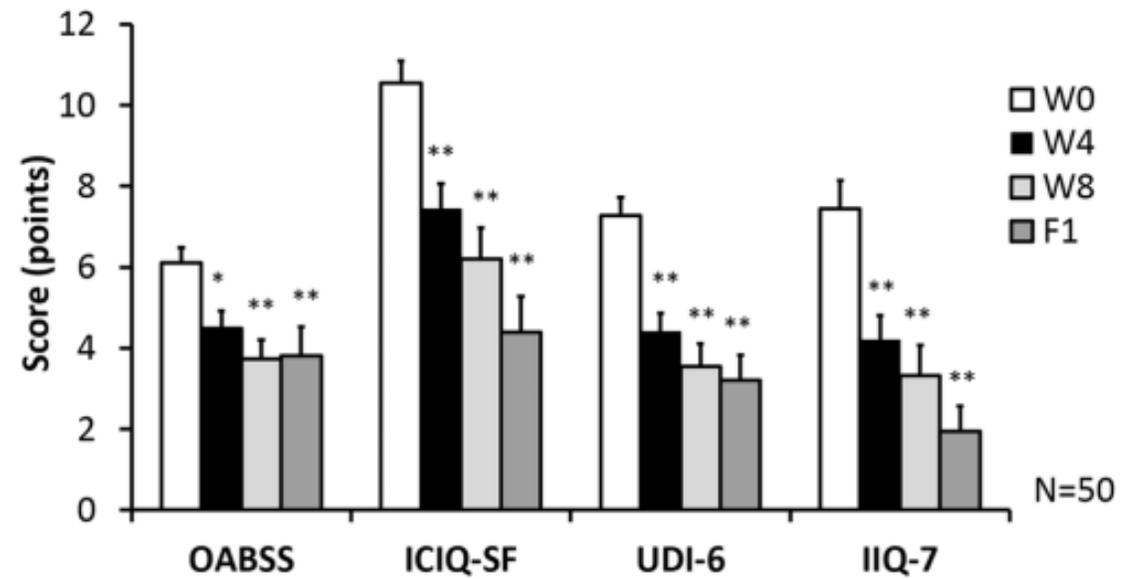


Subjects	Washout	Assessment (W0) (pre-treatment) (Baseline data)	LiESWT treatment	Assessment (W4) (post-treatment)	LiESWT treatment	Assessment (W8) (post-treatment)	Follow up (F1)
50 women of stress urinary incontinence (SUI) A single-arm prospective clinical trial		1. Questionnaires: OABSS, ICIQ-SF, UDI-6 and IIQ-7 score 2. Uroflowmetry and PVR. 3. 3-day voiding diary 4. Pad test	LiESWT (weekly): 3000 pulses, 0.25mJ/mm ² , and 3 pulses/second Once/week, Middle of labia minora: 1000 pulses Right side of labia minora: 1000 pulses Right side of labia minora: 1000 pulses	1. Questionnaires: OABSS, ICIQ-SF, UDI-6 and IIQ-7 score 2. Uroflowmetry and PVR. 3. 3-day voiding diary 4. Pad test 5. Kegel Exercise training	LiESWT (weekly): 3000 pulses, 0.25mJ/mm ² , and 3 pulses/second Once/week. Middle of labia minora: 1000 pulses Right side of labia minora: 1000 pulses Right side of labia minora: 1000 pulses	1. Questionnaires: OABSS, ICIQ-SF, UDI-6 and IIQ-7 score 2. Uroflowmetry and PVR. 3. 3-day voiding diary 4. Pad test 5. Kegel Exercise training	1. Questionnaires: OABSS, ICIQ-SF, UDI-6 and IIQ-7 score 2. Uroflowmetry and PVR. 3. 3-day voiding diary 4. Pad test 5. Kegel Exercise training

Note: LiESWT, low intensity extracorporeal low energy shock wave; W, week; W0, baseline data; W4, once per week, 4-weeks of LiESWT; W8, once per week, 8-weeks of LiESWT; F1, 1-month follow up; PVR, measurement of post-void residual urine volume; Overactive Bladder Symptom Scores (OABSS), International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF), Urogenital Distress Inventory (UDI-6)-Short Form and incontinence impact questionnaire-7 (IIQ-7) score.



Improvement	W4	W8	F1
No change (0%)	29.03%	9.52%	6.67%
Improvement (<25%)	3.23%	9.52%	0.00%
Improvement (<50%)	0.00%	9.52%	0.00%
Improvement (<75%)	19.35%	4.76%	20.00%
Improvement (<100%)	25.81%	33.33%	20.00%
Completely dry (100%)	22.58%	33.33%	53.33%



Post LiESWT (Followed for one month):

Pad test ↓, 53.33% completely dry.

OABSS ↓

ICIQ – SF ↓

UDI – 6 ↓

IIQ – 7 ↓



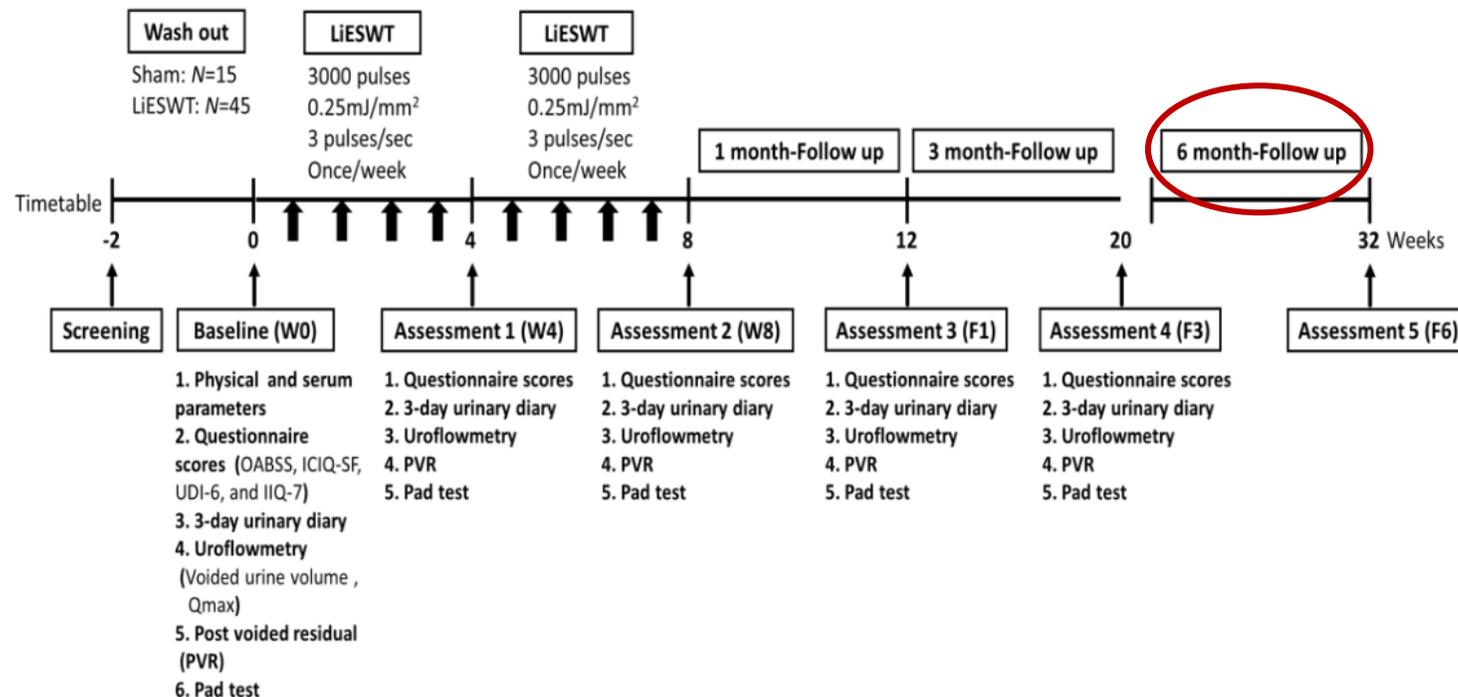
LiESWT for Stress urinary incontinence

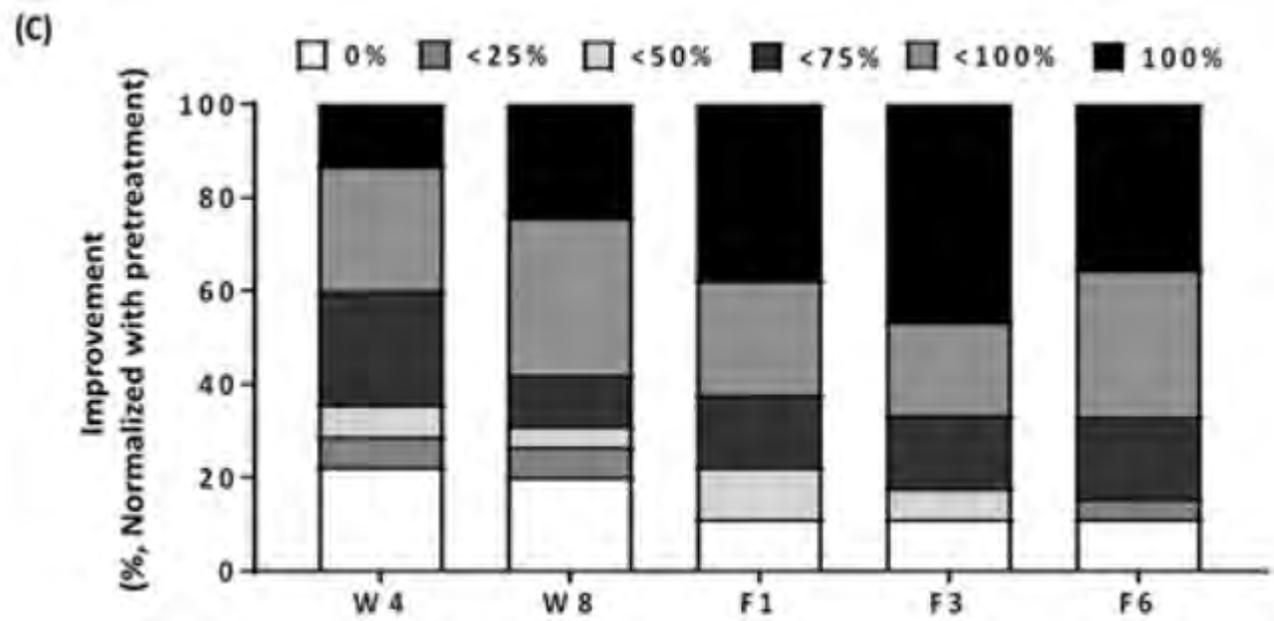
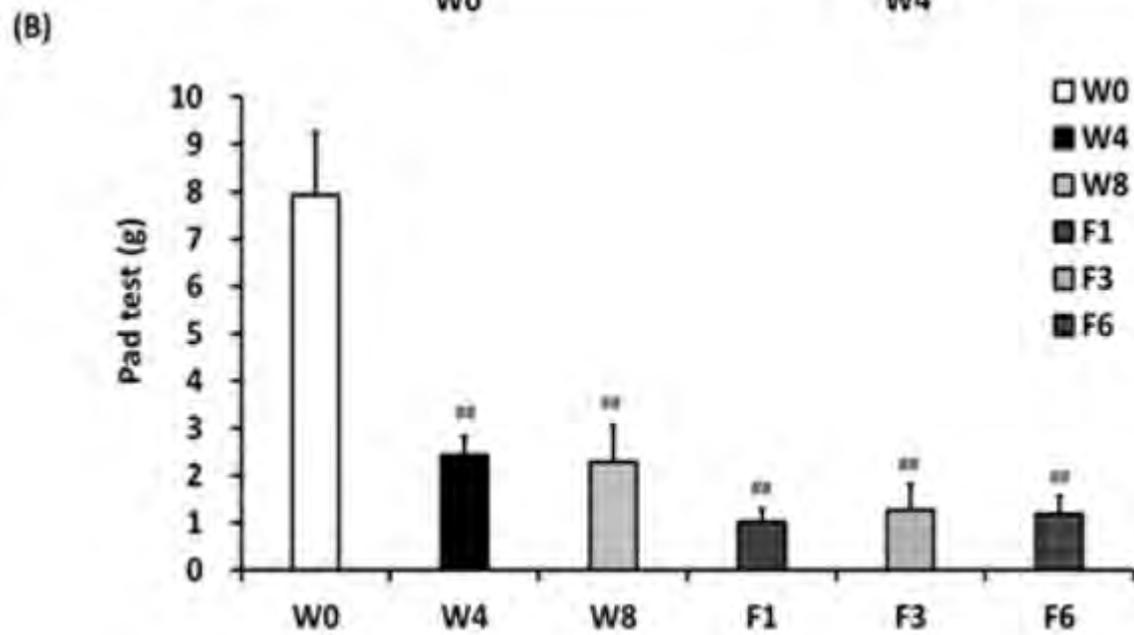
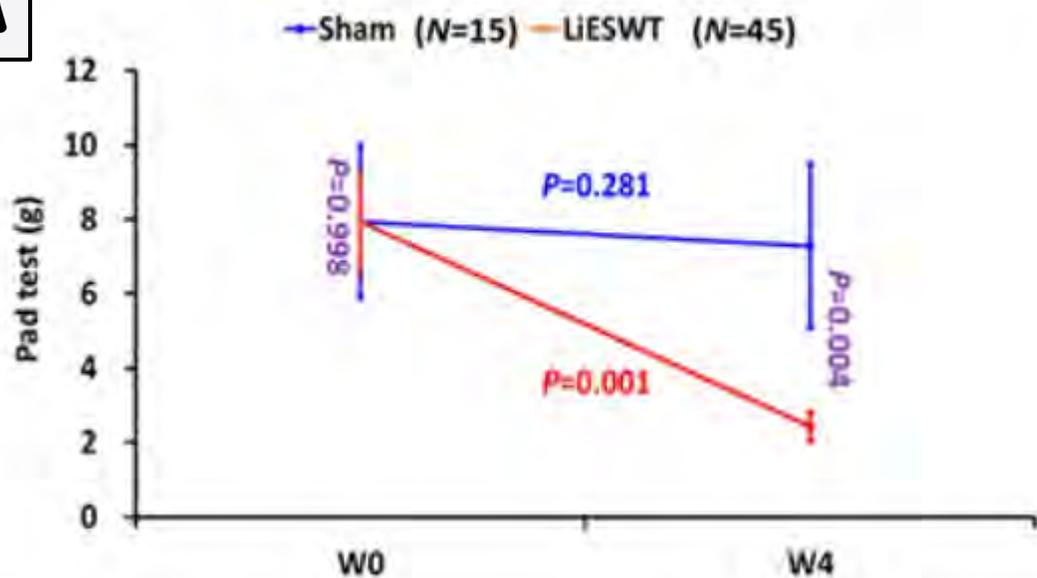
 medicina 

Article

Low Intensity Extracorporeal Shock Wave Therapy as a Novel Treatment for Stress Urinary Incontinence: A Randomized-Controlled Clinical Study

Kun-Ling Lin ^{1,2,3}, Kuang-Shun Chueh ^{1,4,5}, Jian-He Lu ⁶, Shu-Mien Chuang ^{4,7}, Bin-Nan Wu ⁸, Yung-Chin Lee ^{4,7,9}, Yi-Hsuan Wu ^{1,4,7}, Mei-Chen Shen ^{4,7}, Ting-Wei Sun ^{4,7}, Cheng-Yu Long ^{2,9,10,*} and Yung-Shun Juan ^{1,4,5,7,*}

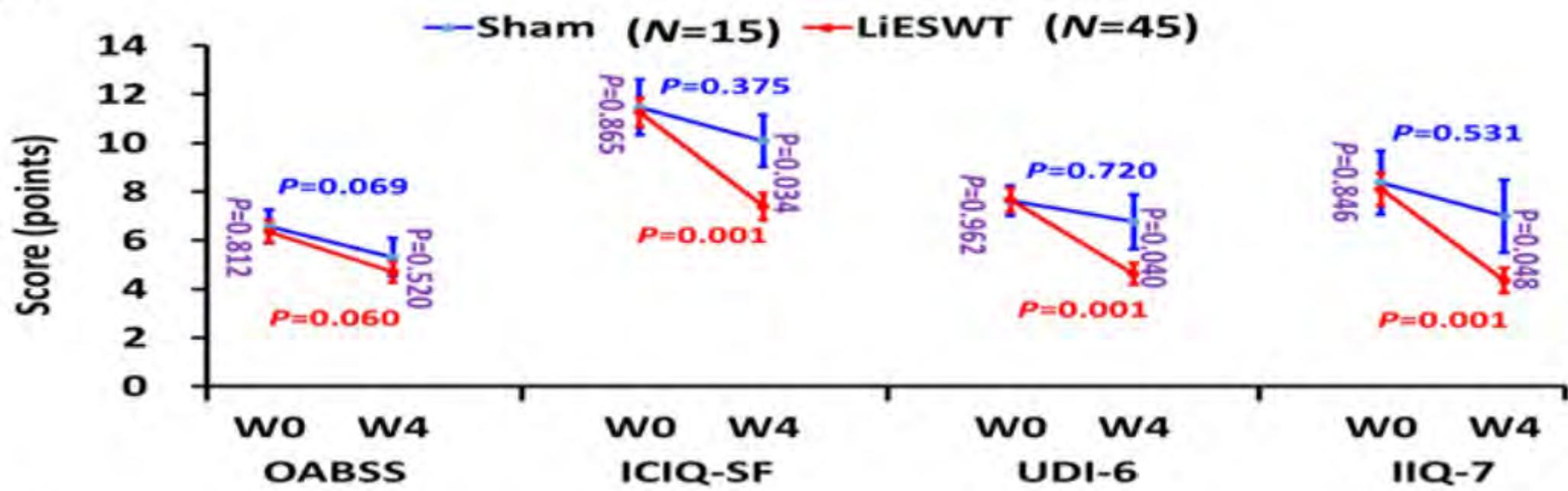




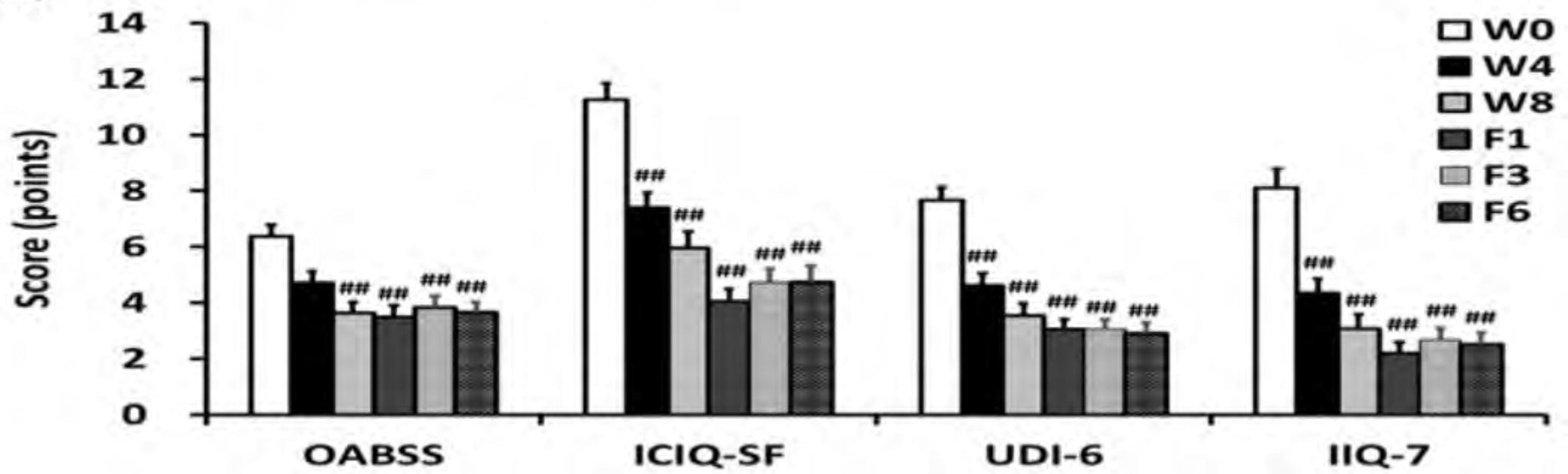
Improvement	No./Total No. (%)				
	W4	W8	F1	F3	F6
No change (0%)	10/45 (22.2)	9/45 (20.0)	5/45 (11.1)	5/45 (11.1)	5/45 (11.1)
Improvement (<25%)	3/45 (6.7)	3/45 (6.7)	0/45 (0.0)	0/45 (0.0)	2/45 (4.4)
Improvement (<50%)	3/45 (6.7)	2/45 (4.4)	5/45 (11.1)	3/45 (6.7)	0/45 (0.0)
Improvement (<75%)	11/45 (24.4)	5/45 (11.1)	7/45 (15.6)	7/45 (15.6)	8/45 (17.8)
Improvement (<100%)	12/45 (26.7)	15/45 (33.3)	11/45 (24.4)	9/45 (20.0)	14/45 (31.1)
Completely dry (100%)	6/45 (13.3)	11/45 (24.4)	17/45 (37.8)	21/45 (46.7)	16/45 (35.6)



(A)



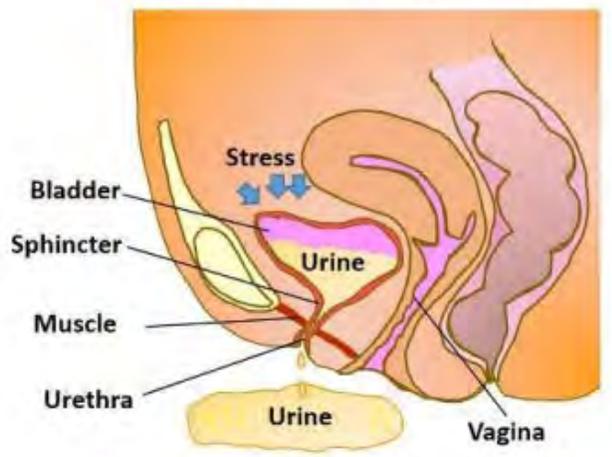
(B)





LiESWT for Stress urinary incontinence

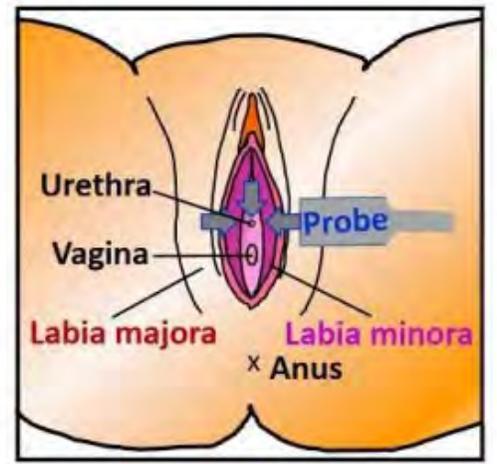
Stress urinary incontinence



Involuntary leakage of urine

Physical exertion, effort, coughing, sneezing, or lifting heavy objects

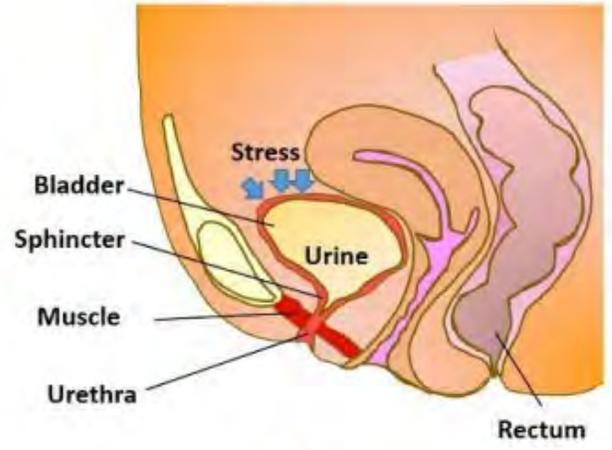
LiESWT treatment



LiESWT:
placed on the middle (1000 pulses), the left side (1000 pulses) and the right side (1000 pulses) of labia minora; 0.25mJ/mm², 3 pulses/second; Once/week.

LiESWT
8 weeks
Follow up
6 months

Improvement



Improvement:
1. ↓ bladder urine leakage.
2. ↓ overactive bladder.
3. ↑ quality of life.

Conclusion

LiESWT for stress urinary incontinence

- Promote angiogenesis and sphincter regeneration (Possible via PERK/ATF4 pathway).
- Promote neurogenesis and neuromuscular junction regeneration.
- Decreased urine leakage (Improved pad test).
- Improved OAB symptoms and QoL.



Thanks for your participation

Appendix

**SCIENTIFIC
REPORTS**

nature research

Therapeutic effects of Low intensity extracorporeal low energy shock wave therapy (LiESWT) on stress urinary incontinence

Cheng-Yu Long ^{# 1 2 3 4}, Kun-Ling Lin ^{# 1 4}, Yung-Chin Lee ^{5 6 7}, Shu-Mien Chuang ^{5 8},
Jian-He Lu ^{5 7}, Bin-Nan Wu ⁹, Kuang-Shun Chueh ^{5 10}, Chin-Ru Ker ¹, Mei-Chen Shen ⁵,
Yung-Shun Juan ^{11 12 13 14}

Parameter	SUI (Mean \pm SE)			
	W 0	W 4	W8	F1
Pad test (g)	9.85 \pm 3.06	3.23 \pm 0.78**	3.60 \pm 1.01**	0.89 \pm 0.31**
Uroflowmetry data				
Voided urine volume (ml)	354.59 \pm 24.59	352.55 \pm 25.57	360.25 \pm 29.59	367.98 \pm 44.26
Maximum flow rate (Qmax) (ml/sec)	33.89 \pm 4.67	32.91 \pm 2.88	34.48 \pm 4.26	35.96 \pm 3.74
Post voided residual (PVR) (ml)	48.54 \pm 8.59	35.66 \pm 5.87*	28.81 \pm 6.57**	26.00 \pm 6.62**
3-day urinary diary data				
Intake (ml)	1784.25 \pm 88.53	1852.80 \pm 96.72	1738.79 \pm 85.37	1729.48 \pm 118.51
Output (ml)	1751.62 \pm 91.68	1819.70 \pm 89.98	1771.05 \pm 84.43	1731.77 \pm 114.13
Average urine volume (ml)	219.70 \pm 11.37	229.31 \pm 10.49	237.01 \pm 11.56*	232.59 \pm 15.21
Functional bladder capacity (ml)	363.93 \pm 15.54	383.47 \pm 19.00*	386.13 \pm 24.62*	379.16 \pm 30.76*
Urinary frequency (times/24hrs)	8.54 \pm 0.31	7.38 \pm 0.38	6.15 \pm 0.40*	7.39 \pm 0.46
Urgency (times)	1.95 \pm 0.31	0.97 \pm 0.24**	0.83 \pm 0.25**	0.78 \pm 0.26**
Nocturia (times)	1.12 \pm 0.12	0.84 \pm 0.13	0.76 \pm 0.14*	0.74 \pm 0.22*

Table 2. Urodynamic parameters of study population for stress urinary incontinence (SUI). Note: W, week; W0, baseline data; W4, once per week, 4 weeks of LiESWT; W8, once per week, 8 weeks of LiESWT; F1, 1-month follow up; Values are means \pm SE. * $p < 0.05$; ** $p < 0.01$ VS. baseline data (W0). N = 50.



Article

Low Intensity Extracorporeal Shock Wave Therapy as a Novel Treatment for Stress Urinary Incontinence: A Randomized-Controlled Clinical Study

Kun-Ling Lin ^{1,2,3}, Kuang-Shun Chueh ^{1,4,5}, Jian-He Lu ⁶ , Shu-Mien Chuang ^{4,7}, Bin-Nan Wu ⁸ , Yung-Chin Lee ^{4,7,9}, Yi-Hsuan Wu ^{1,4,7} , Mei-Chen Shen ^{4,7}, Ting-Wei Sun ^{4,7}, Cheng-Yu Long ^{2,9,10,*} and Yung-Shun Juan ^{1,4,5,7,*} 

Table 3. Urodynamic parameters and questionnaire score of study population for stress urinary incontinence (SUI).

Parameter	Sham (N = 15)		LiESWT (N = 45)					
	W0	W4	W0	W4	W8	F1	F3	F6
Pad test (g)	7.94 ± 2.07	7.29 ± 2.21	7.93 ± 1.32	2.43 ± 0.40 ^{++##}	2.29 ± 0.78 ^{##}	1.02 ± 0.28 ^{##}	1.27 ± 0.54 ^{##}	1.18 ± 0.38 ^{##}
3-day urinary diary record								
Intake (mL)	1698.7 ± 127.7	1703.2 ± 127.8	1757.6 ± 94.3	1822.9 ± 94.8	1738.2 ± 74.7	1678.5 ± 99.4	1680.2 ± 89.8	1785.1 ± 75.9
Output (mL)	1795.3 ± 104.6	1727.4 ± 126.4	1787.6 ± 107.7	1845.1 ± 99.8	1779.9 ± 86.7	1779.5 ± 104.7	1886.2 ± 110.4	1780.4 ± 70.1
Average voided volume (mL)	204.6 ± 15.1	221.4 ± 15.6	212.4 ± 8.9	235.5 ± 9.3	245.4 ± 9.2	245.4 ± 9.9	248.9 ± 8.2 [#]	249.0 ± 10.2 [#]
Functional bladder capacity (mL)	376.6 ± 30.9	378.4 ± 30.0	374.3 ± 16.8	393.2 ± 19.7	389.6 ± 18.8	380.3 ± 19.5	400.8 ± 17.6	398.4 ± 19.6
Daytime frequency (times)	8.86 ± 0.50	8.00 ± 0.38	8.54 ± 0.32	8.42 ± 0.33	7.98 ± 0.34	7.91 ± 0.30	8.12 ± 0.29	8.12 ± 0.25
Nocturia (times)	1.00 ± 0.13	0.81 ± 0.17	0.81 ± 0.10	0.82 ± 0.13	0.69 ± 0.12	0.59 ± 0.12	0.61 ± 0.09	0.55 ± 0.11
Urgency (times)	1.86 ± 0.46	1.68 ± 0.51	2.09 ± 0.33	1.32 ± 0.24	1.06 ± 0.22 [#]	0.57 ± 0.15 ^{##}	0.86 ± 0.19 ^{##}	1.07 ± 0.21 [#]
Uroflowmetry data								
Voided urine volume (mL)	367.2 ± 38.6	378.9 ± 34.9	346.4 ± 24.0	355.5 ± 25.8	394.3 ± 24.4	427.0 ± 23.9 [#]	433.6 ± 26.4 [#]	392.0 ± 24.7
Maximum flow rate (mL/s)	32.2 ± 3.3	33.7 ± 2.9	30.1 ± 1.7	31.2 ± 2.1	33.7 ± 2.4	38.0 ± 2.0 [#]	36.3 ± 2.2	33.1 ± 1.9
PVR (mL)	50.7 ± 11.5	44.3 ± 9.7	53.0 ± 5.6	35.7 ± 4.3	28.3 ± 4.6 [#]	27.5 ± 4.1 [#]	26.7 ± 5.0 [#]	33.5 ± 5.6
Questionnaire score (points)								
OABSS	6.57 ± 0.68	5.31 ± 0.78	6.36 ± 0.43	4.70 ± 0.44	3.65 ± 0.38 ^{##}	3.49 ± 0.42 ^{##}	3.83 ± 0.42 ^{##}	3.66 ± 0.38 ^{##}
ICIQ-SF	11.47 ± 1.14	10.08 ± 1.07	11.26 ± 0.59	7.39 ± 0.56 ^{+##}	5.96 ± 0.60 ^{##}	4.06 ± 0.45 ^{##}	4.73 ± 0.48 ^{##}	4.75 ± 0.59 ^{##}
UDI-6	7.63 ± 0.62	6.77 ± 1.12	7.67 ± 0.48	4.63 ± 0.44 ^{+##}	3.53 ± 0.45 ^{##}	3.05 ± 0.37 ^{##}	3.06 ± 0.36 ^{##}	2.91 ± 0.39 ^{##}
IIQ-7	8.38 ± 1.30	7.00 ± 1.49	8.11 ± 0.67	4.36 ± 0.52 ^{+##}	3.07 ± 0.53 ^{##}	2.19 ± 0.40 ^{##}	2.67 ± 0.45 ^{##}	2.52 ± 0.41 ^{##}

Note: W, week; W4, once per week, 4-week of LiESWT; W8, once per week, 8-week of LiESWT; F1, 1-month follow up; F3, 3-month follow up; F6, 6-month follow up; OABSS, Overactive Bladder Symptom Scores; ICIQ-SF, International Consultation on Incontinence Questionnaire short form; UDI-6, Urinary Distress Inventory, Short Form; IIQ-7, Incontinence Impact Questionnaire, Short Form. Values are means ± SE.
[#] $p < 0.05$; ^{##} $p < 0.01$ vs. W0. ⁺ $p < 0.05$; ⁺⁺ $p < 0.01$ vs. sham group.

Clinical Study

BioMed Research
International



Low-Intensity Extracorporeal Shock Wave Therapy Ameliorates the Overactive Bladder: A Prospective Pilot Study

Yung-Chin Lee ^{1,2,3} **Shu-Mien Chuang**^{1,4} **Kun-Ling Lin** ^{5,6,7} **Wei-Chiao Chen** ^{1,2}
Jian-He Lu ¹ **Kuang-Shun Chueh**^{1,8} **Mei-Chen Shen** ¹ **Li-Wen Liu**¹
Cheng-Yu Long ^{5,6,9} and **Yung-Shun Juan** ^{1,3,8,10}

TABLE 2: Urodynamic parameters of study population for overactive bladder (OAB).

Parameter	OAB (mean \pm SE)				
	W0	W4	W8	F1	F3
3-Day urinary diary record					
Intake (ml)	1868.06 \pm 81.94	1792.07 \pm 76.35	1977.92 \pm 180.65	1761.80 \pm 82.47	1766.56 \pm 74.50
Output (ml)	2045.26 \pm 87.63	1922.54 \pm 75.81	1909.54 \pm 75.78	1928.33 \pm 74.51	1819.03 \pm 77.33
Average voided volume (ml)	182.51 \pm 8.20	195.02 \pm 8.03	206.93 \pm 8.94*	215.67 \pm 12.10*	208.77 \pm 8.88*
Functional bladder capacity (ml)	325.28 \pm 15.04	338.03 \pm 12.01	366.94 \pm 12.83*	359.49 \pm 10.87	359.55 \pm 13.72
Daytime frequency (times)	11.94 \pm 0.45	10.25 \pm 0.38**	9.76 \pm 0.34**	9.70 \pm 0.30**	9.19 \pm 0.34**
Nocturia (times)	1.67 \pm 0.15	1.34 \pm 0.12	1.16 \pm 0.12**	1.14 \pm 0.11**	1.11 \pm 0.11**
Urgency (times)	3.33 \pm 0.41	2.68 \pm 0.43	2.04 \pm 0.35*	1.89 \pm 0.34*	1.72 \pm 0.30**
Uroflowmetry data					
Voided urine volume (ml)	301.43 \pm 15.23	349.69 \pm 17.45*	364.42 \pm 17.99*	350.69 \pm 15.91*	355.80 \pm 16.15*
Maximum flow rate (Q_{\max}) (ml/sec)	24.92 \pm 1.18	26.05 \pm 1.39	28.43 \pm 1.13*	29.08 \pm 1.22*	31.25 \pm 2.65*
Post-voided residual (PVR) (ml)	49.8 \pm 5.5	41.2 \pm 4.9	33.8 \pm 4.2*	28.9 \pm 3.3**	32.0 \pm 2.9*
OABSS score (points)					
Daytime frequency	1.1 \pm 0.1	0.9 \pm 0.1*	0.8 \pm 0.1**	0.7 \pm 0.1**	0.8 \pm 0.1**
Nocturia	2.2 \pm 0.1	1.5 \pm 0.1**	1.3 \pm 0.1**	1.2 \pm 0.1**	1.4 \pm 0.1**
Urgency	2.9 \pm 0.2	2.0 \pm 0.2**	1.5 \pm 0.2**	1.2 \pm 0.2**	1.2 \pm 0.1**
Urgency incontinence	1.7 \pm 0.2	1.1 \pm 0.1*	0.8 \pm 0.1**	0.7 \pm 0.1**	0.7 \pm 0.1**

Note. SE: standard error; W: week; W4: once per week, 4 weeks of LiESWT; W8: once per week, 8 weeks of LiESWT; F1: 1-month follow-up; F3: 3-month follow-up; OABSS: overactive bladder symptom scores. Values are means \pm SE. * $p < 0.05$; ** $p < 0.01$ vs. W0. $N = 82$.



Article

Low-Intensity Extracorporeal Shock Wave Therapy Promotes Bladder Regeneration and Improves Overactive Bladder Induced by Ovarian Hormone Deficiency from Rat Animal Model to Human Clinical Trial

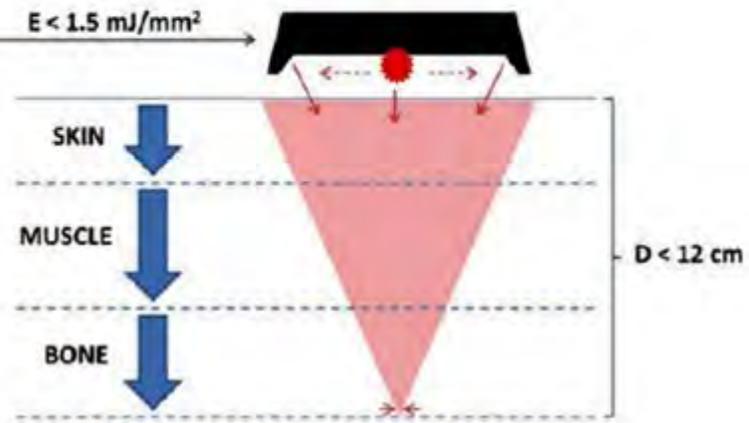
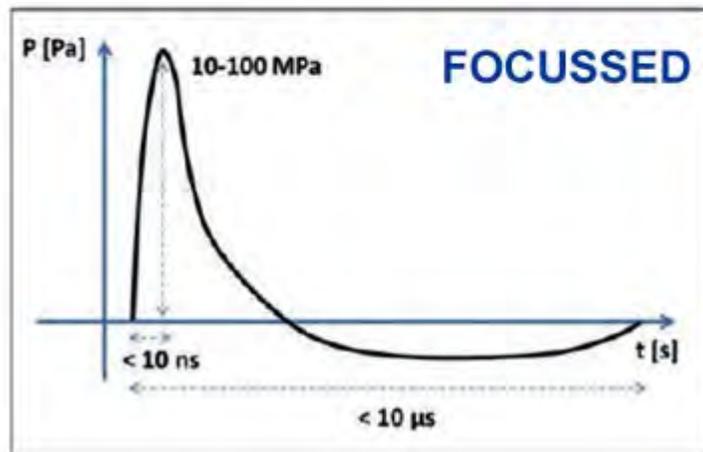
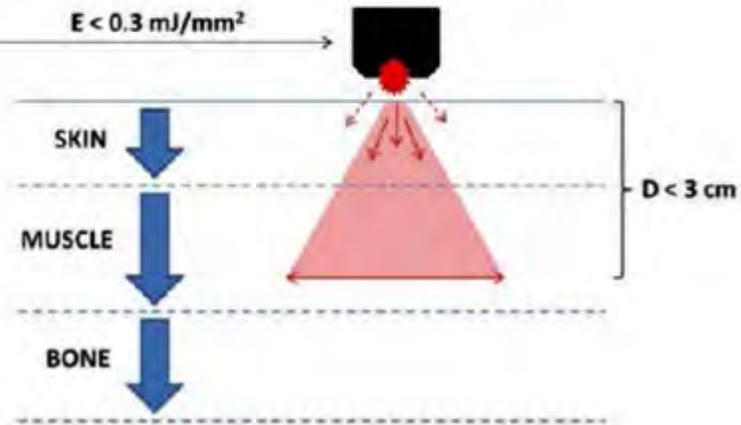
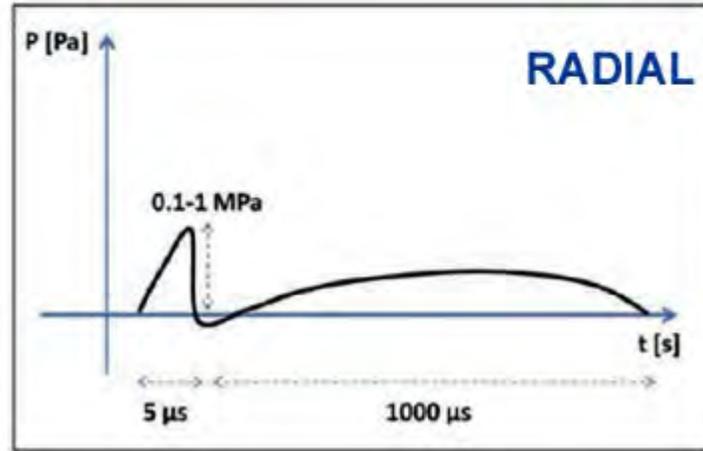
Kun-Ling Lin ^{1,2,3}, Jian-He Lu ⁴ , Kuang-Shun Chueh ^{1,5,6}, Tai-Jui Juan ⁷, Bin-Nan Wu ⁸ , Shu-Mien Chuang ⁹, Yung-Chin Lee ¹⁰, Mei-Chen Shen ⁹, Cheng-Yu Long ^{1,3,*†} and Yung-Shun Juan ^{1,5,6,9,*†} 

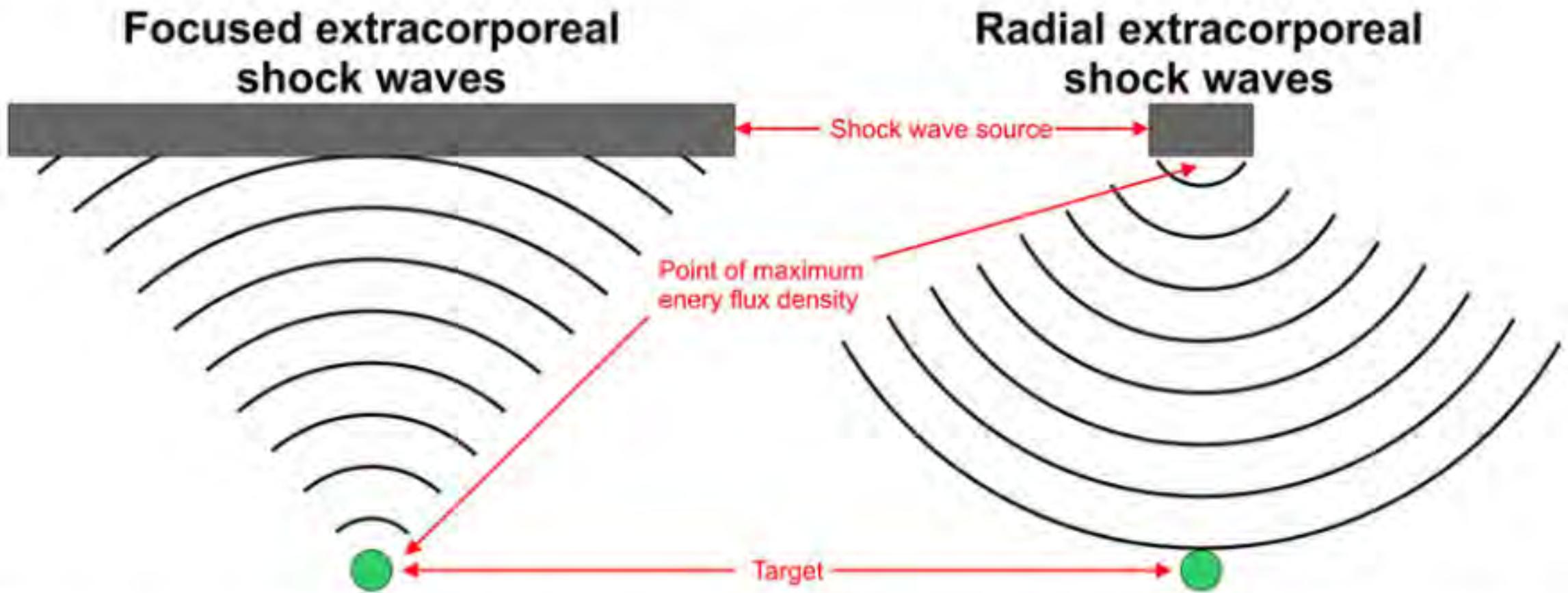
Table 3. Urodynamic parameters of study population for overactive bladder (OAB).

Parameter	Sham		LiESWT					
	W0	W4	W0	W4	W8	F1	F3	F6
3-day urinary diary record								
Intake (mL)	2048.4 ± 69.4	2043.1 ± 46.1	2029.6 ± 74.6	1914.0 ± 54.4	1912.9 ± 45.5	1851.1 ± 50.8	1800.2 ± 56.3	1921.4 ± 57.2
Output (mL)	2070.9 ± 36.3	2016.4 ± 55.7	2017.4 ± 76.5	1977.1 ± 73.1	1932.6 ± 71.6	1897.9 ± 69.2	1922.9 ± 76.7	1928.8 ± 66.1
Average voided volume (mL)	186.8 ± 4.8	195.7 ± 4.5	186.8 ± 7.6	195.5 ± 6.2	213.2 ± 6.5 **	213.6 ± 7.1 **	218.4 ± 7.9 **	209.0 ± 7.6 *
FBC (mL)	344.3 ± 6.1	350.2 ± 6.4	338.1 ± 11.2	343.7 ± 11.2	376.0 ± 11.8 **	378.9 ± 14.8 **	356.7 ± 11.5 *	352.7 ± 14.7
Daytime frequency (times)	11.38 ± 0.33	11.09 ± 0.30	11.83 ± 0.46	10.24 ± 0.35 *,†	9.45 ± 0.28 **	9.47 ± 0.27 **	8.76 ± 0.25 **	8.96 ± 0.21 **
Nocturia (times)	1.73 ± 0.12	1.51 ± 0.11	1.68 ± 0.14	1.27 ± 0.10 *,†	1.17 ± 0.11 **	1.07 ± 0.10 **	1.14 ± 0.10 **	1.06 ± 0.10 **
Urgency (times)	2.90 ± 0.23	2.69 ± 0.24	3.10 ± 0.35	2.22 ± 0.36 **,†	1.87 ± 0.38 **	1.08 ± 0.30 **	1.14 ± 0.30 **	0.97 ± 0.26 **
Uroflowmetry data								
Voided urine volume (mL)	321.3 ± 17.6	339.0 ± 16.4	314.8 ± 14.6	369.6 ± 14.1 **	392.5 ± 17.6 **	380.7 ± 14.0 **	362.8 ± 14.2 **	359.7 ± 13.1 *
Qmax (mL/s)	25.30 ± 1.54	26.65 ± 1.18	24.21 ± 1.09	27.58 ± 1.43 *	28.35 ± 1.15 *	28.09 ± 1.39 *	26.98 ± 0.90 *	26.98 ± 1.14 *
PVR (mL)	42.79 ± 4.58	44.00 ± 4.66	46.67 ± 5.27	35.06 ± 4.63 *,†	31.01 ± 4.94 **	21.45 ± 1.97 **	26.62 ± 2.97 **	24.16 ± 2.92 **
OABSS score (points)								
Daytime frequency	1.07 ± 0.04	1.00 ± 0.03	1.22 ± 0.07	0.86 ± 0.04 *	0.77 ± 0.05 **	0.83 ± 0.05 **	0.85 ± 0.05 **	1.13 ± 0.11
Nocturia	2.30 ± 0.14	2.10 ± 0.13	2.19 ± 0.11	1.47 ± 0.10 **,††	1.32 ± 0.11 **	1.31 ± 0.11 **	1.46 ± 0.11 **	1.63 ± 0.20 *
Urgency	2.56 ± 0.16	2.38 ± 0.16	2.53 ± 0.19	1.57 ± 0.14 **,††	1.07 ± 0.14 **	1.00 ± 0.13 **	1.00 ± 0.10 **	0.96 ± 0.13 **
Urgency incontinence	1.73 ± 0.16	1.67 ± 0.16	1.61 ± 0.18	1.00 ± 0.14 **,††	0.67 ± 0.10 **	0.68 ± 0.10 **	0.74 ± 0.10 **	0.82 ± 0.15 *

Note: FBC, functional bladder capacity; Qmax, maximum flow rate; PVR, post-voided residual; SE, standard error; W, week; W4, once per week, 4-week of LiESWT; W8, once per week, 8-week of LiESWT; F1, 1-month follow-up; F3, 3-month follow-up; F6, 6-month follow-up; OABSS, overactive bladder symptom scores. Values are means ± SE. * $p < 0.05$; ** $p < 0.01$ versus W0. † $p < 0.05$; †† $p < 0.01$ W4 of LiESWT versus W4 of the sham group. $n = 19$ (Sham) and $n = 39$ (LiESWT).

Figure 1: Radial versus focused shockwave patterns





Main differences between focused and radial extracorporeal shock waves. Details are provided in the main text.

Low-Intensity Extracorporeal Shock Wave Therapy Ameliorates the Overactive Bladder

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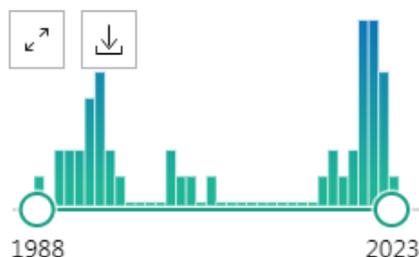
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 Cite Wang HJ, Lee WC, Tyagi P, Huang CC, Chuang YC.
 Share Neurourol Urodyn. 2017 Aug;36(6):1440-1447. doi: 10.1002/nau.23141. Epub 2016 Dec 30. PMID: 28035695
- 22 **Endogenous Stem Cells Were Recruited by Defocused Low-Energy Shock Wave in Treating Diabetic Bladder Dysfunction.**
 Cite Jin Y, Xu L, Zhao Y, Wang M, Jin X, Zhang H.
 Share **Stem Cell Rev Rep.** 2017 Apr;13(2):287-298. doi: 10.1007/s12015-016-9705-1. PMID: 27921202
- 23 **Extracorporeal shock wave lithotripsy monotherapy for treatment of patients with urethral and bladder stones presenting with acute urinary retention.**
 Cite Al-Ansari A, Shamsodini A, Younis N, Jaleel OA, Al-Rubaiai A, Shokeir AA.
 Share **Urology.** 2005 Dec;66(6):1169-71. doi: 10.1016/j.urology.2005.06.069. PMID: 16360434

2014~2016 at UCSF









2015 proposal

LiESWT on diabetic bladder dysfunction

Therapeutic effect of Micro-Energy Shock Wave (MESW) on pancreas and bladder dysfunction in a STZ induced DM rat model↵

↵

Background and significance↵

Diabetes mellitus (DM) is a major healthcare problem affecting 382 million people globally in 2013, a number that is expected to increase up to the 592 million by 2035 as estimated by the International Diabetes Federation [1]. Millions of DM patients receive exogenous insulin injections for their entire lives to control their blood glucose levels, which leads to an economic burden and physical suffering. DM is also associated with a broad constellation of urological consequences including erectile dysfunction (ED) and bladder dysfunction. Over 50% of patients with DM experience diabetic bladder dysfunction (DBD), which may take the form of a hypocontractile bladder or an overactive bladder syndrome typically described as urgency and frequency, with or without





2015 at UCSF

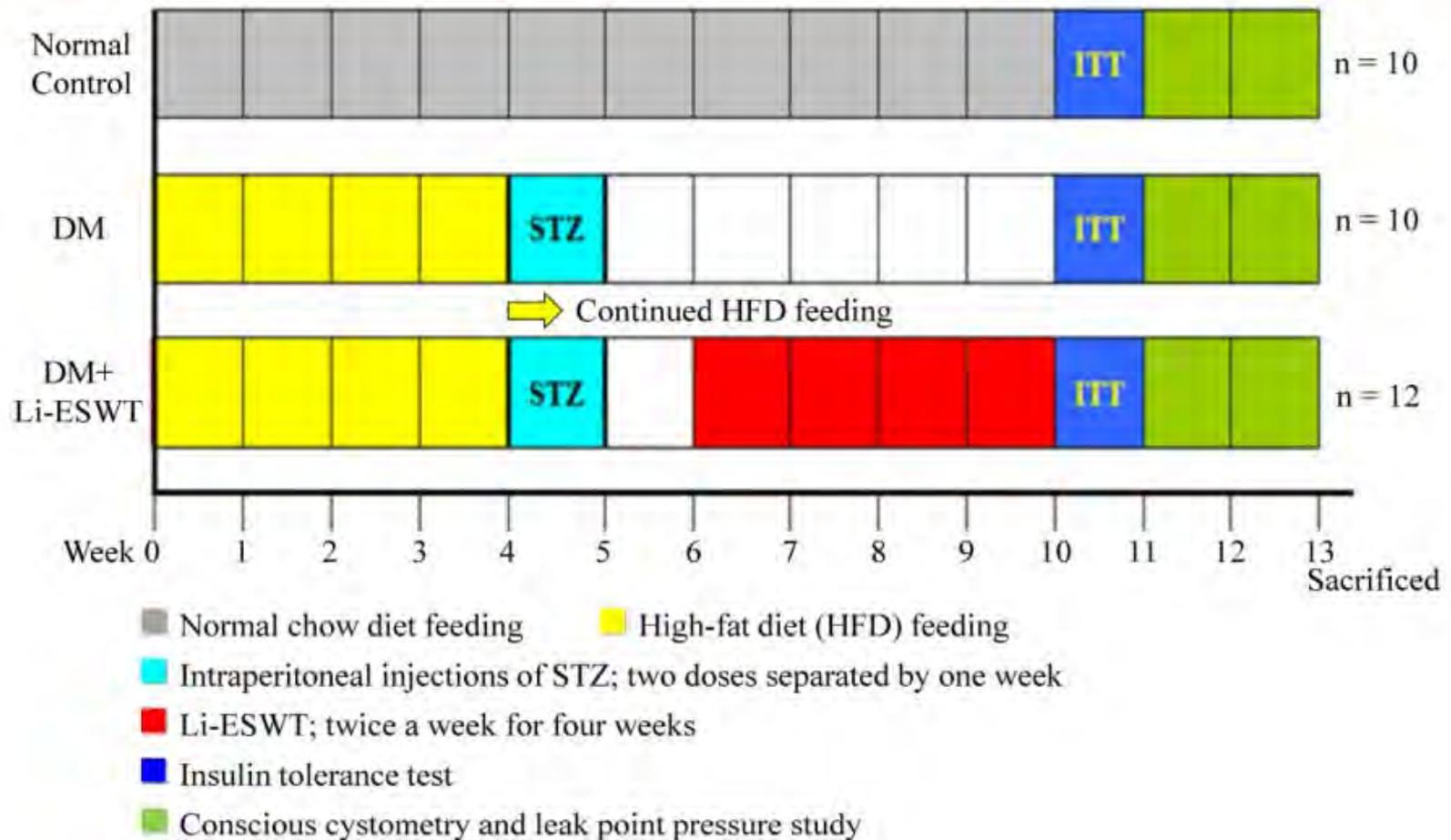
Research Paper

Therapeutic effect of Low intensity Extracorporeal Shock Wave Therapy (Li-ESWT) on diabetic bladder dysfunction in a rat model

Yung-Chin Lee^{1,2,3,4}, Tusty-Jiuan Hsieh⁵, Fang-Hsiang Tang^{6,7,8}, Jhen-Hao Jhan^{2,3,7}, Kun-Ling Lin^{6,7,8}, Yung-Shun Juan^{1,3,5,9}, Hsun-Shuan Wang^{2,3,4}✉ and Cheng-Yu Long^{4,8,10}✉

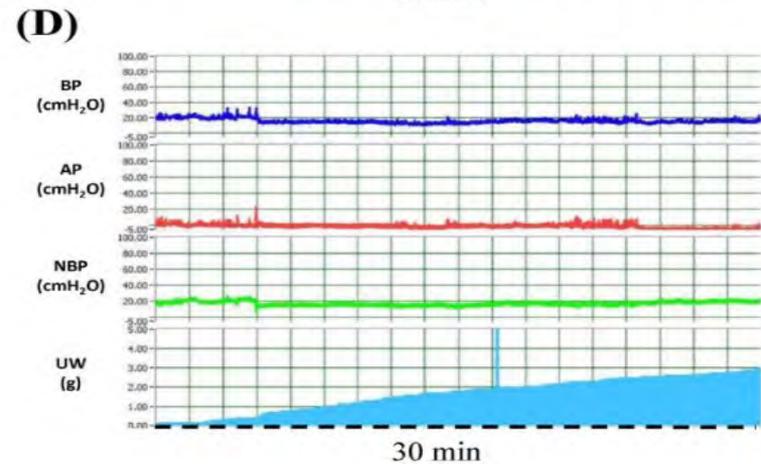
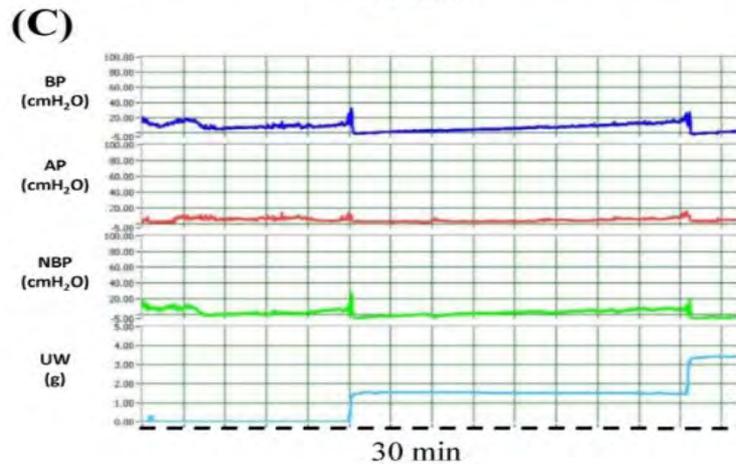
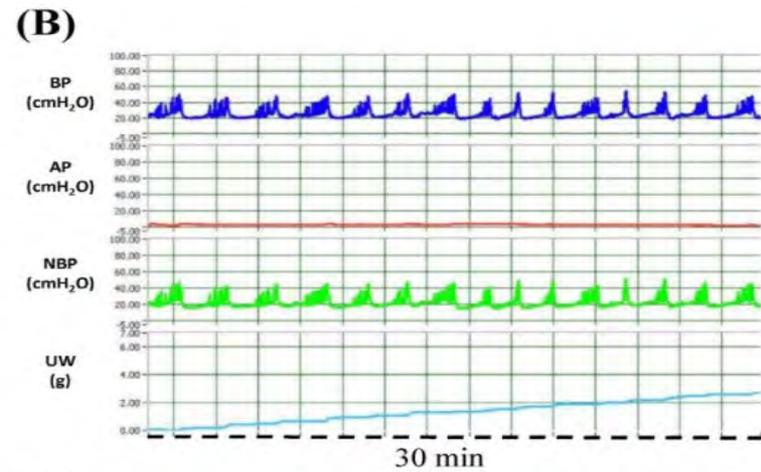
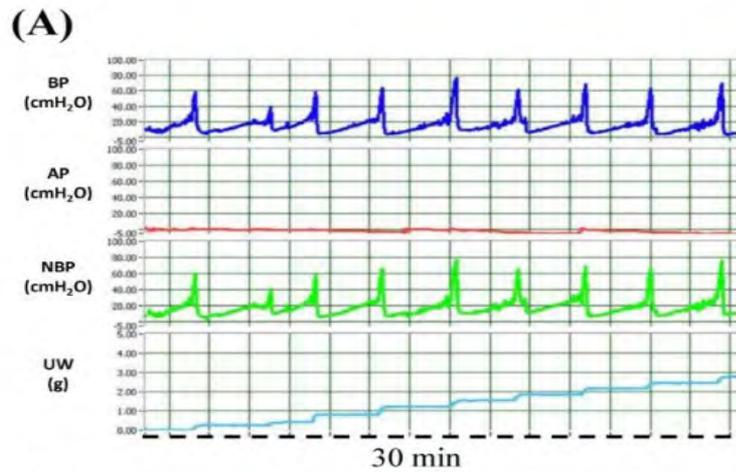
1. Department of Urology, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan
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5. Graduate Institute of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan
6. Department of Obstetrics and Gynecology, Kaohsiung Municipal Ta-Tung Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan
7. Graduate Institute of Clinical Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan
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9. Department of Urology, Kaohsiung Municipal Ta-Tung Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan
10. Department of Obstetrics and Gynecology, Kaohsiung Municipal Siaogang Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan

Therapeutic effect of Low intensity Extracorporeal Shock Wave Therapy (Li-ESWT) on diabetic bladder dysfunction in a rat model

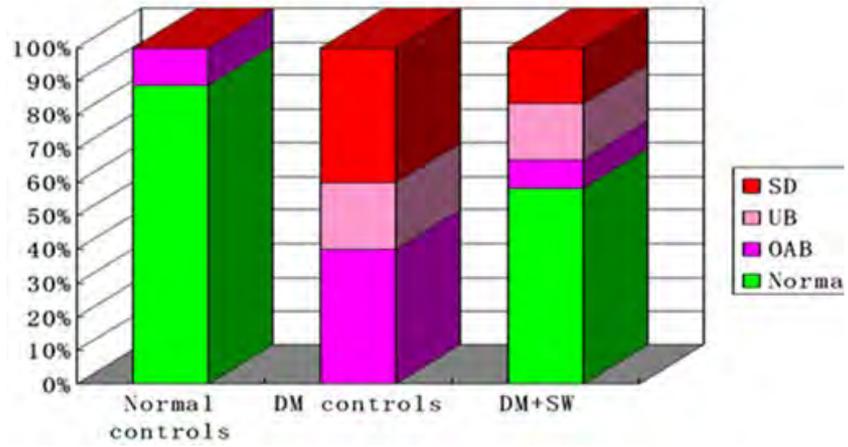


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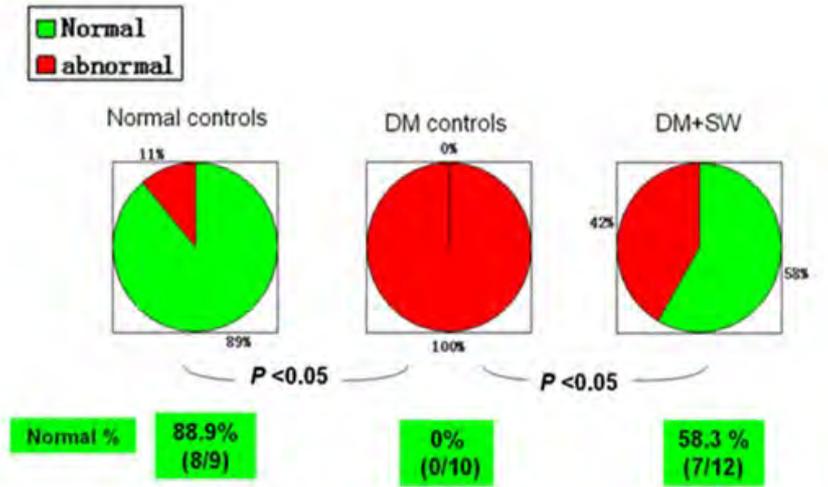
Therapeutic effect of Low intensity Extracorporeal Shock Wave Therapy (Li-ESWT) on diabetic bladder dysfunction in a rat model



A)



(B) ←



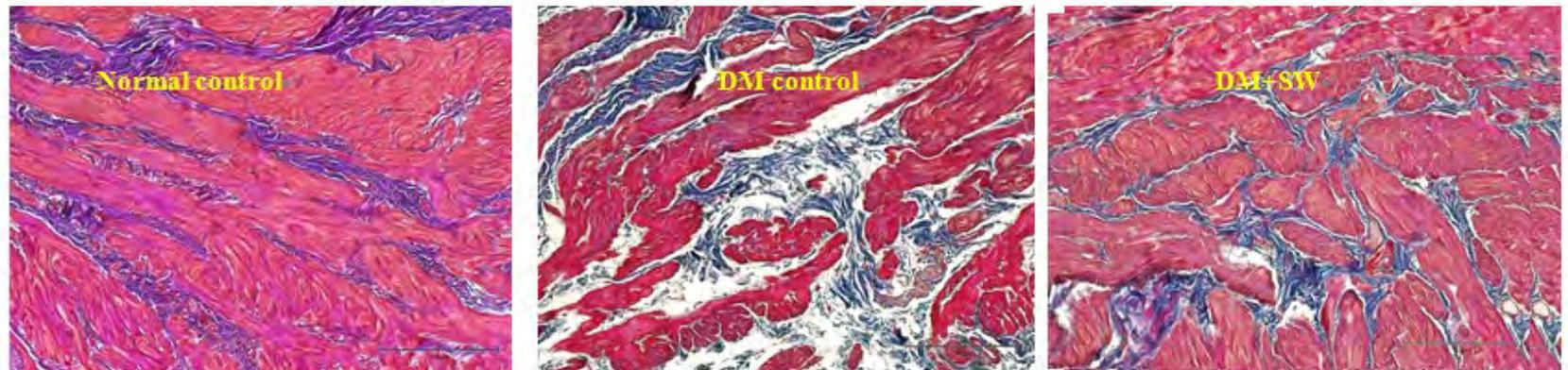
Research Paper

Therapeutic effect of Low intensity Extracorporeal Shock Wave Therapy (Li-ESWT) on diabetic bladder dysfunction in a rat model

(C) Bladder, cross section, 400X

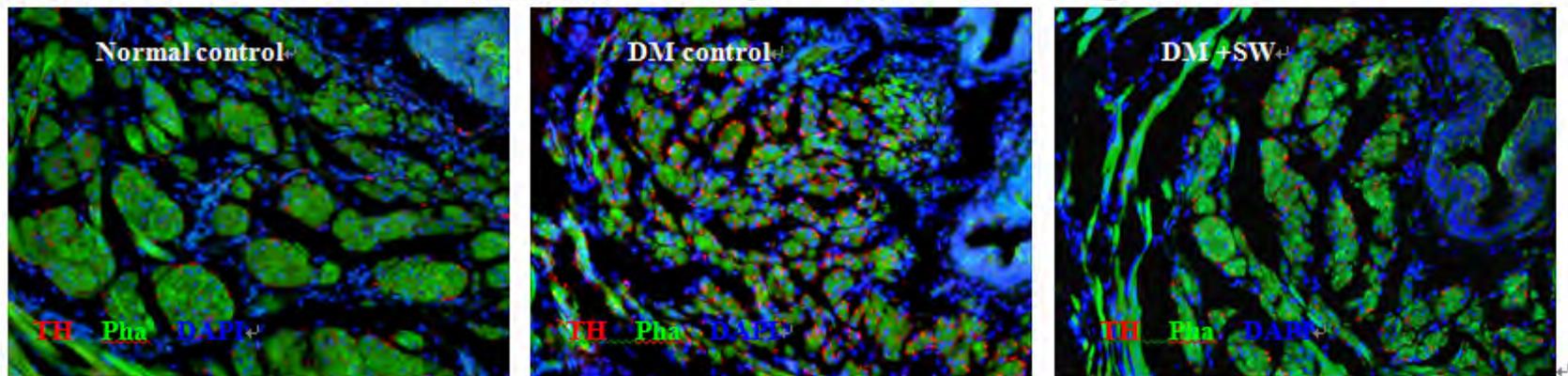


(D) Bladder, *Masson trichrome stain*, 200X

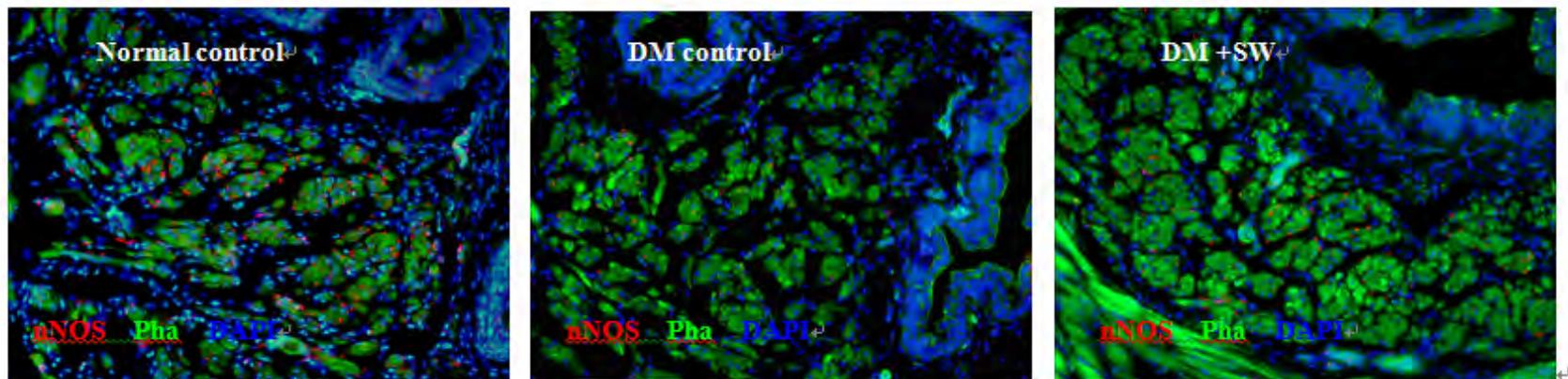


Therapeutic effect of Low intensity Extracorporeal Shock Wave Therapy (Li-ESWT) on diabetic bladder dysfunction in a rat model

(A) Urethra, cross section, 200X (Immunofluorescence staining)



(B) Urethra, cross section, 200X



Low-intensity extracorporeal shockwave therapy ameliorates diabetic underactive bladder in streptozotocin-induced diabetic rats

Hsun Shuan Wang*^{†‡} , Byung Seok Oh*, Bohan Wang* , Yajun Ruan* , Jun Zhou*, Lia Banie*, Yung Chin Lee*^{†‡}, Arianna Tamaddon*, Tie Zhou*, Guifang Wang*, Guiting Lin* and Tom F.Lue*

*Knappe Molecular Urology Laboratory, Department of Urology, School of Medicine, University of California, San Francisco, CA, USA, [†]Department of Urology, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan, and [‡]Department of Urology, Kaohsiung Municipal Hsiaokang Hospital, Kaohsiung, Taiwan

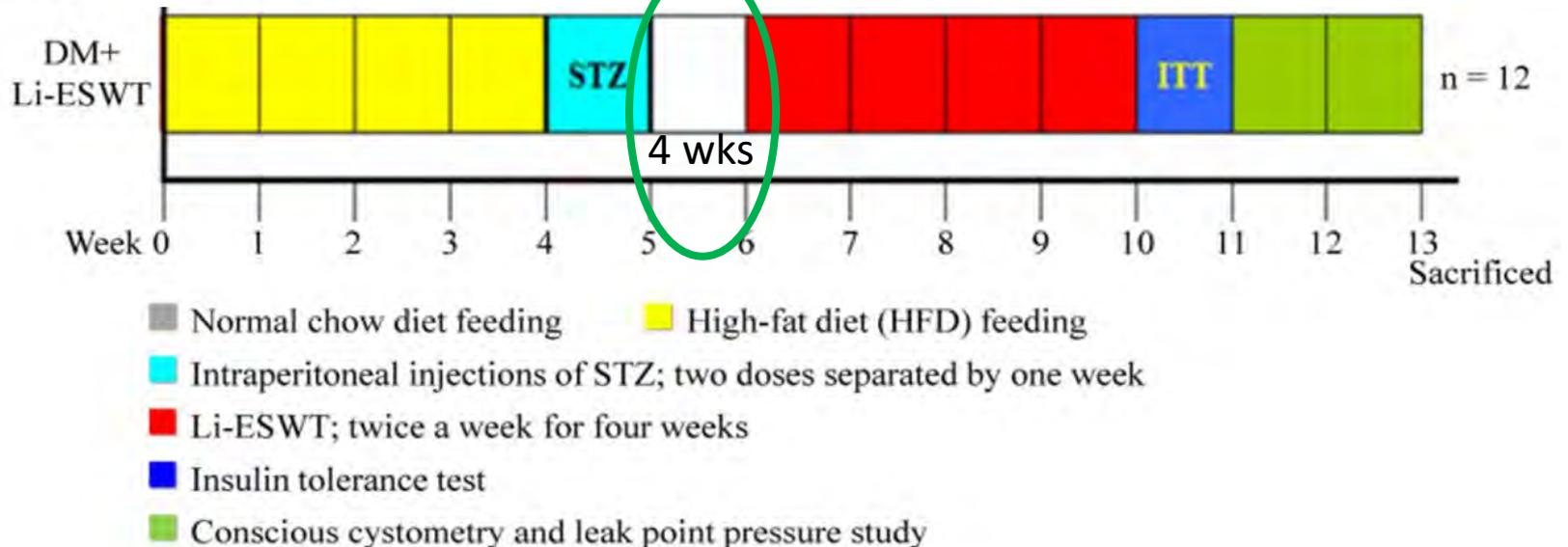
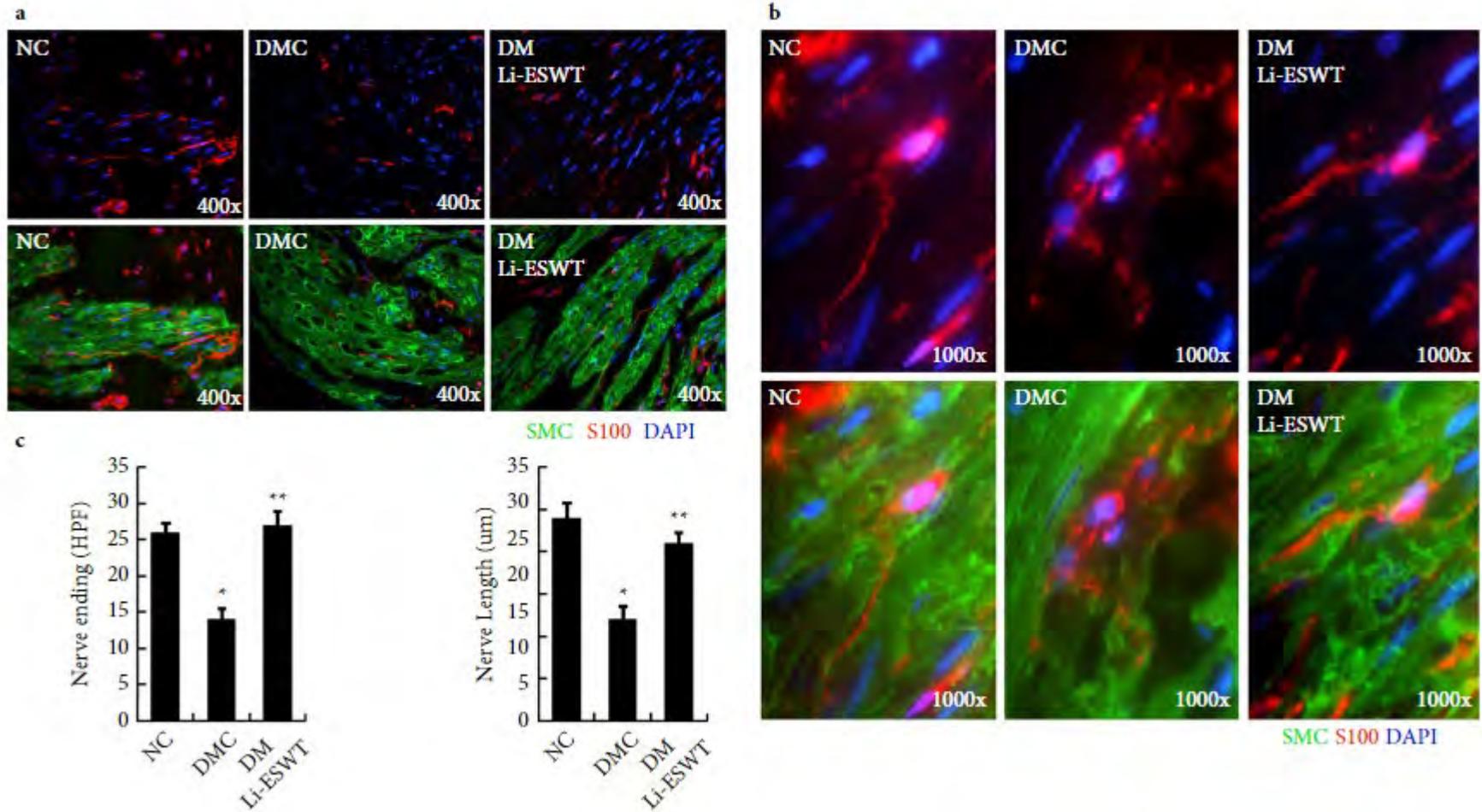
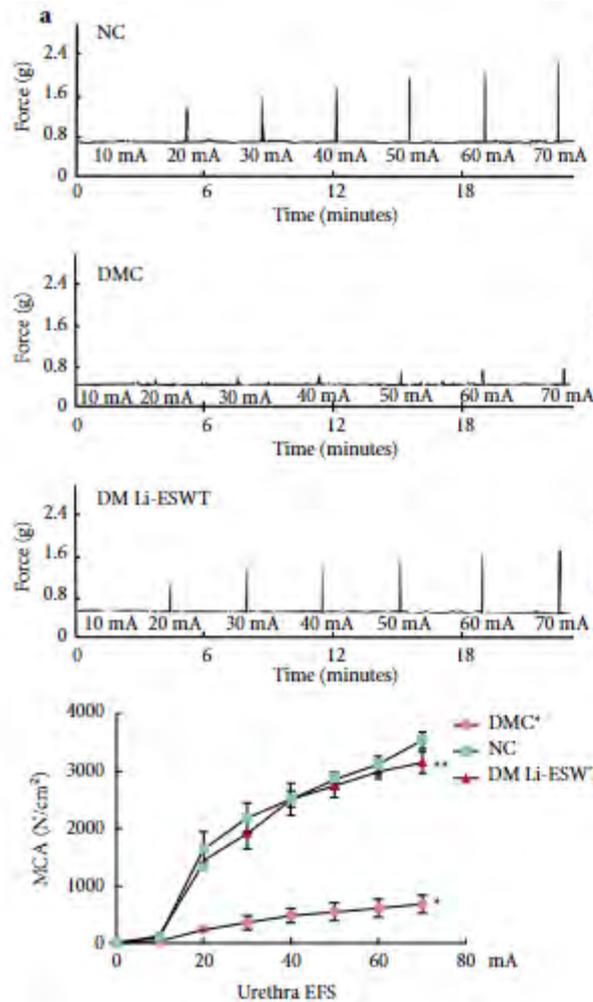


Fig. 6 Immunofluorescence for the effect of Li-ESWT on bladder innervation. **(a)** Anti-S100 antibody staining at $\times 400$ showed decreased nerve ending distribution and shortened nerve fibre length in the bladder wall of DMC rats compared with NC and DM Li-ESWT rats. **(b)** Images at $\times 1000$ revealed the destroyed microstructure of nerve fibres in the DMC group and the recovery of neural integrity in the DM Li-ESWT group. **(c)** Quantification of nerve morphology revealed a significant decrease in nerve ending distribution and nerve length in the DMC group compared with the NC group. The DM Li-ESWT group showed significant recovery after Li-ESWT, with enhanced nerve innervation. * $P < 0.05$ vs NC group; ** $P < 0.05$ vs DMC group. Data are expressed as mean \pm SEM.

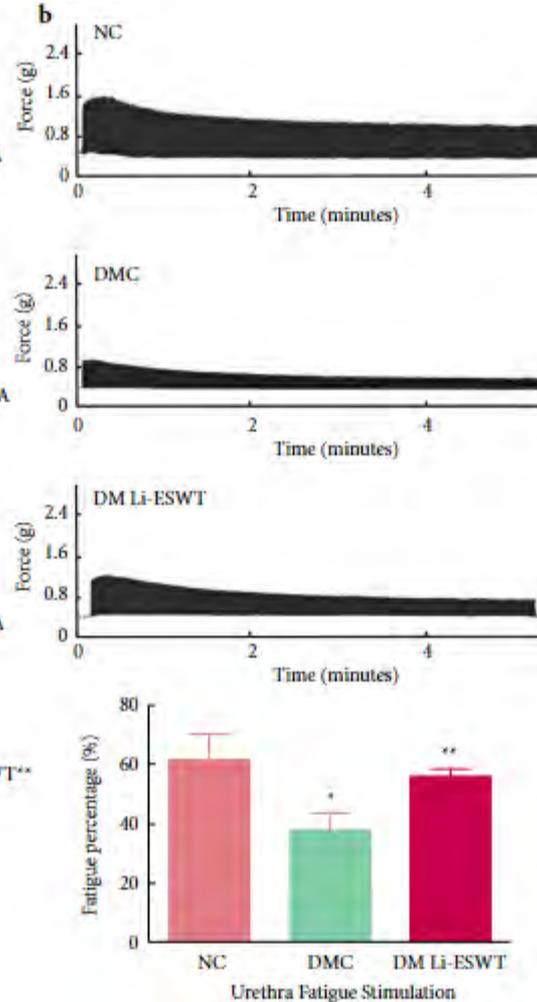


Ex vivo organ bath study

EFS



Fatiguing stimulation test



Urethral MCA

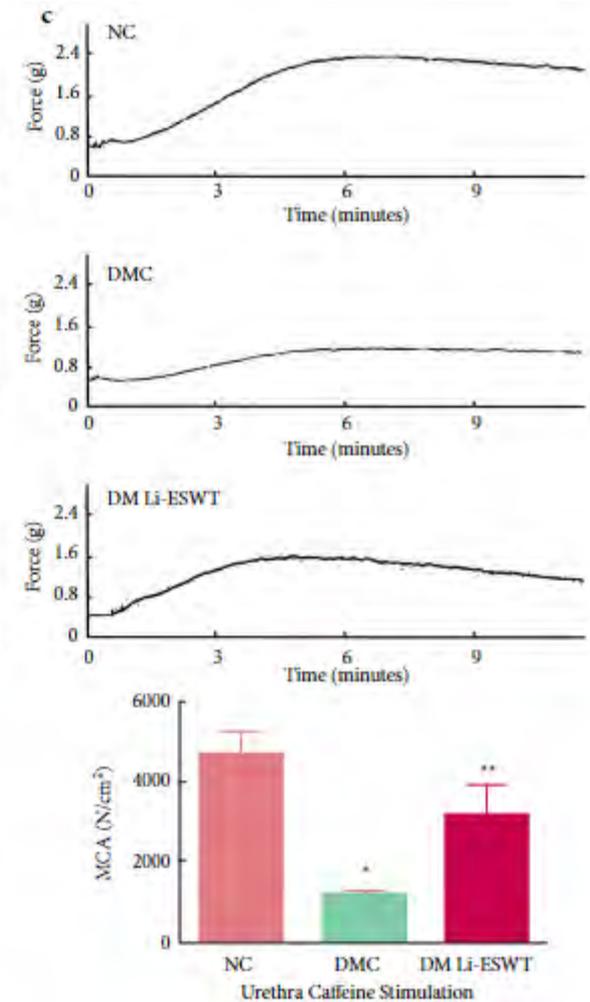


Fig. 3 Representative results of the organ-bath studies for the urethra. **(a)** The DMC group showed significantly impaired MCA at each EFS intensity compared with the NC and DM Li-ESWT groups. **(b)** The DMC group had a significantly lower percentage of MCA in the fatigue-stimulation test compared with the NC and DM Li-ESWT groups. **(c)** The DMC group showed significantly impaired urethral MCA stimulated by caffeine compared with the NC and DM Li-ESWT group. * $P < 0.05$ vs NC group; ** $P < 0.05$ vs DMC group. Data are expressed as mean \pm SEM.

Other animal models of overactive bladder

1. **Low energy shock wave-delivered intravesical botulinum neurotoxin-A potentiates antioxidant genes and inhibits proinflammatory cytokines in (BOO) rat model of overactive bladder.**

Nageib M, Zahran MH, El-Hefnawy AS, Aamer HG, Khater S, Shokeir AA.
Neurourol Urodyn. 2020 Nov;39(8):2447-2454.

2. **Low-intensity extracorporeal shock wave therapy promotes bladder regeneration and improves overactive bladder induced by ovarian hormone deficiency from rat animal model to human clinical trial.**

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Int J Mol Sci. 2021 Aug 27;22(17):9296.

3. **Low-energy shock wave therapy ameliorates ischemic-induced overactive bladder in a rat model.**

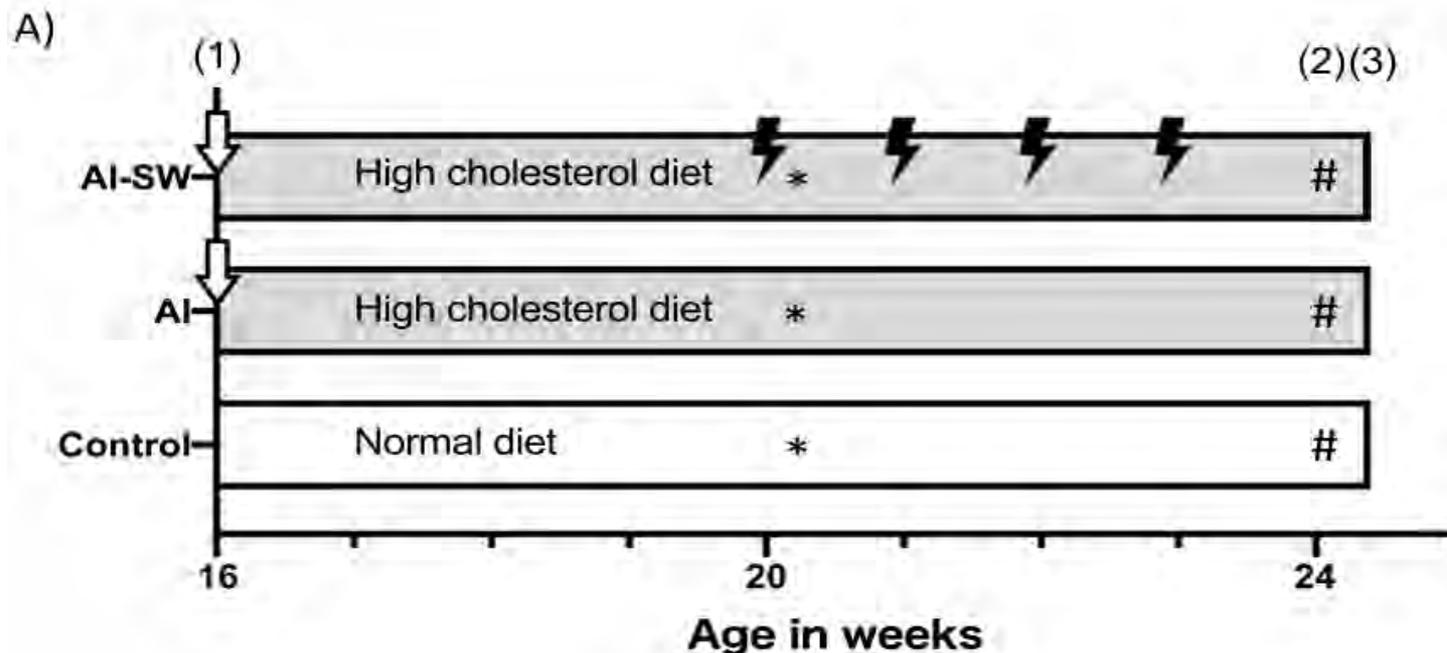
Kimura S, Kawamorita N, Yamashita S, Yasuda S, Shimokawa H, Ito A.
Sci Rep. 2022 Dec 19;12(1):21960.

Low-energy shock wave therapy ameliorates ischemic-induced overactive bladder in a rat model

1

Shingo Kimura¹, Naoki Kawamorita¹✉, Yoku Kikuchi², Tomohiko Shindo², Yuichi Ishizuka¹, Yoichi Satake¹, Takuma Sato¹, Hideaki Izumi¹, Shinichi Yamashita¹, Satoshi Yasuda², Hiroaki Shimokawa^{2,3} & Akihiro Ito¹

[Sci Rep. 2022 Dec 19;12\(1\):21960.](#)



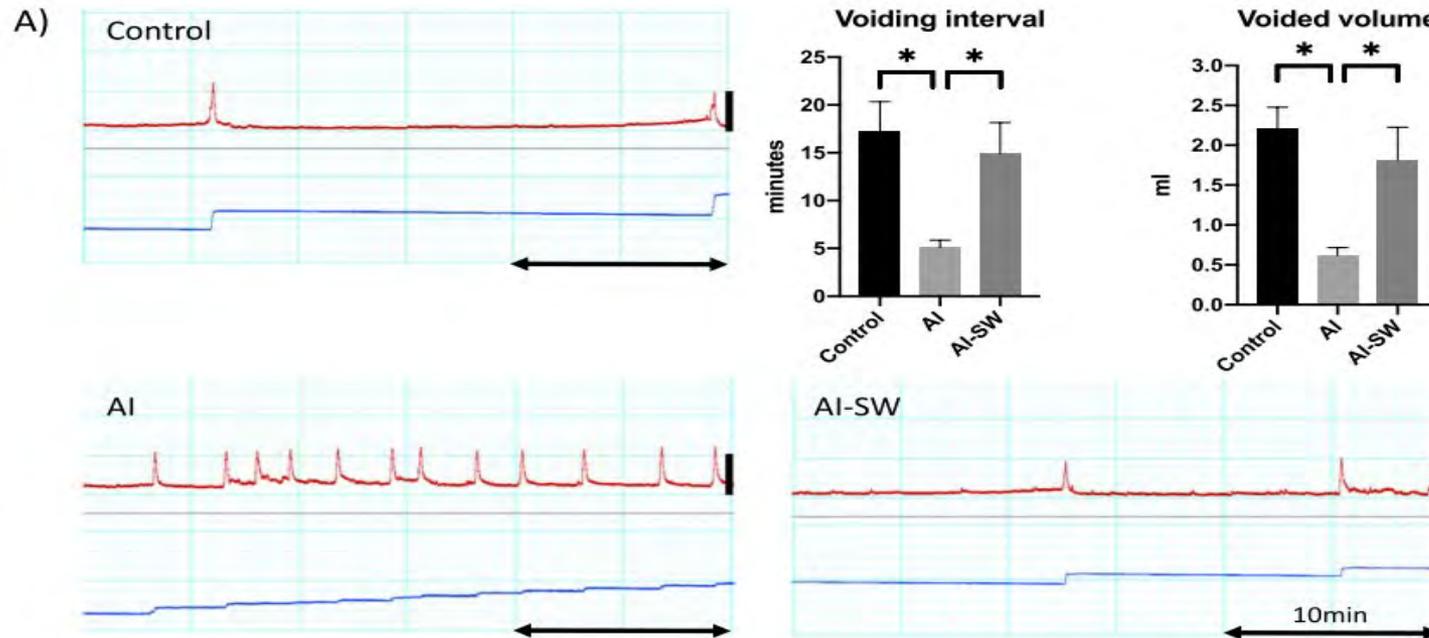


Figure 2. (A) Cystometry. **Urinary frequency** was significantly increased in the AI group than the AI-SW and control groups. Red lines show intravesical pressure and blue lines are voided urine volume. The double horizontal arrow represents the duration of 10 min. The vertical bars indicate 0–50 cmH₂O. (B) **Bladder blood flow measurement**. Blood flow was measured in the anterior bladder walls and adjusted by arterial blood pressure. The adjusted blood flow was significantly greater in the control and AI-SW groups than in the AI group at the three points of saline infusion (0, 0.5, and 1.0 ml).

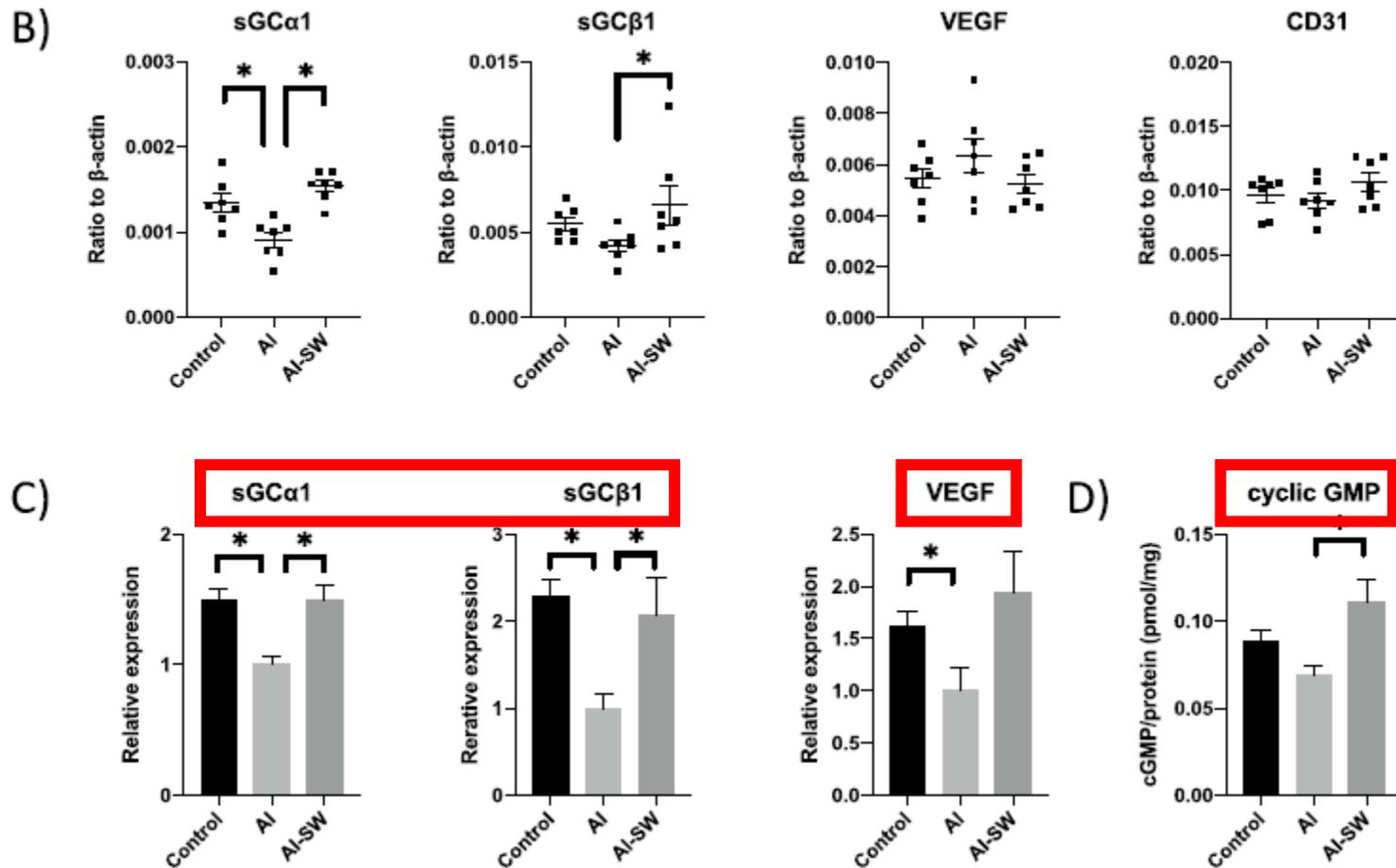


Figure 4 (B) Gene expression by real-time PCR (ratio to β -actin). sGC α 1 expressions were significantly higher in the control and AI-SW groups than in the AI group in the late phase. There was also higher expression of sGC β 1 in the AI-SW than in the AI group. VEGF expression was higher in the AI group without statistical significance. **(C) Protein expression** at the late phase by Western blotting (relative expression / β -actin). The expressions of sGC α 1 and sGC β 1 were significantly higher in the control and AI-SW groups than in the AI group. VEGF was highly expressed in the control than in the AI group. **(D) Cyclic GMP assay**. The amount of cGMP (/total protein) was significantly greater in the AI-SW group than in the AI group. *, $P < 0.05$. All data are presented as mean \pm SEM in the graphs.

Low-Intensity Extracorporeal Shock Wave Therapy Promotes Bladder Regeneration and Improves Overactive Bladder Induced by Ovarian Hormone Deficiency from Rat Animal Model to Human Clinical Trial

2

[Int J Mol Sci. 2021 Aug 27;22\(17\):9296](#)

Kun-Ling Lin ^{1,2,3}, Jian-He Lu ⁴ , Kuang-Shun Chueh ^{1,5,6}, Tai-Jui Juan ⁷, Bin-Nan Wu ⁸ , Shu-Mien Chuang ⁹, Yung-Chin Lee ¹⁰, Mei-Chen Shen ⁹, Cheng-Yu Long ^{1,3,*} and Yung-Shun Juan ^{1,5,6,9,*} 

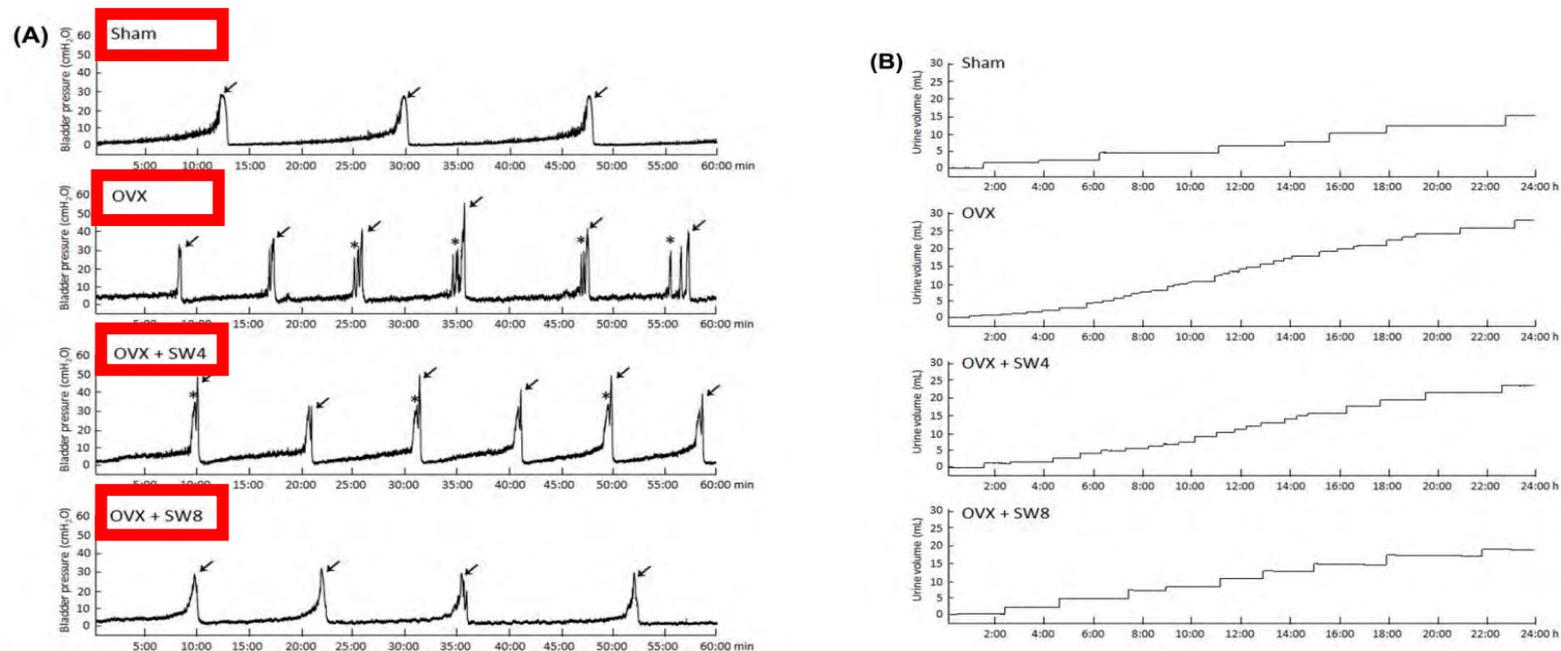


Figure 1. Urodynamic analysis of bladder cystometric parameters and voiding behavior shown in an OVX induced OAB of rat model. (A) Cystometry recordings of micturition pressure, voiding volume, and frequency, including voiding contraction (arrows) and non-voiding contraction (asterisks). (B) Tracing analysis of 24-h voiding behavior by metabolic cage. The OVX group significantly increased bladder maturation pressure, voiding contraction, non-voiding contraction, and micturition frequency, whereas LiESWT treatment significantly improved bladder voiding pattern and capacity.

Low-Intensity Extracorporeal Shock Wave Therapy Promotes Bladder Regeneration and Improves Overactive Bladder Induced by Ovarian Hormone Deficiency from Rat Animal Model to Human Clinical Trial

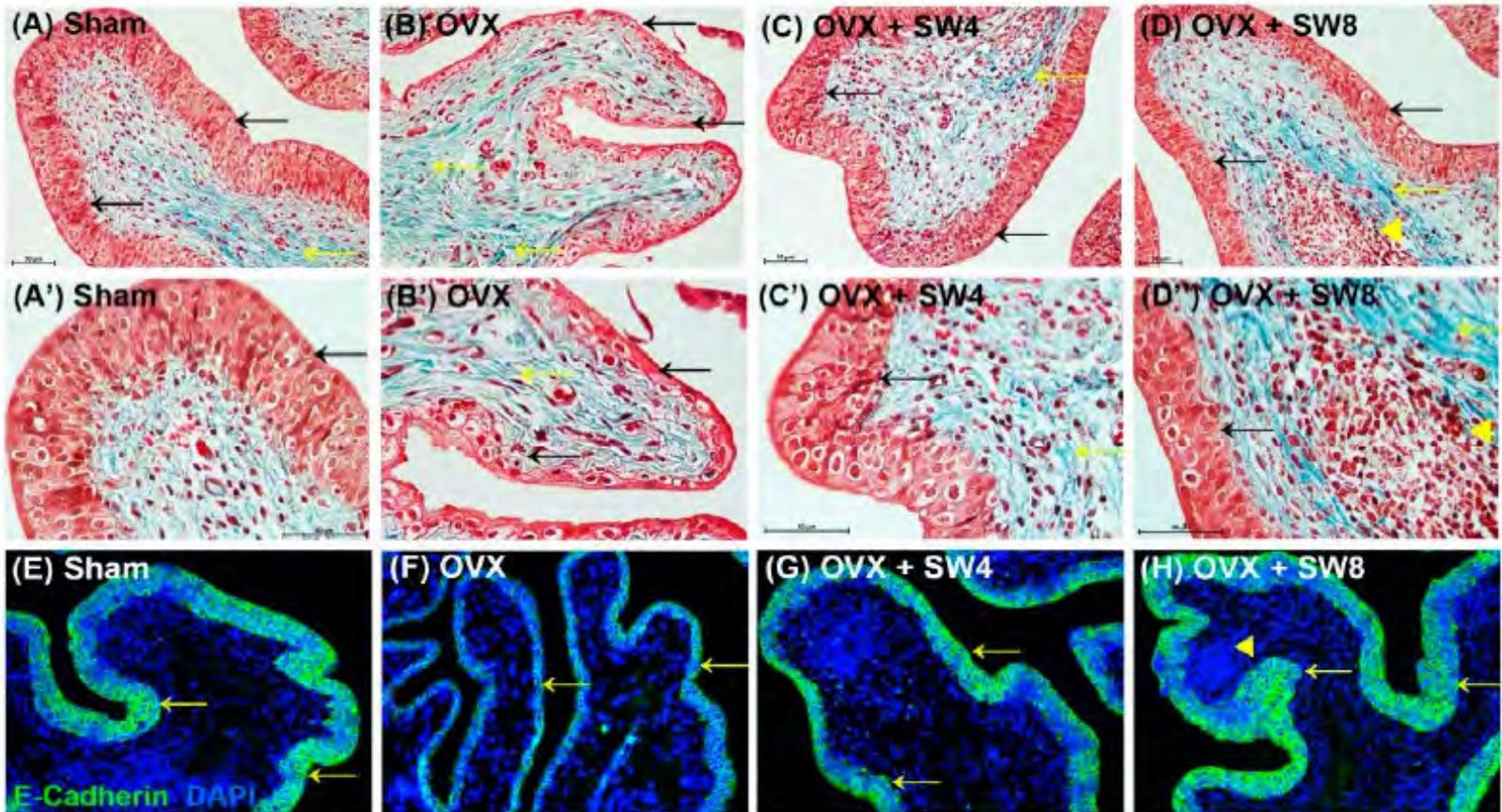
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Kun-Ling Lin ^{1,2,3}, Jian-He Lu ⁴ , Kuang-Shun Chueh ^{1,5,6}, Tai-Jui Juan ⁷, Bin-Nan Wu ⁸ , Shu-Mien Chuang ⁹, Yung-Chin Lee ¹⁰, Mei-Chen Shen ⁹, Cheng-Yu Long ^{1,3,*} and Yung-Shun Juan ^{1,5,6,9,*} 

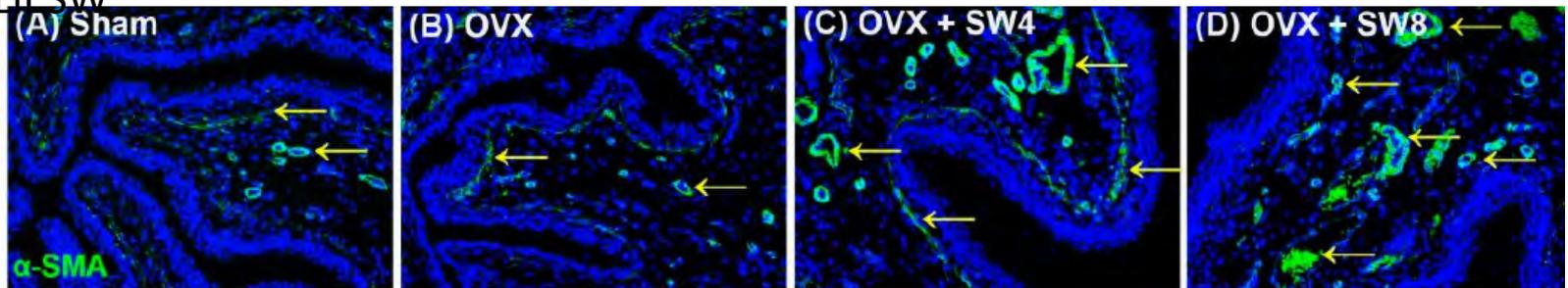
Table 1. Physical indicators and urodynamic parameters for the different experimental groups.

Variable	Sham	OVX	OVX + SW4	OVX + SW8
No. Rats	8	8	8	8
Urodynamic Parameters				
Frequency (No. voids/1 h)	3.60 ± 0.89	6.83 ± 2.71 *	4.29 ± 1.25 †	3.50 ± 0.84 ††
Peak micturition pressure (cm H ₂ O)	25.58 ± 2.94	35.56 ± 5.73 *	25.53 ± 7.60	23.51 ± 4.41
Voided volume (mL)	2.82 ± 0.80	1.46 ± 0.36 **	2.15 ± 0.69	2.92 ± 0.65 ††
No. of non-voiding contractions between micturition (No. voids/h)	0.00 ± 0.00	3.17 ± 1.60 **	1.00 ± 1.73 ††	0.33 ± 0.52 ††

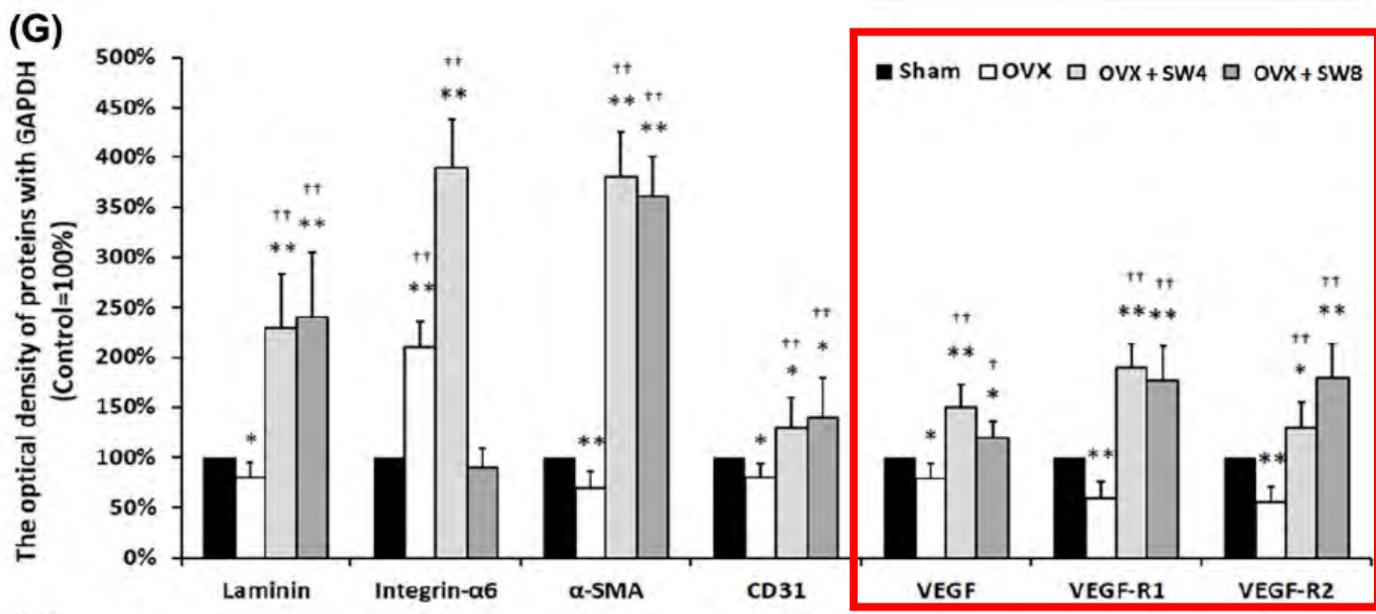
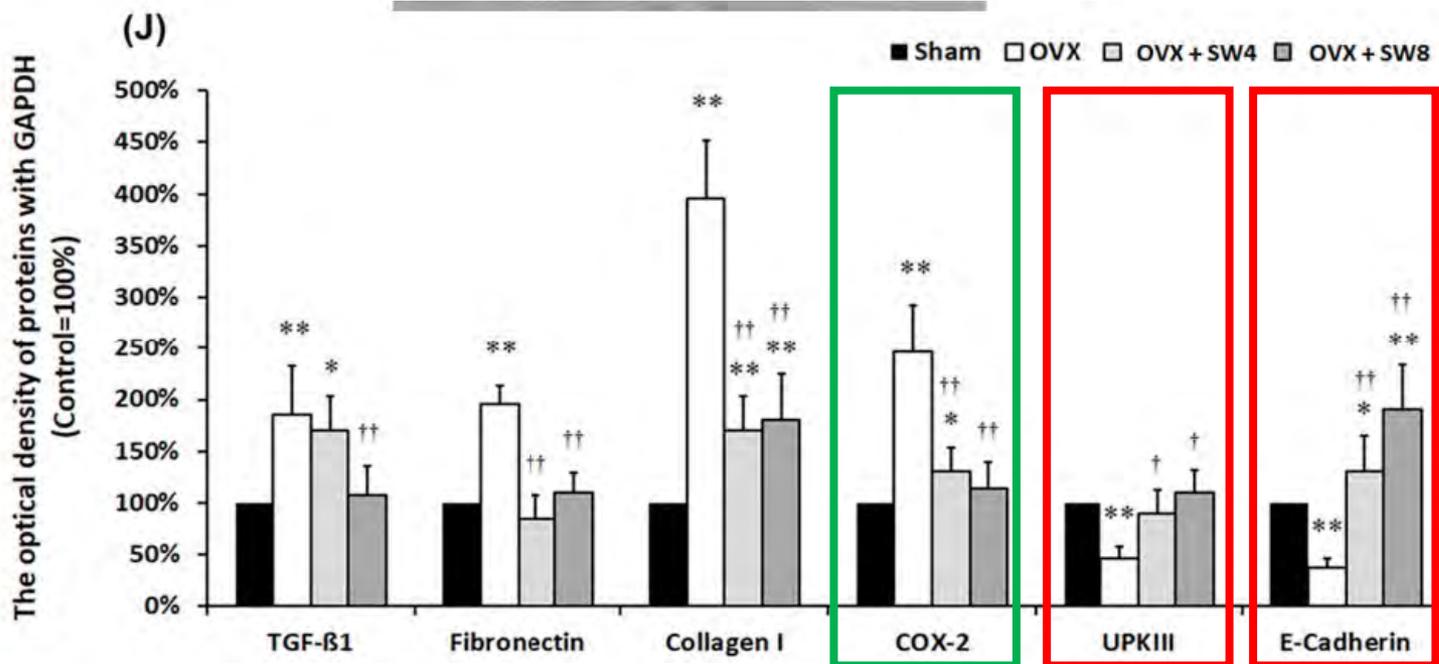
Footnote: OVX, surgical ovariectomy; LiESWT, low-intensity extracorporeal shockwave therapy; W4: 4 weeks of LiESWT treatment; W8: 8 weeks of LiESWT treatment; values are means ± SD. * $p < 0.05$; ** $p < 0.01$ versus the sham group. † $p < 0.05$; †† $p < 0.01$ versus the OVX group.



Histopathological examination for **bladder urothelium damage** restored by LiESW



Potential mechanism of regulating **angiogenic remodeling** triggered by LiESW



Low energy shock wave-delivered intravesical botulinum neurotoxin-A potentiates antioxidant genes and inhibits proinflammatory cytokines in rat model of overactive bladder [Neurourol Urodyn. 2020 Nov;39\(8\):2447-2454](#)

Mohammed Nageib¹  | Mohamed H. Zahran¹ | Ahmed S. El-Hefnawy¹  |
Nashwa Barakat¹ | Amira Awadalla² | Haytham G. Aamer¹ | S. Khater¹ |
Ahmed A. Shokeir^{1,2}



FIGURE 1 Illustrates the rat overactive bladder model. (A) Clamping of the rate urethra to induce acute urine retention. (B) Urethral catheter during cystometry of the rat. (C) Bladder extraction for histopathology

Clamping the distal urethra with a small clip, and then infusing 3 ml (**5 ml/min**) of saline with an infusion pump through a transurethral catheter. The obstruction was sustained for **60 min**

Control OAB LiESWT LiESWT+BoNT-A

TABLE 1 Differences in cystometric parameters among different groups

CMG parameters	Group 1^a	Group 2	Group 3	Group 4	P1	P2
Frequency of detrusor contraction/10 s, Mean (SD, range)	2.5 (0.7, 2-4)	4.8 (1.1, 4-7)	4 (1.3, 3-6)	3.1 (0.9, 2-5)	.2 ^b	.01 ^b
Basal pressure, cm/H ₂ O, Median (range)	2.1 (1-9)	12.4 (5-22)	7.4 (0-20)	0.8 (0-5)	.09 ^c	.008 ^c
Pressure threshold. cm/H ₂ O, Median (range)	1.5 (0-25)	26.9 (3.6-57)	24 (17-50)	1.7 (0-25)	.7 ^c	.001 ^c
Pressure amplitude, cm/H ₂ O, Median (range)	19 (10:40)	40 (22:75)	39 (35:63)	19.6 (7:43)	.8 ^c	.001 ^c

^aRepresent the baseline cystometric parameters in the control group. All parameters were statistically significant in all groups compared to Group 1, P1: comparison between Groups 2 and 3, P2: comparison between Groups 3 and 4.

TABLE 3 Biochemical and molecular expression of oxidative stress markers and proinflammatory cytokines

Variable mean ± SD	Group 1	Group 2	Group 3	Group 4	P1	P2
Oxidative stress						
MDA, nmol/ml	1.9 ± 0.6	11.4 ± 1.3	6.5 ± 0.5	3.6 ± 0.49	.001	.001
SOD, U/ml	67 ± 6	30 ± 4.2	43 ± 2.3	53.6 ± 3.2	.001	.001
Inflammatory cytokines						
TNF-α	0.97 ± 0.07	5.4 ± 0.5	3.3 ± 0.6	2.4 ± 0.07	.001	.001
IL-6	0.9 ± 0.1	6 ± 0.25	4 ± 0.19	2.4 ± 0.4	.02	.001

Note: All comparisons were made using independent sample *t* test. All parameters were statistically significant in all groups compared to Group 1, P1: comparison between Groups 2 and 3, P2: comparison between Groups 3 and 4.

Abbreviations: IL-6, interleukin-6; MDA, malondialdehyde; SOD, superoxide dismutase; TNF-α, tumor necrosis factor-α.

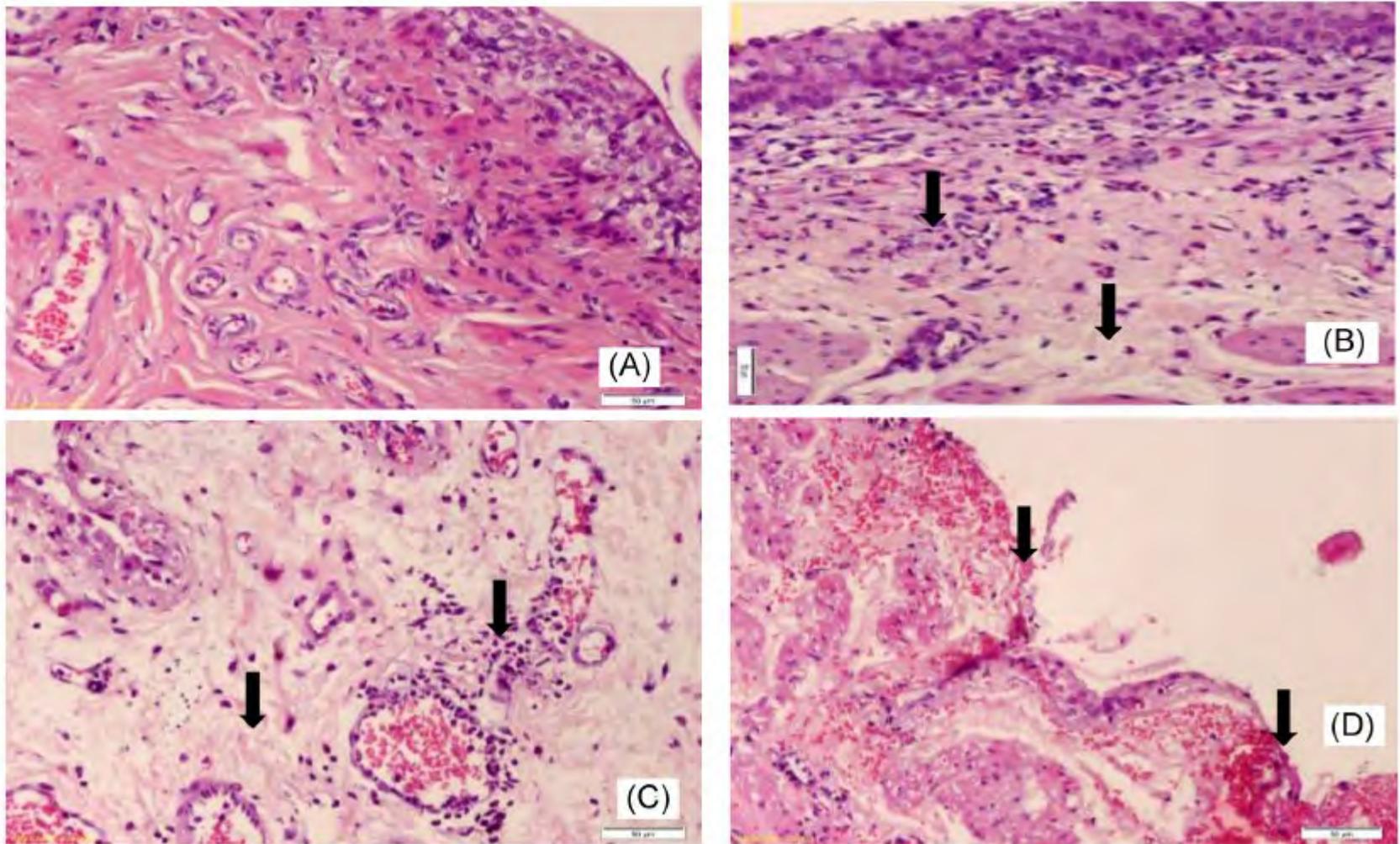


FIGURE 3 Microscopic examination (H&E staining $\times 100$) of bladder mucosa. **(A) Normal bladder** with intact urothelium, no submucosal edema nor inflammatory cell infiltration. **(B) OAB bladder** with submucosal edema and inflammation (black arrows). **(C) LESW-treated rat** with submucosal edema and inflammation (black arrows). **(D) LESW plus BoNT-A** showed denuded urothelium and minimal changes regarding submucosal edema and inflammation (black arrows showed the sites of denuded urothelium and in between intact urothelium). BoNT-A, botulinum neurotoxin-A; H&E, haemotoxylin and eosin; LESW, low intensity shock wave; OAB, overactive bladder

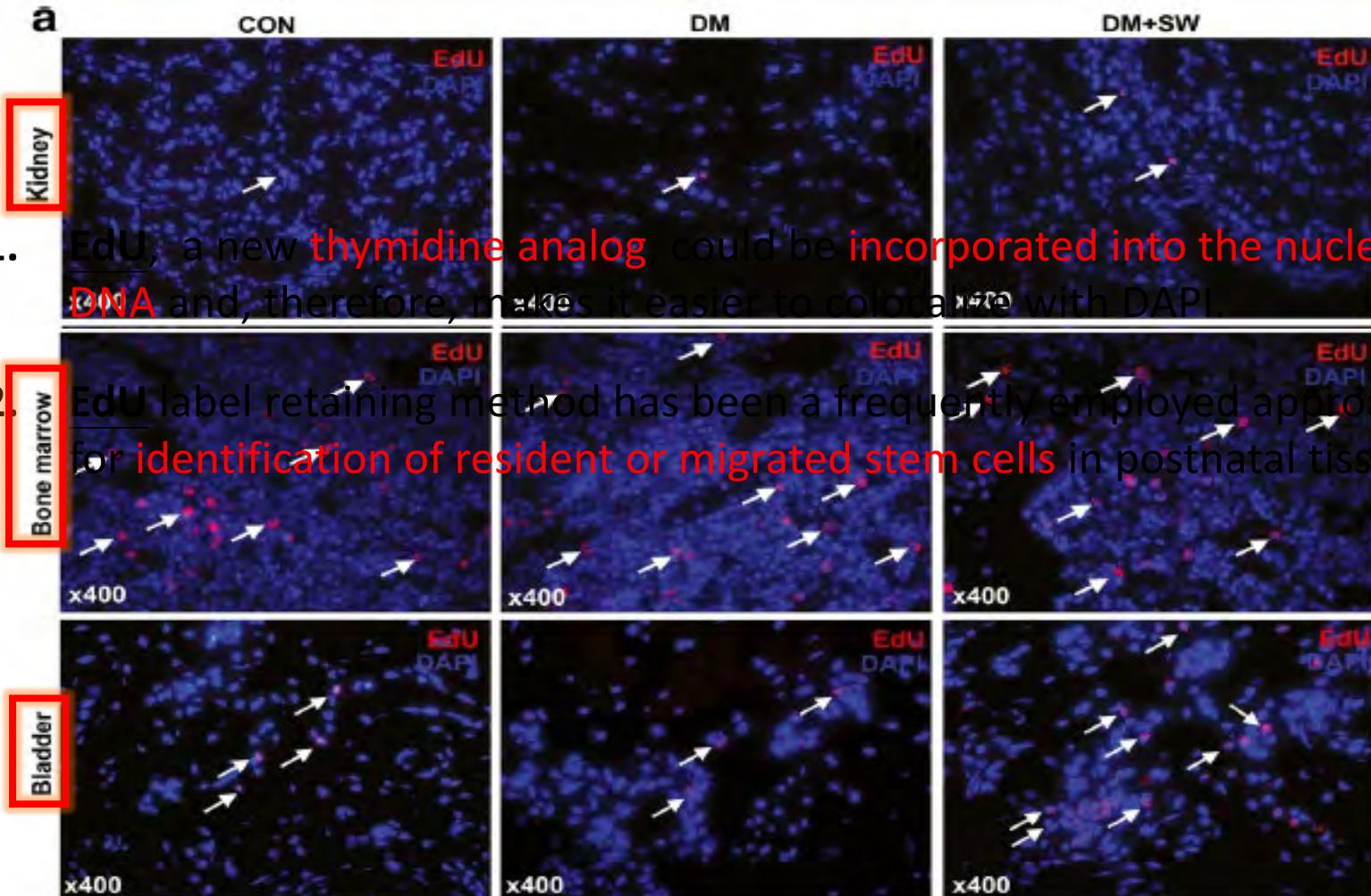
Summary

1. Li-ESWT ameliorated bladder dysfunction and urinary continence in the **DBD rat model**, reflected in restoration of the nerve expression of the urethra and the vascularization of the bladder.
2. Once-per-week Li-ESWT ameliorated bladder dysfunction and urinary incontinence in the **diabetic UAB rat model**. Li-ESWT improved bladder wall composition, activated bladder vessel regeneration, enhanced bladder and urethra muscle contractile function, increased bladder nerve innervation and promoted urethra continence.
3. LESW improved the capacity and blood flow of the bladder and brought an upregulation of cGMP in a **bladder ischemia model**.
4. LiESWT attenuated inflammatory responses, increased angiogenesis, promoted muscle proliferation, and differentiation reduced urinary leakage and improved OAB in a **hormone deficiency model**.
5. Intravesical instillation of BoNT-A with LESW seems to be a good alternative in the management of refractory OAB, improving the urodynamic and anti-inflammatory and antioxidant effect in a **BOO model**.

Endogenous Stem Cells Were Recruited by Defocused Low-Energy Shock Wave in Treating Diabetic Bladder Dysfunction

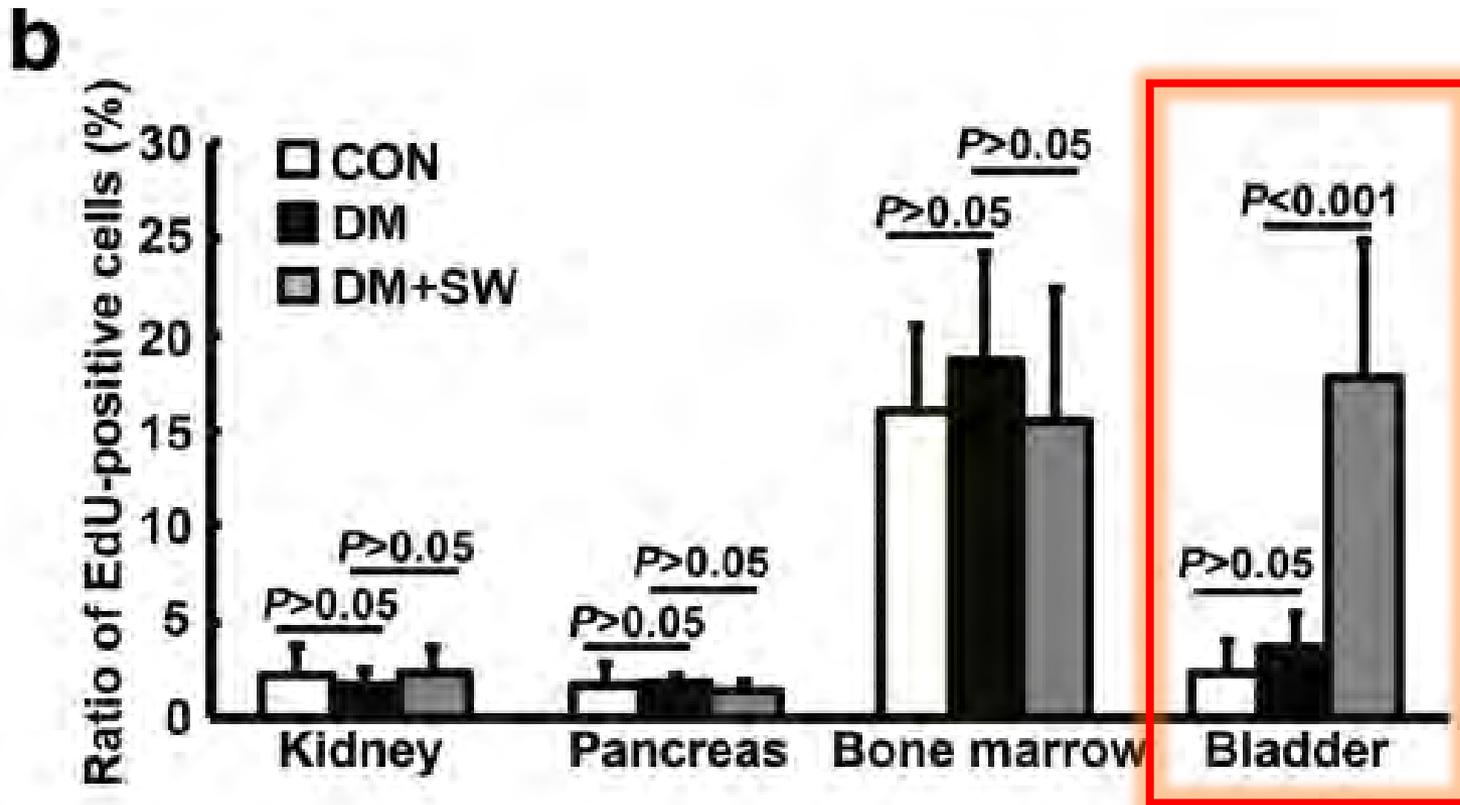
Stem Cell Rev and Rep (2017) 13:287–298

Yang Jin¹ · Lina Xu² · Yong Zhao² · Muwen Wang² · Xunbo Jin² · Haiyang Zhang^{2,3} 



1. EdU, a new **thymidine analog** could be **incorporated into the nuclear DNA** and, therefore, makes it easier to colocalize with DAPI.

2. EdU label retaining method has been a frequently employed approach for **identification of resident or migrated stem cells** in postnatal tissues



- Fig. 3 Tracking of EdU+ cells in rat tissues. **Significantly more EdU+ cells were observed in bladder** in DM + SW group ($p < 0.001$, $17.7 \pm 7.2\%$) than DM group ($3.7 \pm 1.8\%$). However, the numbers of EdU+ cells in kidney, pancreas, and bone marrow were comparable among groups ($p > 0.05$), respectively.

Human

Human clinical trial

1. **Low-Intensity Extracorporeal Shock Wave Therapy Ameliorates the Overactive Bladder: A Prospective Pilot Study.**

Lee YC, Chuang SM, Lin KL, Chen WC, Lu JH, Chueh KS, Long CY, Juan YS

Biomed Res Int. 2020 Jul 6;2020:9175676

2. **Low Intensity Extracorporeal Shock Wave Therapy as a Potential Treatment for Overactive Bladder Syndrome.**

Lu JH, Chueh KS, Chuang SM, Wu YH, Lin KL, Long CY, Lee YC, Shen MC, Sun TW, Juan YS.

Biology (Basel). 2021 Jun 16;10(6):540

3. **Low-intensity extracorporeal shock wave therapy promotes bladder regeneration and improves overactive bladder induced by ovarian hormone deficiency from rat animal model to human clinical trial.**

Lin KL, Lu JH, Chueh KS, Chuang SM, Lee YC, Shen MC, Long CY, Juan YS.

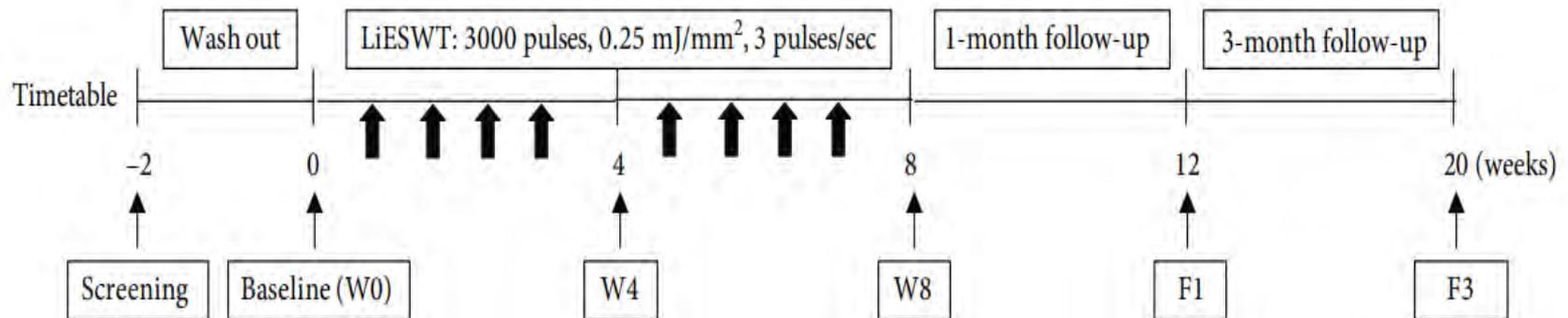
Int J Mol Sci. 2021 Aug 27;22(17):9296.

Clinical Study

Low-Intensity Extracorporeal Shock Wave Therapy Ameliorates the Overactive Bladder: A Prospective Pilot Study

Yung-Chin Lee ^{1,2,3} Shu-Mien Chuang,^{1,4} Kun-Ling Lin ^{5,6,7} Wei-Chiao Chen ^{1,2}
Jian-He Lu ¹ Kuang-Shun Chueh,^{1,8} Mei-Chen Shen ¹ Li-Wen Liu,¹
Cheng-Yu Long ^{5,6,9} and Yung-Shun Juan ^{1,3,8,10}

82 females, 56.5±1.2 (20-75) y/o



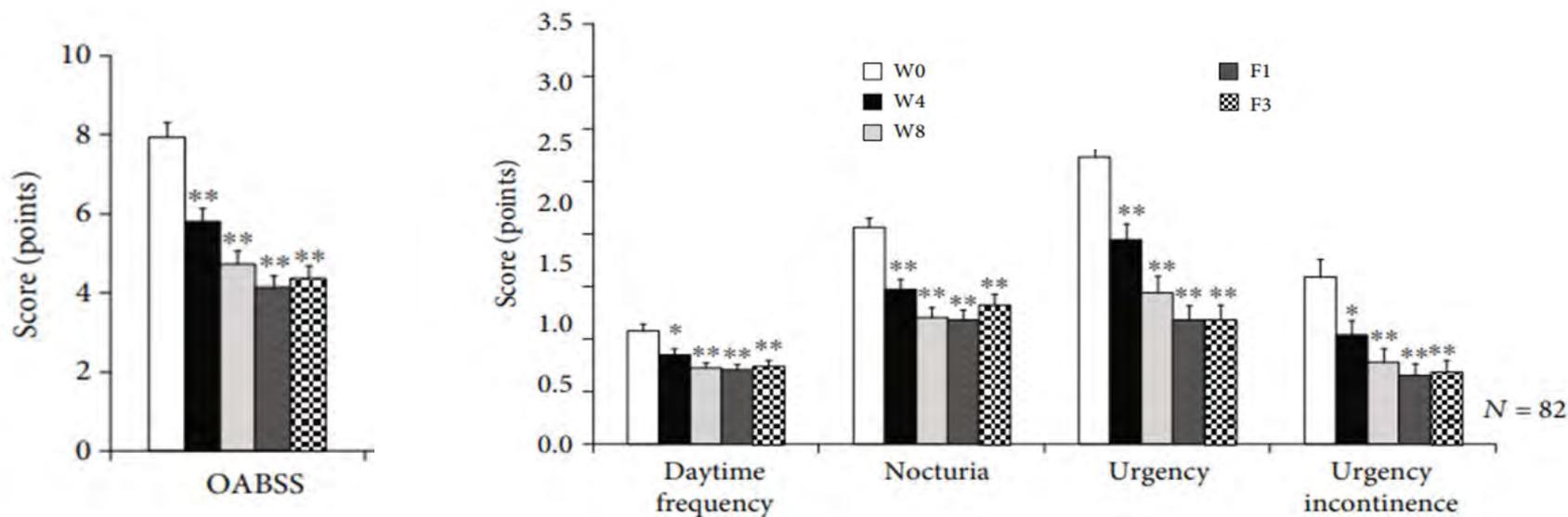
(ii) Assessment: W0, W4, W8, F1, and F3

- (i) Questionnaire scores
- (ii) 3-day urinary diary
- (iii) Uroflowmetry
- (iv) PVR

TABLE 2: Urodynamic parameters of study population for overactive bladder (OAB).

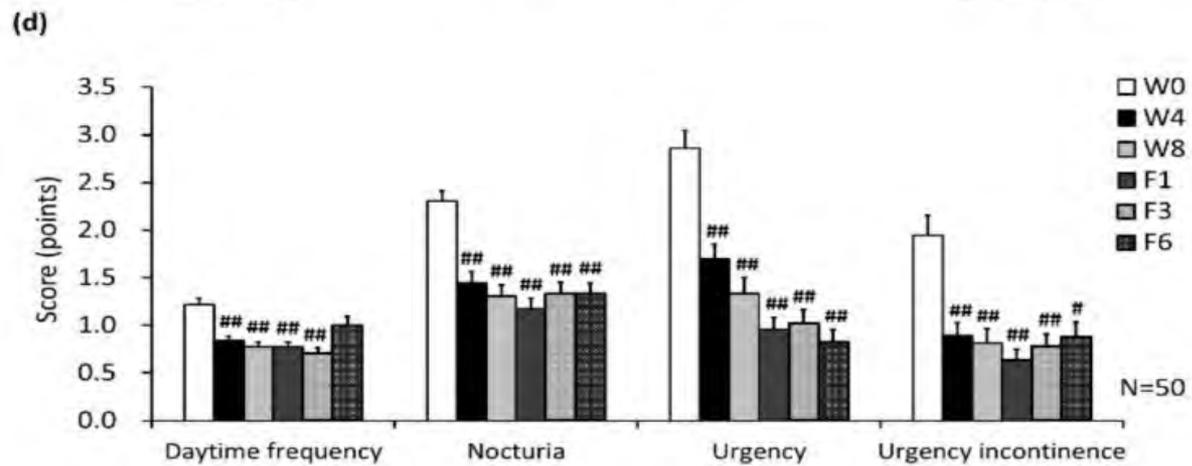
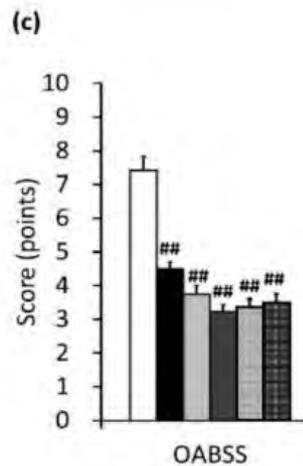
Parameter	OAB (mean \pm SE)				
	W0	W4	W8	F1	F3
OABSS score (points)					
Daytime frequency	1.1 \pm 0.1	0.9 \pm 0.1*	0.8 \pm 0.1**	0.7 \pm 0.1**	0.8 \pm 0.1**
Nocturia	2.2 \pm 0.1	1.5 \pm 0.1**	1.3 \pm 0.1**	1.2 \pm 0.1**	1.4 \pm 0.1**
Urgency	2.9 \pm 0.2	2.0 \pm 0.2**	1.5 \pm 0.2**	1.2 \pm 0.2**	1.2 \pm 0.1**
Urgency incontinence	1.7 \pm 0.2	1.1 \pm 0.1*	0.8 \pm 0.1**	0.7 \pm 0.1**	0.7 \pm 0.1**

Note. SE: standard error; W: week; W4: once per week, 4 weeks of LiESWT; W8: once per week, 8 weeks of LiESWT; F1: 1-month follow-up; F3: 3-month follow-up; OABSS: overactive bladder symptom scores. Values are means \pm SE. * $p < 0.05$; ** $p < 0.01$ vs. W0. $N = 82$.



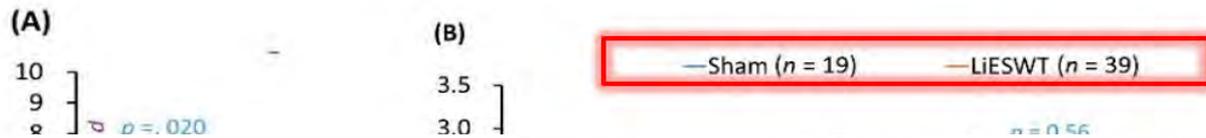
Low Intensity Extracorporeal Shock Wave Therapy as a Potential Treatment for Overactive Bladder Syndrome

Jian-He Lu^{1,2,3,†}, Kuang-Shun Chueh^{2,4,5,†}, Shu-Mien Chuang^{2,3}, Yi-Hsuan Wu^{3,4}, Kun-Ling Lin^{4,6,7}, Cheng-Yu Long^{4,7,8,9}, Yung-Chin Lee^{2,3,10}, Mei-Chen Shen^{2,3}, Ting-Wei Sun^{2,3} and Yung-Shun Juan^{2,3,4,5,9,*,‡}

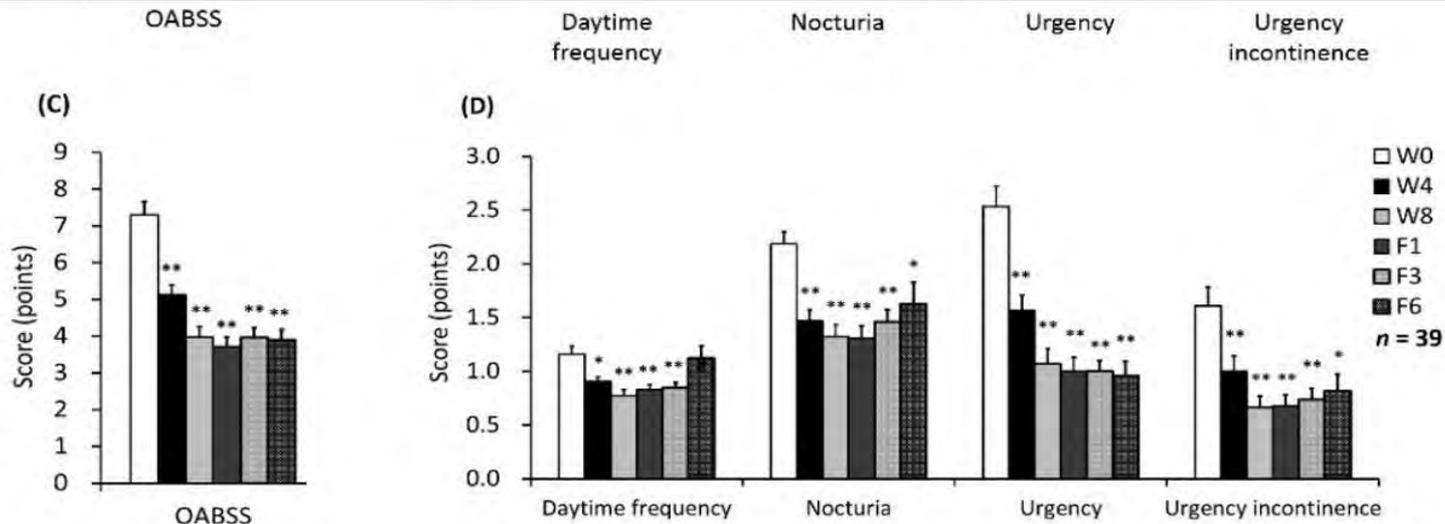


Low-Intensity Extracorporeal Shock Wave Therapy Promotes Bladder Regeneration and Improves Overactive Bladder Induced by Ovarian Hormone Deficiency from Rat Animal Model to Human Clinical Trial

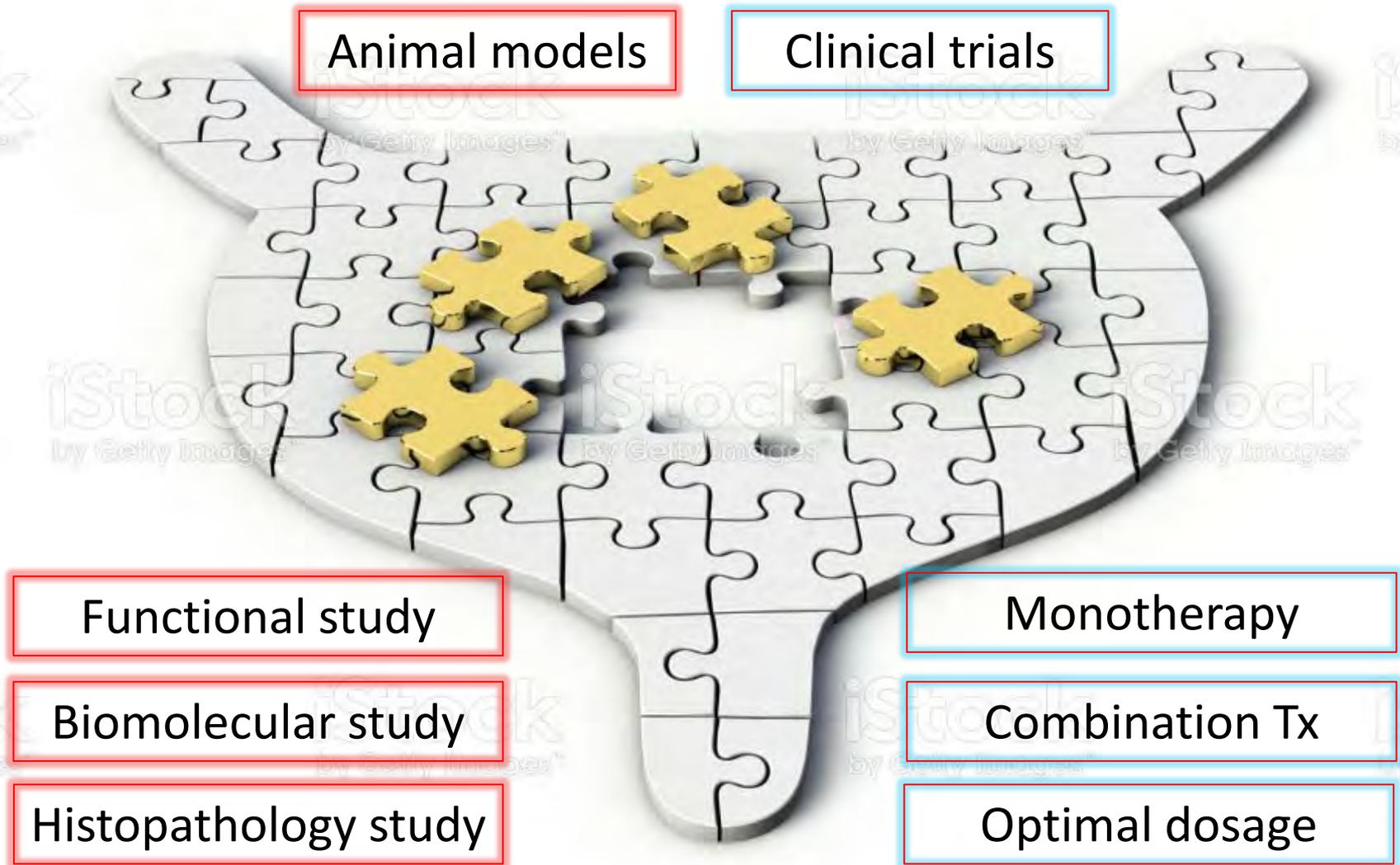
Kun-Ling Lin ^{1,2,3}, Jian-He Lu ⁴ , Kuang-Shun Chueh ^{1,5,6}, Tai-Jui Juan ⁷, Bin-Nan Wu ⁸ , Shu-Mien Chuang ⁹, Yung-Chin Lee ¹⁰, Mei-Chen Shen ⁹, Cheng-Yu Long ^{1,3,*,†} and Yung-Shun Juan ^{1,5,6,9,*,†} 



Parameter	Sham	LiESWT	<i>p</i> Value	Normal Range
No.	19	39		
Female age (years)	60.79 ± 1.98	59.05 ± 1.21	0.44	



LiESW has been shown to involve tissue **regeneration**, which could be a **potentially new** treatment for OAB



謝謝聆聽





Low-Intensity Extracorporeal Shock Wave Therapy for Coronary Artery Disease

小港內科主任
高醫大內科教授
蘇河名醫師



CARE

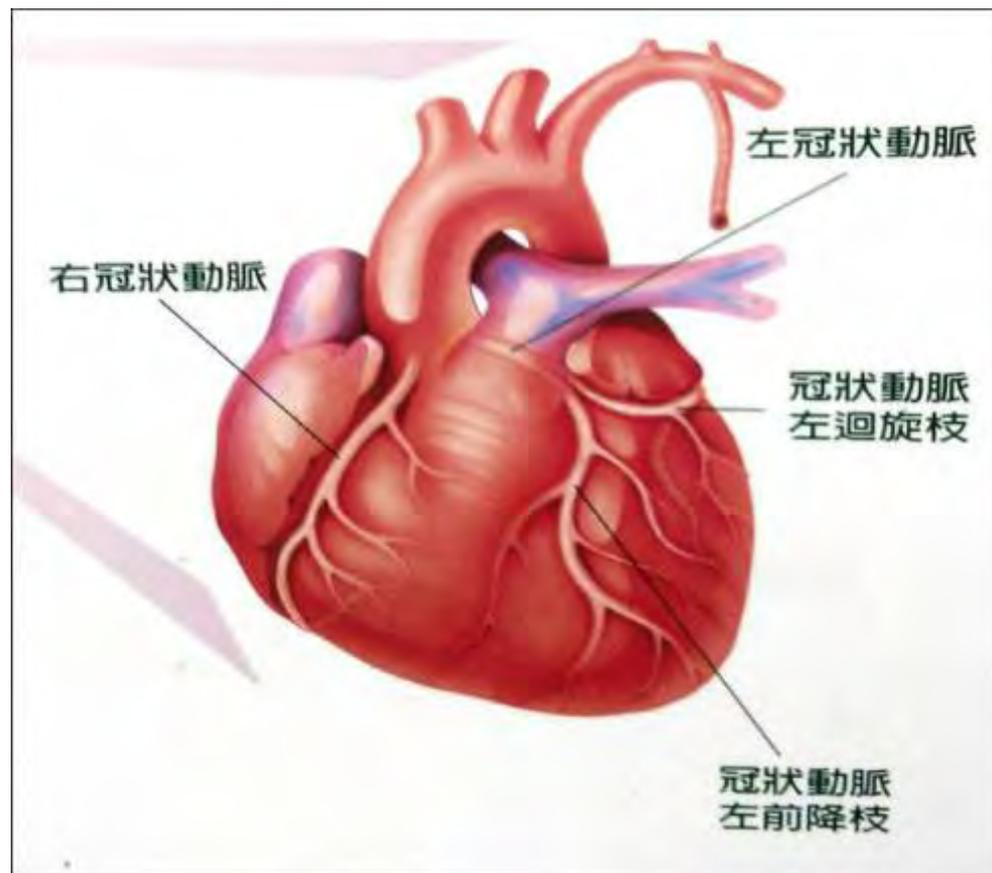
- + Cooperation
- + Accountability
- + Reverence
- + Effectiveness

高雄市立小港醫院

(委託財團法人私立高雄醫學大學經營)
Kaohsiung Municipal Siaogang Hospital

什麼是冠狀動脈心臟病

冠狀動脈是供應心臟活動中所需氧氣及養分的血管其可分為**右冠狀動脈**及**左冠狀動脈**；其中左冠狀動脈又可分為**左迴旋支**及**左前降支**



心血管是如何塞住的

1 這是一條正常的動脈剖面



正常血管

2 當脂肪形成堆積物或斑塊開始堆積在血管中，便會開始減少血液



逐漸堆積

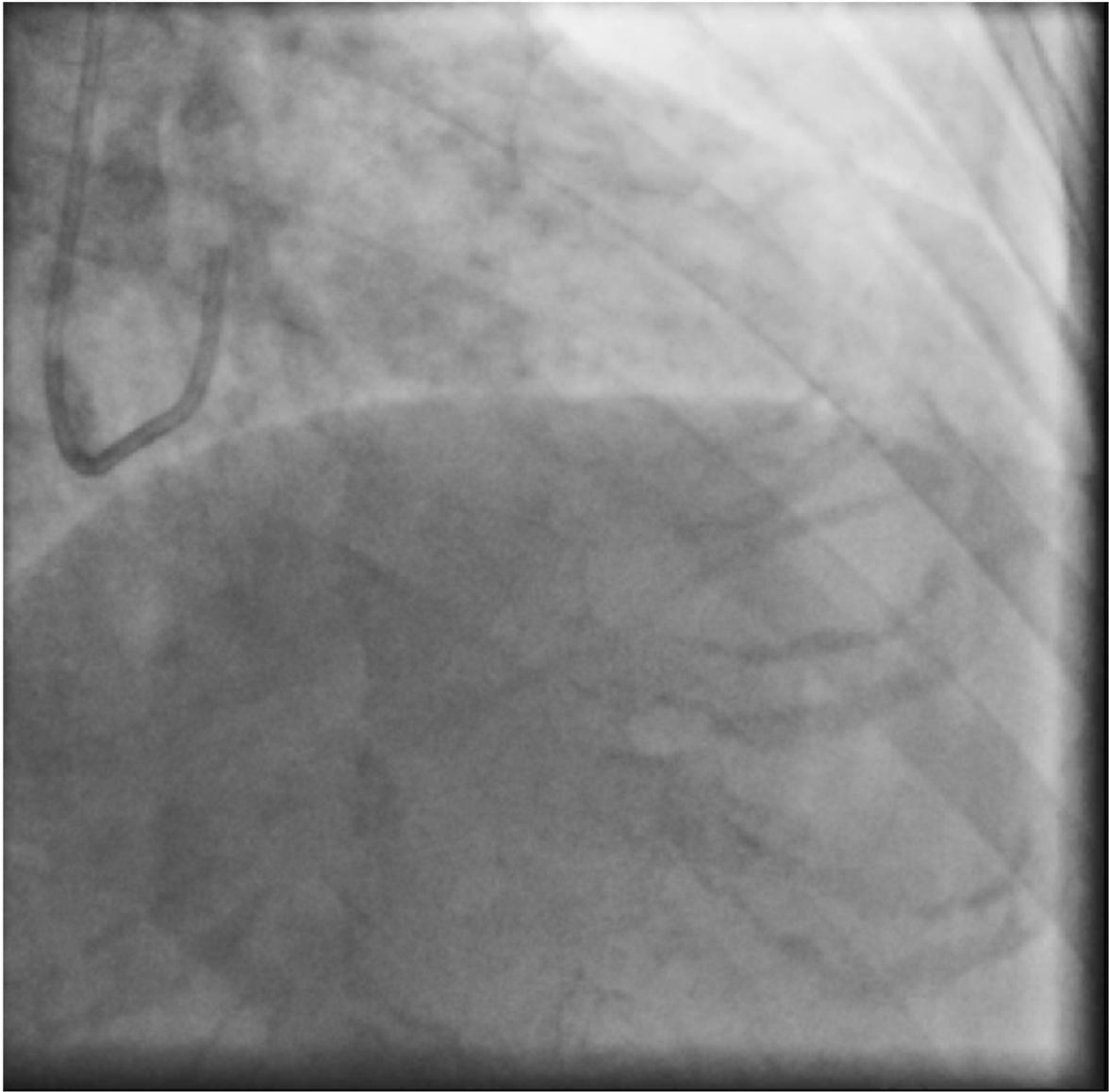
3 雖然血管已經開始阻塞，但因為還有足夠的血液量供應心臟，所以此時並不會出現症狀。

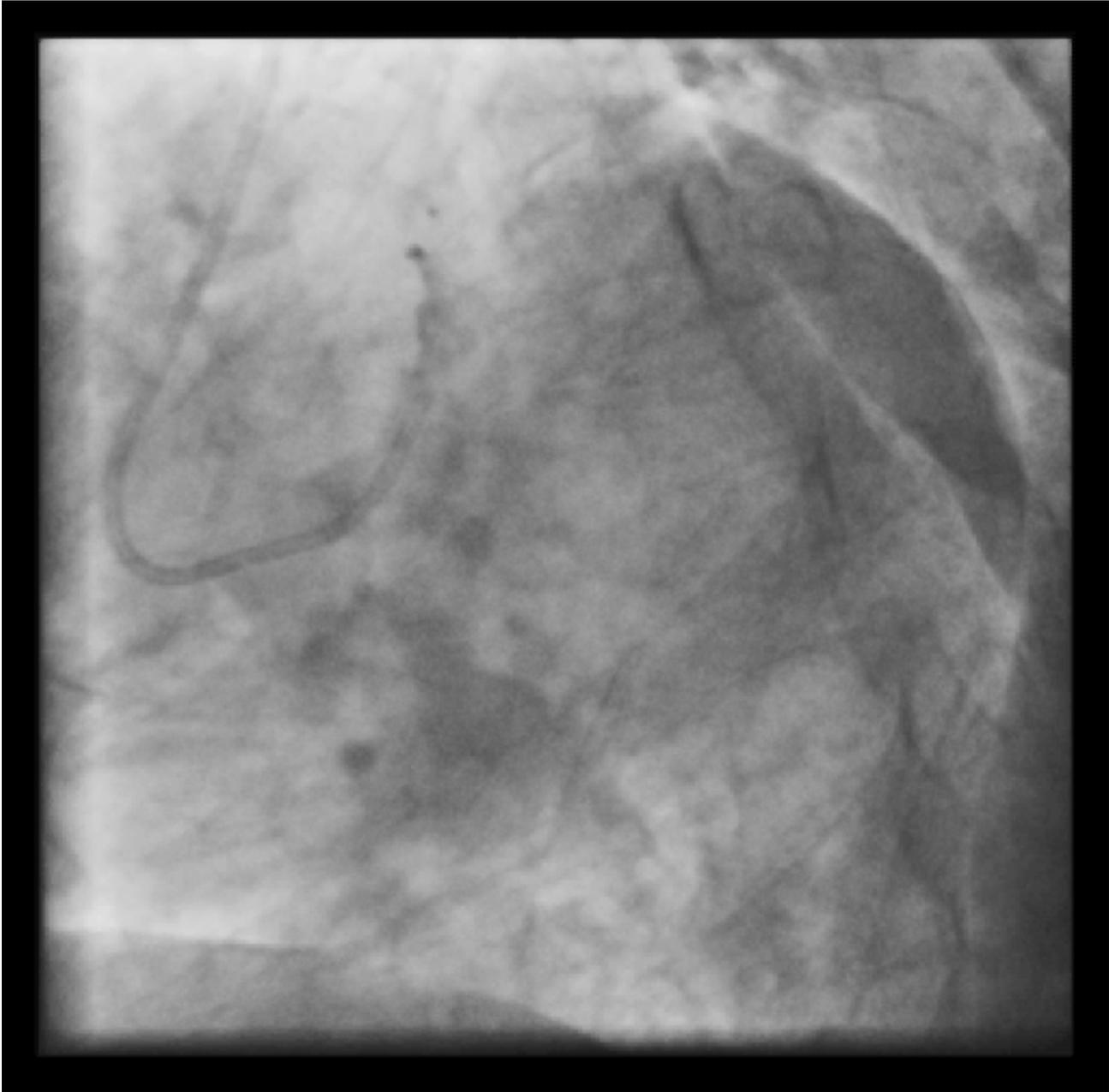


若冠狀動脈發生粥樣硬化導致血管狹窄或堵塞，讓心臟肌肉因為缺血而壞死，即稱為冠狀動脈心臟病，簡稱冠心病。

4 當血液繼續減少時，就可能會出現心絞痛等症狀，一旦完全阻塞，急性心肌梗塞就會發作。









冠心病該如何治療？

治療方式介紹

- ◆ 藥物治療
- ◆ 心導管介入治療
- ◆ 心臟手術治療
- ◆ 最新心臟體外震波治療



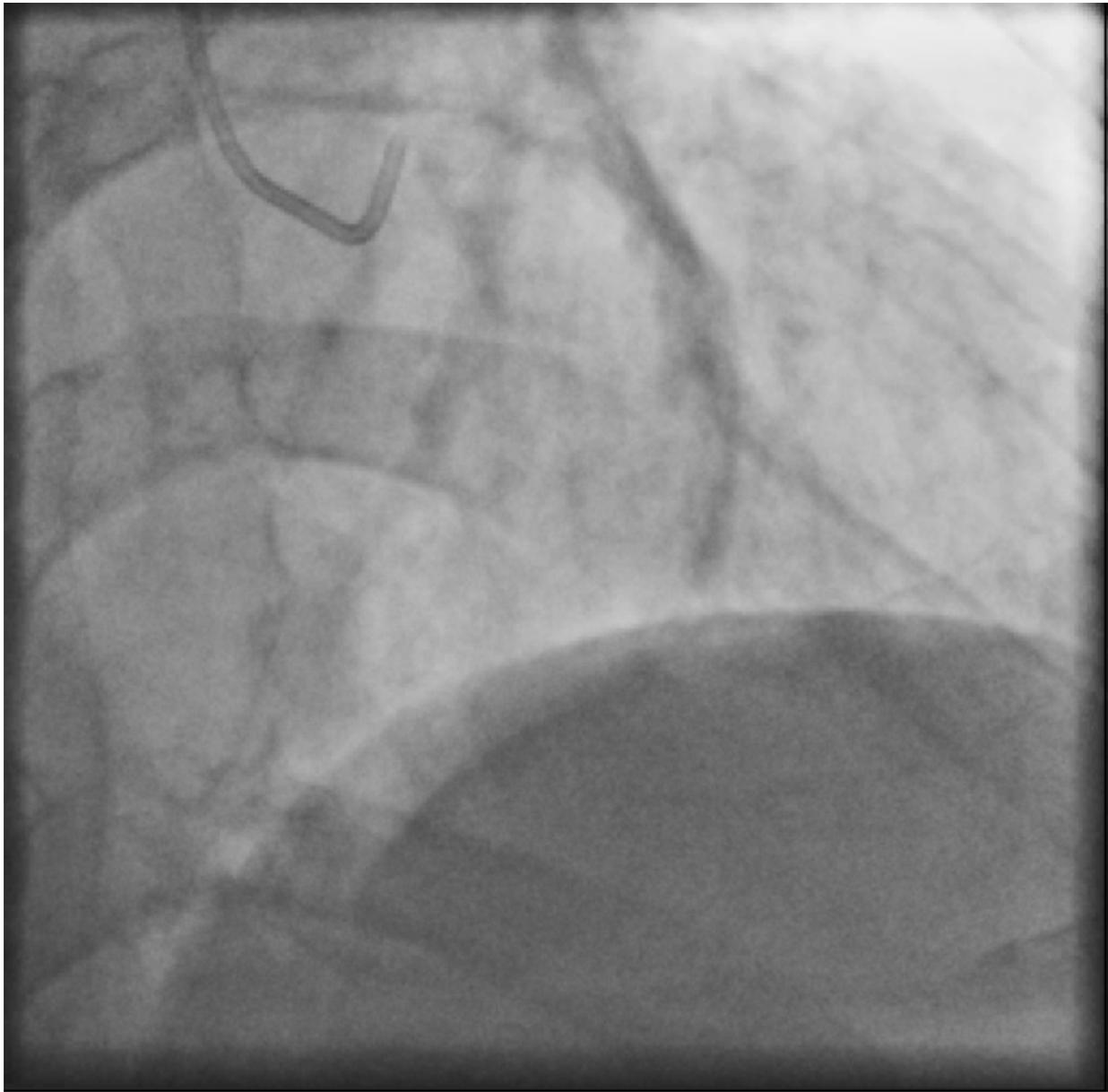
藥物治療

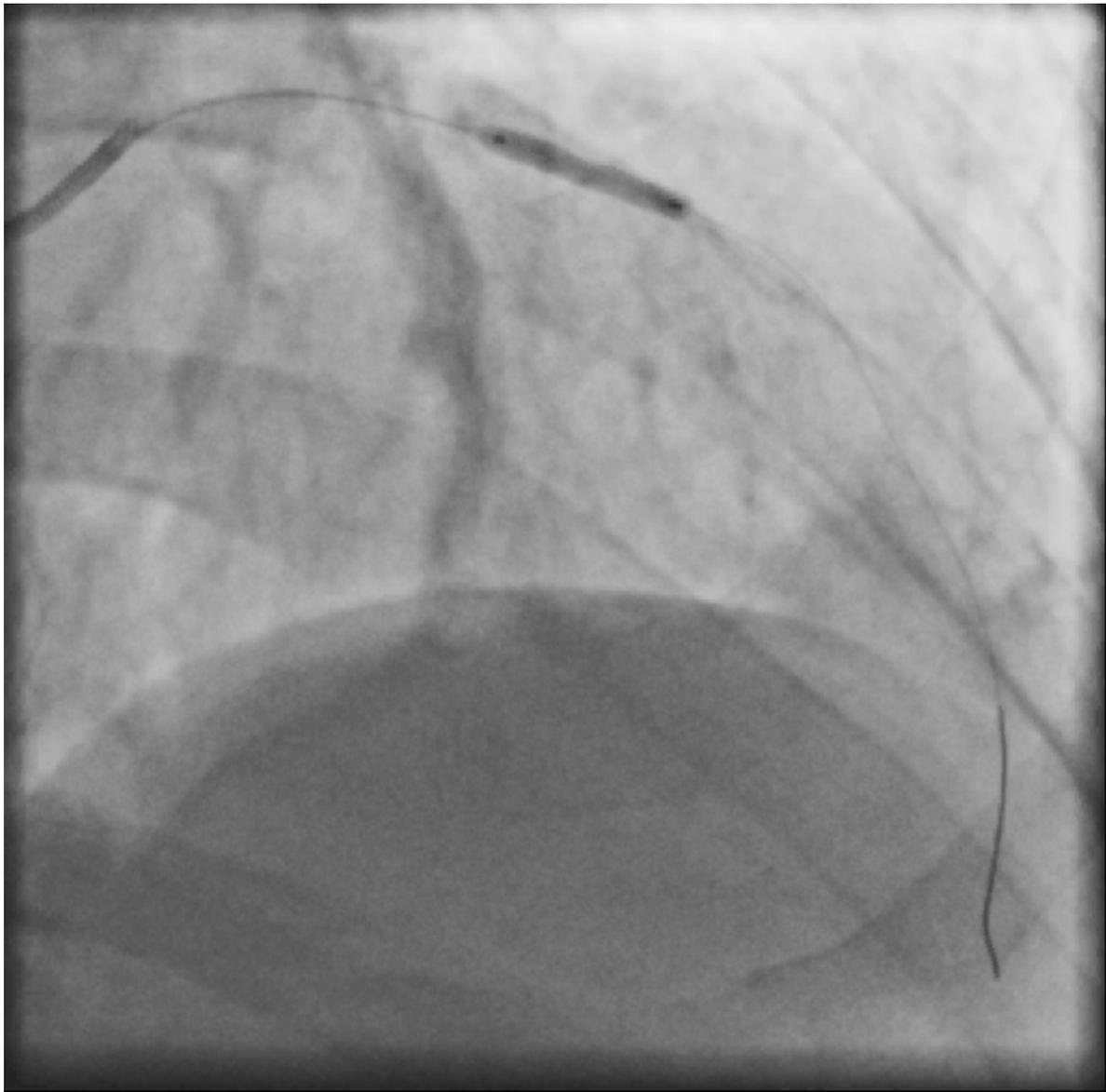
主要目的為減慢或減輕動脈粥樣硬化發生和穩定血管內斑塊，來減低心臟負荷，增加心肌血液的供應。但必須規則依照醫師指示服藥，不能自行停藥或減少藥量。

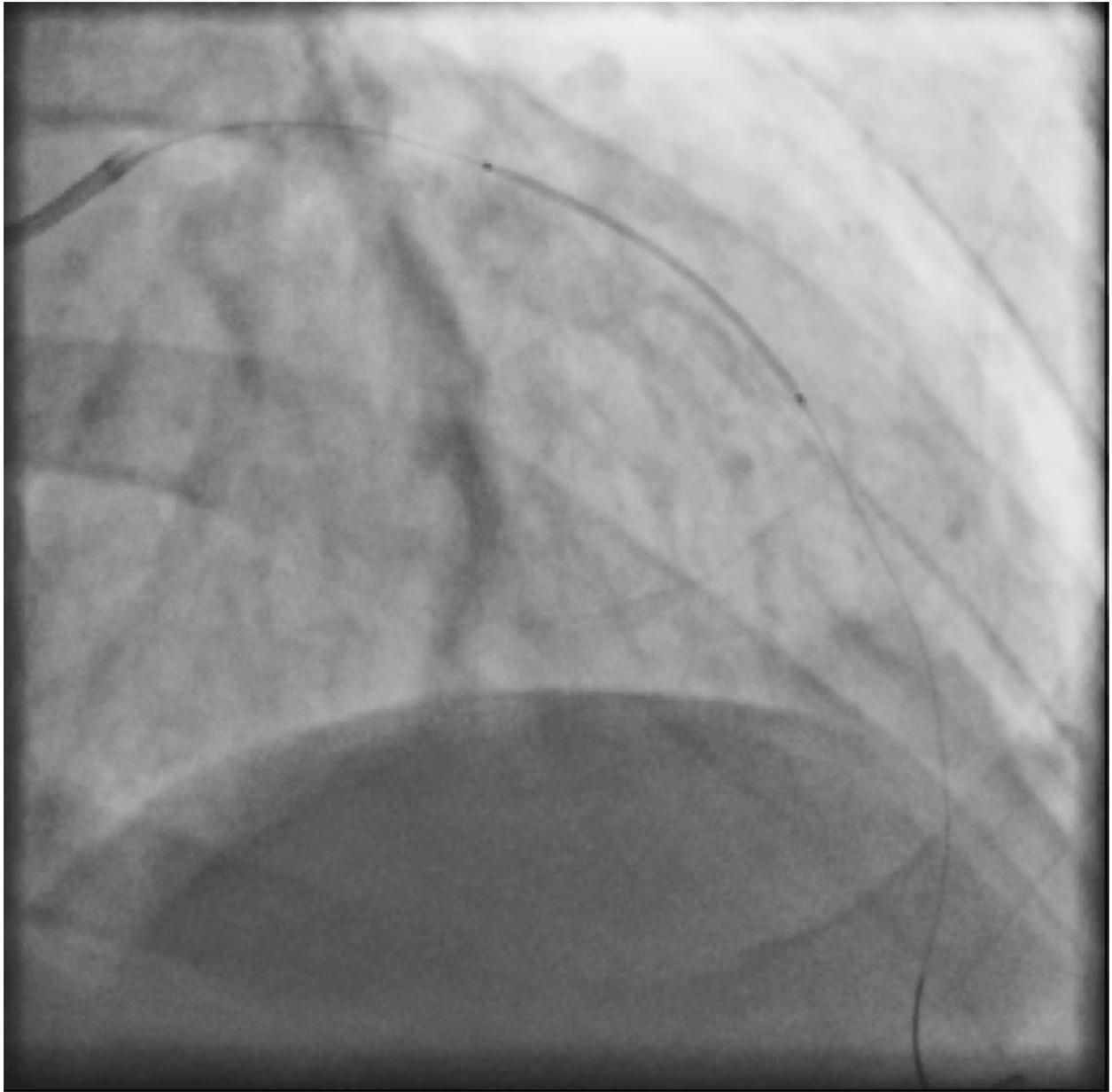
心導管介入性治療

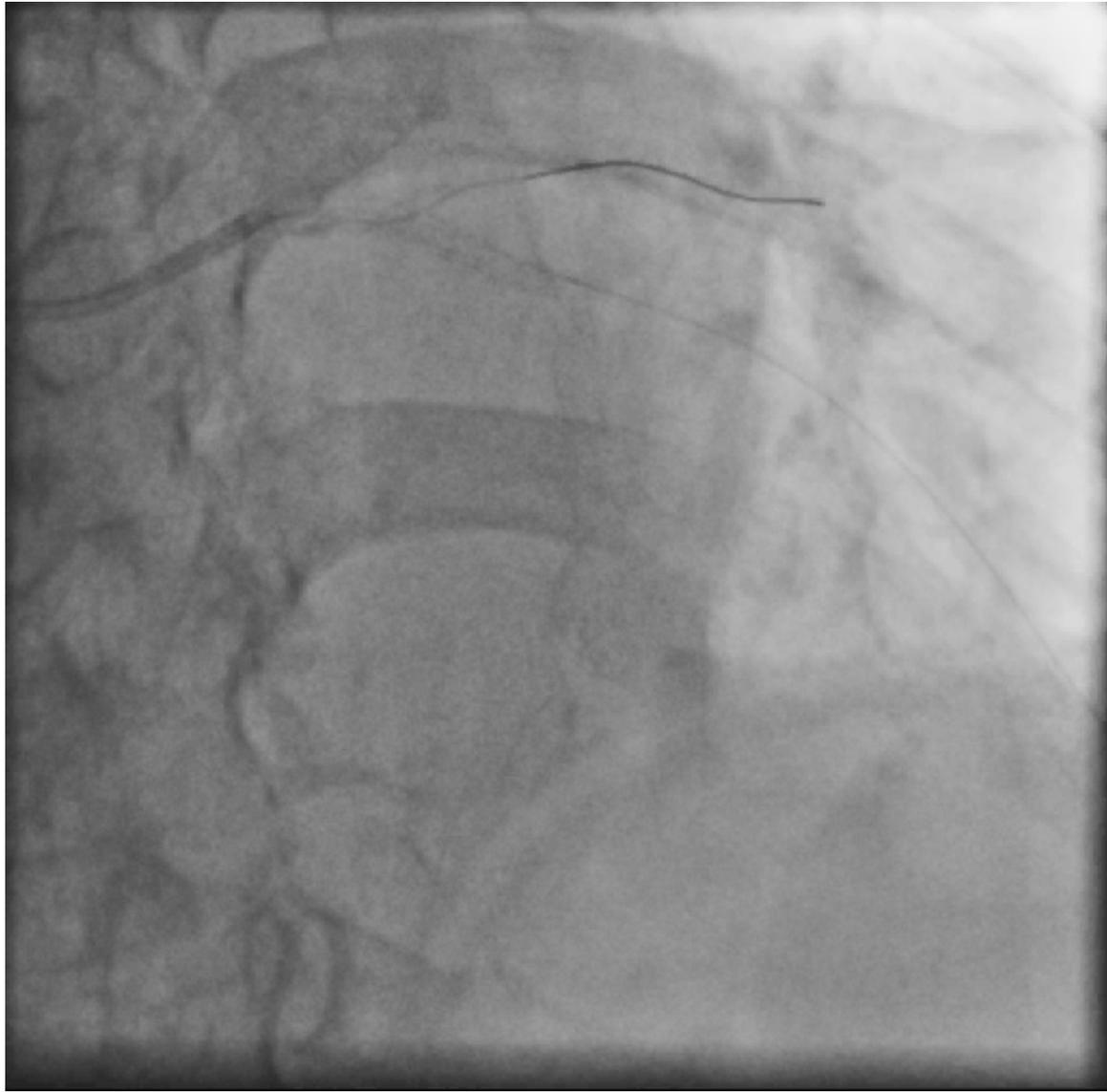
所謂的心導管介入治療就是將一細導管從手部橈動脈或鼠蹊部股動脈穿刺，再順著動脈血流抵達冠狀動脈，確定病變後，使用**氣球擴張術**或**置放支架擴張變窄或完全阻塞的血管**，使血流再次恢復通暢。



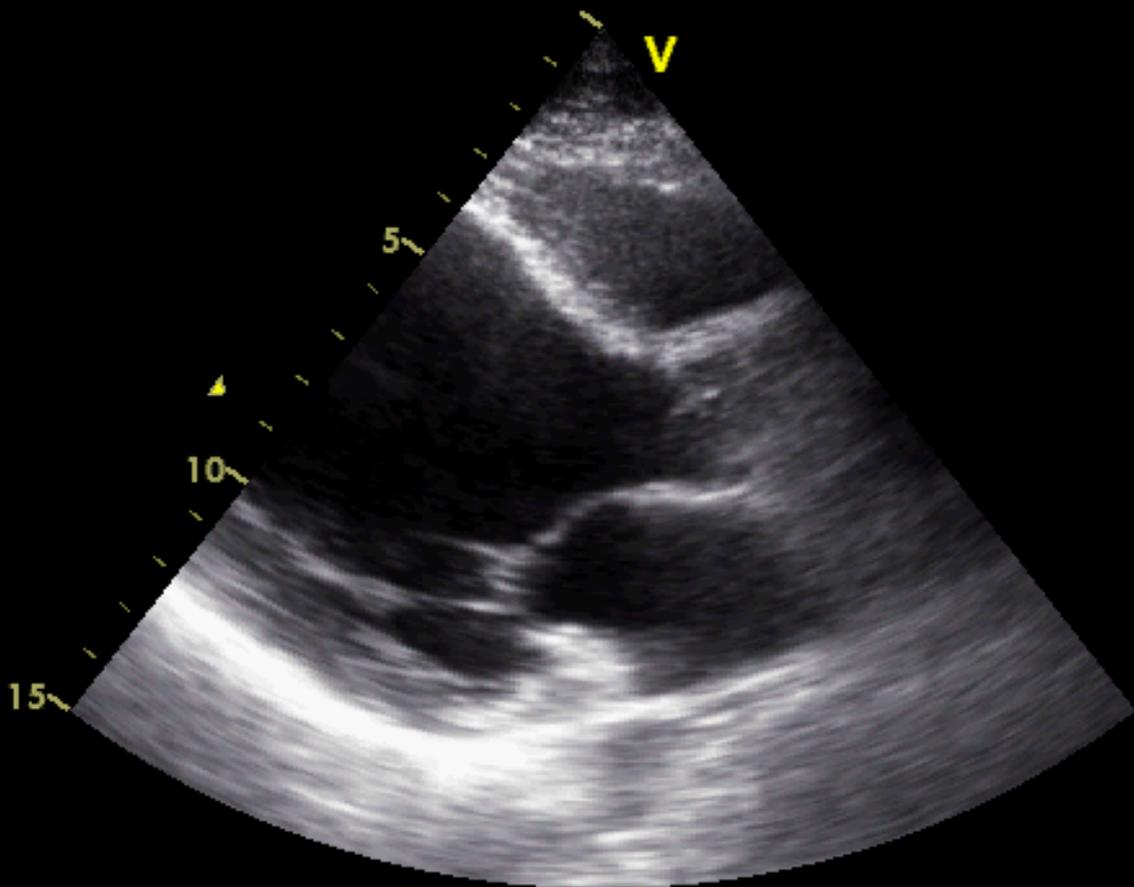








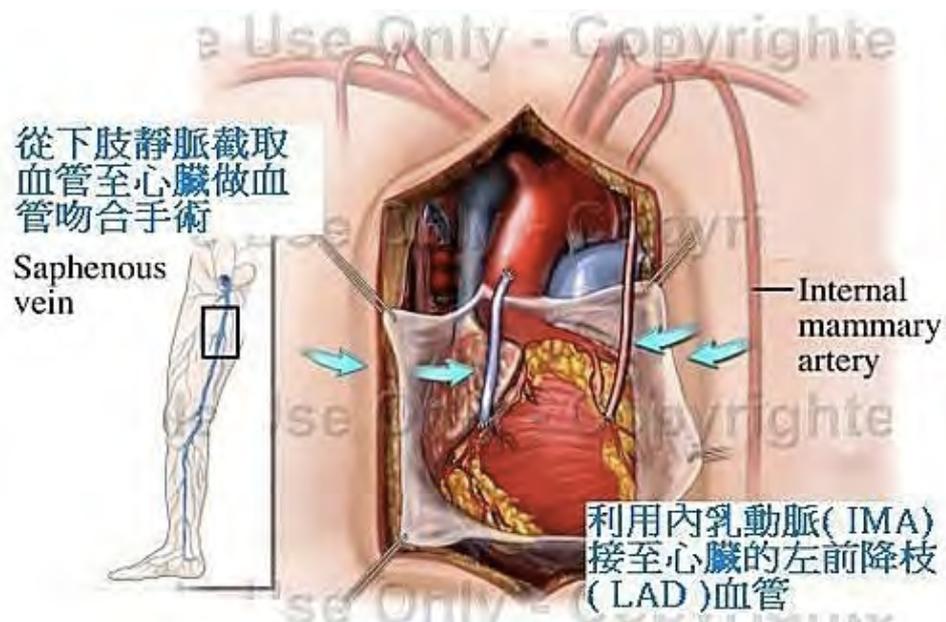
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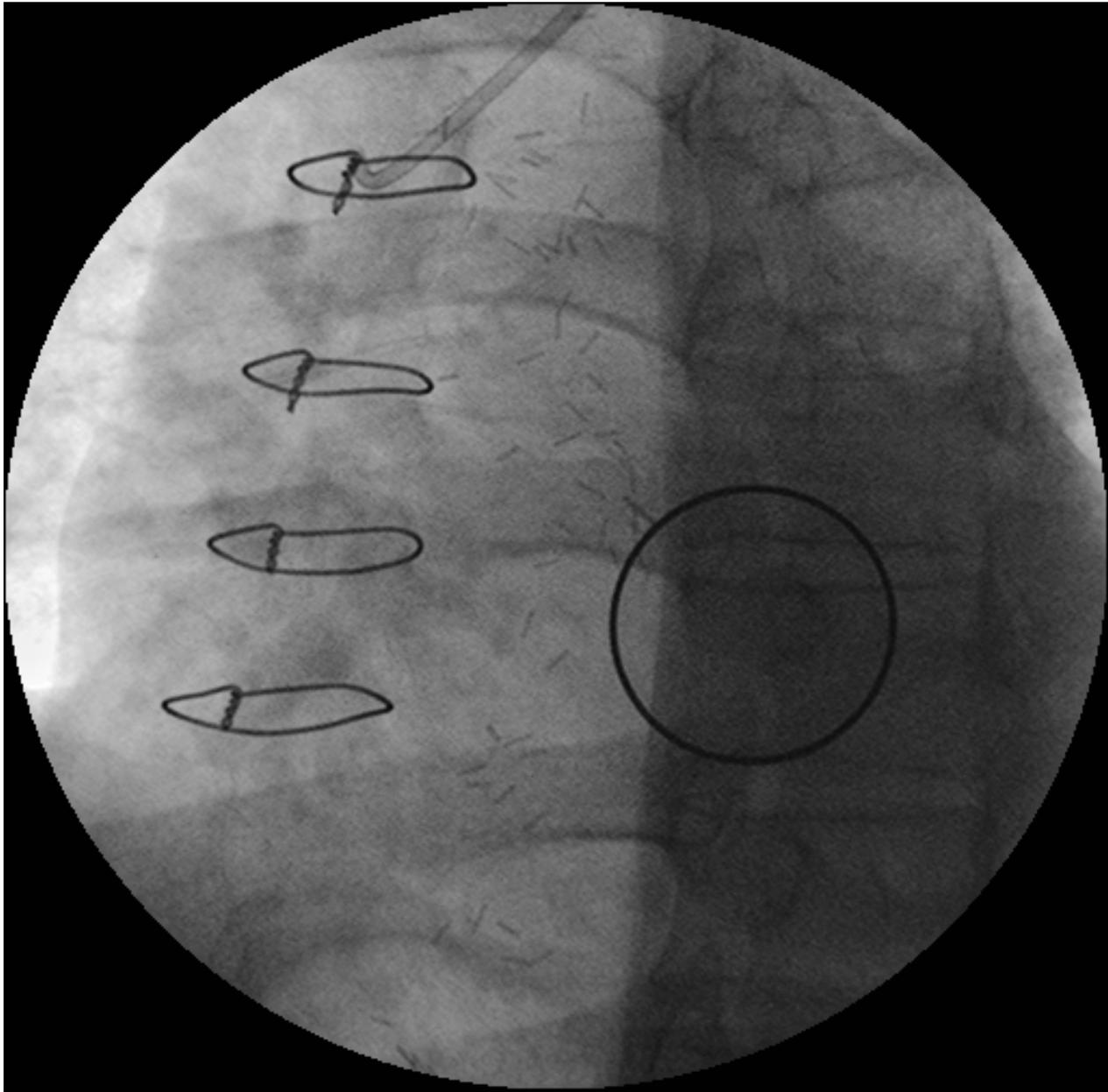


3:264 67 HR

心臟外科手術治療

稱為**冠狀動脈繞道手術**，手術過程必須進行**開胸、插氣管內管、輸血、全身麻醉、體外循環**等。手術時心臟外科醫師會從病人身體其他部位摘取合適血管，接駁做成橋樑讓血流繞過阻塞部位，就能將血流由主動脈經橋樑帶到受損的心肌部位







冠狀動脈疾病治療新利器

心臟體外震波治療

非侵入性治療，主要透過高頻率的聲波，經由準確的心臟超音波同軸定位，可以精細得將震波能量釋放到心肌細胞，透過刺激心臟細小血管增生，產生一氧化氮讓血管擴張，進而改善整體心肌血流灌注，減緩心絞痛及心臟衰竭症狀，提升患者生活品質。



本院109年6月引進 心臟體外震波治療

為全台灣第一台、瑞士
製造、最新同軸定位技
術專利震波系統。
是冠心病治療新選擇。







小港醫院9日成立「複合式震波中心」現場同時首次公開「全台第一台」心臟同軸定位技術專利震波系統，以非侵入性及不用開刀等優點，改善患者的心絞痛症狀及心衰竭症狀。(圖/徐炳文攝)

2 台灣沒有本土案例，卻屢傳出輸日個案？指揮中心找到關鍵
宋清銓

3 林右昌提萬里、金山、石門全劃給基隆市！侯友宜這樣說
潘京婕

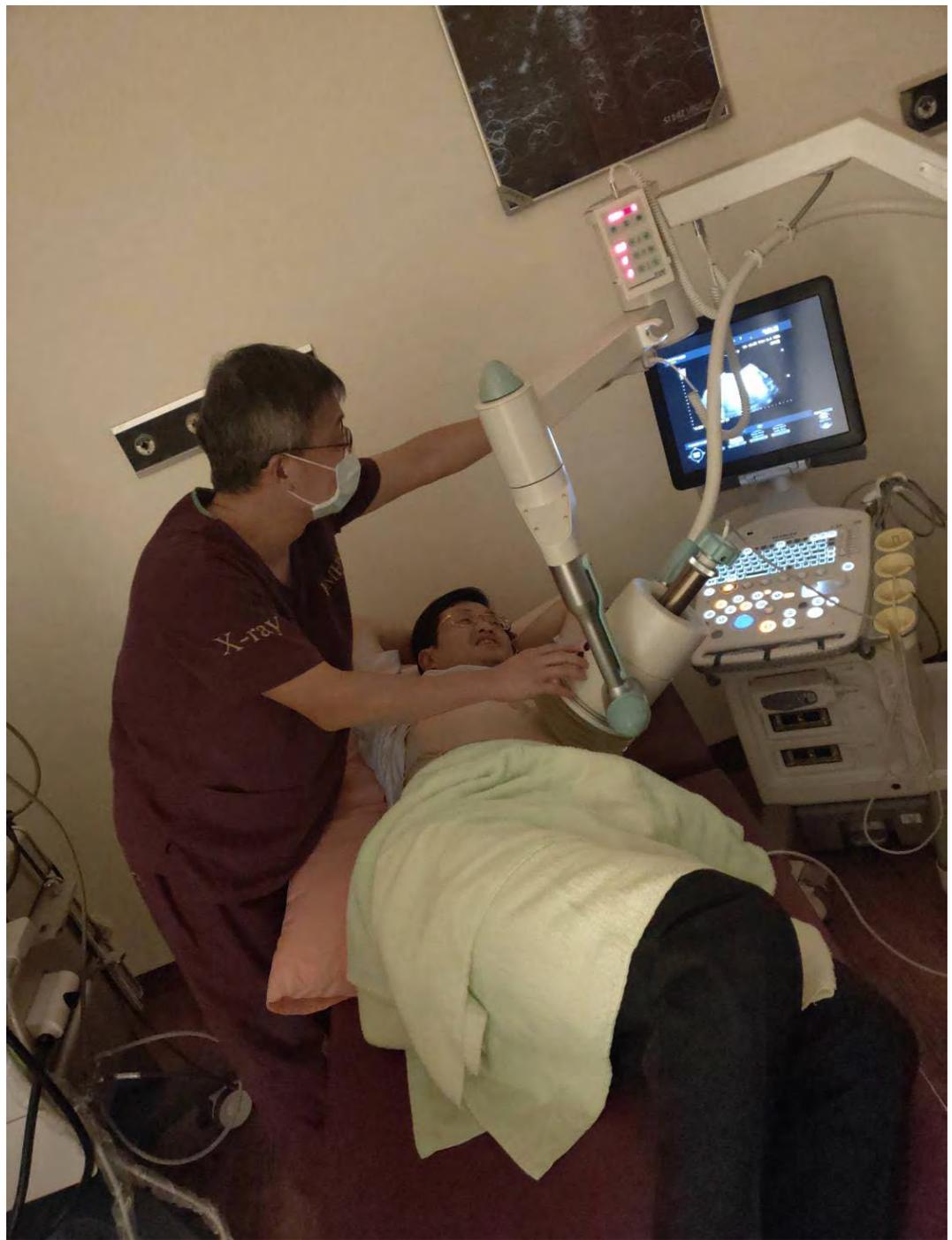
4 房市過熱會走向泡沫化？專家：要擔心別件事
好房網

5 「我換了三間難民營，還被職員騷擾性侵」香港女大生因反送中
德國之聲

6 每月該存多少？月薪3萬8的他分享千萬存款秘訣：這年頭沒人在
方莉婷

7 韓戰阻擋毛澤東統一台灣目標
中國老兵：現在打台灣不靠「中

[洪副.mp4](#)



傳統震波

- 震波是一種高頻率的聲波。
- 過去很成功的用來治療泌尿道的結石。
- 90年代的研究發現較低能量的震波可以用來治療某些型式的關節炎及肌腱炎，增進骨頭或傷口的癒合。

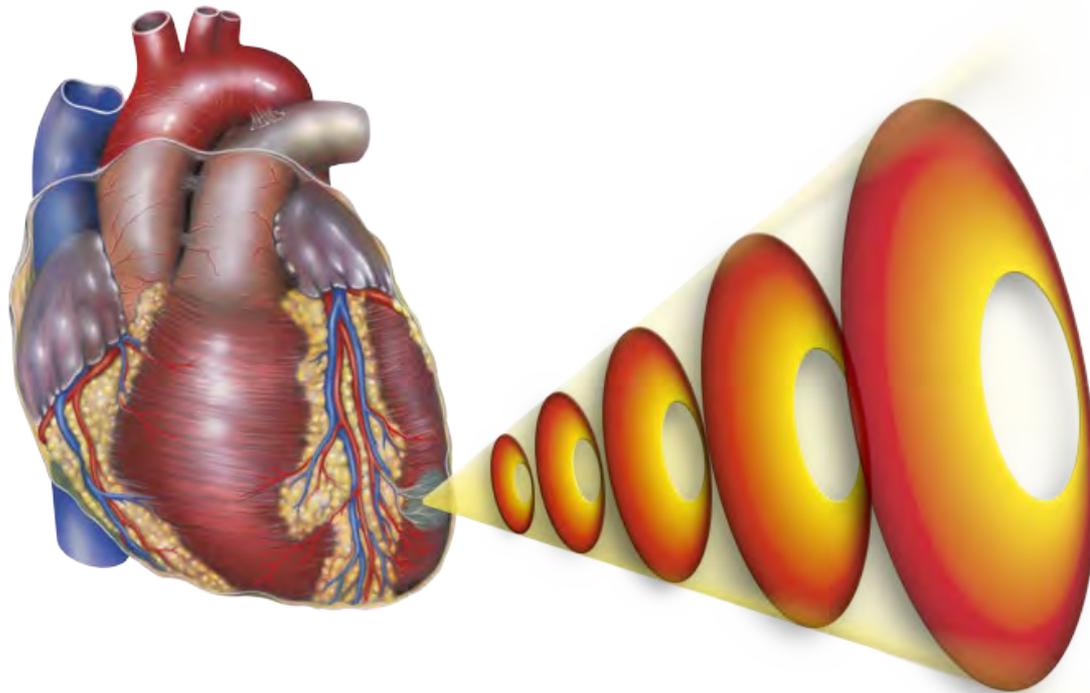
心臟體外震波

- 2000年開始研究團隊更發現低能量的震波可以激發病變部位的一些發炎因子或其他因素，造成細小血管的新生。
- 心臟體外震波治療是利用低能量的震波，在心臟超音波的導引下按摩心臟的肌肉……………

Cardiac Shock Wave Treatment of Angina Pectoris

Cardiac shock wave therapy acts as a stimulator for angiogenesis by:

- releasing nitric oxide (NO)
- up-regulating angiogenic growth factors (VEGF)
- leading to re-perfusion of ischemic tissue
- activating stem cells, tissue repair



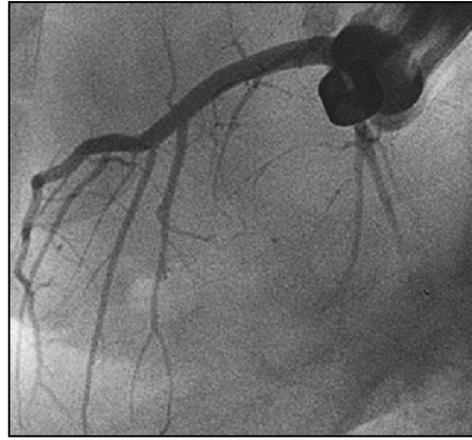
Coronary Arteriogram

Shimokawa et al. (Circulation Vol. 110, No. 19, Nov. 9, 2004)

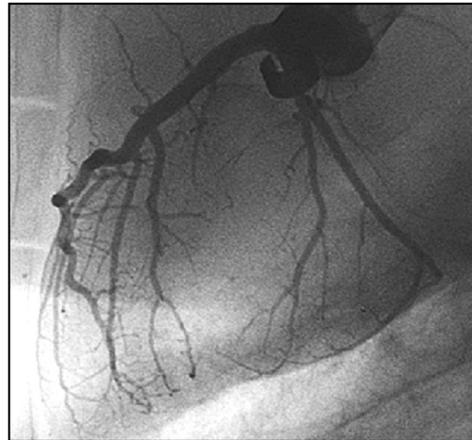
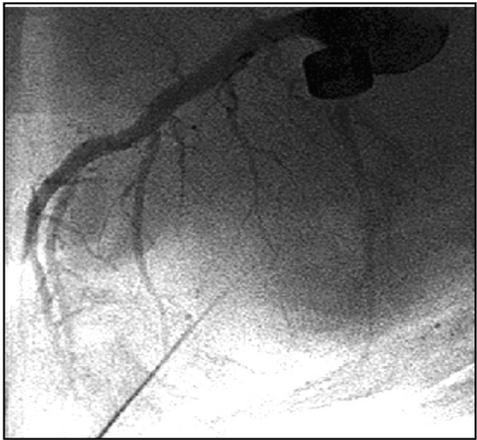
Pre SW (4wks)

Post SW (8wks)

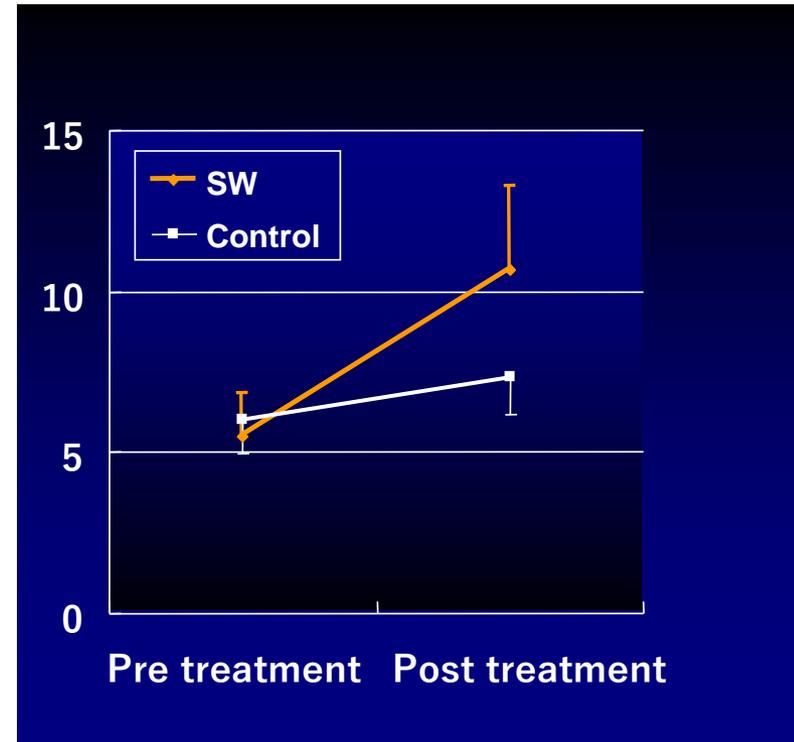
Control



SW



Number of visible Coronary arteries



Shimokawa et al. (Circulation Vol. 110, No. 19, Nov. 9, 2004)

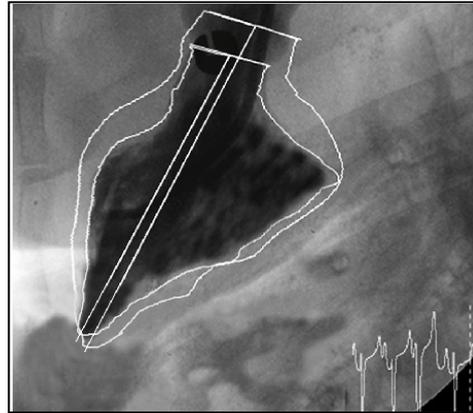
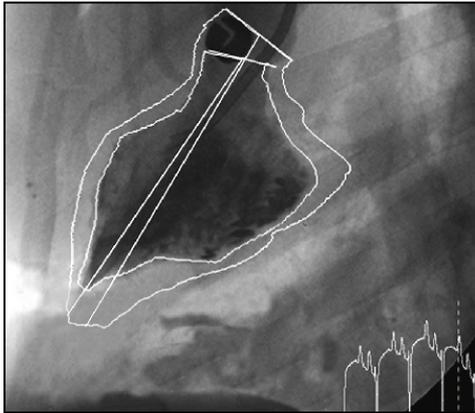
Improved Left Ventricle Ejection Fraction (LVEF) after SW treatment

Shimokawa et al. (Circulation Vol. 110, No. 19, Nov. 9, 2004)

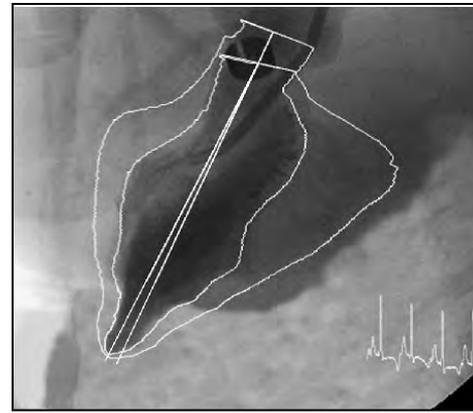
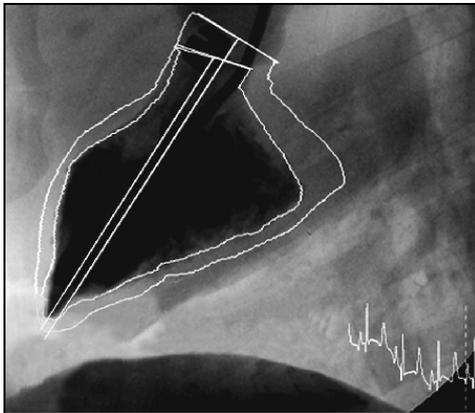
Pre (4wks)

Post (8wks)

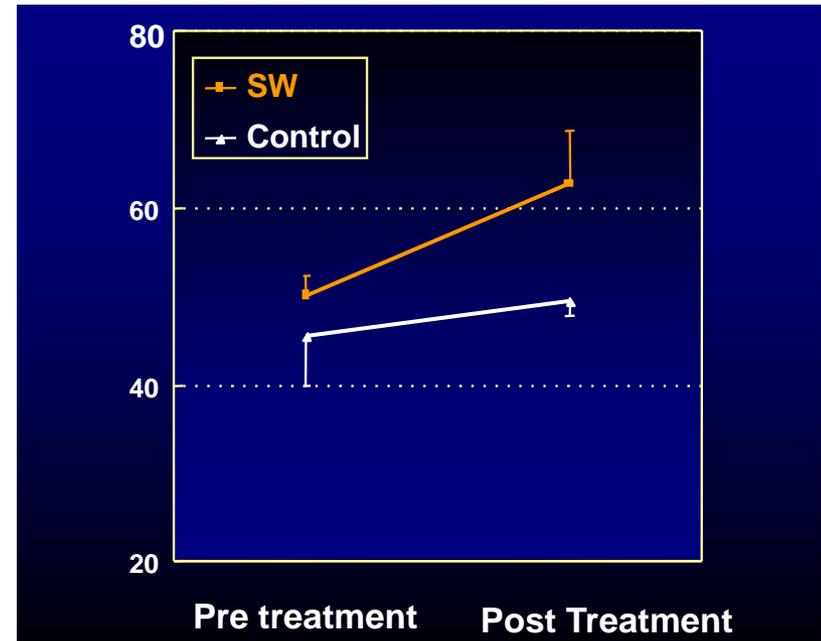
Control



SW



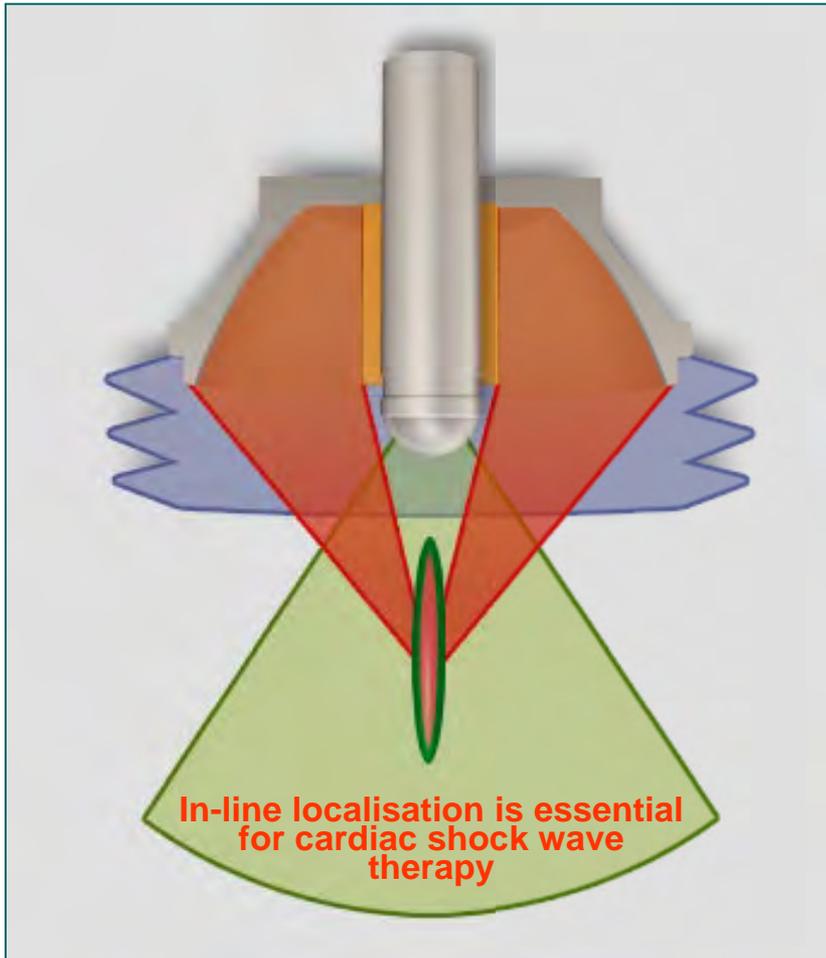
Left Ventricle Ejection Fraction (%)



Shimokawa et al. (Circulation Vol. 110, No. 19, Nov. 9, 2004)

STORZ MODULITH MODULITH® SLC

In-Line Ultrasound Localisation (in line with shock wave path)



Aloka Ultrasound Systems

- B+W stand-alone unit (**Targeting**)
- Colour Doppler stand-alone unit (**Targeting & Diagnostics**)
- 5.0 MHz In-Line Transducer

Prosound 6

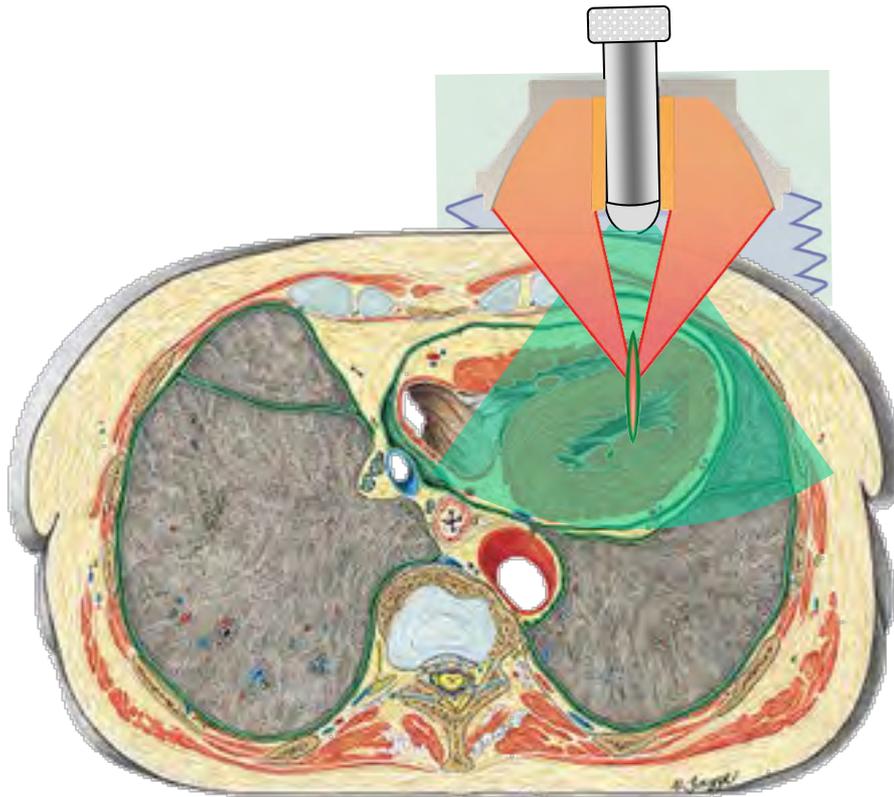


Prosound 3500SX



STORZ MEDICAL MODULITH SLC

Localisation of Ischemic Area
and Shock Wave Source Positioning with Ultrasound



哪些人適合接受心臟震波治療？

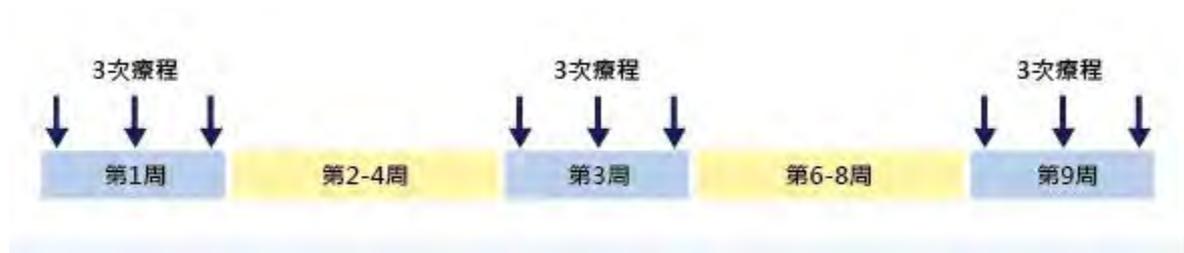
- 心絞痛病患，瀰漫性(多處心臟血管阻塞)心肌缺血，且病人不適合做介入性心導管治療或開刀。或已接受治療後效果反應不佳者。
- 長期服用心絞痛藥物，但無明顯改善心絞痛症狀者。
- 心肌缺氧造成之心臟衰竭

哪些人不適合接受心臟震波治療？

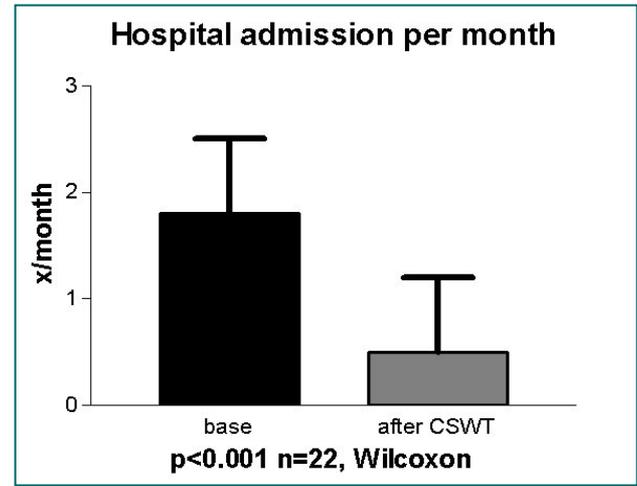
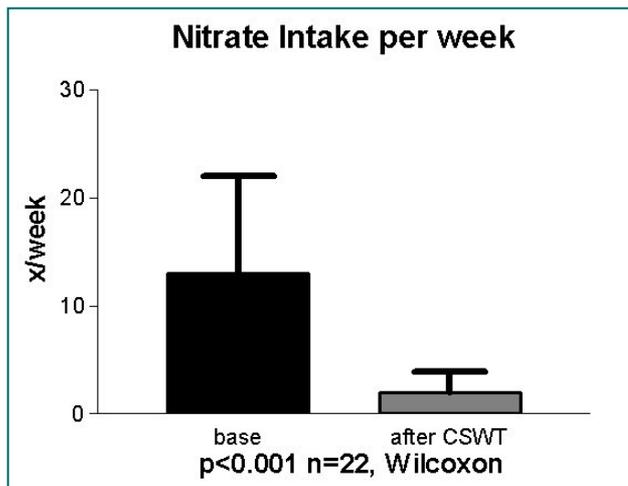
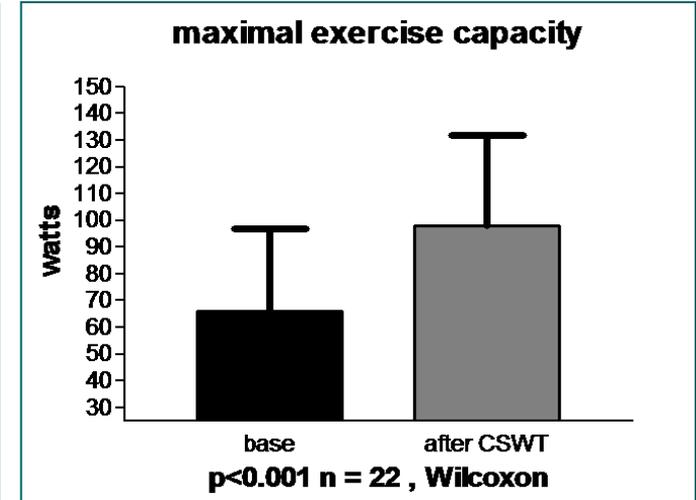
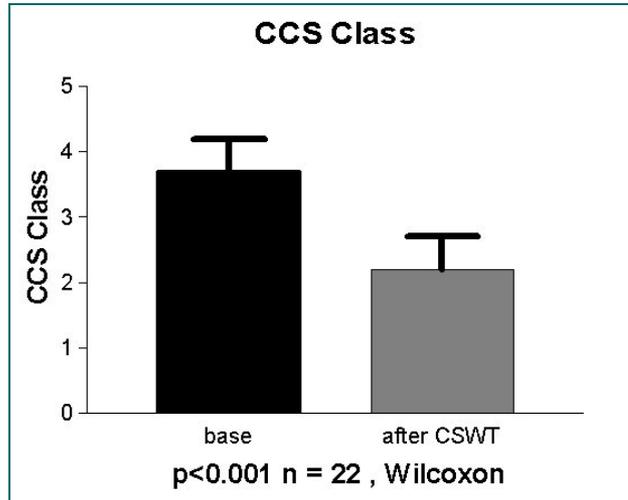
- 曾接受金屬瓣膜置換或心律調節器植入者。
- 心臟有血栓
- 心內膜炎、心肌炎、心包膜炎
- 懷孕
- 治療區域有惡性腫瘤
- Poor window
- 未受管控制的心律不整

體外心臟震波治療需要治療多久

- 九次的治療分三個月來進行。
- 目前所通用的治療方法是第一星期接受三次的治療然後休息三星期，第五個星期再接受三次的治療，再休息三星期，於第九個星期再接受三次的治療。
- 而每星期三次的治療可以每間隔一天的方式來進行，也可以每天的方式來進行。至於那一種方式取決於治療醫師及病患時間的方便來決定。
- 而每次治療的時間約為三十分鐘到一個鐘頭。



Cardiac Shock Wave Therapy (Treatment Results*)

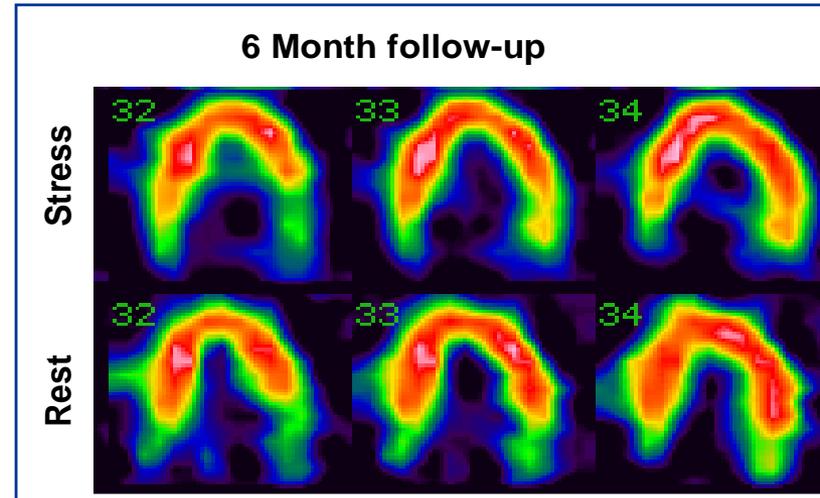
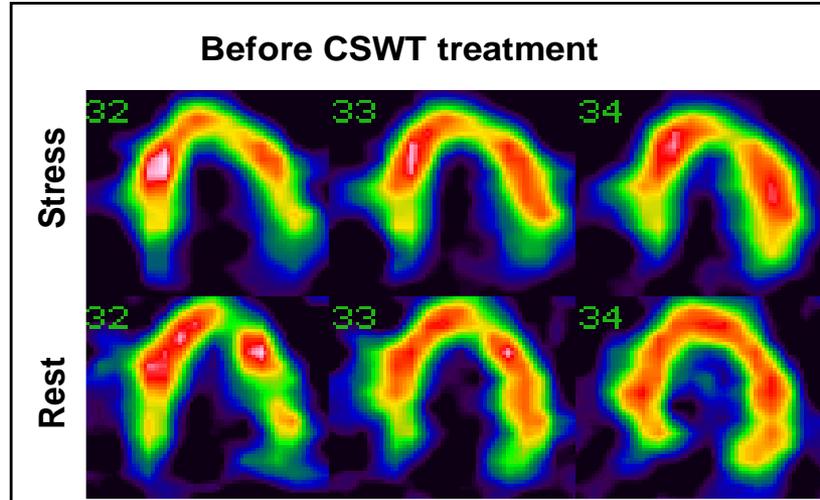


* Dr. A. Gutersohn

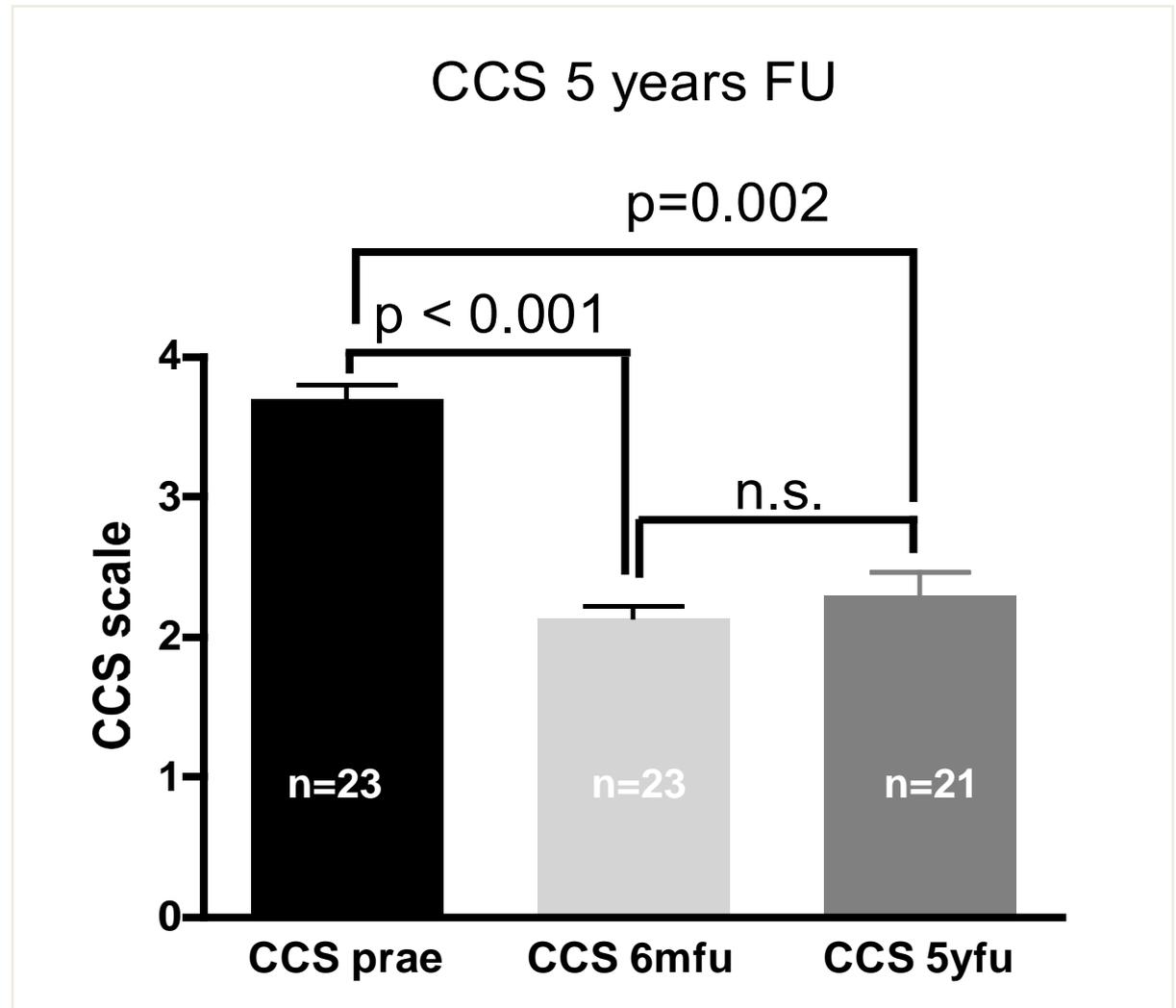
Cardiac Shock Wave Therapy (Treatment Results*)



Single Photon Emission Computerised Tomography (SPECT)



Cardiac Shock Wave Therapy (5 years follow up*)



療效

- 心肌掃描百分之七十的人會有改善；而百分之八十的人症狀會有改善。每個人的情況可能會有一些差異。
 - 減少心絞痛發生
 - 增加運動時間
 - 延長運動時發生心絞痛時間
 - 增加心臟血流灌注(改善心肌掃描)
 - 改善心臟功能(左心室射出功率)
 - 改善局部心肌收縮功能

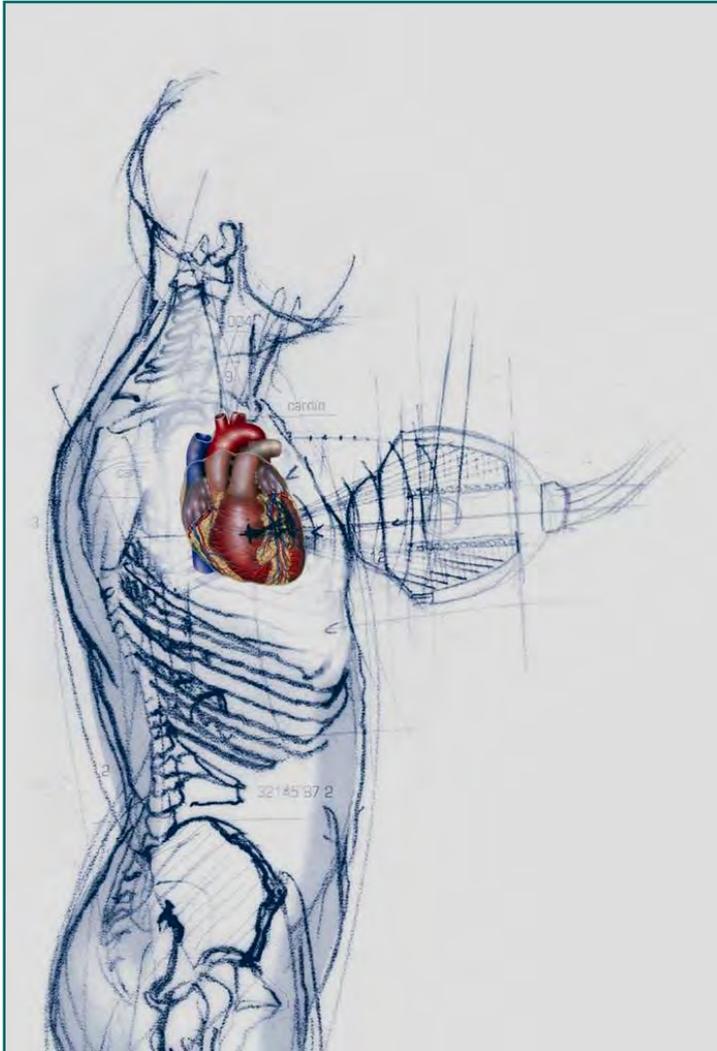
療效

- 從過去的經驗，在治療後的第三到第四星期就會感受到心絞痛症狀的改善。至於整體心臟的評估包括超音波，運動心電圖及心肌掃描的評估，一般而言是等到施行後第六個月再進行。

副作用

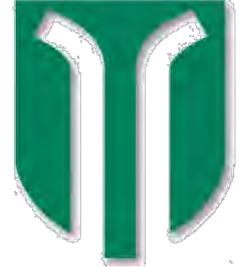
- 這是一種非侵入性、非藥物、幾乎無疼痛感的治療，根據研究及多篇國際性論文發表之結果顯示，這種治療基本上是很安全的。
 - 輕微胸痛
 - 不會引發嚴重心律不整(偶而會有VPCs)
 - 不會傷害心臟(心肌酵素沒有上昇)
 - 不會傷害皮膚
 - 沒有治療產生的副作用及死亡

Cardiac Shock Wave Treatment



European Reference and Teaching Centre:

- Inselspital
Bern, Switzerland
- Dr. Schmid



Asian Reference and Teaching Centre:

- Tohoku University,
Sendai, Japan
- Prof. Shimokawa



Paper review

RESEARCH

Cardiovascular
Therapeutics

Cardiac Shock Wave Therapy for **Chronic Refractory Angina Pectoris**. A Prospective Placebo-Controlled Randomized Trial

Jean-Paul Schmid, Mauro Capoferri, Andreas Wahl, Parham Eshtehardi & Otto Martin Hess

Division of Cardiology, Swiss Cardiovascular Center, Bern University Hospital, and University of Bern, Switzerland

Conclusions: This placebo controlled trial shows a significant improvement in **symptoms, quality of life parameters and ischemic threshold during exercise** in patients **with chronic refractory angina pectoris** treated with CSWT. Thus, CSWT represents a new option for the treatment of patients with refractory AP.

Cardiovascular Therapeutics 31 (2013) e1–e6

Clinical Effect of Cardiac Shock Wave Therapy on Myocardial Ischemia in Patients With Ischemic Heart Failure

Wenxia Wang, MS¹, Hua Liu, PhD¹, Mengxian Song, BS¹,
Weiyi Fang, PhD¹, and Fang Yuan, MS¹

Journal of Cardiovascular
Pharmacology and Therapeutics
1-7

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DOI: 10.1177/1074248415616189
cpt.sagepub.com



Conclusions: Cardiac shock wave therapy can improve myocardial ischemia and represents as a treatment option for patients with ischemic HF through promoting neovascularization and inhibiting cell apoptosis.

Low-energy cardiac shockwave therapy to suppress left ventricular remodeling in patients with acute myocardial infarction: a first-in-human study

Yuta Kagaya^a, Kenta Ito^{a,b}, Jun Takahashi^a, Yasuharu Matsumoto^a, Takashi Shiroto^a, Ryuji Tsuburaya^a, Yoku Kikuchi^a, Kiyotaka Hao^a, Kensuke Nishimiya^a, Tomohiko Shindo^a, Tsuyoshi Ogata^a, Ryo Kurosawa^a, Kumiko Eguchi^a, Yuto Monma^a, Sadamitsu Ichijo^a, Kazuaki Hatanaka^b, Satoshi Miyata^a and Hiroaki Shimokawa^{a,b}

Conclusion: These results suggest that low-energy extracorporeal cardiac SW therapy is feasible and may ameliorate postmyocardial infarction LV remodeling in patients with AMI as an adjunctive therapy to primary PCI.

Coronary Artery Disease 2017, 00:000–000

Cardiac shock wave therapy shows better outcomes in the coronary artery disease patients in a **long term**

S. NIRALA, Y. WANG, Y.-Z. PENG, P. YANG, T. GUO

Department of Cardiology, 1st Affiliated Hospital of the KMU (Kunming Medical University), Kunming, Yunnan, P.R. China

Conclusion:

1. Following **6 years** of follow-up, the CSWT provided agreeable results that improved **myocardial function** and **quality of life** in comparing to the month 0 and the control group.
2. These outcomes advise that on a long-term (72 months) CSWT shows better parameters than the control group.
3. These findings highlight that CSWT can improve **clinical symptoms**, morphology, **functions of the heart** and **quality of life** in patients with CHD than the patients just on drug therapy for a long-term.

Extracorporeal shockwave myocardial revascularization improves clinical symptoms and left ventricular function in patients with refractory angina

Gitana Zuozienė^a, Aleksandras Laucevičius^a and David Leibowitz^b

Conclusion This study demonstrates the potential efficacy of ESMR for the treatment of refractory angina pectoris. The patients showed both a significant clinical response as well as improved LV ejection fraction on serial MRI imaging. Larger studies are needed to adequately define the clinical utility of this novel therapy. Coron Artery Dis 23:62–67

Shock-Wave Therapy Improves Myocardial Blood Flow Reserve in Patients with Refractory Angina: Evaluation by Real-Time Myocardial Perfusion Echocardiography

Conrado L. Ceccon, MD, Anderson S. Duque, MD, Luis H. Gowdak, MD, Wilson Mathias, Jr., MD, Hsu Po Chiang, MD, Joao C. N. Sbrano, MD, Marta F. Lima, MD, Luis Antonio Machado Cesar, MD, Cecilia B. B. V. Cruz, MD, Paulo M. M. Dourado, MD, Claudio Meneghetti, MD, and Jeane M. Tsutsui, MD,
São Paulo, Brazil

Conclusions:

1. CSWT improved **myocardial blood flow reserve** in ischemic segments, as demonstrated by quantitative **real-time myocardial perfusion echocardiography**.
2. These results suggest that CSWT has the potential to increase myocardial blood flow, with an impact on **symptoms** and quality of life in patients with RA. (J Am Soc Echocardiogr 2019;:-:---.)



Cardiac Shock Wave Therapy Ameliorates Myocardial Ischemia in Patients With Chronic Refractory Angina Pectoris: **A Randomized Trial**

Liu Weijing, Fan Ximin, Shen Jianying, Zhu Mengyun, Fan Xuehua, Xu Yawei and Hong Liqiong*

Shanghai Tenth People's Hospital, Tongji University, Shanghai, China

Conclusions: CSWT may improve the **myocardial perfusion and reduce clinical symptoms** without increasing adverse effects in CRAP patients. It provides a non-invasive and safe clinical therapy for CRAP patients.



Case Series: Extracorporeal Shockwave Myocardial Revascularization Therapy Improves Ischemic Response, Functional Capacity, and Quality of Life in Indicated **CABG-Stable Angina** Pectoris Patients

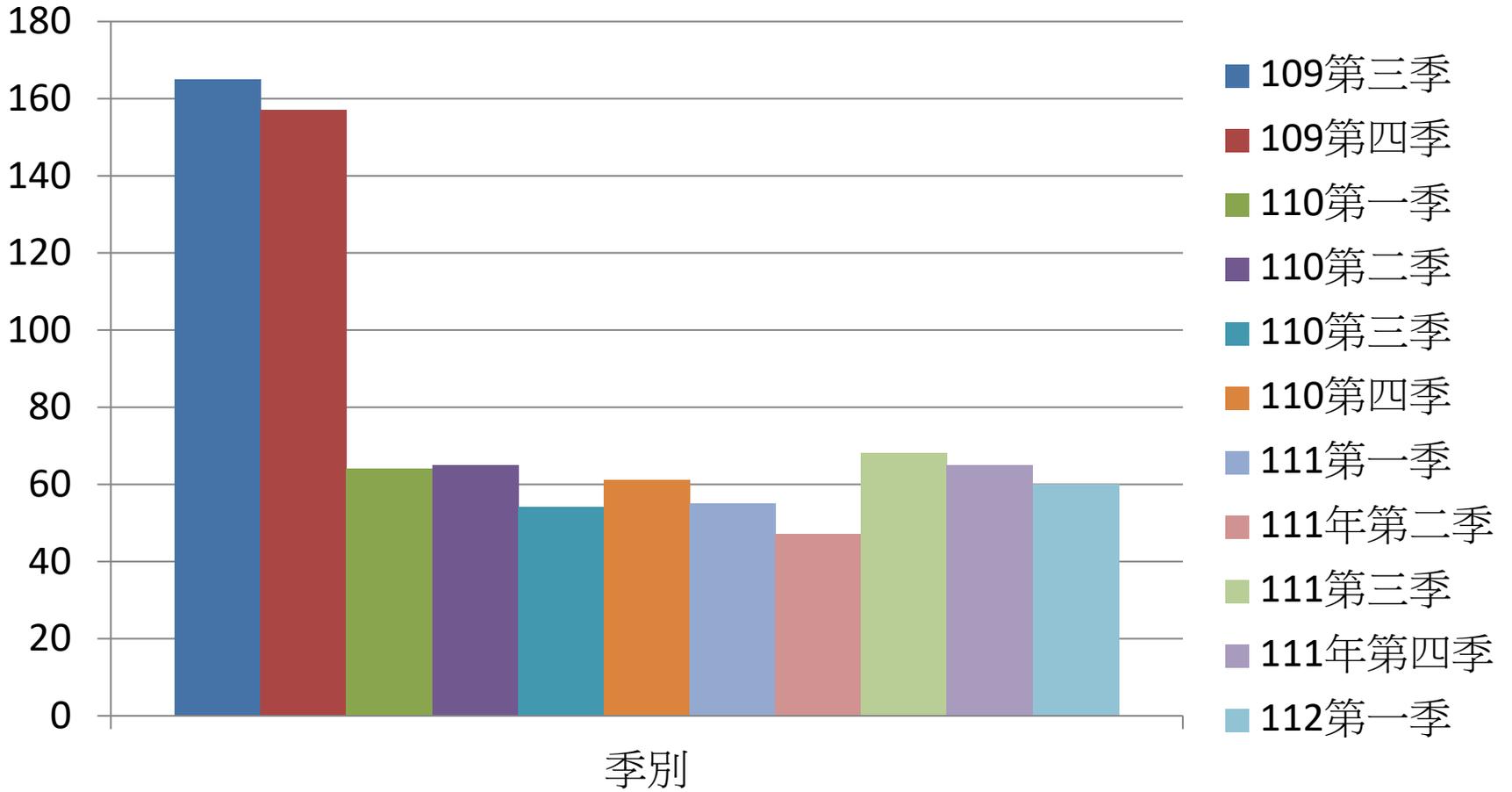
OPEN ACCESS

Conclusion: ESMR therapy might be beneficial for indicated patients with CABG-SAP to improve **ischemic response, functional capacity, and physical component of quality of life.**

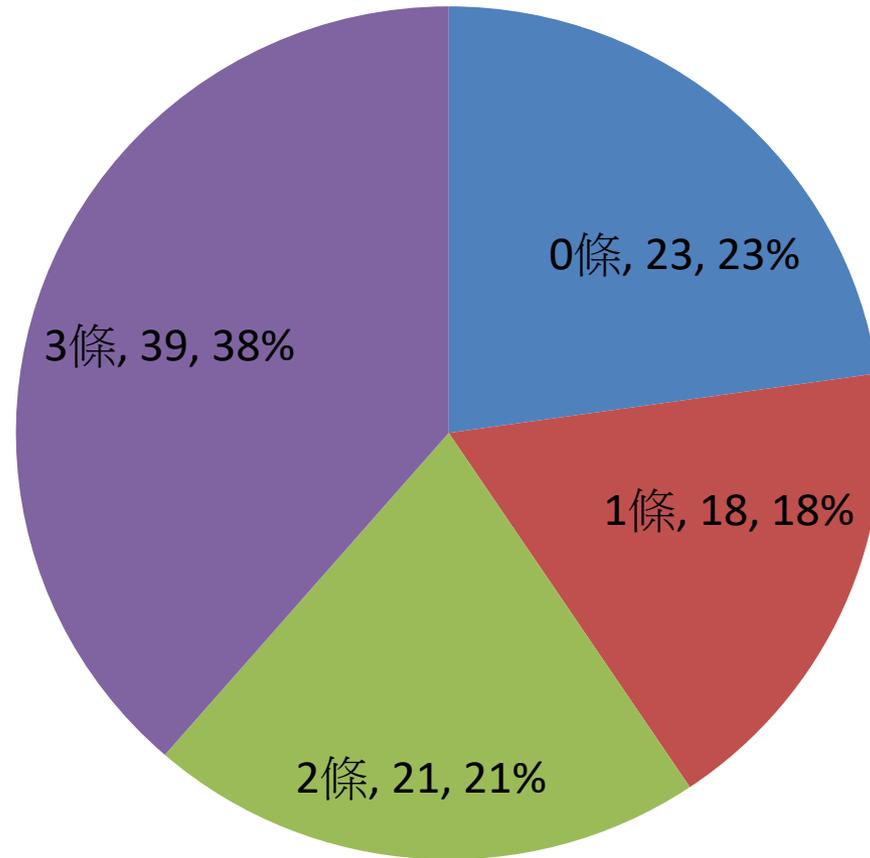
本院的經驗

- 自2020年6月16日至2023年03月31日，共執行857人次，平均每月約26人次。
- 心臟震波療程中，病人只提到胸部有些微感覺，但尚未達到痛覺的程度，治療過程中及療程結束後，皆沒有任何其他副作用出現。

每季人次數



CAD數



案例分享1

- 第一位為89歲周先生，幾年前心肌梗塞後，就有活動時呼吸困難的情況。
- 知道本院有心臟震波儀器後，第一位接受治療。在經過9次療程後，最近走路、爬樓梯體力變好。雖然高齡近90歲，也可以輕鬆地爬個3-4樓，喘的情況也改善很多。



案例分享2

- 67歲楊先生，3年半以前因活動時胸痛，至本院裝了兩支心臟支架，之後症狀已有改善。
- 2020年9月得知本院購入心臟震波之後，本來對高科技治療接受度頗高的他，立刻接受治療，經過完整27個療程後，讓本來就喜歡運動的他，運動能力更加進步，不論是游泳和朋友飆速，或是跑個半馬，都顯得更加輕鬆寫意

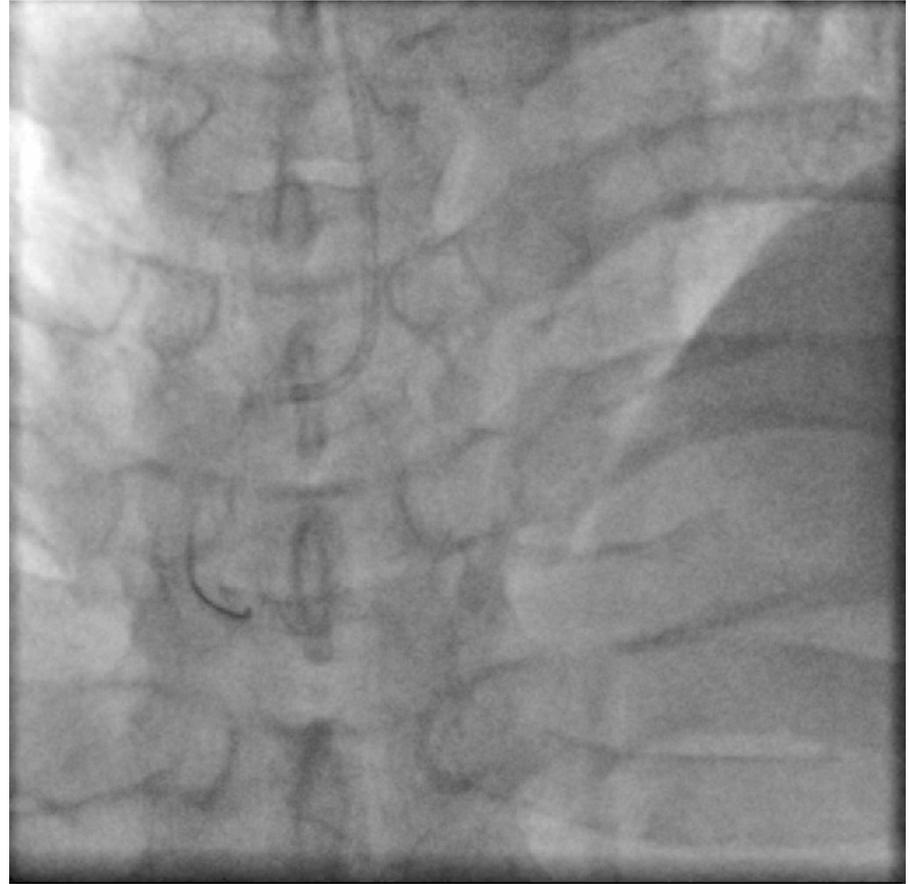
三年半前，右冠狀動脈支架治療前後



案例分享3

- 37歲柯先生，三年前打籃球時，心肌梗塞突發，旋即送至本院急診並立刻接受緊急心導管治療，前後共置放5支藥物支架。
- 大管徑的冠狀動脈，經支架治療後，已得到大幅改善，但可能是糖尿病的關係，三條冠狀動脈遠端殘餘很多小血管的病變，只能先靠藥物治療。
- 病人知道本院引進心臟震波後，也立刻同意接受震波治療，在完成9次療程後，目前胸悶吸不到氣的情況已大有改善。

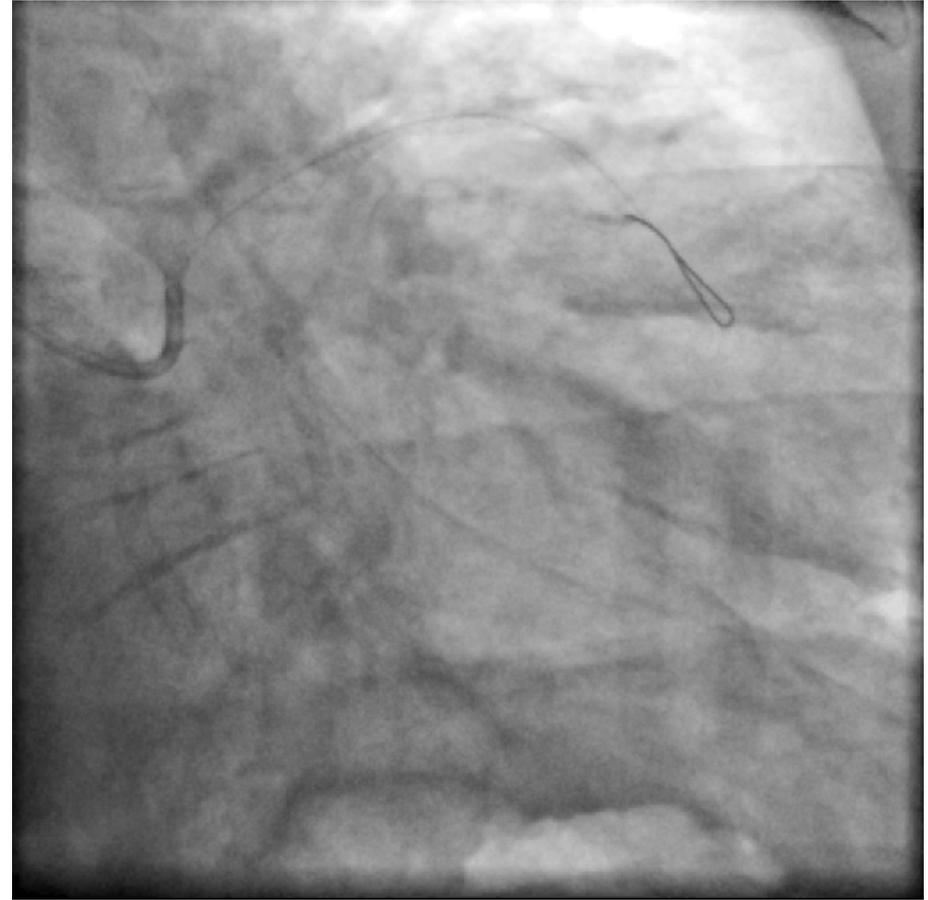
三年前，右冠狀動脈支架治療前後



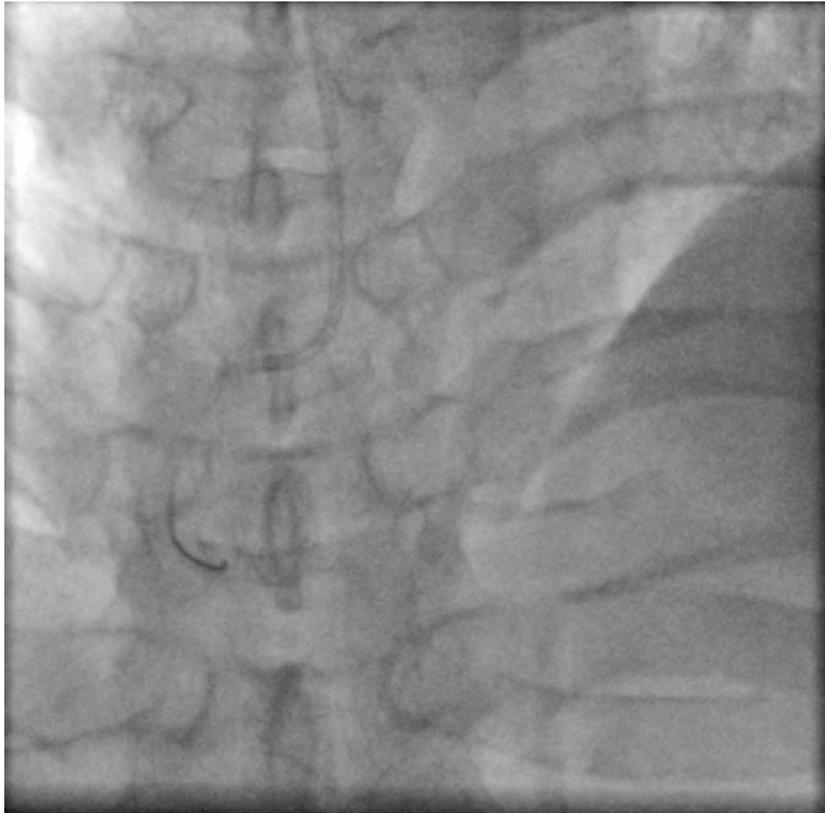
三年前，左前降支支架治療前後



三年前，左迴旋支支架治療前後



- 由於病人剩餘的冠狀動脈病變，大部份為細小血管病變，今年6月引進心臟震波後，剛好可以治療他的心臟血管病變。





案例分享4和5

- 目前有位病人，經由網路廣告，由台南奇美轉至本院治療，為三條血管病變，無法放支架和開刀。病患經詢價後，決定至本院治療，目前已完成12次療程，症狀已有大幅改善。
- 並介紹一位台北病人來治療，該位病人每次都坐高鐵至本院治療，效果也不錯。這兩位病人是本院第一次治療到台南以北的病人，為一好的跡象。



小港醫院
複合式震波中心

Extracorporeal Shock Wave Therapy Center

院外
42



END

謝謝您的聆聽

CARE ———

- + Cooperation
- + Accountability
- + Reverence
- + Effectiveness

高雄市立小港醫院

(委託財團法人私立高雄醫學大學經營)

Kaohsiung Municipal Siaogang Hospital

Low-Intensity Extracorporeal
Shock Wave Therapy
for Erectile dysfunction
Taiwanese experience

新店耕莘醫院姜秉均醫師

- Pubmed search: Erectile dysfunction, Taiwan, shock wave/ESWT
- Two clinical researches:

Article

Low-Intensity Extracorporeal Shockwave Therapy Can Improve Erectile Function in Patients Who Failed to Respond to Phosphodiesterase Type 5 Inhibitors

Chia-Chun Tsai^{1,2}, Chii-Jye Wang^{2,3}, Yung-Chin Lee^{2,3}, Yen-Ting Kuo⁴, Hsiao-Hua Lin⁵, Ching-Chia Li^{1,2,3}, Wen-Jeng Wu^{1,2,3}, and Chia-Chu Liu^{2,3,6}

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Article

Efficacy of Penile Low-Intensity Shockwave Therapy and Determinants of Treatment Response in Taiwanese Patients with Erectile Dysfunction

Kai-Yi Tzou^{1,2,3}, Su-Wei Hu^{2,3,4}, Oluwaseun Adebayo Bamodu^{2,5,6}, Yuan-Hung Wang^{4,6}, Wen-Ling Wu^{2,3} and Chia-Chang Wu^{1,2,3,*}

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Article

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and Chia-Chang Wu ^{1,2,3,*}

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- Single-center, retrospective, non-randomized, single-arm study
- January 2018 and December 2019 at Shuang Ho Hospital
- 85 non-psychogenic ED cases

Inclusion criteria

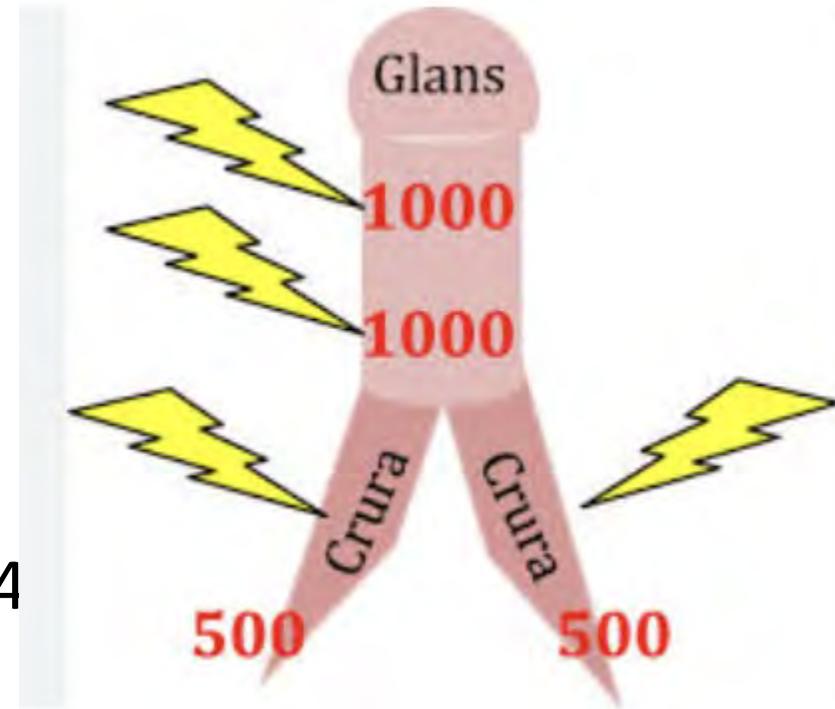
- Aged ≥ 18 years
- Definitive non-psychogenic ED diagnosis
- ED history ≥ 6 months
- Non-responsive to or dissatisfied with administered medical therapies including PDE5i for at least the last 6 months
- EHS ≤ 2
- Off PDE5i in the last 3 weeks
- Completed 12 sessions of Li-ESWT and followed up to one year, while maintaining regular sexual activity

Exclusion criteria

- Post-radical prostatectomy
- Post-radiation therapy for pelvic organs
- Post-chemotherapy pathoetiology
- Untreated hypogonadism
- Anatomical, hormonal, or neurological impairments, or that were concomitantly receiving treatment for any psychiatric condition
- Psychogenicity was ruled out when etiology was uncertain or unknown;
- Presence of psychogenic factors, including hypoactive sexual desire, major psychiatric disorders such as anxiety disorder and depression, pessimistic attitudes, negative outlook on life, relationship problems, or stress
- 16 of the enrolled 85 cases were excluded (n=69)

Li-ESWT Protocol

- DUOLITH® SD1 mobile shockwave therapy apparatus with a SEPIA® handpiece (Storz Medical AG, Tägerwil, Switzerland)
- 20-min treatment session performed once per week for 12 consecutive weeks
- 3000 shockwave impulses at an energy flux density of 0.2 mJoule/mm² and a frequency of 4 Hertz were given



Questionnaires

- International Index of Erectile Function (IIEF-5)
 - 5–7 (severe ED), 8-11 (moderate ED), 12–16 (mild to moderate ED), or 17–21 (mild ED) points
- Patient-reported measure of erectile dysfunction and other sexual issues
- Erection Hardness Score (EHS)



- Assessments were performed at baseline (pre-treatment), and 1 month, 3 months, 6 months, and 12 months post-treatment.

Li-ESWT Outcome Measurement

(based on the minimal clinically important difference (MCID))

Successful treatment:

- Baseline IIEF-5 scores
 - 5–7 (severe ED), improvement ≥ 7
 - 8–16 (mild to moderate, moderate ED), improvement ≥ 5
 - 17–21 (mild ED) points improvement ≥ 2
- When erection was hard enough for vaginal penetration (EHS ≥ 3)

Characteristics

Characteristic	
Age (years, median (Q ₁ –Q ₃))	55 (45–66)
Body mass index (kg/m ² , median (SD))	24.6 (3.89)
Baseline erectile function, median (SD)	
EHS	2.0 (0.80)
IIEF-5	10 (5.54)
ED Severity, n (%)	
Mild (IIEF-5 score: 17–21)	6 (8.6%)
Mild-to-Moderate (IIEF-5 score: 12–16)	16 (23.2%)
Moderate (IIEF-5 score: 8–11)	20 (29%)
Severe (IIEF-5 score: 5–7)	24 (34.8%)
Duration of ED (months, median (Q ₁ –Q ₃))	12 (6–36)
PDE5i non-responders, n (%)	52 (75.4%)
Testosterone level (ng/dL, mean (SD))	3.92 (1.45)
Co-morbidity, n (%)	
Diabetes mellitus	29 (42%)
Hypertension	16 (23.2%)
Hyperlipidemia	33 (47.8%)
Chronic kidney disease	9 (13%)
Hypogonadism	21 (30.4%)
Tobacco smoking, n (%)	7 (10.1%)

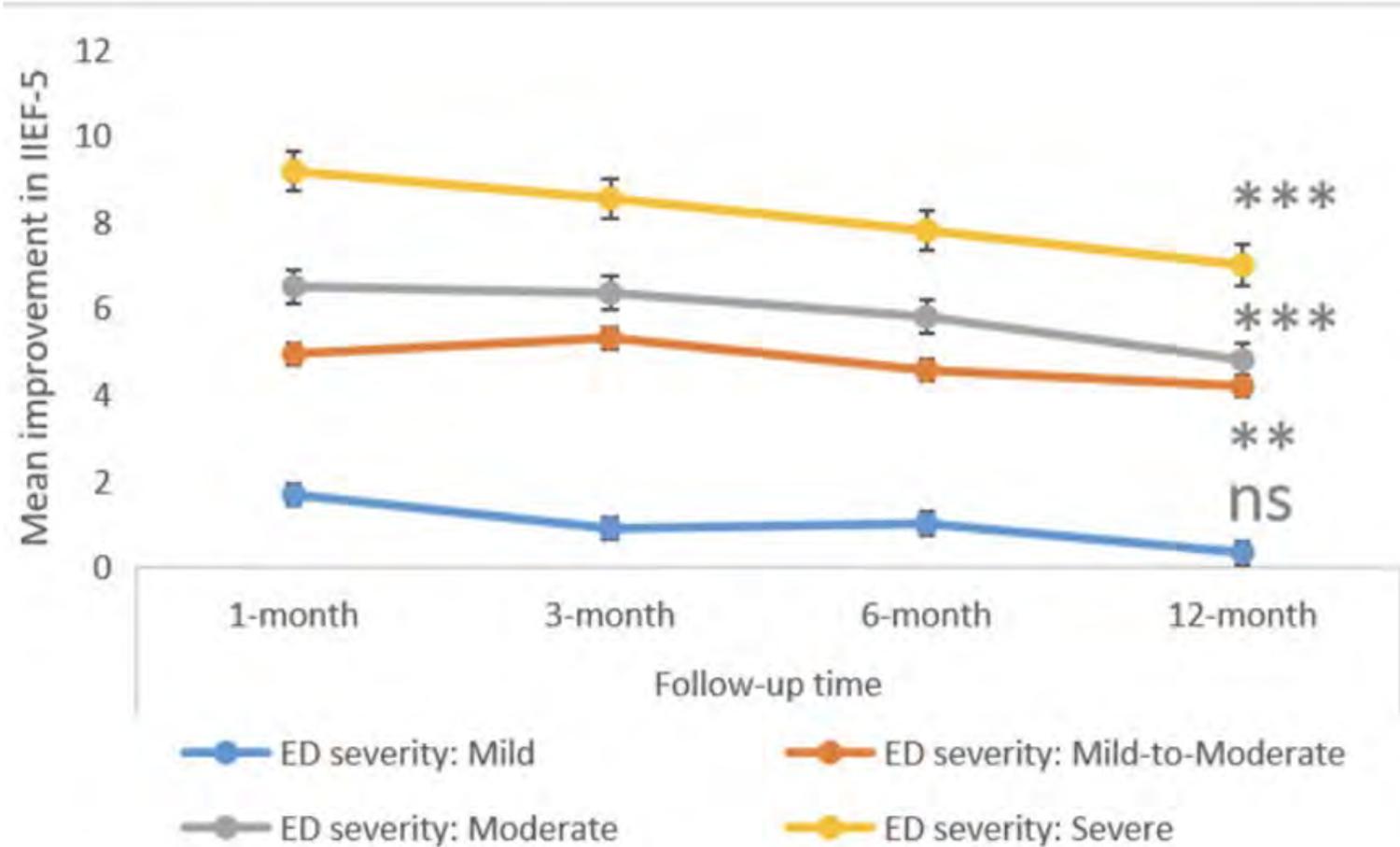
Q₁, first quartile; Q₃, third quartile; SD, standard deviation; ED, erectile dysfunction; EHS, Erectile Hardness Score; IIEF-5, five-item International Index of Erectile Function; PDE5i, phosphodiesterase 5 inhibitor.

Li-ESWT Significantly Improves ED

Erectile Function Index	Change from Baseline	
	Mean (95% CI)	<i>p</i> -Value
	1 month follow-up	
IIEF-5	6.65 (5.30–7.99)	<0.001
EHS	0.88 (0.67–1.09)	<0.001
QoL	–0.45 (–0.74––0.16)	0.003
Success * n (%)	39 (56.5%)	
	3 months follow-up	
IIEF-5	6.37 (5.08–7.67)	<0.001
EHS	0.89 (0.69–1.10)	<0.001
QoL	–0.57 (–0.83––0.30)	<0.001
Success * n (%)	37 (53.6%)	
	6 months follow-up	
IIEF-5	5.79 (4.46–7.12)	<0.001
EHS	0.86 (0.64–1.09)	<0.001
QoL	–0.56(–0.83––0.29)	<0.001
Success * n (%)	38 (55.1%)	
	12 months follow-up	
IIEF-5	5.10 (3.65–6.55)	<0.001
EHS	0.80 (0.58–1.03)	<0.001
QoL	–0.59 (–0.86––0.32)	<0.001
Success * n (%)	32 (46.4%)	

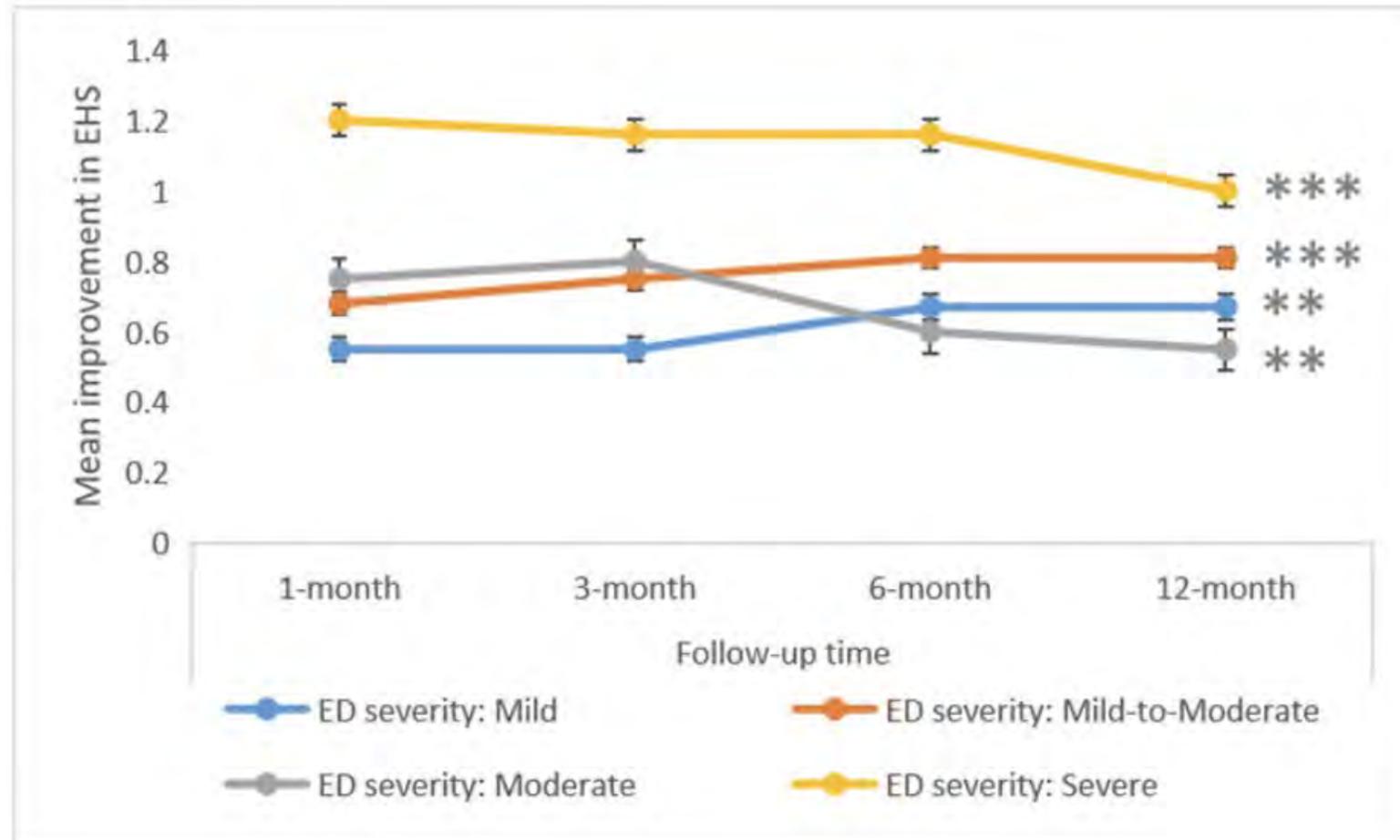
Mean improvement in IIEF-5 stratified by severity of ED

ED severity	Mild (n = 9)	Mild-to-Moderate (n = 16)	Moderate (n = 20)	Severe (n = 24)
1st Month				
IIEF-5	1.67*	4.94***	6.50***	9.17***
EHS	0.55*	0.68**	0.75***	1.20***
Success* n (%)	4 (44.4%)	11 (68.8%)	11 (55%)	13 (54.2%)
QoL	-0.38	-0.82*	-0.24	-0.46
3rd Month				
IIEF-5	0.89	5.31***	6.35***	8.54***
EHS	0.55*	0.75***	0.80***	1.16***
Success* n (%)	2 (22.2%)	12 (75%)	10 (50%)	13 (54.2%)
QoL	-0.5	-1.0**	-0.47	-0.46
6th Month				
IIEF-5	1.00	4.56***	5.80***	7.80***
EHS	0.67**	0.81***	0.60**	1.16***
Success* n (%)	4 (44.4%)	10 (62.5%)	10 (50%)	14 (58.3%)
QoL	-0.625	-0.91**	-0.42*	-0.46
12th month				
IIEF-5	0.33	4.19**	4.80***	7.00***
EHS	0.67**	0.81***	0.55**	1.0***
Success* n (%)	4 (44.4%)	8 (50%)	8 (40%)	12 (50%)
QoL	-0.67	-1.0	-0.29	-0.59*



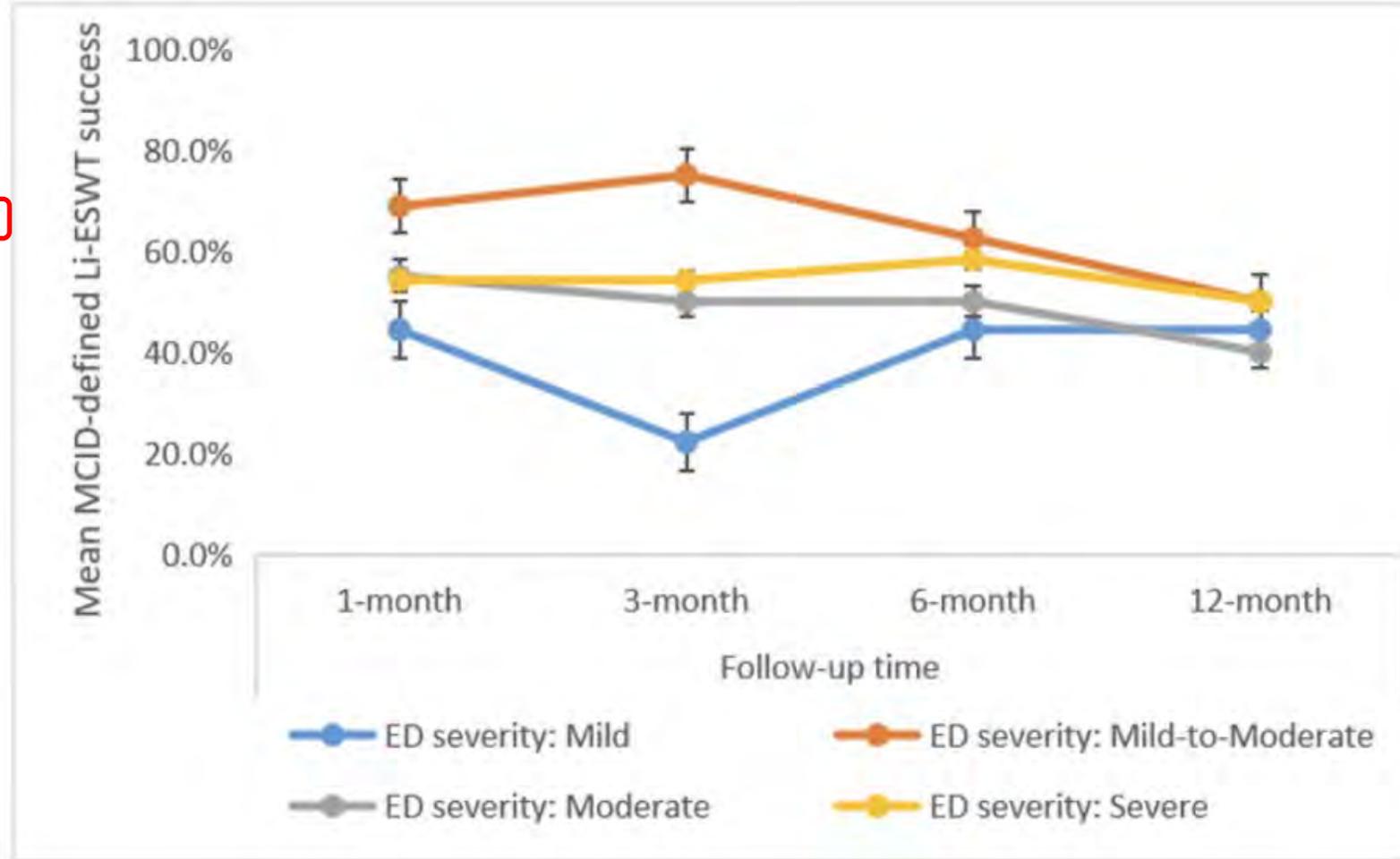
Mean improvement in EHS stratified by severity of ED

ED severity	Mild (n = 9)	Mild-to-Moderate (n = 16)	Moderate (n = 20)	Severe (n = 24)
1st Month				
IIEF-5	1.67*	4.94***	6.50***	9.17***
EHS	0.55*	0.68**	0.75***	1.20***
Success* n (%)	4 (44.4%)	11 (68.8%)	11 (55%)	13 (54.2%)
QoL	-0.38	-0.82*	-0.24	-0.46
3rd Month				
IIEF-5	0.89	5.31***	6.35***	8.54***
EHS	0.55*	0.75***	0.80***	1.16***
Success* n (%)	2 (22.2%)	12 (75%)	10 (50%)	13 (54.2%)
QoL	-0.5	-1.0**	-0.47	-0.46
5th Month				
IIEF-5	1.00	4.56***	5.80***	7.80***
EHS	0.67**	0.81***	0.60**	1.16***
Success* n (%)	4 (44.4%)	10 (62.5%)	10 (50%)	14 (58.3%)
QoL	-0.625	-0.91**	-0.42*	-0.46
12th month				
IIEF-5	0.33	4.19**	4.80***	7.00***
EHS	0.67**	0.81***	0.55**	1.0***
Success* n (%)	4 (44.4%)	8 (50%)	8 (40%)	12 (50%)
QoL	-0.67	-1.0	-0.29	-0.59*



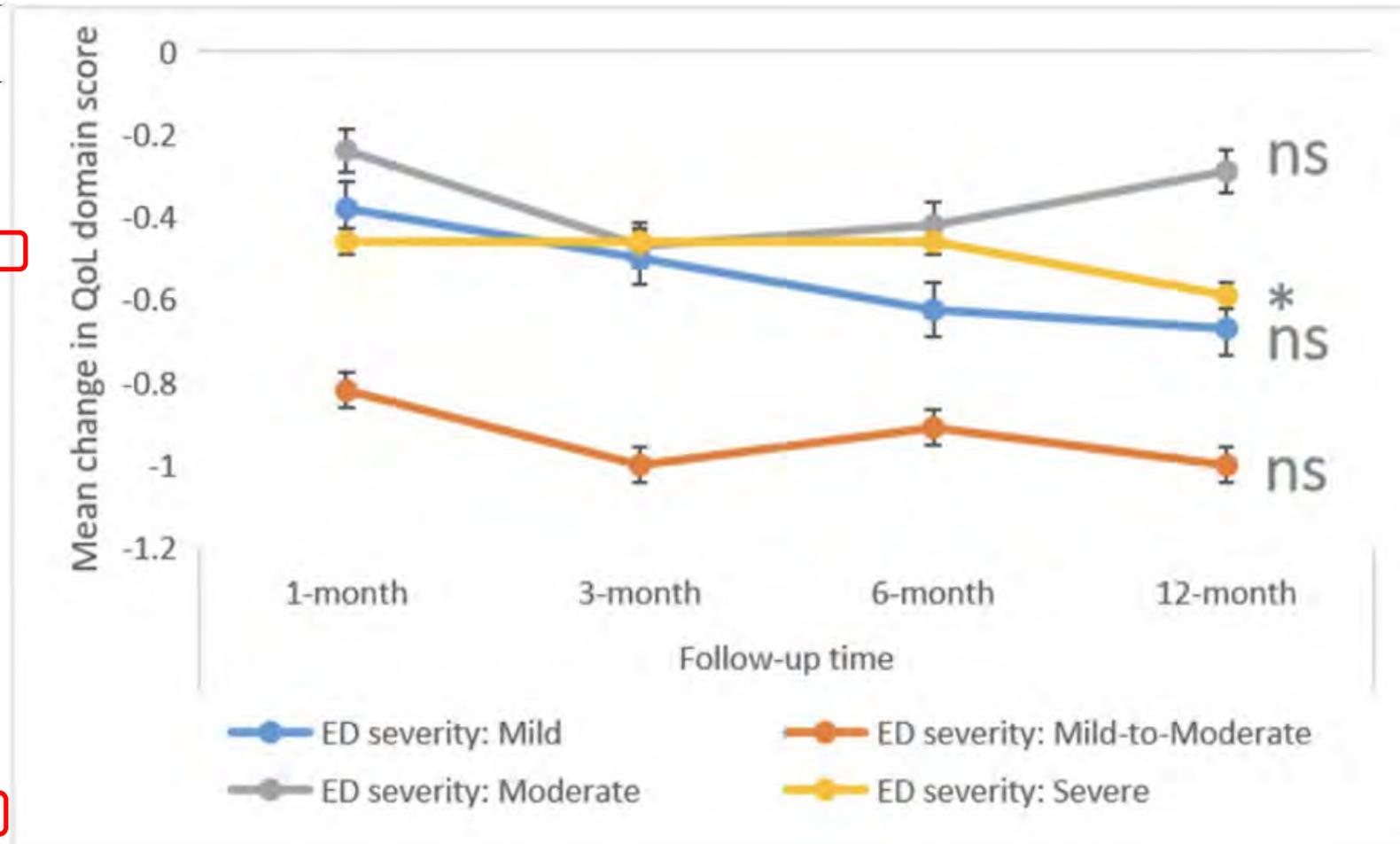
Mean MICD-defined Li-ESWT Success stratified by severity of ED

ED severity	Mild (n = 9)	Mild-to-Moderate (n = 16)	Moderate (n = 20)	Severe (n = 24)
1st Month				
IIEF-5	1.67*	4.94***	6.50***	9.17***
EHS	0.55*	0.68**	0.75***	1.20***
Success* n (%)	4 (44.4%)	11 (68.8%)	11 (55%)	13 (54.2%)
QoL	-0.38	-0.82*	-0.24	-0.46
3rd Month				
IIEF-5	0.89	5.31***	6.35***	8.54***
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Success* n (%)	2 (22.2%)	12 (75%)	10 (50%)	13 (54.2%)
QoL	-0.5	-1.0**	-0.47	-0.46
5th Month				
IIEF-5	1.00	4.56***	5.80***	7.80***
EHS	0.67**	0.81***	0.60**	1.16***
Success* n (%)	4 (44.4%)	10 (62.5%)	10 (50%)	14 (58.3%)
QoL	-0.625	-0.91**	-0.42*	-0.46
12th month				
IIEF-5	0.33	4.19**	4.80***	7.00***
EHS	0.67**	0.81***	0.55**	1.0***
Success* n (%)	4 (44.4%)	8 (50%)	8 (40%)	12 (50%)
QoL	-0.67	-1.0	-0.29	-0.59*



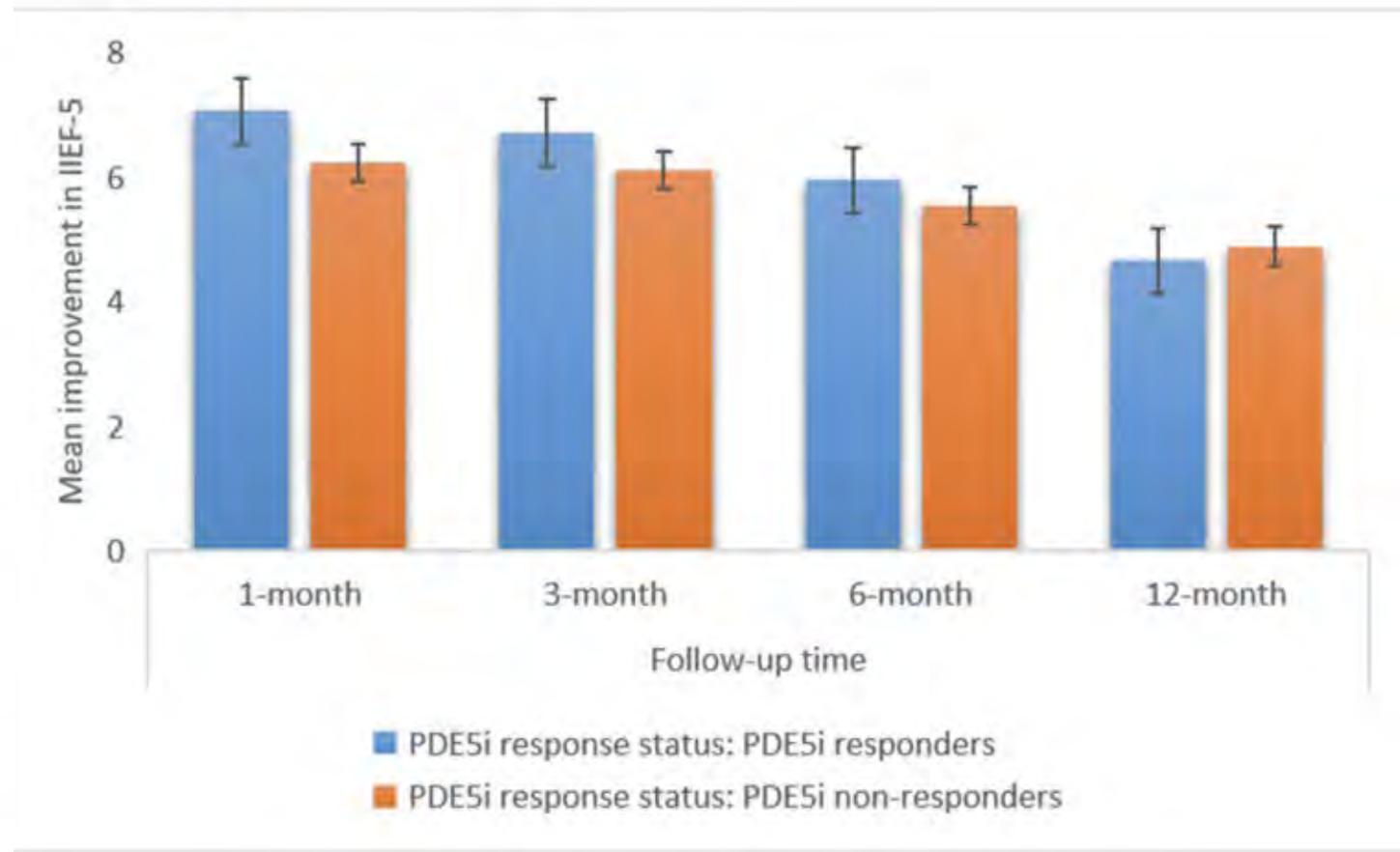
Mean improvement in QoL domain score stratified by severity of ED

ED severity	Mild (n = 9)	Mild-to-Moderate (n = 16)	Moderate (n = 20)	Severe (n = 24)
1st Month				
IIEF-5	1.67*	4.94***	6.50***	9.17***
EHS	0.55*	0.68**	0.75***	1.20***
Success* n (%)	4 (44.4%)	11 (68.8%)	11 (55%)	13 (54.2%)
QoL	-0.38	-0.82*	-0.24	-0.46
3rd Month				
IIEF-5	0.89	5.31***	6.35***	8.54***
EHS	0.55*	0.75***	0.80***	1.16***
Success* n (%)	2 (22.2%)	12 (75%)	10 (50%)	13 (54.2%)
QoL	-0.5	-1.0**	-0.47	-0.46
5th Month				
IIEF-5	1.00	4.56***	5.80***	7.80***
EHS	0.67**	0.81***	0.60**	1.16***
Success* n (%)	4 (44.4%)	10 (62.5%)	10 (50%)	14 (58.3%)
QoL	-0.625	-0.91**	-0.42*	-0.46
12th month				
IIEF-5	0.33	4.19**	4.80***	7.00***
EHS	0.67**	0.81***	0.55**	1.0***
Success* n (%)	4 (44.4%)	8 (50%)	8 (40%)	12 (50%)
QoL	-0.67	-1.0	-0.29	-0.59*



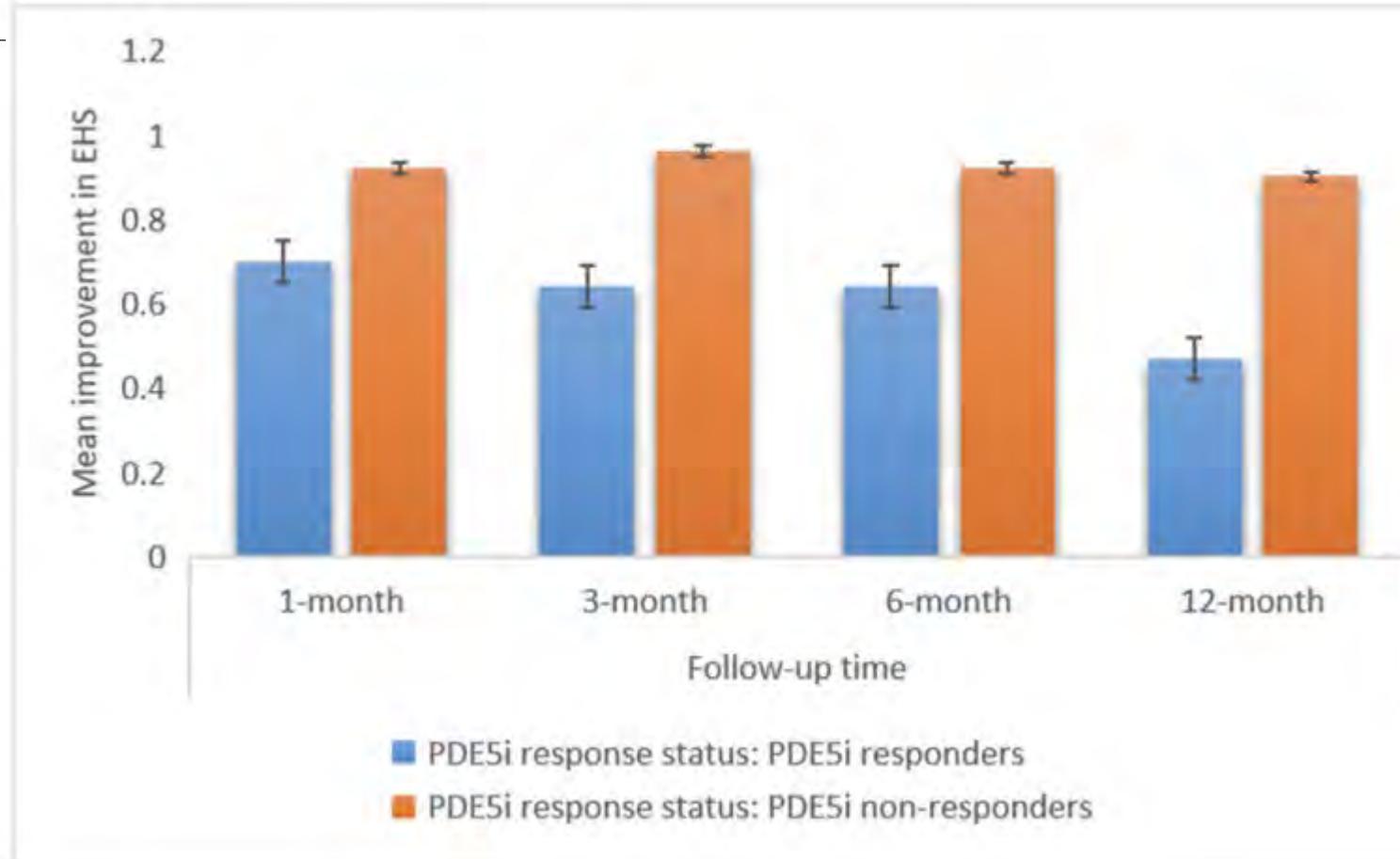
Mean improvement in IIEF-5 stratified by PDE5i response

	PDE5i responders (n = 17)	PDE5i non-responders (n = 52)	<i>p</i> -value
1st Month			
IIEF-5	7.06	6.23	0.66
EHS	0.70	0.92	0.36
Success* n (%)	10 (58.8%)	29 (55.7%)	0.85
QoL	-0.41	-0.46	0.91
3rd Month			
IIEF-5	6.71	6.10	0.69
EHS	0.64	0.96	0.17
Success* n (%)	10 (58.8%)	27 (51.9%)	0.62
QoL	-0.66	-0.54	0.71
6th Month			
IIEF-5	5.94	5.54	0.79
EHS	0.64	0.92	0.23
Success* n (%)	8 (47.1%)	30 (57.7%)	0.44
QoL	-0.58	-0.55	0.92
12th month			
IIEF-5	4.65	4.88	0.89
EHS	0.47	0.90	0.08
Success* n (%)	8 (47.1%)	24 (46%)	0.94
QoL	-0.75	0.55	0.56



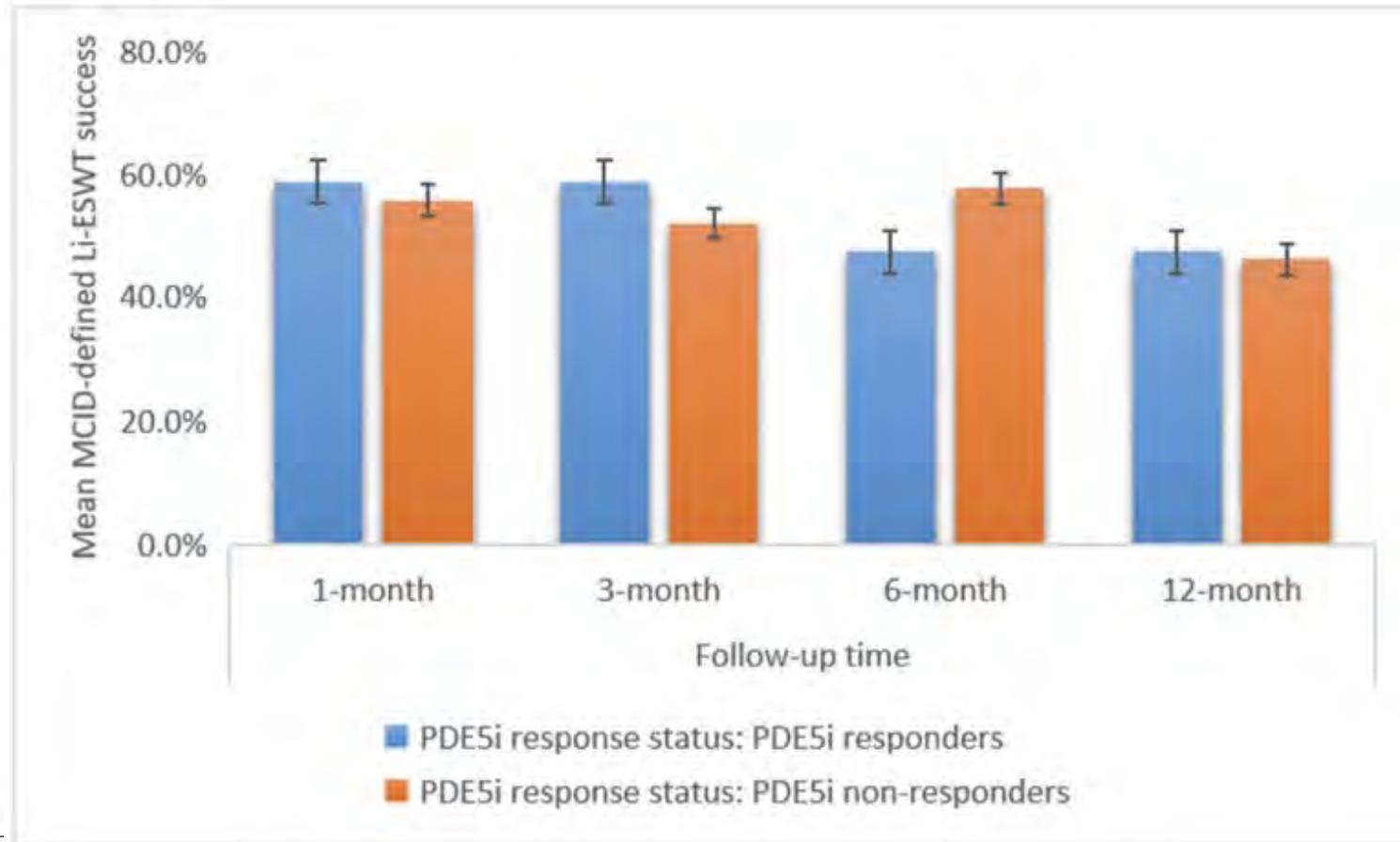
Mean improvement in EHS stratified by PDE5i response

	PDE5i responders (n = 17)	PDE5i non-responders (n = 52)	<i>p</i> -value
1st Month			
IIEF-5	7.06	6.23	0.66
EHS	0.70	0.92	0.36
Success* n (%)	10 (58.8%)	29 (55.7%)	0.85
QoL	-0.41	-0.46	0.91
3rd Month			
IIEF-5	6.71	6.10	0.69
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QoL	-0.66	-0.54	0.71
6th Month			
IIEF-5	5.94	5.54	0.79
EHS	0.64	0.92	0.23
Success* n (%)	8 (47.1%)	30 (57.7%)	0.44
QoL	-0.58	-0.55	0.92
12th month			
IIEF-5	4.65	4.88	0.89
EHS	0.47	0.90	0.08
Success* n (%)	8 (47.1%)	24 (46%)	0.94
QoL	-0.75	0.55	0.56



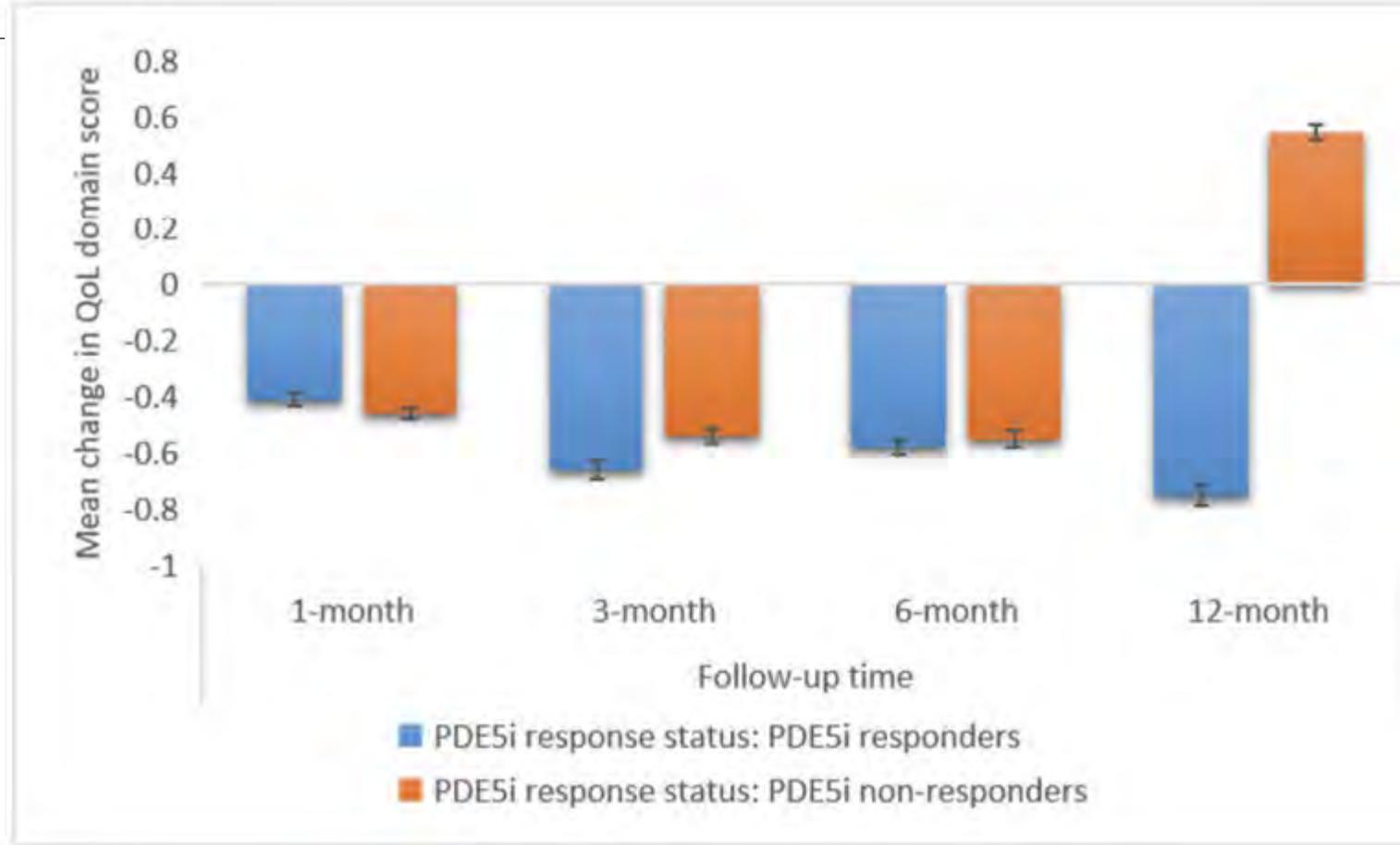
Mean improvement in MICD-defined success stratified by PDE5i response

	PDE5i responders (n = 17)	PDE5i non-responders (n = 52)	<i>p</i> -value
1st Month			
IIEF-5	7.06	6.23	0.66
EHS	0.70	0.92	0.36
Success* n (%)	10 (58.8%)	29 (55.7%)	0.85
QoL	-0.41	-0.46	0.91
3rd Month			
IIEF-5	6.71	6.10	0.69
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Success* n (%)	10 (58.8%)	27 (51.9%)	0.62
QoL	-0.66	-0.54	0.71
6th Month			
IIEF-5	5.94	5.54	0.79
EHS	0.64	0.92	0.23
Success* n (%)	8 (47.1%)	30 (57.7%)	0.44
QoL	-0.58	-0.55	0.92
12th month			
IIEF-5	4.65	4.88	0.89
EHS	0.47	0.90	0.08
Success* n (%)	8 (47.1%)	24 (46%)	0.94
QoL	-0.75	0.55	0.56



Mean improvement in QoL domains score stratified by PDE5i response

	PDE5i responders (n = 17)	PDE5i non-responders (n = 52)	<i>p</i> -value
1st Month			
IIEF-5	7.06	6.23	0.66
EHS	0.70	0.92	0.36
Success* n (%)	10 (58.8%)	29 (55.7%)	0.85
QoL	-0.41	-0.46	0.91
3rd Month			
IIEF-5	6.71	6.10	0.69
EHS	0.64	0.96	0.17
Success* n (%)	10 (58.8%)	27 (51.9%)	0.62
QoL	-0.66	-0.54	0.71
6th Month			
IIEF-5	5.94	5.54	0.79
EHS	0.64	0.92	0.23
Success* n (%)	8 (47.1%)	30 (57.7%)	0.44
QoL	-0.58	-0.55	0.92
12th month			
IIEF-5	4.65	4.88	0.89
EHS	0.47	0.90	0.08
Success* n (%)	8 (47.1%)	24 (46%)	0.94
QoL	-0.75	0.55	0.56



Independent risk factors of LiESWT negative response

	Univariate		Multivariate	
	Odds Ratio	<i>p</i> -Value	Odds Ratio	<i>p</i> -Value
Age (>45 years)	0.27	0.04 *	0.24	0.04 *
BMI (kg/m ²)	0.90	0.25		
Tobacco smoking	1.30	0.28		
Hypogonadism	0.63	0.40		
Hypertension	0.71	0.54		
Diabetes mellitus	0.43	0.09		
Diabetes mellitus (uncontrolled)	0.17	0.04 *	0.21	0.08
Hyperlipidemia	0.53	0.19		
Hyperlipidemia (uncontrolled)	0.25	0.01 **	0.27	0.03 *
Severe and moderate ED	0.56	0.27		
Duration of ED (>2 year)	0.54	0.38		
EHS < 3	0.62	0.37		
PDE5i non-responders	0.88	0.83		

BMI, body mass index; ED, erectile dysfunction; EHS, Erectile Hardness Score; PDE5i, phosphodiesterase 5 inhibitor: * $p < 0.05$. ** $p < 0.01$.

Results

- Taiwanese Patients with ED are mostly older than 45 years and present with advanced disease severity
- Li-ESWT Significantly Improves the Erectile Function of Taiwanese Patients
- Taiwanese Patients **with advanced ED severity** benefit more from the therapeutic effect of Li-ESWT, compared with the less severe cases
- Li-ESWT Is therapeutically efficacious in Taiwanese patients regardless of Their PDE5i response status, albeit slightly more so among PDE5i Responders
- Age > 45 Years and uncontrolled DM, hyperlipidemia are independent negative predictors of Li-ESWT response or success in Taiwanese patients with ED

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Hsiao-Hua Lin⁵, Ching-Chia Li^{1,2,3}, Wen-Jeng Wu^{1,2,3}, and Chia-Chu Liu^{2,3,6}**

- April 2015 and December 2016, Kaohsiung Medical University–affiliated hospitals, Kaohsiung Municipal Ta-Tung Hospital, and Pingtung Hospital
- open-label single-arm prospective study
- erection hardness score, EHS, ≤ 2 after taking a maximal dosage of PDE5
- sildenafil (100 mg), tadalafil (20 mg), and vardenafil (20 mg) with a trial of at least four times, or tadalafil (5 mg) with a trial of at least 28 days
- TRT for >3 months if <350ng/dL

- Exclusion :
coagulopathy
penile anatomical abnormalities
neurological abnormalities
unstable psychiatric disorders
uncorrected hormone abnormalities
clinically significant medical diseases
history of extensive pelvic surgery or irradiation.

Li-ESWT Protocol

- DUOLITH® SD1 mobile shockwave therapy (Storz, Tägerwilen, Switzerland)
- 20-min treatment session performed once per week for 12 consecutive weeks
- 3000 shockwave impulses at an energy flux density of **0.15** mJoule/mm² and a frequency of 4 Hertz were given.
- Remaining high on-demand or once-daily PDE5i dosing schedules.

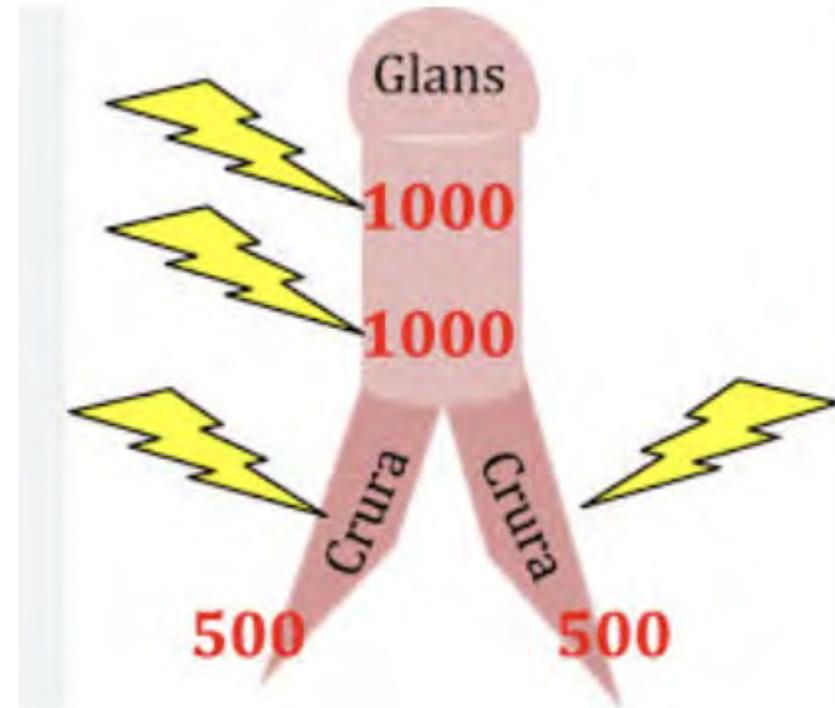


Table 1. Baseline Characteristics of the Study Population ($n = 52$).

Parameter	No (%)	Mean \pm SD	Median	IQR
Age (years)		60.1 \pm 11.5	63.0	52.5–68.0
Body mass index (kg/m ²)		25.3 \pm 2.3	25.1	23.5–26.2
Erectile dysfunction history (month)		38.3 \pm 26.9	33.0	18.0–60.0
Diabetes mellitus	14 (26.3)			
Hypertension	27 (51.9)			
Dyslipidemia	31 (59.6)			
Cardiovascular disease	7 (13.5)			
Stroke	0 (0)			
Current smoking	11 (21.2)			
Current alcohol drinking	9 (17.3)			
Laboratory data				
Testosterone (ng/dL)		501.4 \pm 183.6	476.5	378.4–611.2
Triglycerides (mg/dL)		112.1 \pm 57.4	90.5	73.8–154.8
Total cholesterol (mg/dL)		191.1 \pm 33.9	191.5	161.8–211.5
High-density lipoprotein (mg/dL)		46.9 \pm 13.6	45.3	35.4–55.3
Fasting sugar (mg/dL)		114.2 \pm 36.6	102.5	94.8–116.5

Note. IQR = interquartile range; SD = standard deviation.



Table 2. Medical Treatments With Insufficient Response (Erection Hardness Score ≤ 2) Before Shockwave Therapy.

Phosphodiesterase type 5 inhibitors	N (%)	Adjuvant TRT (N)
Sildenafil (100 mg)	19 (36.6)	2
Tadalafil (5 mg) daily use	8 (15.4)	0
Sildenafil (100 mg) and vardenafil (20 mg)	1 (1.9)	1
Sildenafil (100 mg) and tadalafil (20 mg)	4 (7.7)	1
Sildenafil (100 mg) and tadalafil (5 mg) daily use	12 (23.1)	3
Tadalafil (20 mg) and tadalafil (5 mg) daily use	4 (7.7)	1
Sildenafil (100 mg), vardenafil (20 mg), and tadalafil (5 mg) daily use	1 (1.9)	0
Sildenafil (100 mg), tadalafil (20 mg), and tadalafil (5 mg) daily use	3 (5.8)	1
Total	52 (100.0)	9

Note. TRT = testosterone replacement therapy.

Table 3. Change of Erectile Function After Shockwave Therapy at the 1-Month and 3-Month Follow-up.

	Baseline	1 month after treatment	Difference	3 months after treatment	Difference
Erectile hardness score	1.7 ± 0.4	2.8 ± 0.8	1.1 ± 0.7 ^a	2.7±0.8	1.0 ± 0.7 ^a
1	14 (26.9)	3 (5.8)		3 (5.8)	
2	38 (73.1)	14 (26.9)		16 (30.8)	
3	0 (0)	28 (53.8)		27 (51.9)	
4	0 (0)	7 (13.5)		6 (11.5)	
IIEF-5 score	9.6 ± 2.9	15.0 ± 5.0	5.4 ± 3.7 ^a	15.4 ± 4.9	5.8 ± 3.4 ^a

Note. IIEF-5 = 5-item version of the International Index of Erectile Function.

^a*p* < .001.

Table 4. Comparison of Clinical Characteristics and Laboratory Data Between Subjects With and Without Response to Shockwave Therapy.

Parameter	Subjects without response (N = 17)	Subjects with response (N = 35)	p value
Age (years)	61.4 ± 10.5	59.4 ± 12.1	.57
Body mass index (kg/m ²)	25.8 ± 2.9	25.1 ± 2.0	.29
Duration of erectile dysfunction (month)	39.6 ± 24.1	37.6 ± 27.1	.80
Severity of erectile dysfunction, n (%)			
Initial EHS1	9 (64.3)	5 (35.7)	.005
Initial EHS2	8 (21.1)	30 (78.9)	
IIEF-5	8.1 ± 2.8	10.4 ± 2.7	.01
Diabetes mellitus, n (%)	7 (50.0)	7 (50.0)	.11
Diabetes mellitus with insulin control, n (%)	3 (60.0)	2 (40.0)	.37
Hypertension, n (%)	8 (29.6)	19 (70.4)	.63
Dyslipidemia, n (%)	11 (35.5)	20 (64.5)	.60
Cardiovascular disease, n (%)	2 (28.6)	5 (71.4)	.80
Stroke, n (%)	0 (0)	0 (0)	
Hypogonadism, n (%)	4 (44.4)	5 (55.6)	.41
Current smoking, n (%)	3 (27.3)	8 (72.7)	.19
Current alcohol drinking, n (%)	1 (11.1)	8 (88.9)	.13
Number of comorbidities	2.0 ± 1.3	1.7 ± 1.2	.29
Laboratory data			
Total testosterone (ng/dL)	492.9 ± 198.3	505.6 ± 178.9	.82
Triglycerides (mg/dL)	104.9 ± 56.4	115.9 ± 58.5	.52
Total cholesterol (mg/dL)	189.0 ± 35.4	192.2 ± 33.6	.76
High-density lipoprotein (mg/dL)	47.4 ± 17.4	46.6 ± 11.5	.86
Fasting blood sugar (mg/dL)	132.4 ± 54.7	104.8 ± 16.9	.058

Note. EHS = erection hardness score; IIEF-5 = 5-item version of the International Index of Erectile Function.

1 month after LI-ESWT

no one reported any adverse effect associated with LI-ESWT

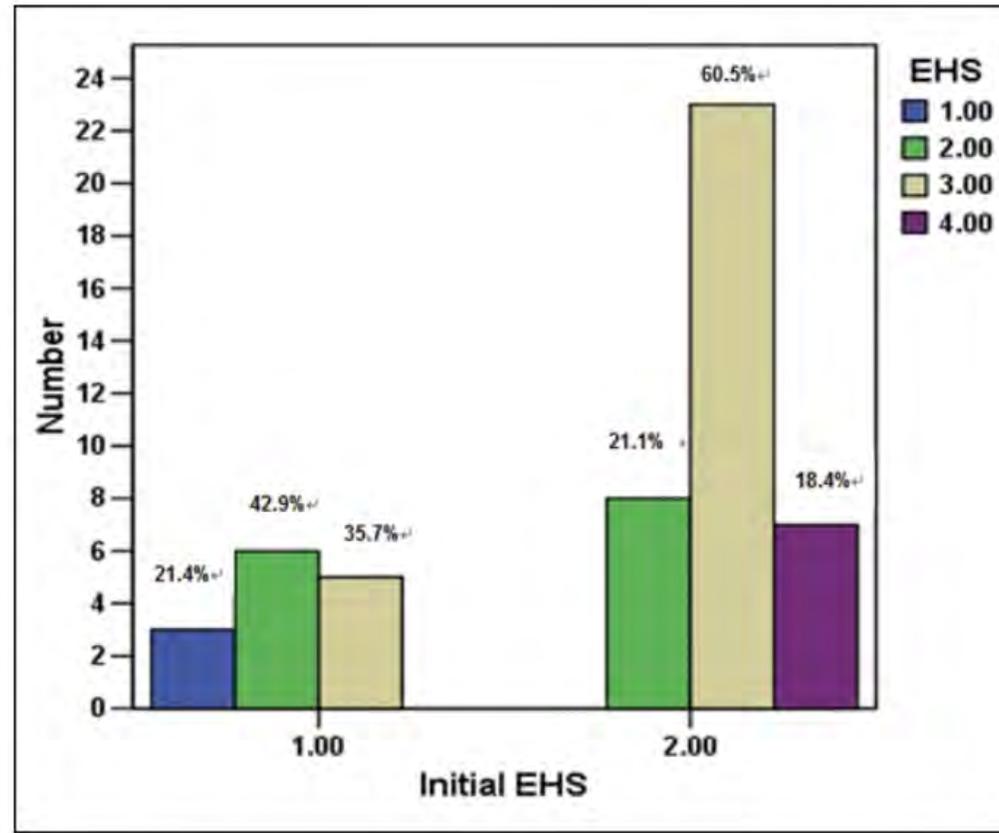


Figure 1. Improvement of erectile function after shockwave therapy in patients with different initial erection hardness scores (EHSs).

LI-ESWT can serve as a salvage therapy in ED patients who failed to response to PDE5i

- 2/3 failed to respond to PDE5is (EHS ≤ 2) +PDE5I s/p LiESWT achieve an erection sufficient (EHS ≥ 3)
- 94.3% subjects who responded to LI-ESWT+PDE5I could still maintain \geq EHS3 at the 3 month.
- Initial severity of ED (EHS and IIEF-5)was the only significant predictor of successful response to LI-ESWT.

EAU guidelines

<p>Use low intensity shockwave treatment (LI-SWT) with/without PDE5Is in patients with <u>mild vasculogenic ED or as an alternative first-line therapy</u> in well-informed patients who do not wish or are not suitable for oral vasoactive therapy or desire a curable option.</p>	Weak
<p>Use LI-SWT with/without PDE5Is in vasculogenic ED patients who are <u>poor responders to PDE5Is</u>.</p>	Weak

ESSM

Patient-reported outcomes (IIEF, EHS). Current evidence is promising but is still controversial; therefore, a clear clinical recommendation of LISWT for ED cannot be made, and more high-quality studies are needed.

Penile hemodynamics. LISWT significantly improves penile hemodynamic parameters of patients with vasculogenic ED. However, the clinical long-term significance of this improvement is uncertain (level 2; grade C).

Effect endurance. Current data suggest a variable effect of LISWT on EF up to 12 months after treatment (level 2; grade C). More data are needed to assess the longer-term effects of LISWT.

How to select patients with ED? PDE5I responder v.s. non-responder

Taiwanese cohort

- Regardless of Their PDE5i Response Status, Albeit Slightly More So among PDE5i Responders (1)

Literatures

- PDE5i responder or non-responder
- PDE5i responders might have more advantages

How about the severity of ED?

Taiwanese cohort

- Moderate to severe ED Benefit More. (1)
- EHS2>EHS1 (2)

Literatures

- Most data from RCTs support a benefit of Li-ESWT in the treatment of mild ED.

- (EAU guidelines) Use low intensity shockwave treatment (LI-SWT) with/without PDE5Is in patients with **mild vasculogenic ED** or as an alternative first-line therapy

Negative predictors of unsuccessful Tx

Taiwanese cohort

- Age > 45y/o (1)
- uncontrolled hyperlipidemia (1)
- uncontrolled DM (1)
- Lower EHS (2)
- Lower IIEF-5 (2)

Literatures

- age \geq 65 years
- HTN
- DM
- hyperlipidemia
- CVDs

In conclusions

- Compared to more invasive or device dependent management, e.g injection, intraurethral agents, vacuum device, LiESWT can be considered in treating patients with ED.

Thank you for your listening!

LOW-INTENSITY EXTRACORPOREAL
SHOCK WAVE THERAPY
FOR
CHRONIC PROSTATITIS
/ CHRONIC PELVIC PAIN SYNDROME

(安昱診所經驗)

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@ 高雄洲際飯店3樓, 2023 /04/22 低能量體外震波創新運用研討會

TUA GUIDELINE FOR DEFINITION

慢性骨盆腔疼痛 (Chronic pelvic pain, CPP)

一種慢性或持續性的骨盆腔區域的疼痛

至少六個月持續或反覆的發生

中樞敏感疼痛(Central sensitization pain)

通常伴隨著下泌尿道、認知、行為、性、腸道、骨盆底、或情緒上負面的影響

PROSATATITIS 分類 (NIH)

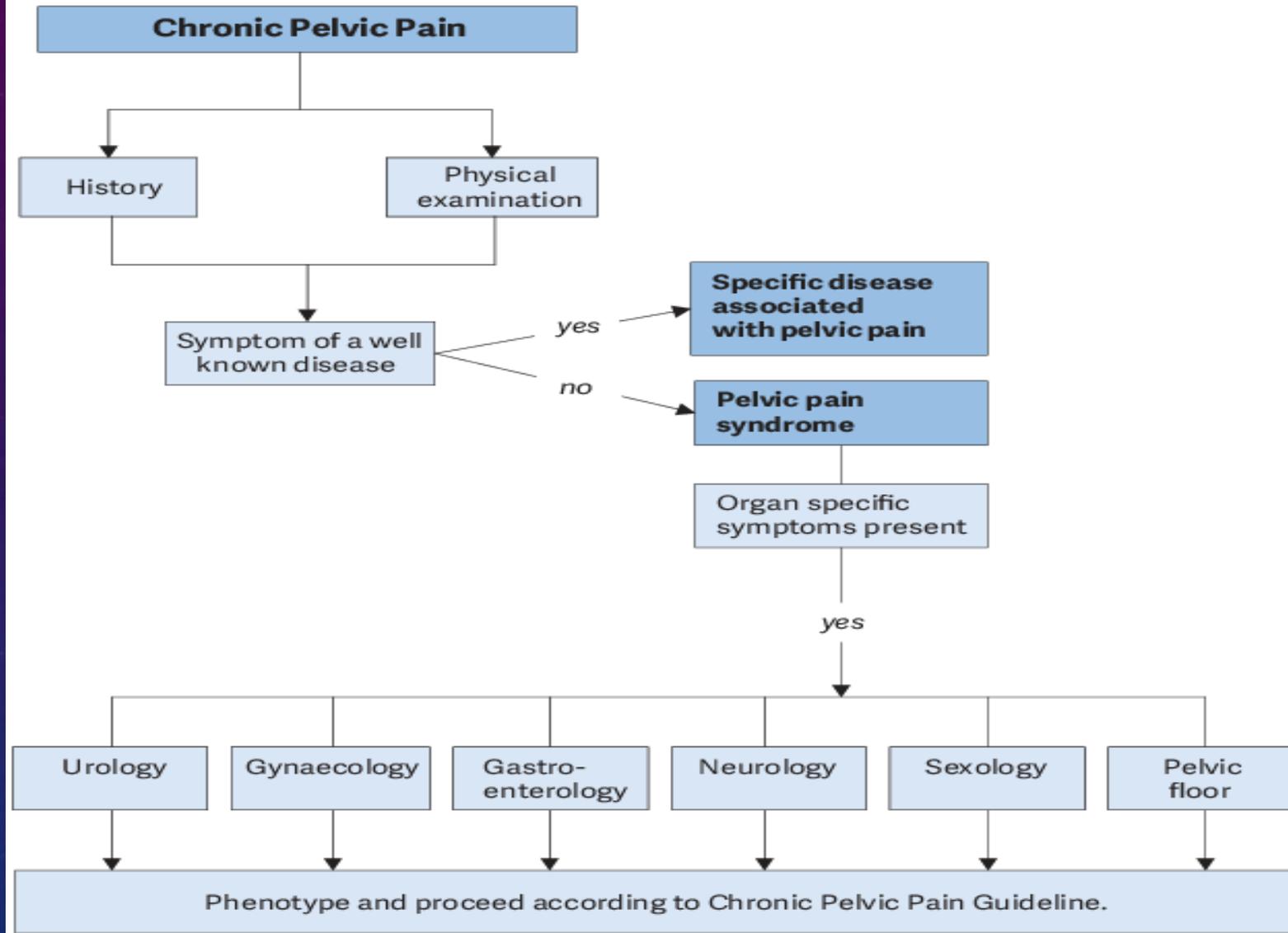
類型	名詞定義
I	急性細菌性攝護腺炎 (acute bacterial prostatitis)
II	慢性細菌性攝護腺炎 (chronic bacterial prostatitis)
IIIA	發炎性慢性骨盆腔疼痛症候群 (Inflammatory CPPS) (white cells in semen/EPS/VB3)
IIIB	非發炎性慢性骨盆腔疼痛症候群 (Non-inflammatory CPPS) (no white cells in semen/EPS/VB3)
IV	無症狀發炎性攝護腺炎 (Asymptomatic inflammatory prostatitis)

DISEASE-SPECIFIC CHRONIC PELVIC PAIN

CHRONIC PRIMARY PELVIC PAIN SYNDROME

Diagnosing chronic pelvic pain (2022 EUA GUIDELINE)

Figure 1: Diagnosing chronic pelvic pain



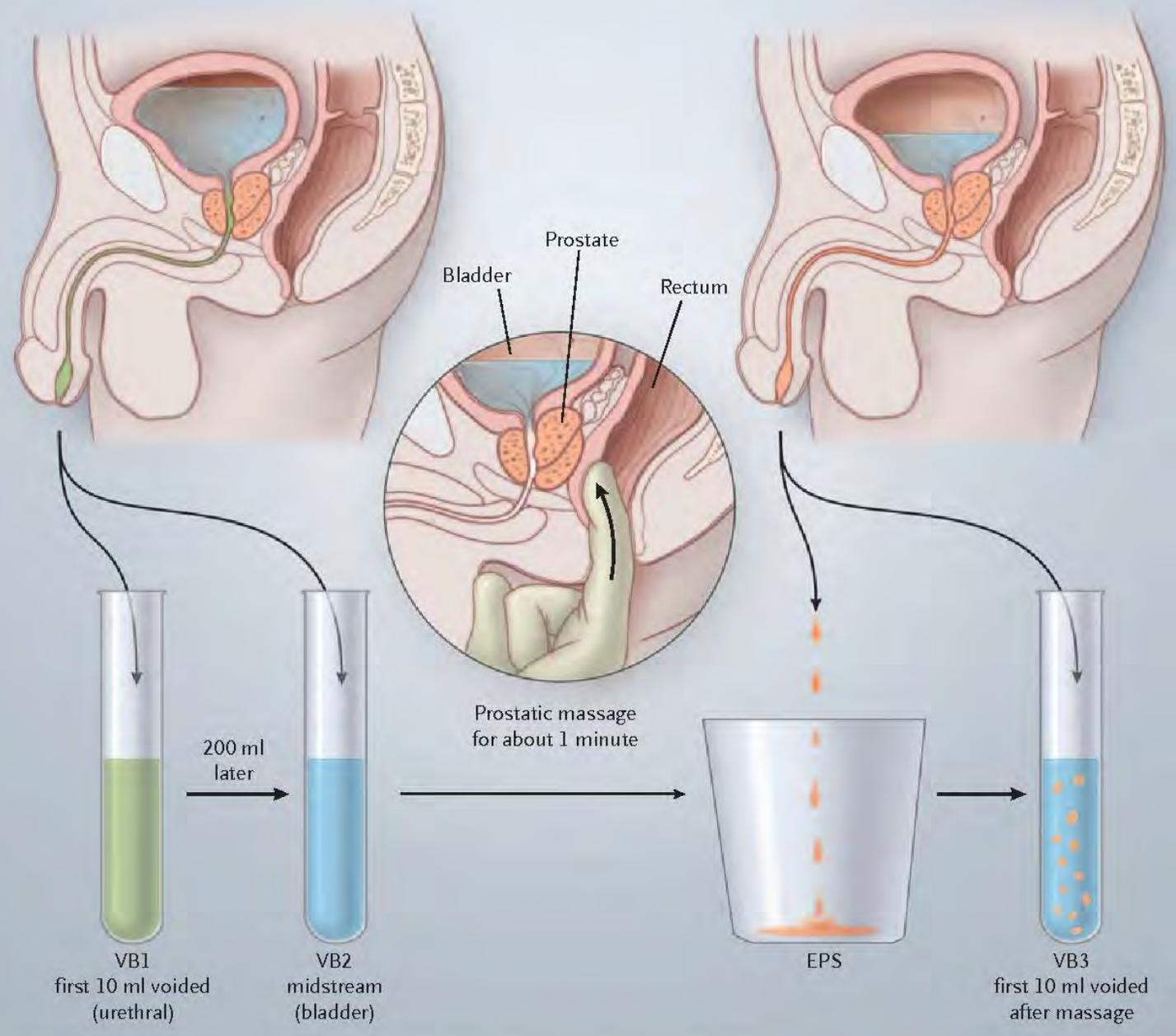


Figure 1. The Meares–Stamey 4-Glass Urine Test.

Phenotyping of pelvic pain - UPOINT classification (2022 EUA GUIDELINE)

Phenotyping	Assessment
Urology	Urinary flow, micturition diary, cystoscopy, ultrasound, uroflowmetry.
Psychology	Anxiety about pain, depression and loss of function, history of negative sexual experiences.
Organ specific	Ask for gynaecological, gastro-intestinal, ano-rectal, sexological complaints. Gynaecological examination, rectal examination.
Infection	Semen culture and urine culture, vaginal swab, stool culture.
Neurological	Ask for neurological complaints (sensory loss, dysaesthesia). Neurological testing during physical examination: sensory problems, sacral reflexes and muscular function.
Tender muscle	Palpation of the pelvic floor muscles, the abdominal muscles and the gluteal muscles.
Sexological	Erectile function, ejaculatory function, post-orgasmic pain.

Management of primary prostate pain syndrome (2022 EUA GUIDELINE)

Phenotypically directed treatment may improve treatment success.	3
α-blockers have moderate treatment effect regarding total pain, voiding, and QoL scores in PPPS.	1a
Antimicrobial therapy has a moderate effect on total pain, voiding, and QoL scores in PPPS.	1a
Non-steroidal anti-inflammatory drugs have moderate overall treatment effects on PPPS.	1a
Phytotherapy has some beneficial effect on pain and overall favourable treatment response in PPPS.	1a
Pentosane polysulphate improves global assessment and QoL score in PPPS.	1b
There are insufficient data on the effectiveness of muscle relaxants in PPPS.	2b
Pregabalin is not effective for the treatment of PPPS.	1b
Botulinum toxin type A injection into the pelvic floor (or prostate) may have a modest effect in PPPS.	2b
Acupuncture is superior to sham acupuncture in improving symptoms and QoL.	1a
Posterior tibial nerve stimulation is probably effective for the treatment of PPPS.	1b
Extracorporeal shock wave therapy is probably effective over the short term.	1b
There are insufficient data supporting the use of other surgical treatments, such as transurethral incision of the bladder neck, transurethral resection of the prostate, or radical prostatectomy in patients with PPPS.	3
Cognitive behavioural therapy designed for PPPS may improve pain and QoL.	3

(2022 EUA GUIDELINE)

Recommendations	Strength rating
Offer multimodal and phenotypically directed treatment options for Primary Prostate Pain Syndrome (PPPS).	Weak
Use antimicrobial therapy (quinolones or tetracyclines) over a minimum of six weeks in treatment-naïve patients with a duration of PPPS less than one year.	Strong
Use α-blockers for patients with a duration of PPPS less than one year.	Strong
Offer high-dose oral pentosane polysulphate in PPPS.	Weak
Offer acupuncture in PPPS.	Strong
Offer non-steroidal anti-inflammatory drugs (NSAIDs) in PPPS, but long-term side-effects have to be considered.	Weak

2022 TUA GUIDELINE 建議

強度
評比

症狀小於一年可使用 **Alpha-blockers**

強

症狀小於一年可使用一個療程（**至少六周**）的抗生素
（**quinolones or Tetracyclines**）

強

針灸（Acupuncture）

強

Non-steroid Anti-inflammatory drugs（NSAIDs），但需
注意藥物之副作用

弱

高劑量的 **Pentosan polysulfate** 可以用於 **PPS**

弱

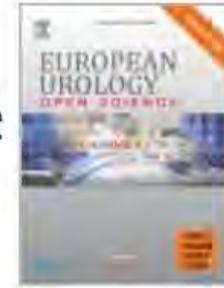
提供多專科與多面向的方式治療病人

弱



European Urology Open Science

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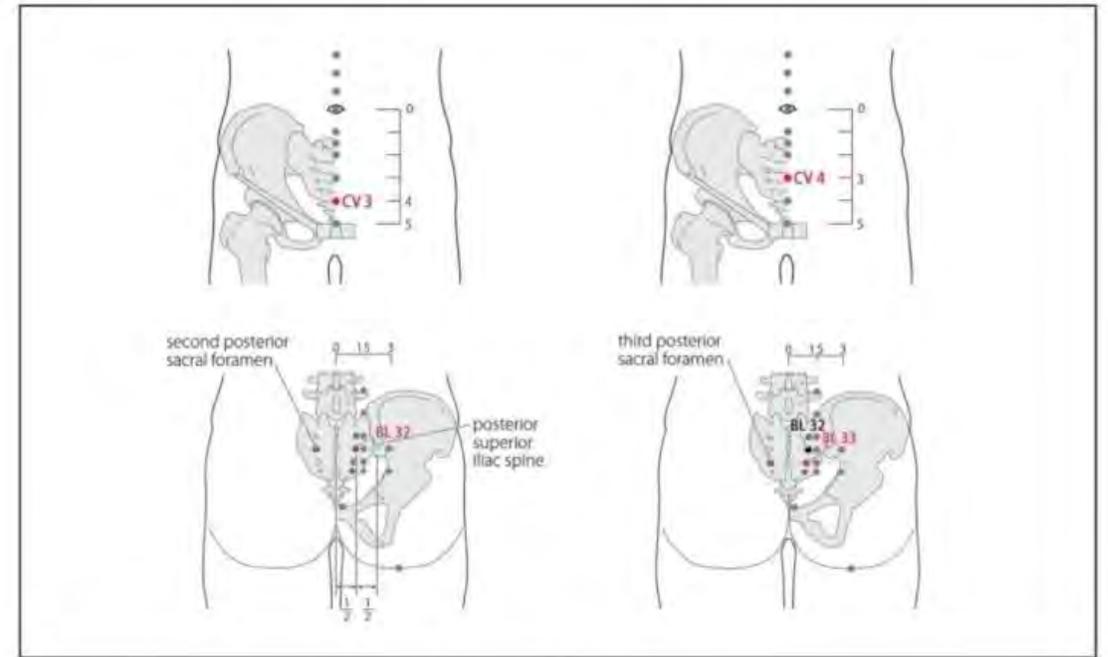
Pelvic Pain

Acupuncture for Chronic Prostatitis/Chronic Pelvic Pain Syndrome: A GRADE-assessed Systematic Review and Meta-analysis

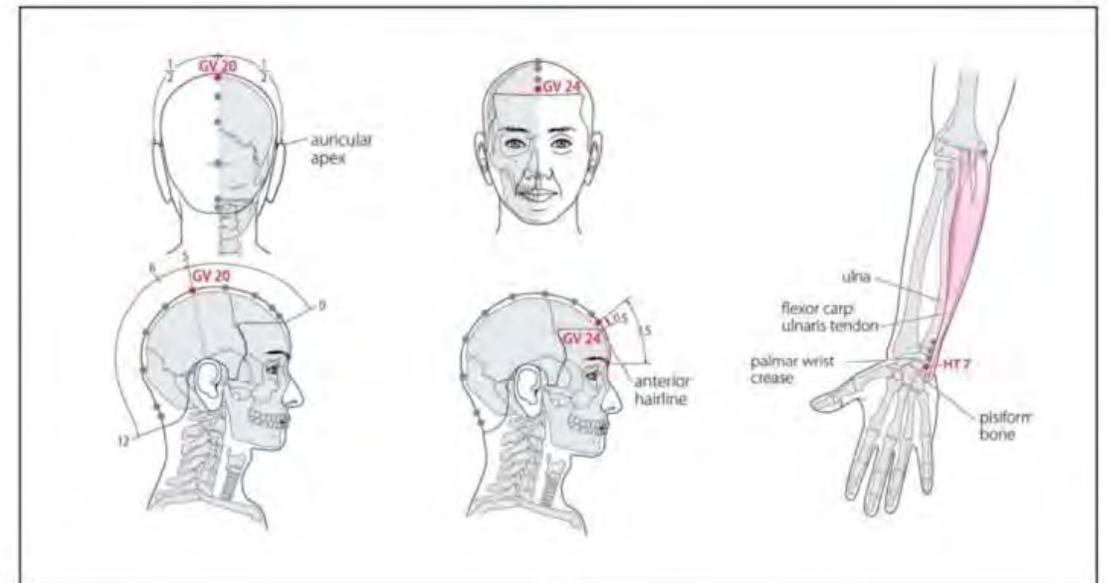
Zongshi Qin^{a b †}, Jianbo Guo^{b †}, Haiyong Chen^b  ,
Jiani Wu^a  

Domain	Diagnostic criteria	Potential acupuncture therapies
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Urinary	Associated lower urinary tract symptoms	BL32 (Ciliao), BL33 (Zhongliao), BL35 (Huiyang)
Psychological	Clinical depression with a catastrophic attitude about CP/CPPS symptoms	EX-HN3 (Yingtang), DU20 (Baihui), GV24 (Shenting)
Organ specific	Pain associated with the voiding cycle or prostate-specific tenderness	BL32 (Ciliao), BL33 (Zhongliao), BL35 (Huiyang)
Infection	Positive culture of either urine or expressed prostatic secretions	ST36 (Zusanli)
Neurological/systemic	Pain outside the pelvis or other pain disorders	GV3 (Zhongji), GV4 (Guanyuan), BL23 (Shenshu)
Tenderness	Pain or tenderness in the lower abdominal or pelvic musculature as palpated on physical exam	Electroacupuncture, warm needle, moxibustion

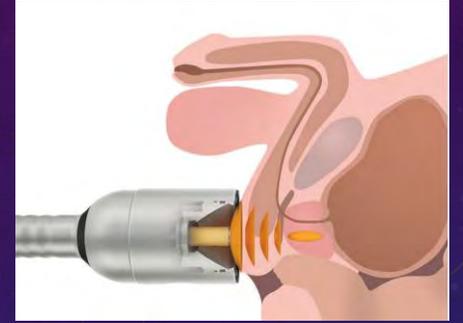


(a)



(b)

安昱診所觀點及經驗



- 我們的檢查: URINE STRIP EXAM, MICROSCOPIC URINALYSIS, ECHOGRAM, STD EXAM
- REPEAT RECURRENT UTI AND REFRACTORY TO LONG-TERM ORAL ANTIBIOTICS: 強烈懷疑 CPPS
- 女患者也會有 CPPS
- 第一線用藥 ALPHA-1 BLOCKER + MUSCLE RELAXATE + NSAID + DEANXIT
- 藥效不滿意或無法停藥者: ESWT
- INFLAMMATORY CPPS 使用 ESWT 也效果不錯

TAKE HOME MESSAGES

- CP/ CPPS 是長期擾人的疾病
- 先排除特殊疾病造成之骨盆腔疼痛
- 藥物治療應為第一線治療之選擇
- 體外震波是頑固CP/ CPPS 之治療利器



謝謝指教!!

