How does obesity contribute to SUI, and what are the treatment strategies?

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- 婦女泌尿醫學會專科醫師

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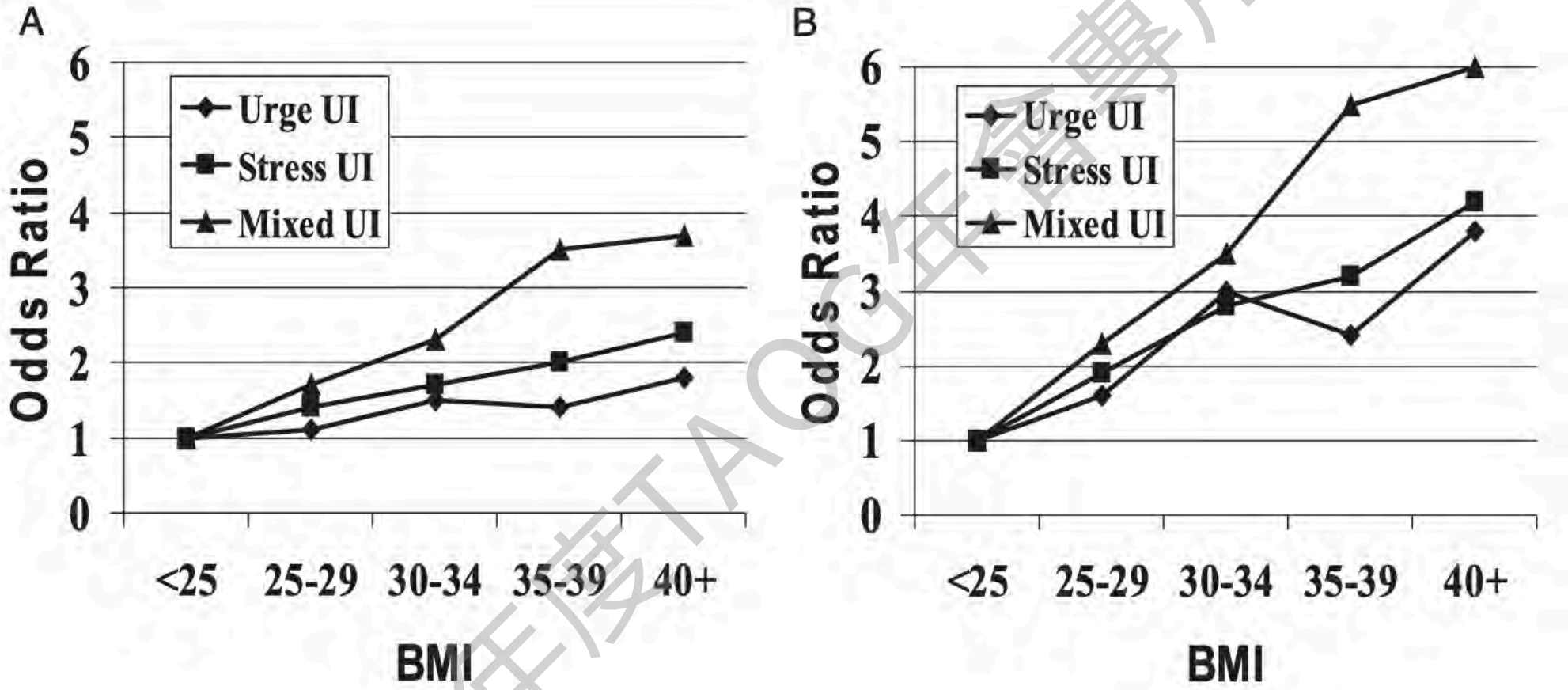
Severe UI



Obesity does impact the urinary incontinence

Subak LL, Richter HE, Hunskaar S (2009) Obesity and Urinary Incontinence: Epidemiology and Clinical Research Update. J Urol 182:S2–S7.

The association of diet and other lifestyle factors with overactive bladder and stress incontinence: a longitudinal study in women

H.M. DALLOSSO, C.W. McGROTHER, R.J. MATTHEWS, M.M.K. DONALDSON and the Leicestershire MRC Incontinence Study Group

Department of Epidemiology and Public Health, University of Leicester, Leicester, UK

Accepted for publication 7 March 2003

Obesity, vs acceptable weight				
Underweight.	0.69 (0.38–1.26)	0.002	0.82 (0.46–1.44)	0.05
Overweight BMI 25-29.9	1.25 (0.94–1.67)		1.24 (0.93–1.63)	
Obese	1.74 (1.22–2.48)		1.46 (1.02–2.09)	
Missing	1.54 (1.11–2.12)		1.46 (1.07–1.99)	

OAB

Dallosso, H. M., McGrother, C. W., Matthews, R. J., Donaldson, M. M. K. & Group, the L. M. I. S. The association of diet and other lifestyle factors with overactive bladder and stress incontinence: a longitudinal study in women. *BJU Int.* **92**, 69–77 (2003).

Epidemiology

表1、成人過重及肥胖盛行率(以身體質量指數為標準)(2017-2020)

性別	年齡(歲)	樣本數(人)	BMI≧35	30≦BMI＜35	27≦BMI＜30	24≦BMI＜27
			比率（%）	比率（%）	比率（%）	比率（%）
男性	19-30	258	3.64	9.00	10.63	26.41
	31-44	292	3.26	13.21	17.87	31.17
	45-64	651	1.12	9.17	19.08	30.79
	65 -	1052	0.52	6.26	15.35	33.97
	≧19	2253	2.12	9.78	16.45	30.52
女性	19-30	275	1.48	7.31	5.86	17.91
	31-44	322	1.48	6.72	9.43	18.30
	45-64	698	0.39	8.09	11.57	24.83
	65 -	962	1.21	8.58	17.59	32.78
	≧19	2257	1.03	7.67	10.95	23.15

資料來源：2017-2020年國民營養健康調查。

註.有效樣本數採實際完訪樣本數之最大可利用值，分析結果經加權調整。

製表日期：2022/06/15

58.87% 過重

11.90% 肥胖

□□□□ □過重

□□□ □肥胖

Why obesity impact urinary incontinence ?

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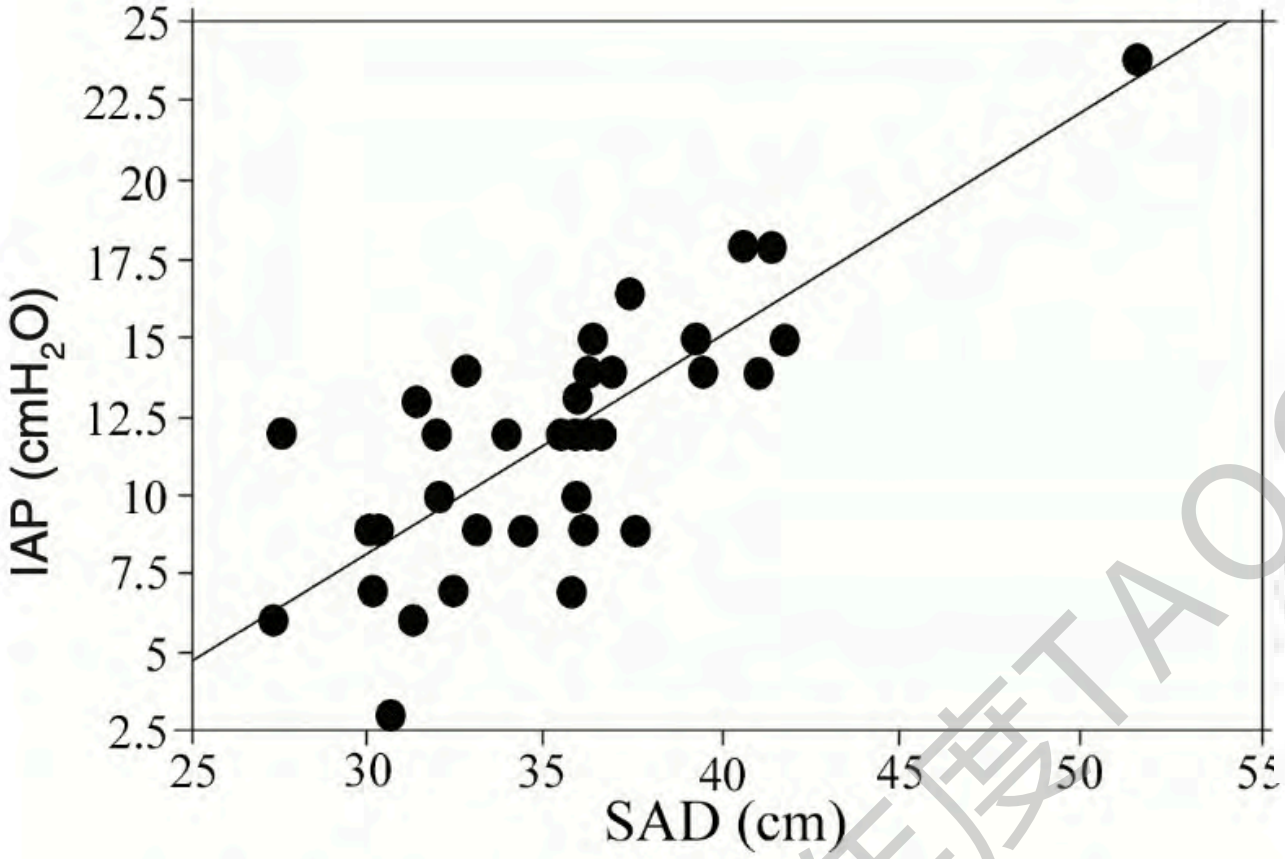

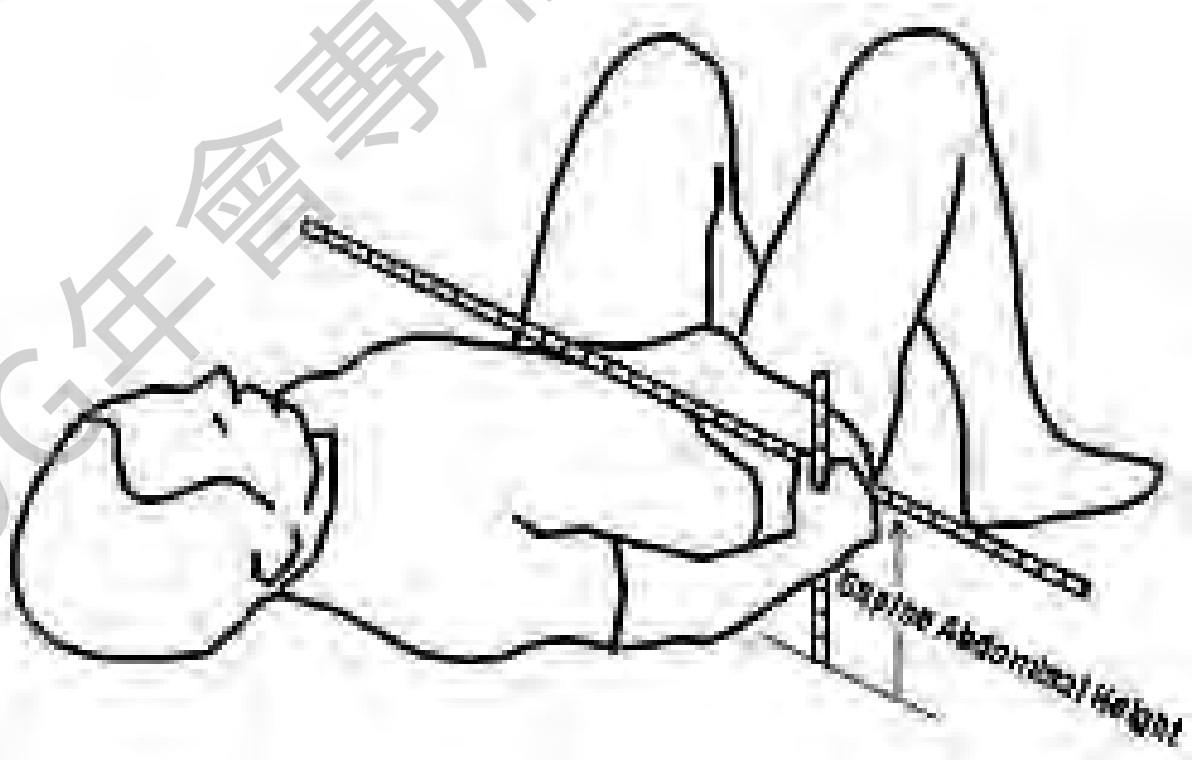

IAP is associated with weight, BMI and SAD (r=0.59, 0.58, 0.78 respectively; P<0.0001)

Original Article

The Relationship of Body Mass Index to Intra-abdominal Pressure as Measured by Multichannel Cystometry

K. L. Noblett, J. K. Jensen, D. R. Ostergard
Long Beach Memorial Medical Center, Long Beach, California, USA

Table 3. Pearson correlation coefficients

IAP*/BMI	0.76 ($P < 0.0001$)
IVP†/BMI	0.71 ($P < 0.0001$)
IAP§/BMI	0.73 ($P < 0.0001$)

*intra-abdominal pressure (both transvaginal and transrectal)
†intravesical pressure
§intra-abdominal pressure (transvaginal)

Noblett KL, Jensen JK, Ostergard DR (1997) The relationship of body mass index to intra-abdominal pressure as measured by multichannel cystometry. Int Urogynecology J 8:323–326.

Why obesity leads to IAP?

Mechanism	Impact on IAP
Increased visceral fat	Direct volume increase inside abdomen
Mechanical compression	Continuous elevated baseline pressure
Reduced abdominal wall compliance	Less ability to accommodate fat volume
Elevated diaphragm	Compresses abdominal organs downward
Postural changes	Further reduction in abdominal space
Physical activities	Higher pressure peaks with minimal effort

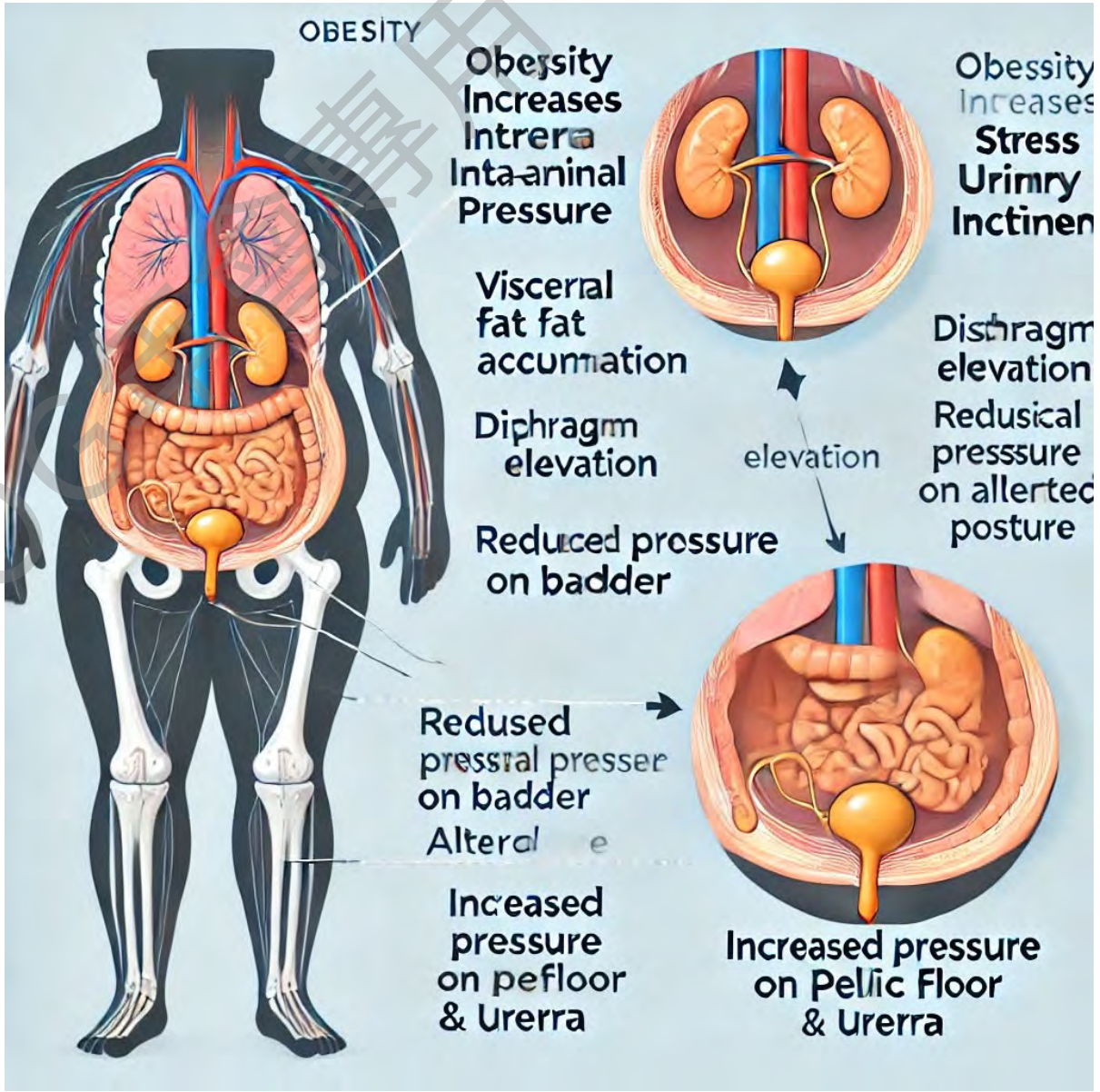

Table 2.
Pelvic Floor Dysfunctions: Prevalence and Mean Scores

Variable	Obese (BMI≥35) (n=358)		Control (BMI<35) (n=37)		Age-Adjusted		Covariant-Adjusted	
	Prevalence (%)	Mean Score	Prevalence (%)	Mean Score	Prevalence *P*-value(1)	Mean Scores *P*-value(2)	Prevalence *P*-value(3)	Mean Scores *P*-value(4)
PFDI-20								
POPDI	66	18.1	14	1.4	<.001	<.001	<.001	<.001
CRADI	68	17.0	8	0.8	<.001	<.001	<.001	<.001
UDI	81	32.5	5	0.8	<.001	<.001	<.001	<.001
Total	91	67.5	22	2.9	<.001	<.001	<.001	<.001
PFIQ-7								
IIQ	46	15.1	0	0	<.001	<.001	<.001	<.001
CRADI	25	8.2	0	0	<.001	0.01	<.001	0.01
POPDI	24	9.3	0	0	<.001	0.01	<.001	0.01
Total	53	32.6	0	0	<.001	<.001	<.001	<.001

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Wasserberg, N. *et al.* Morbid Obesity Adversely Impacts Pelvic Floor Function in Females Seeking Attention for Weight Loss Surgery. *Dis. Colon Rectum* **50**, 2096–2103 (2007).

Prevalence and degree of bother from pelvic floor disorders in obese women

Emily L. Whitcomb · Emily S. Lukacz · Jean M. Lawrence · Charles W. Nager · Karl M. Luber

The more the obesity,

The more the pelvic symptoms

(SUI, OAB, POP …)

Condition	Obese, BMI 30–34.9 kg/m^2, *N*=690	Severely obese BMI 35–39.9 kg/m^2, *N*=284	Morbidly obese BMI≥ 40 kg/m^2, *N*=181	*p*
Prolapse, *N*, % (95% CI)	48, 7.0 (5.3–9.1)	28, 9.9 (6.9–13.9)	23, 12.7 (8.6–18.4)[a]	0.040[b]
VAS	73.2±19.9	72.5±20.1	66.8±18.6	0.422[c]
Stress incontinence, *N*, % (95% CI)	135, 19.7 (16.9–22.9)	91, 32.3 (27.2–38.1)[a]	54, 30.2% (23.9–37.3)[a]	<0.001[c]
VAS	66.3±14.8	65.1±14.2	64.5±14.2	0.699[b]
Overactive bladder, *N*, % (95% CI)	136, 20.2 (17.3–23.4)	71, 26.1 (21.2–31.6)	46, 26.7 (20.7–33.8)	0.054[c]
VAS	78.8±11.4	76.8±10.8	80.5±12.1	0.216[b]
Anal incontinence, *N*, % (95% CI)	188, 27.2% (24.1–30.7)	93, 32.7% (27.6–38.4)	59, 32.6% (26.2–39.7)	0.178[c]
VAS	42.0±17.9	42.4±17.9	41.5±13.6	0.955[b]
Any PFD, *N*, % (95% CI)	292, 44.3 (40.6–48.1)	143, 52.6 (46.6–58.4)[a]	96, 56.8 (49.3–64.0)[a]	0.004[c]

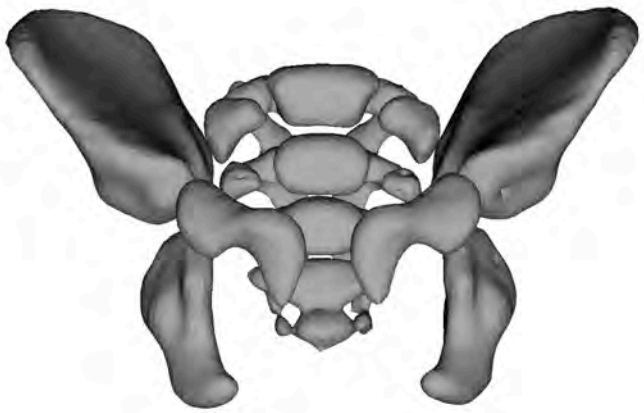
Whitcomb, E. L., Lukacz, E. S., Lawrence, J. M., Nager, C. W. & Luber, K. M. Prevalence and degree of bother from pelvic floor disorders in obese women. *Int. Urogynecology J.* **20**, 289 (2008).

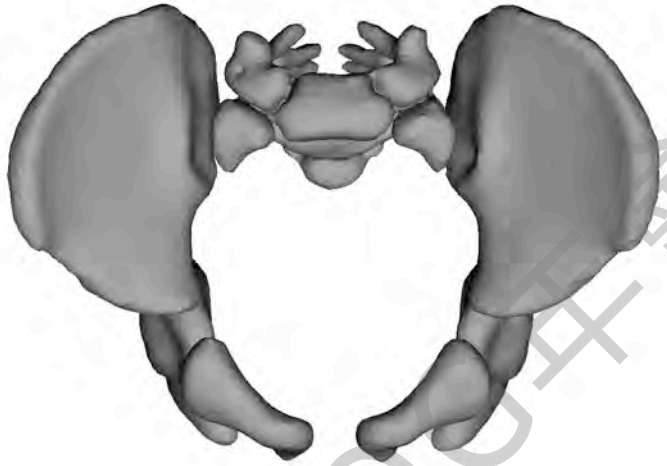
Table 3 Crude and adjusted odds ratios (95% CI) for the associations between degree of obesity (obese, severely obese, and morbidly obese) and each and any pelvic floor disorder

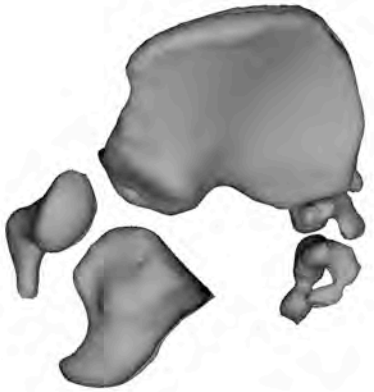
	POP	OAB	SUI	AI	Any PFD
Crude OR (95% CI)					
Obese (*N*=690)	1.00 (referent)	1.00 (referent)	1.00 (referent)	1.00 (referent)	1.00 (referent)
Severe (*N*=284)	1.46 (0.89–2.37)	1.38 (0.99–1.92)	1.93 (1.41–2.64)	1.29 (0.95–1.75)	1.38 (1.04–1.84)
Morbidly (*N*=181)	1.95 (1.15–3.31)	1.48 (1.01–2.17)	1.79 (1.24–2.59)	1.32 (0.93–1.89)	1.67 (1.19–2.35)
Adjusted OR (95% CI)					
Obese (*N*=690)	1.00 (referent)	1.00 (referent)	1.00 (referent)	1.00 (referent)	1.00 (referent)
Severe (*N*=284)	1.55 (0.92–2.60)	1.40 (0.98–1.99)	1.99 (1.43–2.78)	1.32 (0.96–1.82)	1.43 (1.05–1.93)
Morbidly (*N*=181)	2.09 (1.18–3.68)	1.66 (1.11–2.50)	1.87 (1.26–2.76)	1.39 (0.96–2.02)	1.75 (1.22–2.51)

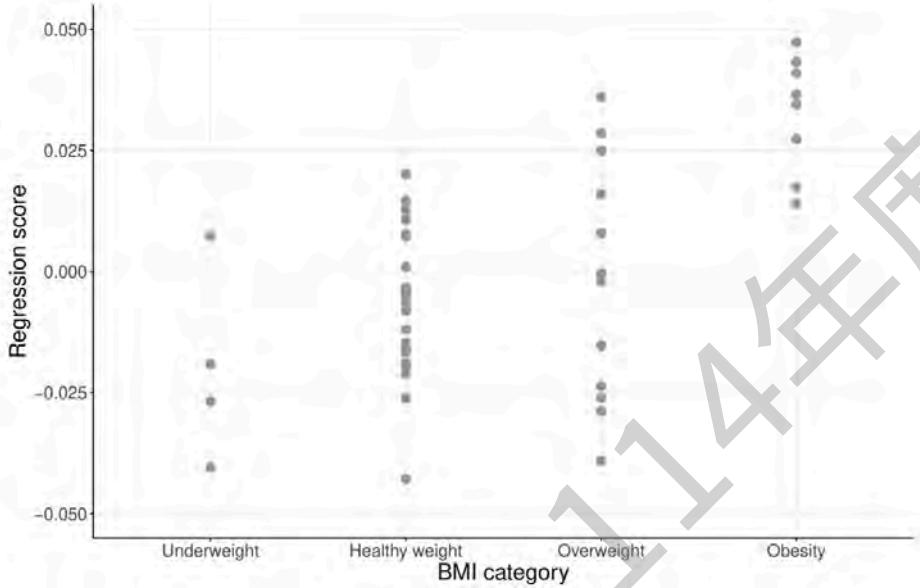
SUI and POP are two main symptoms proportioned to the severity of obesity

Whitcomb, E. L., Lukacz, E. S., Lawrence, J. M., Nager, C. W. & Luber, K. M. Prevalence and degree of bother from pelvic floor disorders in obese women. *Int. Urogynecology J.* **20**, 289 (2008).



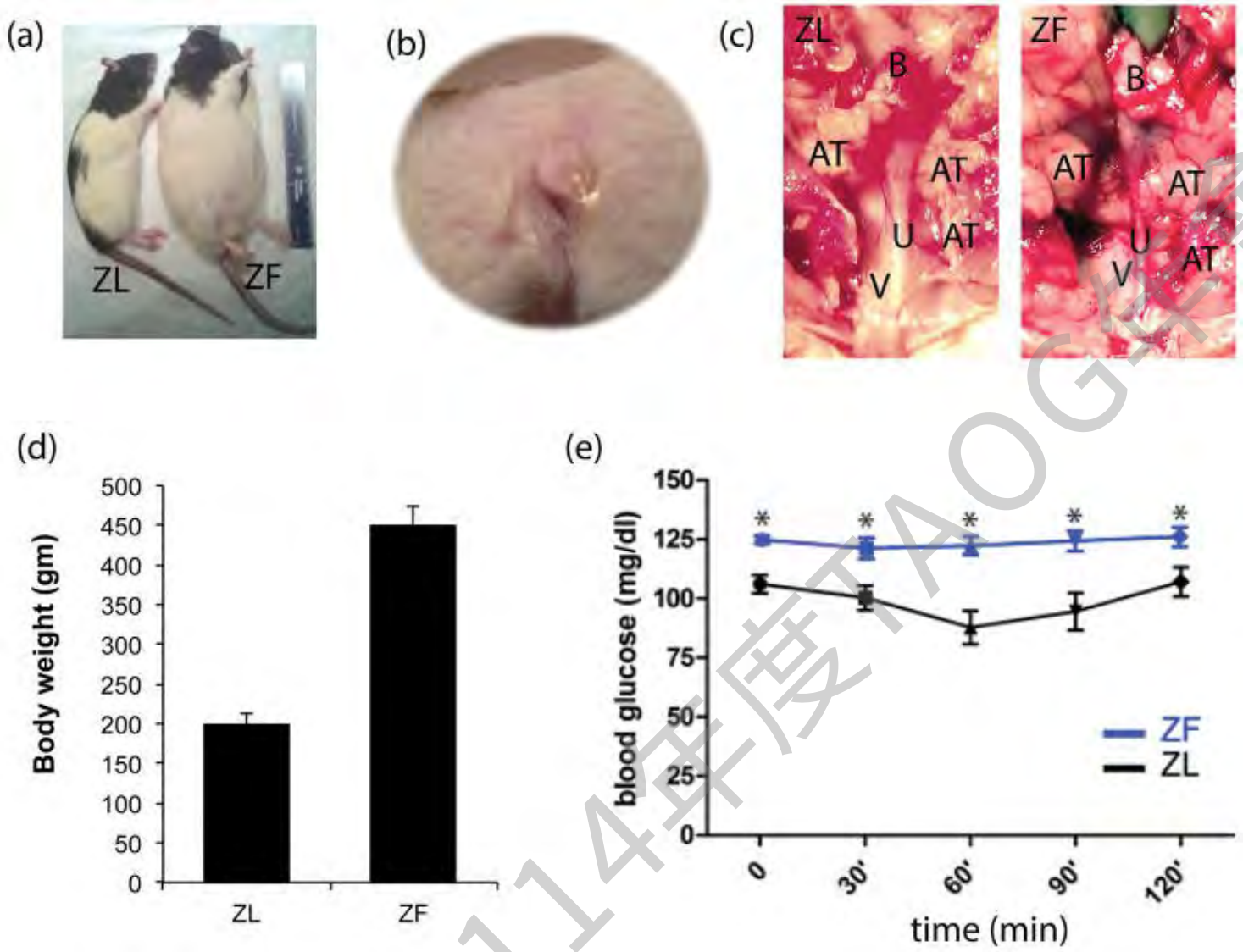






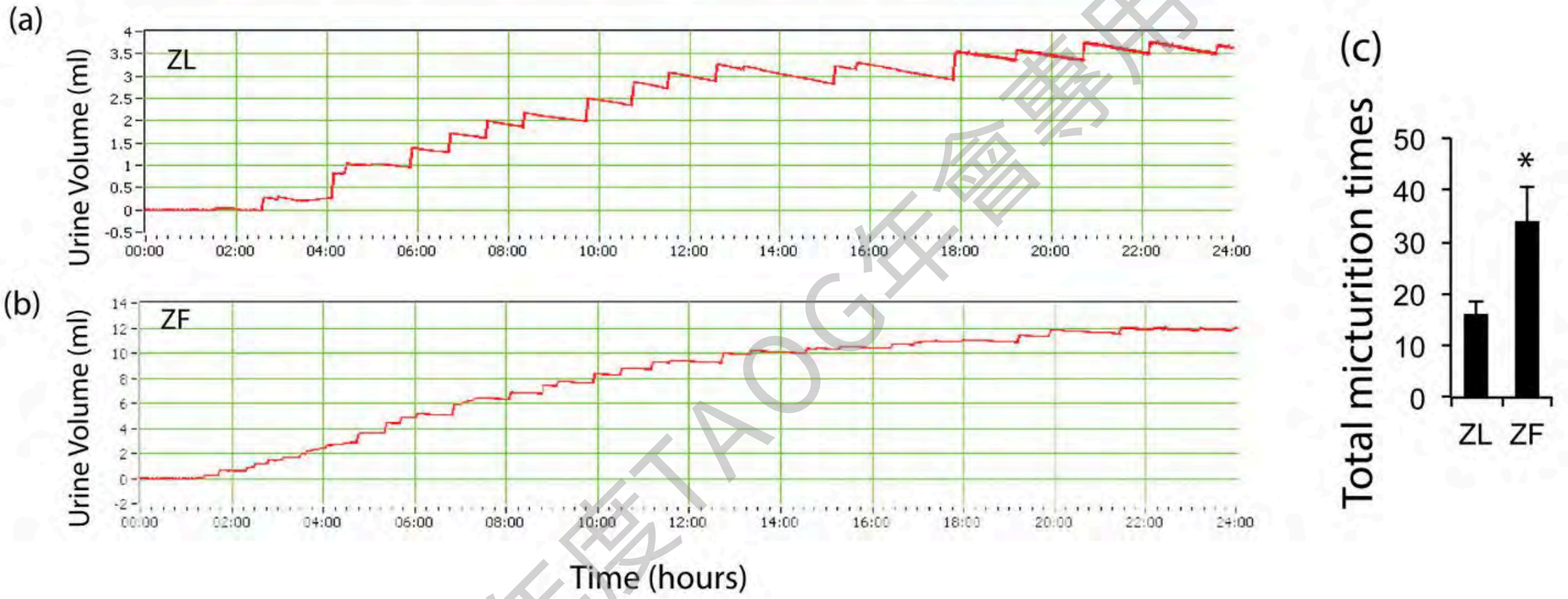
The pelvic girdle of young females with underweight and healthy BMIs (N = 30) showed relatively more upright ilium and prominent ischial spines and relatively higher everted sacrum than those with overweight and obese BMIs.

Kubicka, A. M. Changes in plasticity of the pelvic girdle from infancy to late adulthood in Homo sapiens. *Sci. Rep.* **13**, 9698 (2023).



- Zucker Fatty(ZF) rat
- Genetic defect in the leptin receptor
- Hyperphagia
- Insulin resistance
- Hyperinsulinemia Hyperlipoproteinemia
- Obesity
- Not diabetes mellitus

Wang, L. *et al.* Transgenic animal model for studying the mechanism of obesity-associated stress urinary incontinence. *BJU Int.* **119**, 317–324 (2017).



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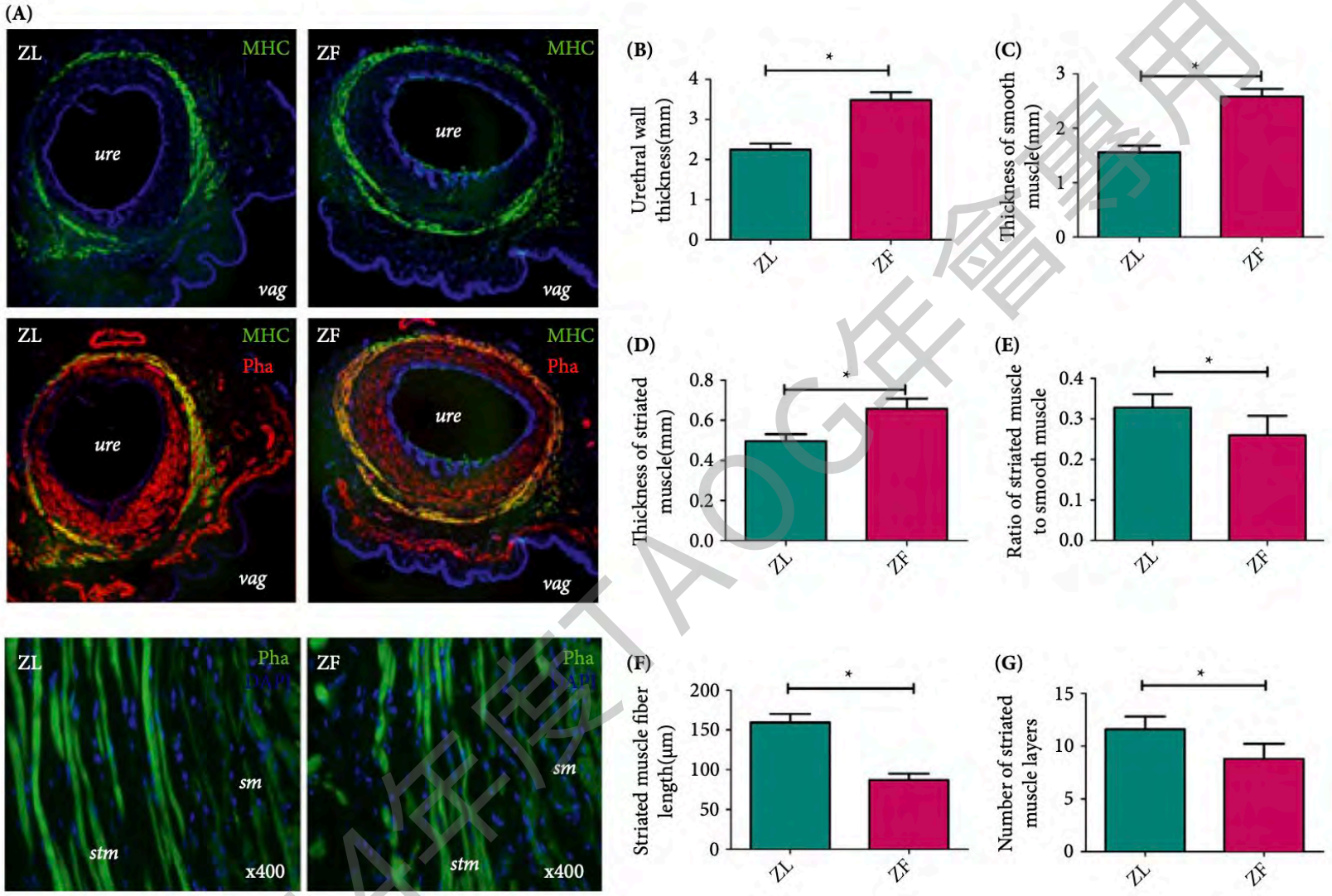
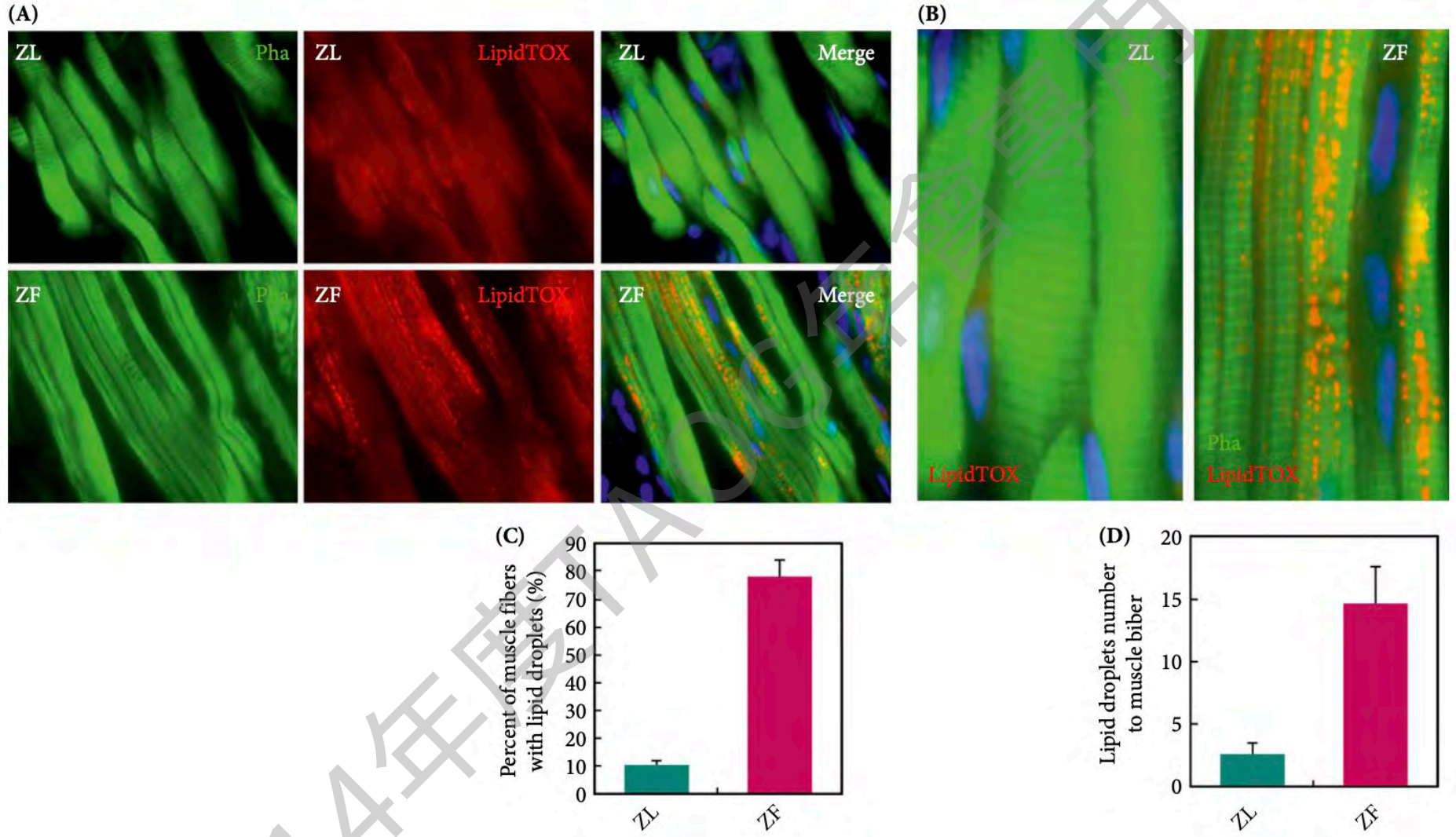
Wang, L. *et al*. Transgenic animal model for studying the mechanism of obesity-associated stress urinary incontinence. *BJU Int*. **119**, 317–324 (2017).



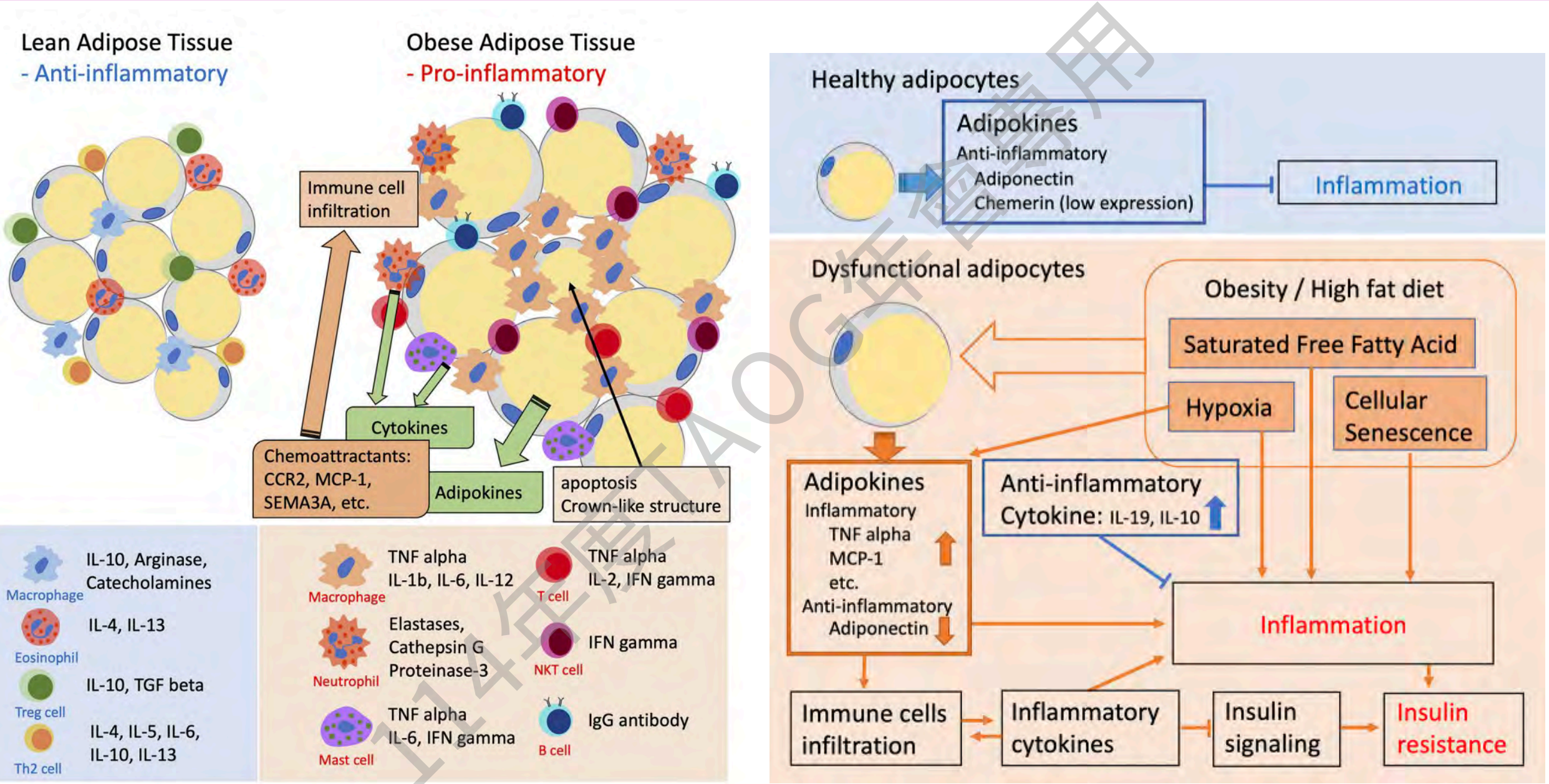
Urethral striated muscles are less in ZF than ZL rats

Wang, L. *et al*. Transgenic animal model for studying the mechanism of obesity-associated stress urinary incontinence. *BJU Int*. **119**, 317–324 (2017).



Lipid accumulated within the urethral striated muscle myofibers in Zucker fatty (ZF) rats

Wang, L. *et al.* Transgenic animal model for studying the mechanism of obesity-associated stress urinary incontinence. *BJU Int.* **119**, 317–324 (2017).



Kawai T, Autieri MV, Scalia R (2021) Adipose tissue inflammation and metabolic dysfunction in obesity. Am J Physiol-Cell Physiol 320:C375–C391.

Treatment strategies

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SGS PAPERS www.AJOG.org

Ten-year follow-up after the tension-free vaginal tape procedure

Thomas Aigmueller, MD; Gerda Trutnovsky, MD; Karl Tamussino, MD; Julia Kargl, MD; Anna Wittmann, MD; Milana Surtov, MD; Petra Kern, MD; Andrea Frudinger, MD; Paul Riss, MD; Vesna Bjelic-Radisic, MD

Results

Interview data were available for 67%; full clinical investigation was performed in 56% of patients. At 10 years, the clinical stress test was negative in 84%, slightly positive in 8.5%, and strongly positive in 4.3%. Subjectively, 57% of patients considered themselves "cured," 23% "improved," 6.4% "unchanged," and 11% "worse." Eleven of 141 (7.8%) had been reoperated in the interim. The rate of de novo urgency was 20%. Obesity seemed to be a risk factor for failure.

EUROPEAN UROLOGY 61 (2012) 939–946

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Platinum Priority – Female Urology – Incontinence

Editorial by Firouz Daneshgari on pp. 947–948 of this issue

Tension-free Vaginal Tape for the Treatment of Urodynamic Stress Incontinence: Efficacy and Adverse Effects at 10-Year Follow-Up

Maurizio Serati[a,], Fabio Ghezzi[a], Elena Cattoni[a], Andrea Braga[a], Gabriele Siesto[b], Marco Torella[c], Antonella Cromi[a], Domenico Vitobello[b], Stefano Salvatore[d]*

[a] *Department of Obstetrics and Gynecology, University of Insubria, Varese, Italy;* [b] *Department of Gynecology, IRCCS Humanitas Clinical Institute, Rozzano, Milan, Italy;* [c] *Department of Obstetrics and Gynecology, 2nd Faculty, Naples, Italy;* [d] *Department of Obstetrics and Gynecology, IRCCS San Raffaele Hospital, Milan, Italy*

In 2010-2012, we observed that obesity seems to be a risk factor of TVT failure

Is Obesity a Risk Factor for Failure and Complications After Surgery for Incontinence and Prolapse in Women?

Rashel M. Haverkorn, B. Jill Williams, William S. Kubricht, III and Alex Gomelsky*

From the Department of Urology, University of Texas Southwestern, Dallas, Texas (RMH), Department of Urology, Louisiana State University Health Sciences Center, Shreveport (BJW, AG), and Urology Center for Women, Baton Rouge (WSK), Louisiana

	PP	
	BMI Less Than 30	BMI 30 or Greater
Pads/day:		
Preop	1.15	2.12
Postop	0.17	0.28
SEAPI:		
Preop	5.22	6.44
Postop	0.68	1.15
IIQ:		
Preop	8.23	11.19
Postop	1.01	1.50
UDI-6:		
Preop	7.02	8.39
Postop	0.97	1.55
VAS:		
Preop	2.85	2.25
Postop	9.27	9.05

	PP		
	BMI Less Than 30		BMI 30 or Greater
Mean mos followup	22.47		23.12
% Global cure	83.9		70.9
p Value		<0.001	
% SUI cure	91.9		81.2
p Value		<0.001	
% Would undergo surgery again*	96.9		97.4
% Would recommend to friend*	96.3		98.3

* All values p not significantly differ

BMI≧30 used more pads and lower SUI cure rate at 12 months

Haverkorn RM, Williams BJ, Kubricht WS, Gomelsky A (2011) Is Obesity a Risk Factor for Failure and Complications After Surgery for Incontinence and Prolapse in Women? J Urol 185:987–992.

European Journal of Obstetrics & Gynecology and Reproductive Biology 170 (2013) 571–574

Contents lists available at ScienceDirect

European Journal of Obstetrics & Gynecology and Reproductive Biology

journal homepage: www.elsevier.com/locate/ejogrb

Single incision mid-urethral slings: impact of obesity on outcomes

Michele Meschia *, Gabriela Rossi, Silvia Bertini, Arianna Sommacal, Sara Foina, Francesca Sandretti, Pietro Barbacini

Department of Obstetrics and Gynecology, Azienda Ospedaliera di Legnano, Ospedale "G. Fornaroli", Magenta, Italy

One year objective and patient reported outcomes.

	Normal $N=69$	Overweight $N=91$	Obese $N=36$	P
Objective cure, n (%)	63 (91.3)	76 (83.5)	27 (75)	0.07[a]
Change in ICI-SF, (pre-post) mean ± SD	−12.4 ± 3.7	−12.3 ± 3.8	−9.3 ± 5.1	<0.001[b]
PGI-I, score 1–2, n (%)	65 (94)	80 (88)	26 (72)	0.006[c]
Change in WIPSS, (pre-post) mean ± SD	−3.4 ± 4.2	−4 ± 4.8	−3.6 ± 5.3	0.71
Change in OAB symptoms, (pre-post) n, (%)	20–14 (−8%)	27–18 (−8%)	16–13 (−5%)	0.39

Why sling tends to fail in obese patients?

Rodrigues, C. *et al.* Pelvic Floor 3D Ultrasound of Women with a TVT, TVT-O, or TVT-S for Stress Urinary Incontinence at the Three-year Follow-up. *Rev. Bras. Ginecol. e Obstet. RBGO - Gynecol. Obstet.* **39**, 471–479 (2017).

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“It is possible that increased intra-abdominal pressure generated in obese women during routine daily activities may stress the sling repeatedly and earlier than in nonobese women. Thus, the sling may settle and incorporate into a looser position, and decrease the chance of retention.”

Settle in looser position

Haverkorn RM, Williams BJ, Kubricht WS, Gomelsky A (2011) Is Obesity a Risk Factor for Failure and Complications After Surgery for Incontinence and Prolapse in Women? J Urol 185:987–992.

Table 2. Body Weight and Frequency of Urinary-Incontinence Episodes at Baseline and at 6 Months According to Treatment Group.*

Outcome	Weight-Loss Group (N=226)	Control Group (N=112)	P Value
Body weight†			
Baseline — kg	98±17	95±16	
6 Mo — kg	90±17	94±17	
% Change (95% CI)	−8.0 (−9.0 to −7.0)	−1.6 (−2.7 to −0.4)	<0.001
Urinary-incontinence episodes‡			
Any incontinence			
Baseline — no./wk	24±18	24±16	
6 Mo — no./wk	13±15	17±19	
% Change (95% CI)	−47 (−54 to −40)	−28 (−41 to −13)	0.01
Stress incontinence			
Baseline — no./wk	9±11	10±10	
6 Mo — no./wk	4±7	7±9	
% Change (95% CI)	−58 (−67 to −46)	−33 (−50 to −9)	0.02
Urge incontinence			
Baseline — no./wk	14±14	13±15	
6 Mo — no./wk	8±11	10±15	
% Change (95% CI)	−42 (−51 to −32)	−26 (−44 to −3)	0.14

ORIGINAL ARTICLE

Weight Loss to Treat Urinary Incontinence in Overweight and Obese Women

Leslee L. Subak, M.D., Rena Wing, Ph.D., Delia Smith West, Ph.D., Frank Franklin, M.D., Ph.D., Eric Vittinghoff, Ph.D., Jennifer M. Creasman, M.S.P.H., Holly E. Richter, Ph.D., M.D., Deborah Myers, M.D., Kathryn L. Burgio, Ph.D., Amy A. Gorin, Ph.D., Judith Macer, B.Sc., John W. Kusek, Ph.D., and Deborah Grady, M.D., M.P.H., for the PRIDE Investigators*

Subak, L. L. *et al.* Weight Loss to Treat Urinary Incontinence in Overweight and Obese Women. *N. Engl. J. Med.* **360**, 481–490 (2009).

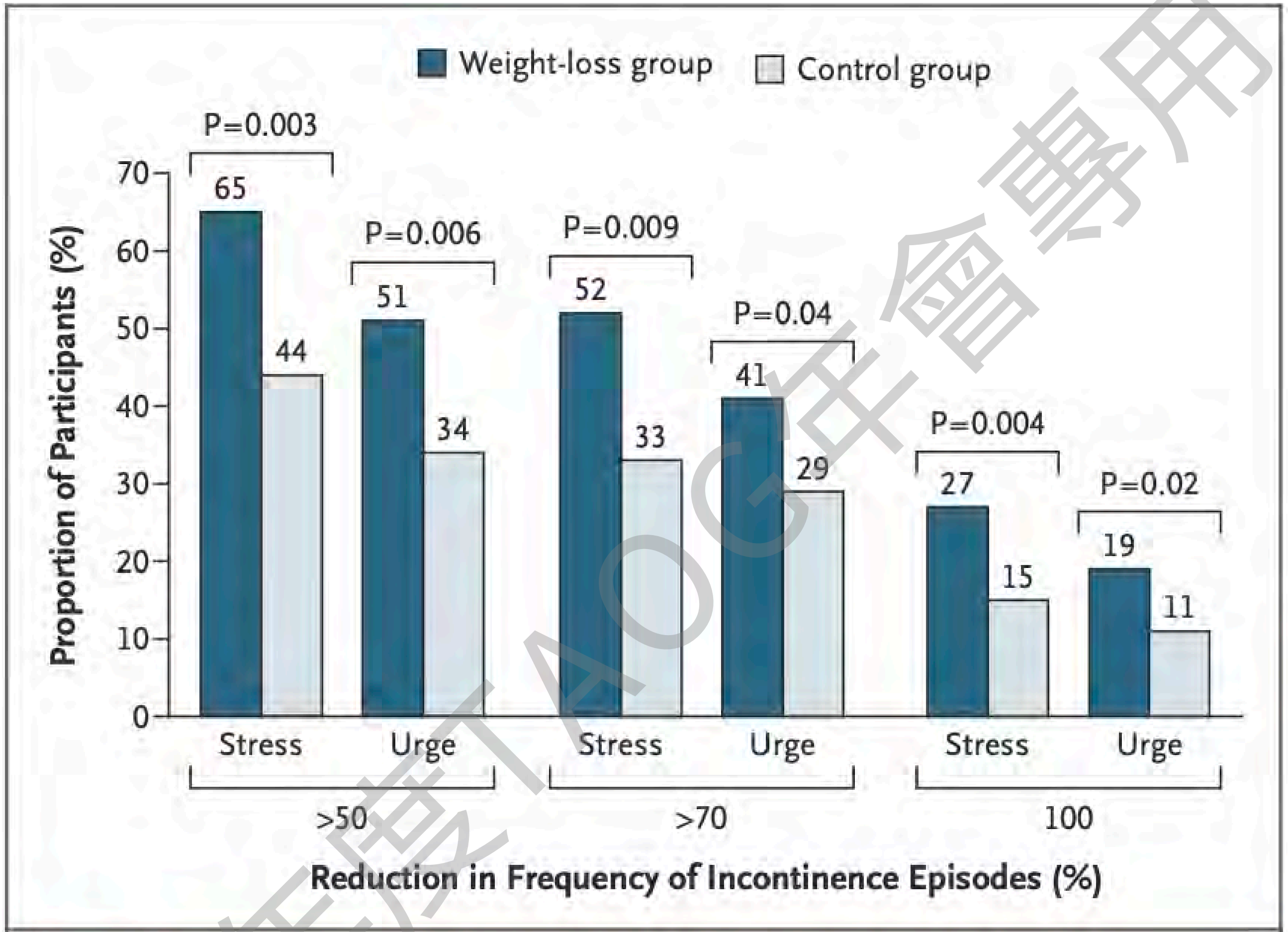
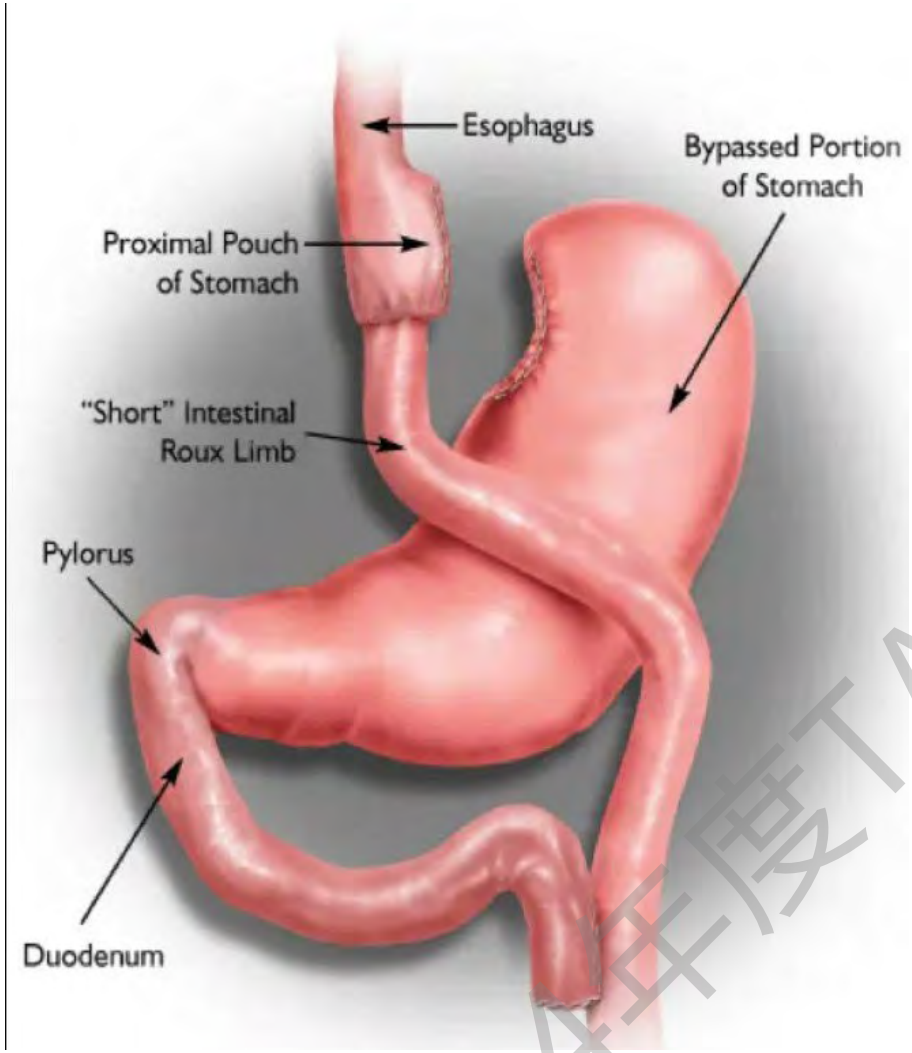
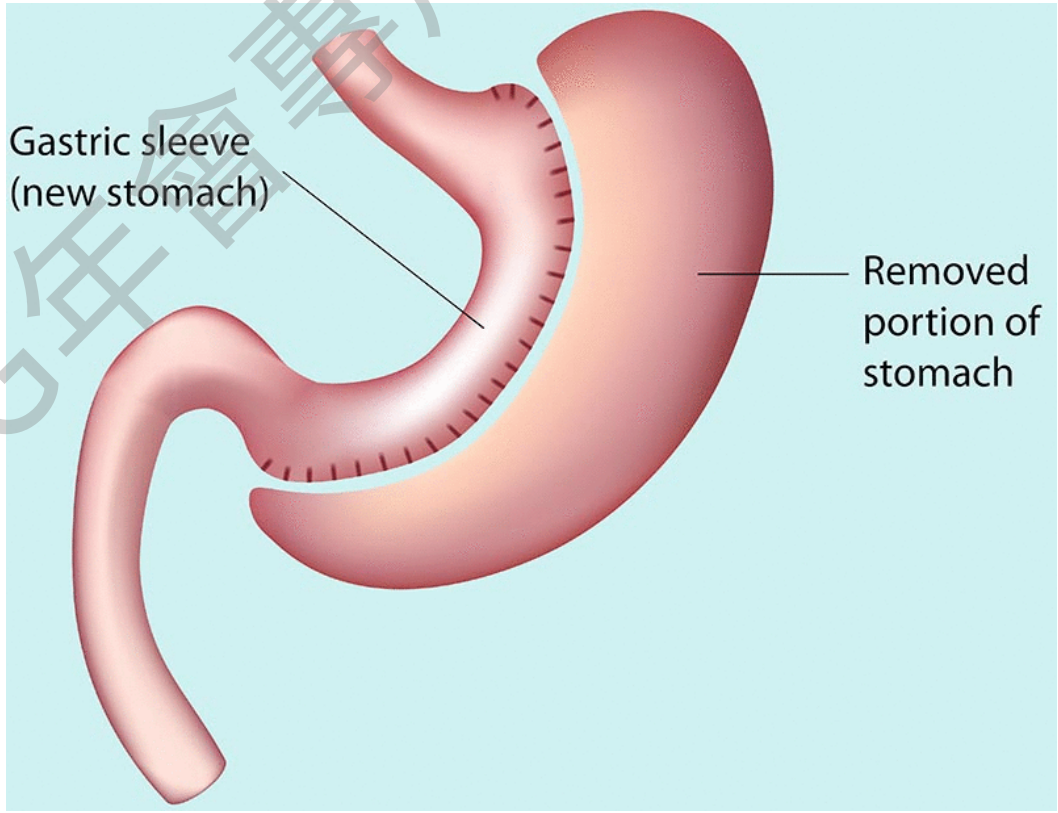


Figure 3. Proportion of Participants with Reductions in the Frequency of Episodes of Stress Incontinence and of Urge Incontinence at 6 Months.

Subak, L. L. *et al.* Weight Loss to Treat Urinary Incontinence in Overweight and Obese Women. *N. Engl. J. Med.* **360**, 481–490 (2009).



Roux-en-Y gastric bypass (RYGB)



Sleeve gastrectomy (SG)

Original Investigation

Urinary Incontinence Before and After Bariatric Surgery

Leslee L. Subak, MD; Wendy C. King, PhD; Steven H. Belle, PhD, MScHyg; Jia-Yuh Chen, MS; Anita P. Courcoulas, MD, MPH; Faith E. Ebel, RD, MS, MPH; David R. Flum, MD, MPH; Saurabh Khandelwal, MD; John R. Pender, MD; Sheila K. Pierson, BS; Walter J. Pories, MD; Kristine J. Steffen, PharmD, PhD; Gladys W. Strain, PhD; Bruce M. Wolfe, MD; Alison J. Huang, MD, MAS

- Observational cohort study at 10 US hospitals
- Between February 21, 2005, and February 17, 2009
- 1-year weight loss of 29.5% (95% CI, 29.0%-30.1%)
- Define at least weekly incontinence of any type were considered to have prevalent incontinence.

Bariatric surgical procedure	
Roux-en-Y gastric bypass	1111 (71.0)
Laparoscopic adjustable gastric band	387 (24.7)
Sleeve gastrectomy	33 (2.1)
Biliopancreatic diversion with duodenal switch	12 (0.8)
Banded gastric bypass	22 (1.4)

Subak, L. L. *et al.* Urinary Incontinence Before and After Bariatric Surgery. *JAMA Intern. Med.* **175**, 1378–1387 (2015).

Variable	No./Total No. (%)			
	Baseline	Year 1	Year 2	Year 3
Women (n = 1565)				
Frequency of urinary incontinence episodes	(n = 1565)	(n = 1373)	(n = 1241)	(n = 1188)
Never	357 (22.8)	680 (49.5)	576 (46.4)	528 (44.4)
<Monthly	247 (15.8)	304 (22.1)	257 (20.7)	235 (19.8)
Monthly	189 (12.1)	139 (10.1)	119 (9.6)	135 (11.4)
Weekly	352 (22.5)	135 (9.8)	160 (12.9)	157 (13.2)
Daily	420 (26.8)	115 (8.4)	129 (10.4)	133 (11.2)
Prevalence of urinary incontinence at least weekly				
Any type	772/1565 (49.3)	250/1373 (18.2)	289/1241 (23.3)	290/1188 (24.4)
Stress type	646/1530 (42.2)	188/1357 (13.9)	211/1226 (17.2)	220/1169 (18.8)
Urgency type	505/1528 (33.0)	165/1359 (12.1)	204/1229 (16.6)	202/1174 (17.2)

- Year 1 urinary incontinence prevalence was significantly lower among women(18.3%; 95% CI,16.4%-20.4%)
- The 3-year prevalence was higher than the 1-year prevalence for women(24.8%; 95% CI, 21.8%-26.5%) but was substantially lower than baseline (P < .001 for all).

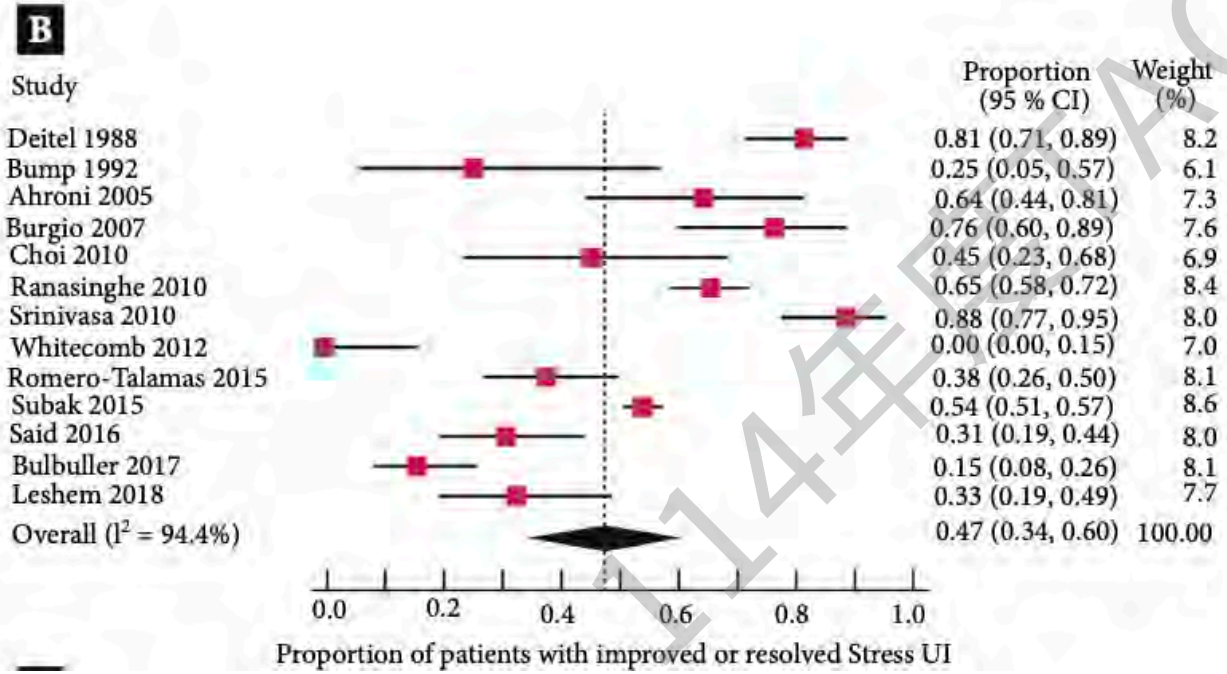
Subak, L. L. *et al.* Urinary Incontinence Before and After Bariatric Surgery. *JAMA Intern. Med.* **175**, 1378–1387 (2015).

Review

BJUI
BJU International

The impact of bariatric surgery on urinary incontinence: a systematic review and meta-analysis

Yung Lee*,†,‡, James Yu†,‡, Kari A.O. Tikkinen§, Michał Pędziwiatr¶,**, Piotr Major¶,**, Ishan Aditya††, Yonah Krakowsky‡‡, Aristithes G. Doumouras†,‡, Scott Gmora†,‡, Mehran Anvari†,‡ and Dennis Hong†,‡



- Bariatric surgery results in 47% (95% CI 34–60%) improvement in SUI.
- The quality of evidence was very low for all outcomes

Lee, Y. *et al.* The impact of bariatric surgery on urinary incontinence: a systematic review and meta-analysis. *BJU Int.* **124**, 917–934 (2019).

Pelvic floor muscle training?

- [illegible]
- [illegible]


Study protocol | Open access | Published: 05 June 2023

Effect of pelvic floor muscle training on reports of urinary incontinence in obese women undergoing a low-calorie diet before bariatric surgery — protocol of a randomized controlled trial

Pauliana C. S. Mendes, Tatiana B. Fretta, Milena F. C. Camargo, Patricia Driusso & Cristine Homsi Jorge

Trials **24**, Article number: 376 (2023) | Cite this article

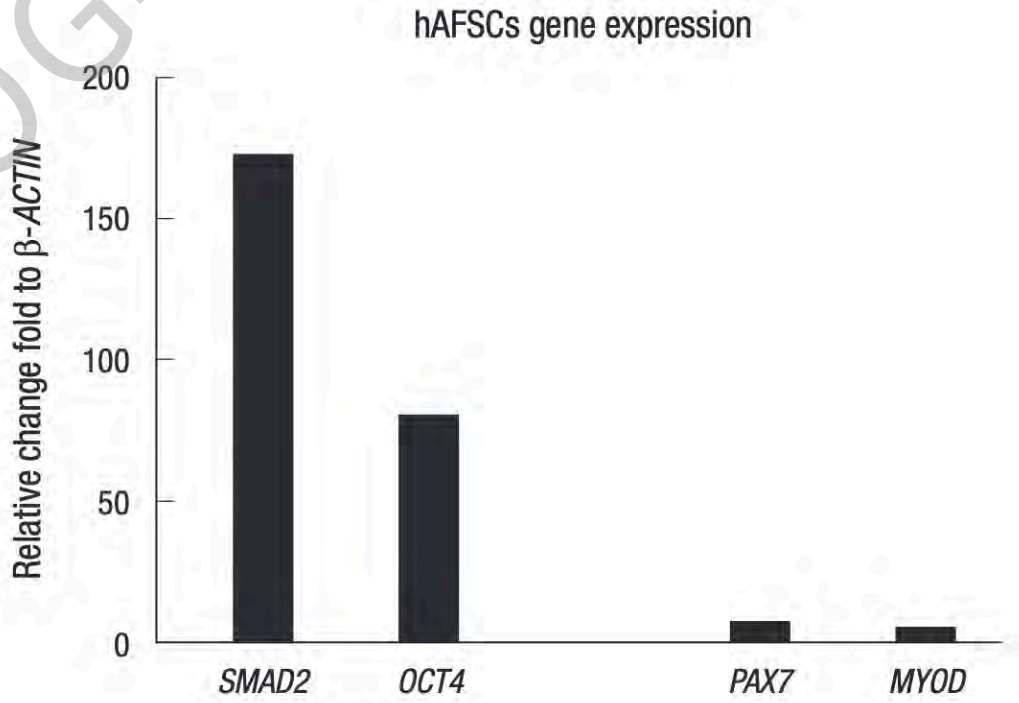
ORIGINAL ARTICLE
Cell Therapy & Organ Transplantation

JKMS

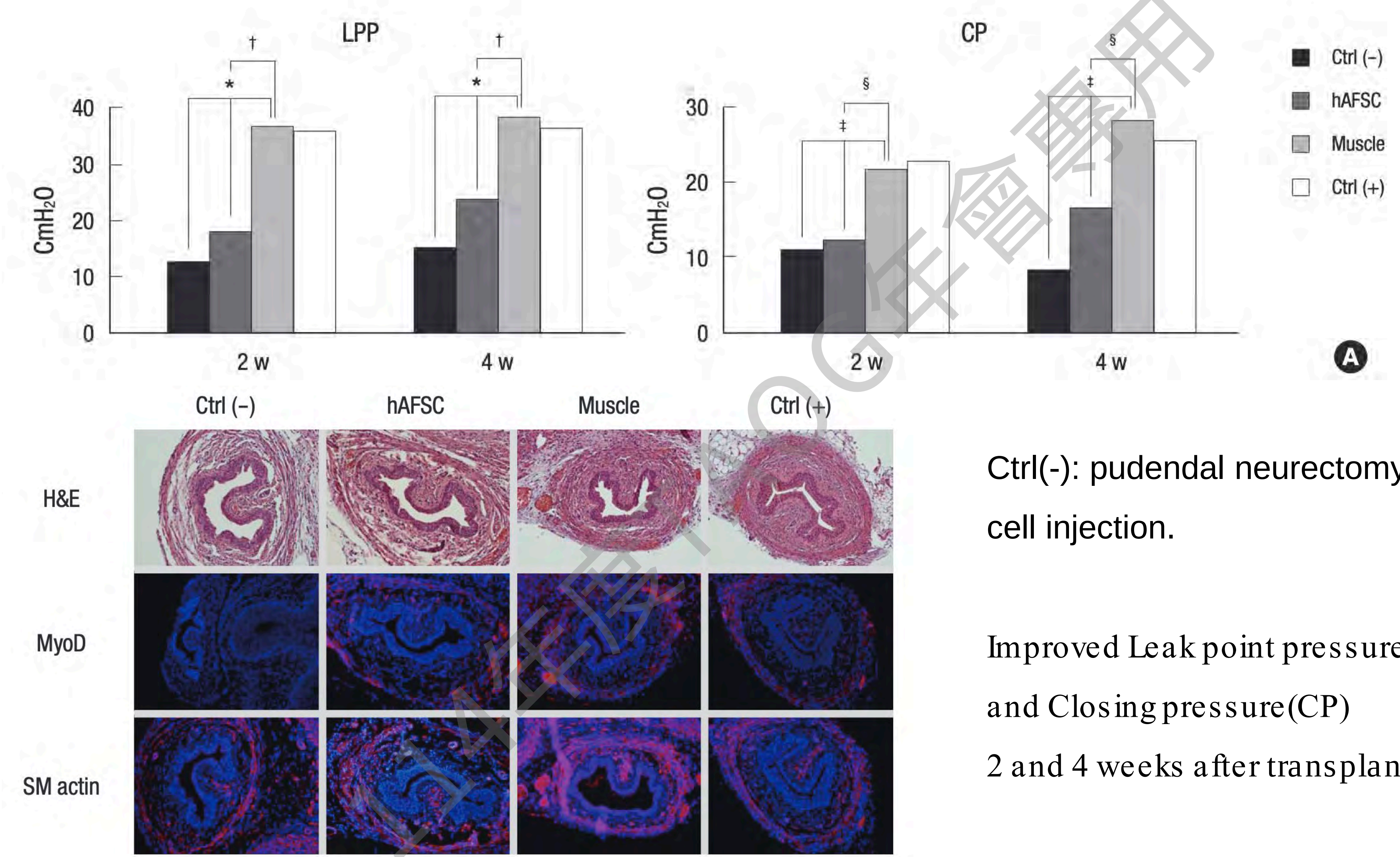
http://dx.doi.org/10.3346/jkms.2012.27.11.1300 • J Korean Med Sci 2012; 27: 1300-1307

Human Amniotic Fluid Stem Cell-derived Muscle Progenitor Cell Therapy for Stress Urinary Incontinence

Samples of 10 mL amniotic fluid were obtained with informed consent from 4 women who were undergoing amniocentesis for prenatal diagnosis at 15-19 weeks of pregnancy. The amniotic fluid was centrifuged and the pellets were resuspended in the Chang Medium (α- MEM, 15% embryonic stem cell-fetal bovine serum [Gibco-In-vitrogen, Grand island, NY, USA] with 18% Chang B and 2% Chang C [Irvine Scientific, Irvine, CA, USA]) and placed on a petri dish. Non-adherent cells were discarded at 1 week. Adherent cells were passaged for expansion when they reached 80% confluence. The culture medium was replaced every 3 days.



Chun, S. Y. *et al.* Human Amniotic Fluid Stem Cell-derived Muscle Progenitor Cell Therapy for Stress Urinary Incontinence. *J. Korean Méd. Sci.* **27**, 1300–1307 (2012).



Ctrl(-): pudendal neurectomy without cell injection.

Improved Leak point pressure(LPP) and Closing pressure(CP) 2 and 4 weeks after transplanatation.

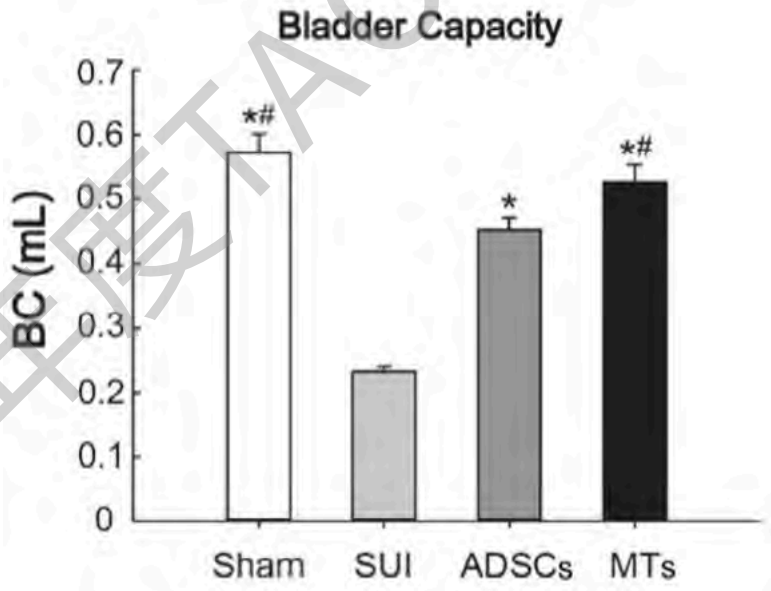
Chun, S. Y. *et al.* Human Amniotic Fluid Stem Cell-derived Muscle Progenitor Cell Therapy for Stress Urinary Incontinence. *J. Korean Méd. Sci.* **27**, 1300–1307 (2012).

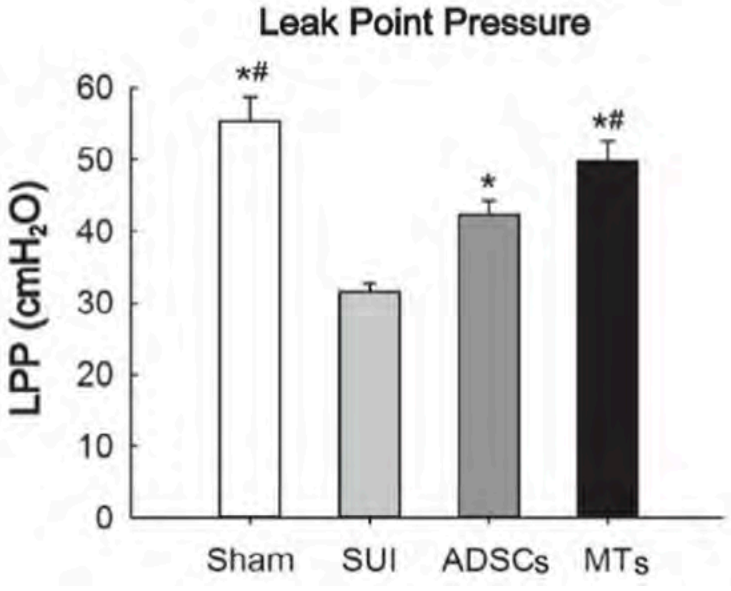
Therapeutic Potential of Adipose-derived Stem Cell-based Microtissues in a Rat Model of Stress Urinary Incontinence

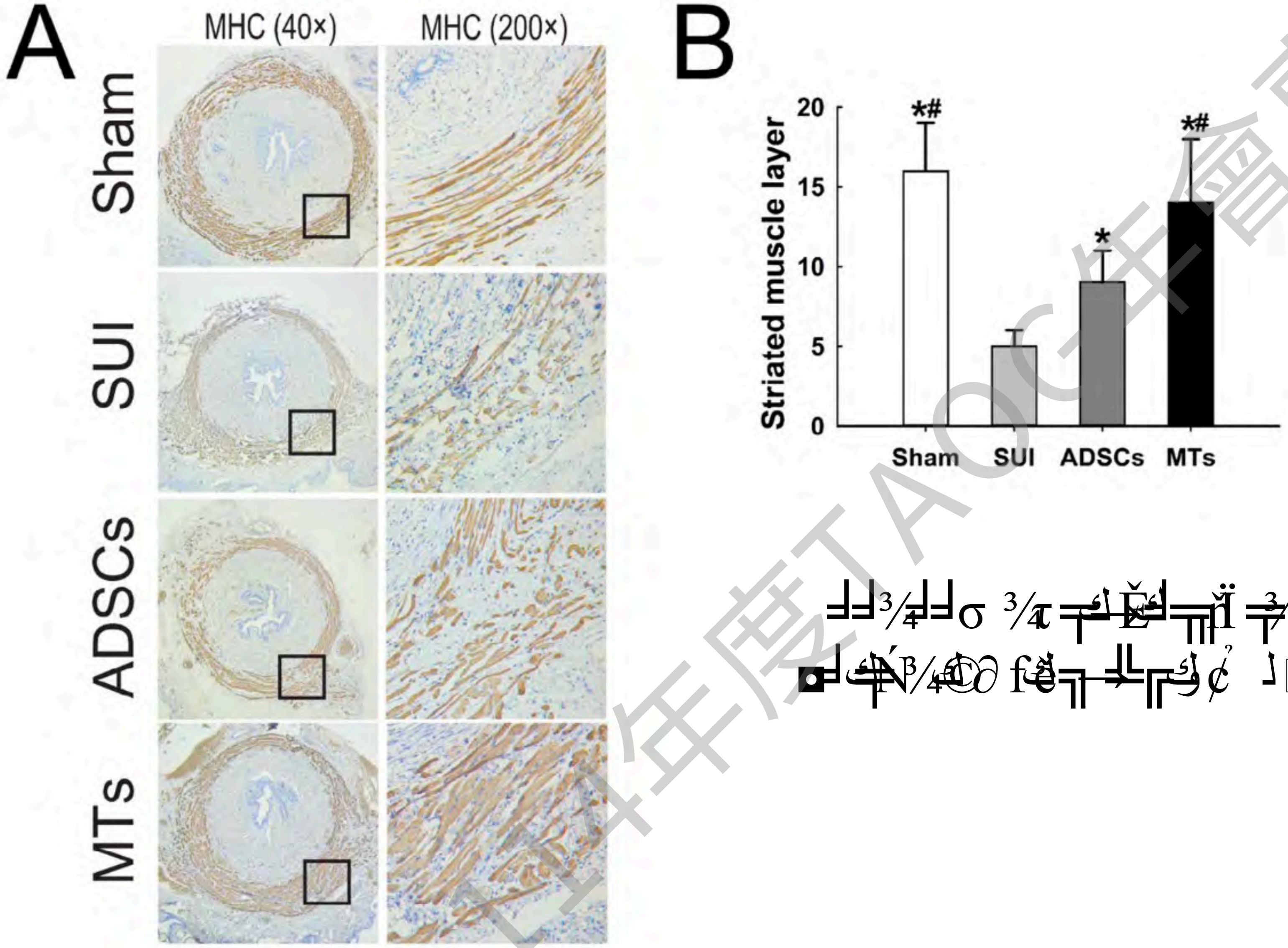
Meng Li,[1] Guangyong Li,[1] Hongen Lei, Ruili Guan, Bicheng Yang, Zhezhu Gao, Yu Hui, Fubao Chen, and Zhongcheng Xin

During the ovariectomy, ADSCs were isolated from para-ovary fat and cultured

28-days after cell injection







被科學文獻紀錄，接受未經證實的幹細胞療法的案例

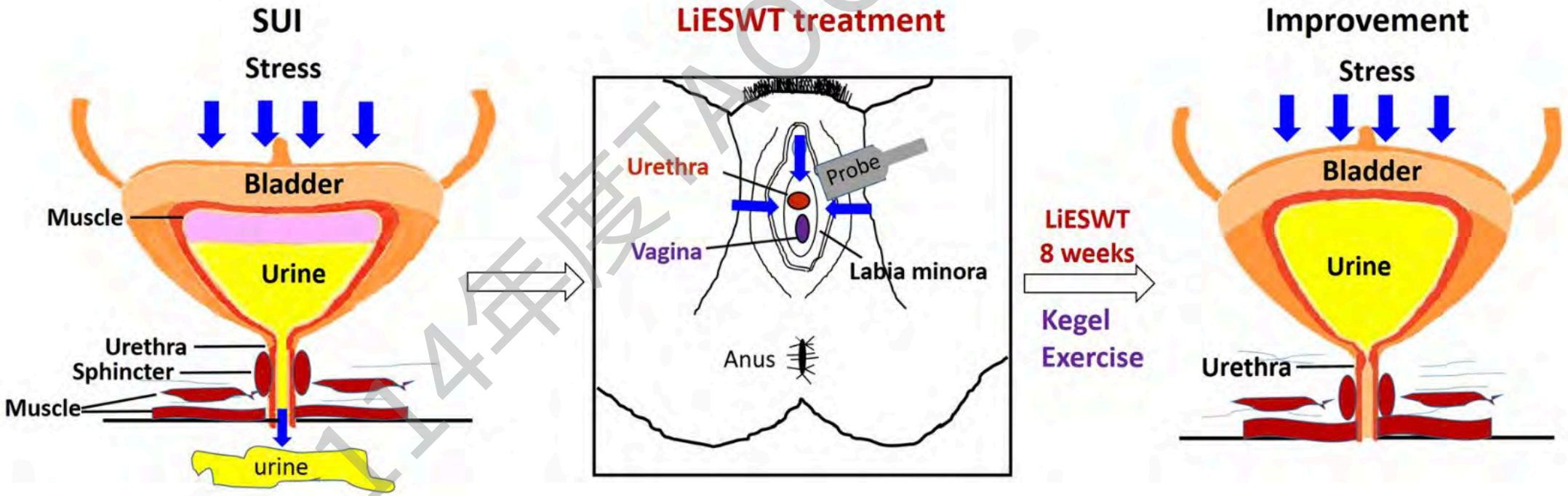
性別	年紀	居住國	提供治療地	疾病狀態	細胞療法	注射部位	併發症
男	13	以色列	莫斯科診所	共濟失調微血管擴張症候群	胎兒神經幹細胞	直接注射小腦及腦脊液	腫瘤
女	46	泰	泰國私人診所	狼瘡性腎病	造血幹細胞	經皮直接注射兩腎	腫瘤
女	17	美	哥斯大黎加	多發性硬化症	異體臍帶血幹細胞 自體脂肪幹細胞	鞘內注射和靜脈輸注	神經性
男	66	美	中國、阿根廷 墨西哥的診所	缺血性中風	間質幹細胞、胚胎幹細胞、胎兒神經幹細胞	鞘內注射	腫瘤
女	63	美	美	整容	臍部脂肪	臉部注射	感染
女	18	美	葡萄牙	脊椎損傷	嗅黏膜細胞	脊椎管內移植	腫瘤
女	73	美	美	老化性黃斑部病變	自體脂肪幹細胞	水晶體內注射	失明
不明	22	西方人	中	脊髓損傷	嗅鞘胎兒細胞	脊椎注射	感染、消化道出血
女	27	埃及	埃及	急性橫貫性脊髓炎	間質幹細胞	鞘內注射	自體免疫反應(腦膜炎)
男	41	不明	不明	肥厚型心肌病	自體前驅細胞	心肌注射	心室顫動
男	41	不明	不明	頸椎椎間盤突出	脂肪幹細胞	靜脈注射	肺栓塞
女	71	不明	日本	慢性腎衰竭	脂肪幹細胞	靜脈注射	神經性

資料：Stem Cells Transl Med. 2018;7:676–685　表 1(節錄)

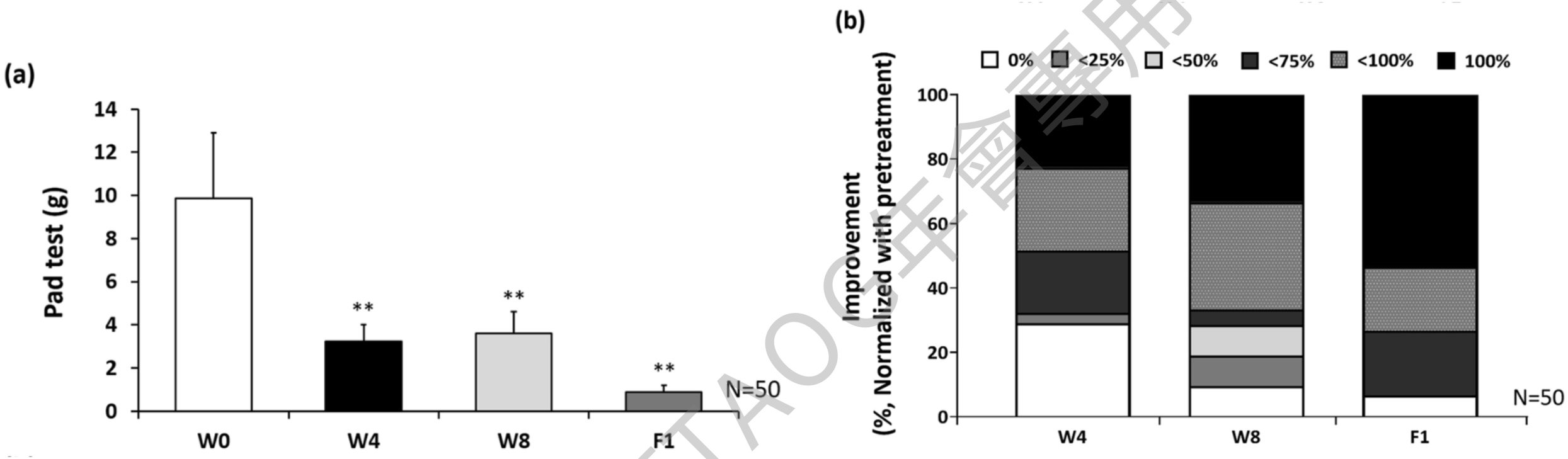
生科人梁智强 整理/翻譯

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

Cheng-Yu Long[1,2,3,4,11], Kun-Ling Lin[1,4,11], 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[3,5,7,10*]



Long, C.-Y. *et al.* Therapeutic effects of Low intensity extracorporeal low energy shock wave therapy (LiESWT) on stress urinary incontinence. *Sci Rep-uk* **10**, 5818 (2020).



Long, C.-Y. *et al.* Therapeutic effects of Low intensity extracorporeal low energy shock wave therapy (LiESWT) on stress urinary incontinence. *Sci Rep-uk* **10**, 5818 (2020).

Õ □ W4 Õ □ F1

Timetable	2 weeks	1 week	4 weeks	1 week	4 weeks	1 week	1 month
	Screening	Run in	Treatment			End of treatment	End of recovery	End of study

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

Long, C.-Y. *et al.* Therapeutic effects of Low intensity extracorporeal low energy shock wave therapy (LiESWT) on stress urinary incontinence. *Sci Rep-uk* **10**, 5818 (2020).

Take home message

- 肥胖透過增加腹壓、骨盆底肌壓迫、荷爾蒙變化、細胞內脂肪累積、全身性發炎等造成尿道括約肌萎縮導致尿失禁。
- 減重約 體重重量可減低漏尿頻率約
- 透過減重手術如 或 亦可達到類似效果
- 肥胖病人漏尿仍可接受尿道中段懸吊手術，滿意度高，失敗率較不肥胖者高。
- 肥胖病人漏尿手術失敗，可能原因為吊帶過鬆或移位。

吳晉睿醫師