

How dose diabetes affect POP, and what are the treatment strategies?

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DM -- Prevalence

資料來源：衛福部國健署

台灣

亞洲地區內

▲糖尿病盛行率最高

台灣18歲以上成人
糖尿病盛行率為11.1%

▲肥胖人口比例最高

台灣18歲以上成人
過重率約達50.3%

- 全球各國罹患糖尿病的人口越來越多，根據國際糖尿病聯盟預估，2045年全球糖尿病人口將超過6億人，是2020年的1.5倍。



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台灣糖尿病現況



台灣有11%的成人
罹患糖尿病

這代表至少有**230萬名成人**
罹患糖尿病



台灣的死亡人口中，
有5.7% 因糖尿病死亡



43.9%

的人口過重。
肥胖是導致糖尿病的
高風險因子

- 而國家衛生院2019年糖尿病年鑑指出，台灣罹患糖尿病的人口約有230萬，且每年以25000人的速度持續增加。
- 根據衛福部統計，國人十大死亡原因中，糖尿病位居第5名。



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DM – Obesity

| 盛行率 | 過重 | 肥胖 | 腰圍過大 |
|---------|-------|-------|-------|
| 19歲以上男性 | 30.5% | 28.3% | 47.2% |
| 19歲以上女性 | 23.2% | 19.6% | 52.9% |
| 19歲以上全體 | 26.8% | 23.9% | 50.1% |

- 根據103~106年「國民營養健康狀況變遷調查」結果，
 - 高中以下的學生，有超過9成的人每週至少喝一次含糖飲料；
 - 在19~64歲的成人有74.7%；65歲以上老年人則有40.5%的人每週至少喝一次手搖飲料，
 - 有4成的民眾每週至少喝7次以上。
- 長期喝含糖飲料或吃含糖點心、缺乏運動、營養失調之下，很容易造成體重過重，讓罹患代謝症候群等慢性疾病的風險增加。

DM – Diagnosis

2017年美國糖尿病學會 - 糖尿病篩檢建議



(無症狀成人)



- 40 歲以上民眾，建議每 3 年篩檢 1 次；65 歲以上民眾，建議每年篩檢 1 次。
- 若檢查正常，建議至少每三年要追蹤一次，視情況可縮短追蹤時間；糖尿病前期者，則建議每年追蹤。



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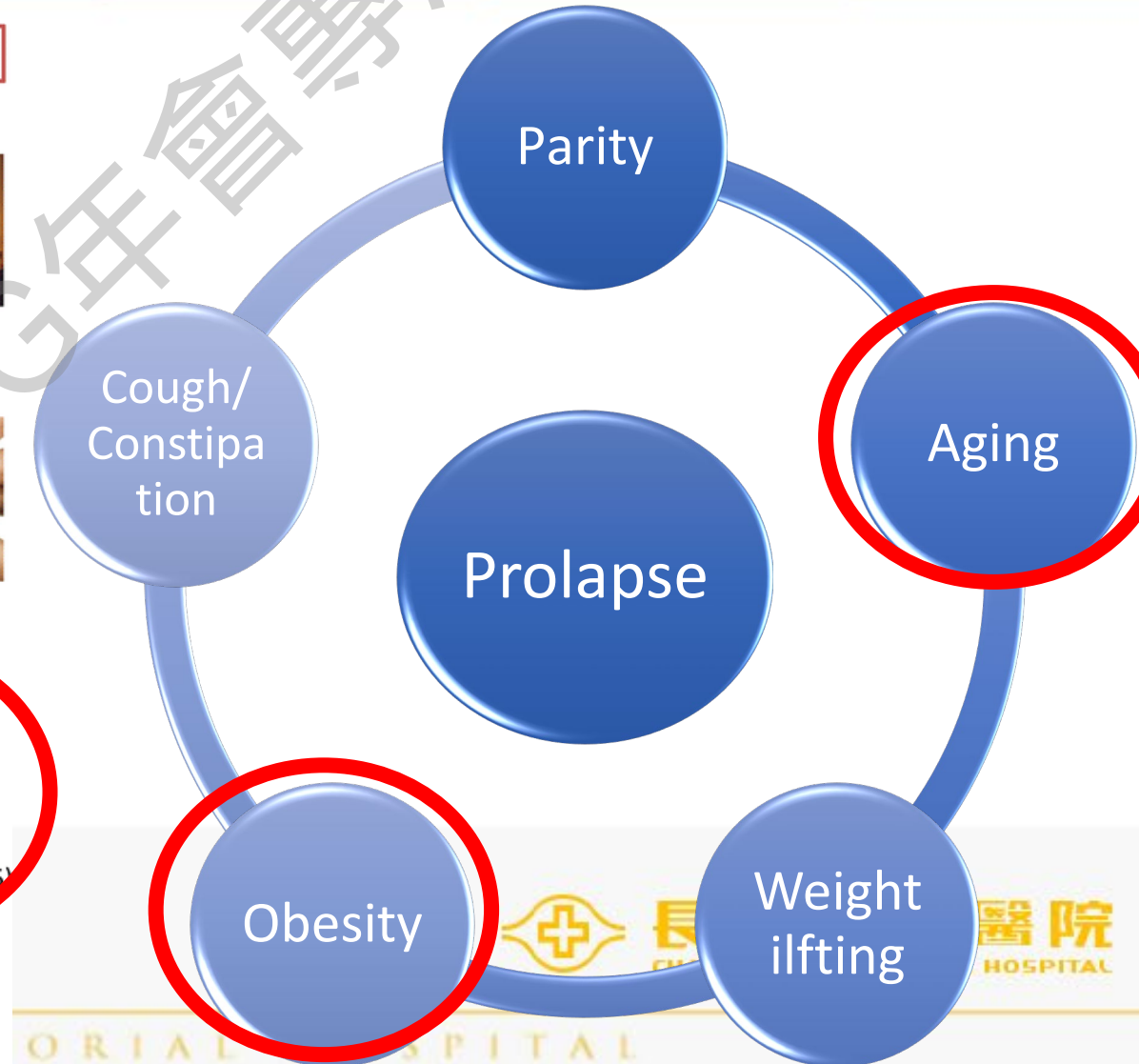
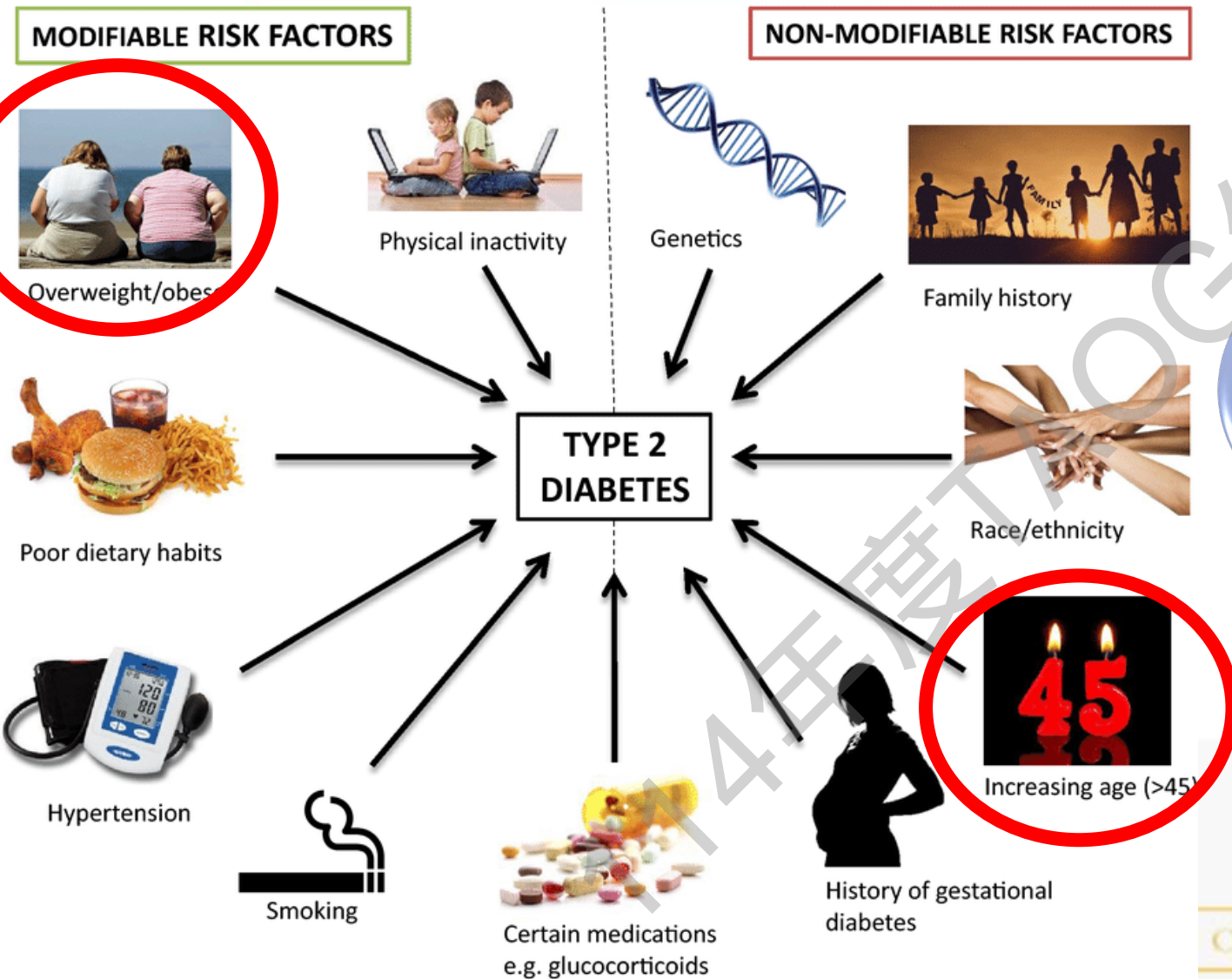
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2024年糖尿病診斷標準

| 診斷 | 正常 | 糖尿病前期 | 糖尿病 |
|-----------|-----------|--------------|------------|
| 糖化血紅蛋白 | <5.7% | 5.7-6.4% | ≥6.5% |
| 空腹血糖 | <99mg/dL | 100-125mg/dL | ≥126 mg/dL |
| 口服葡萄糖耐量試驗 | <139mg/dL | 140-199mg/dL | ≥200 mg/dL |
| 隨機血漿血糖測試 | N/A | N/A | ≥200 mg/dL |

DM – Risk Factor





危機四伏

糖

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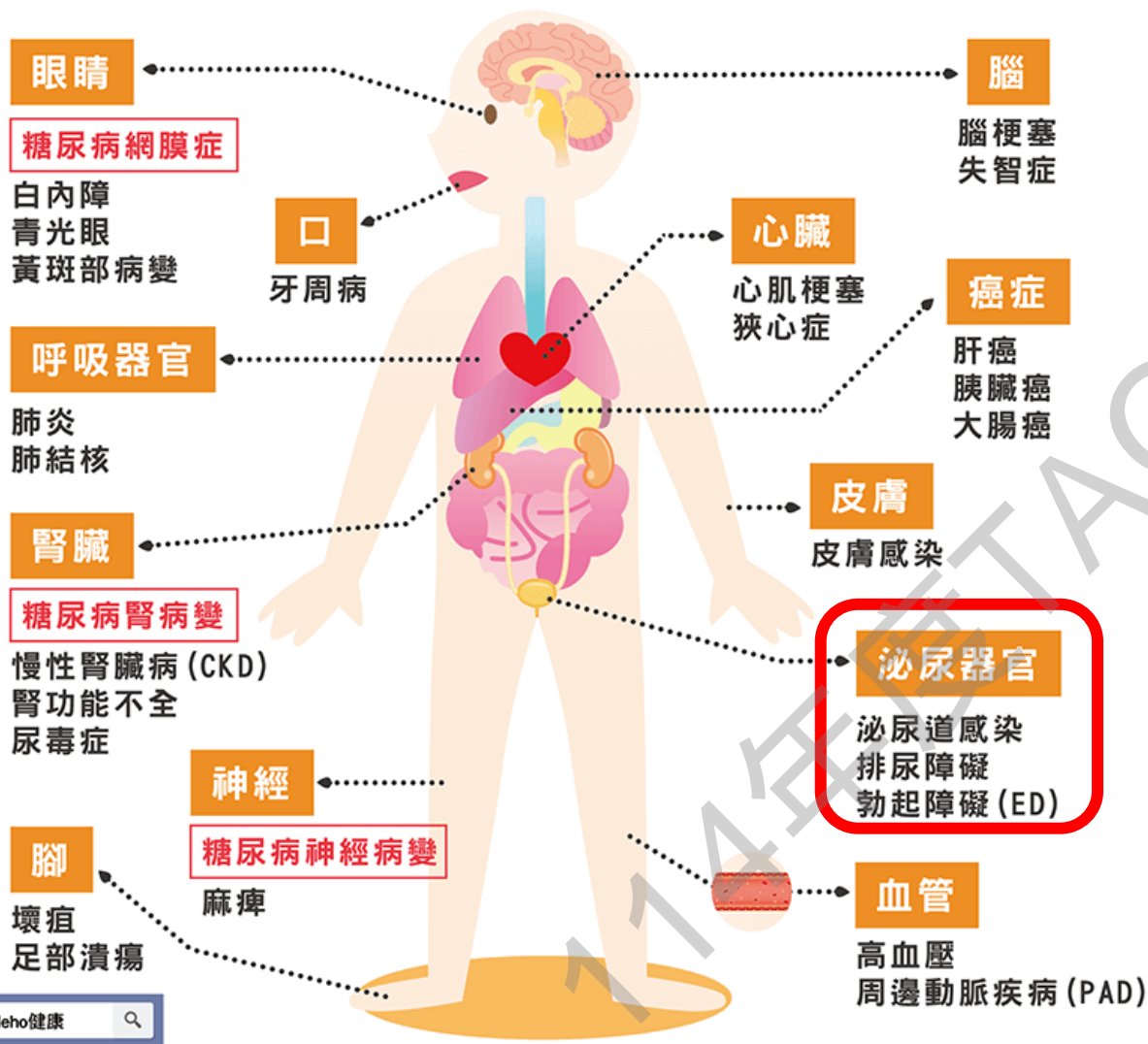
併

發

症

HEHO

DM – Complication



• 四大病變：

• 大血管病變

- 糖尿心、糖尿腦

• 小血管病變

- 糖尿眼、糖尿腎

• 神經病變

- 周邊神經病變、自律神經病變、局部神經病變

• 足部病變

- 糖尿腳



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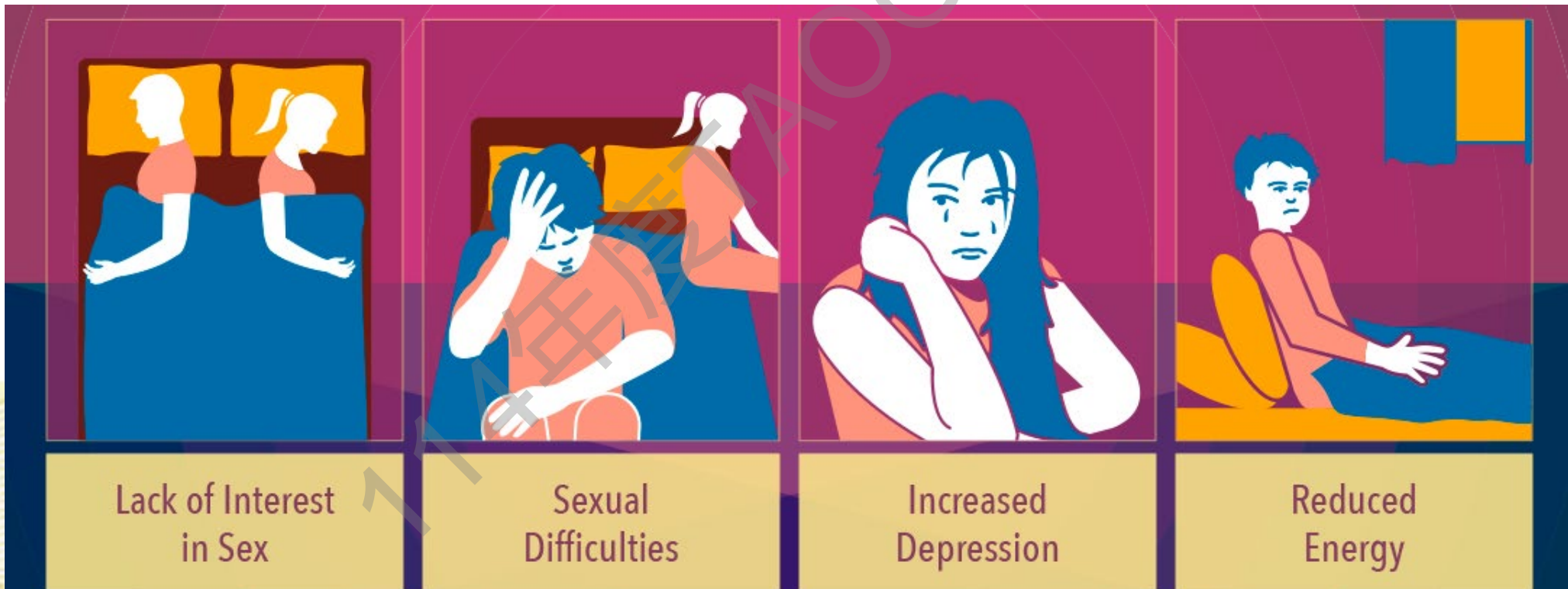


Heho健康



DM – Sexual Dysfunction

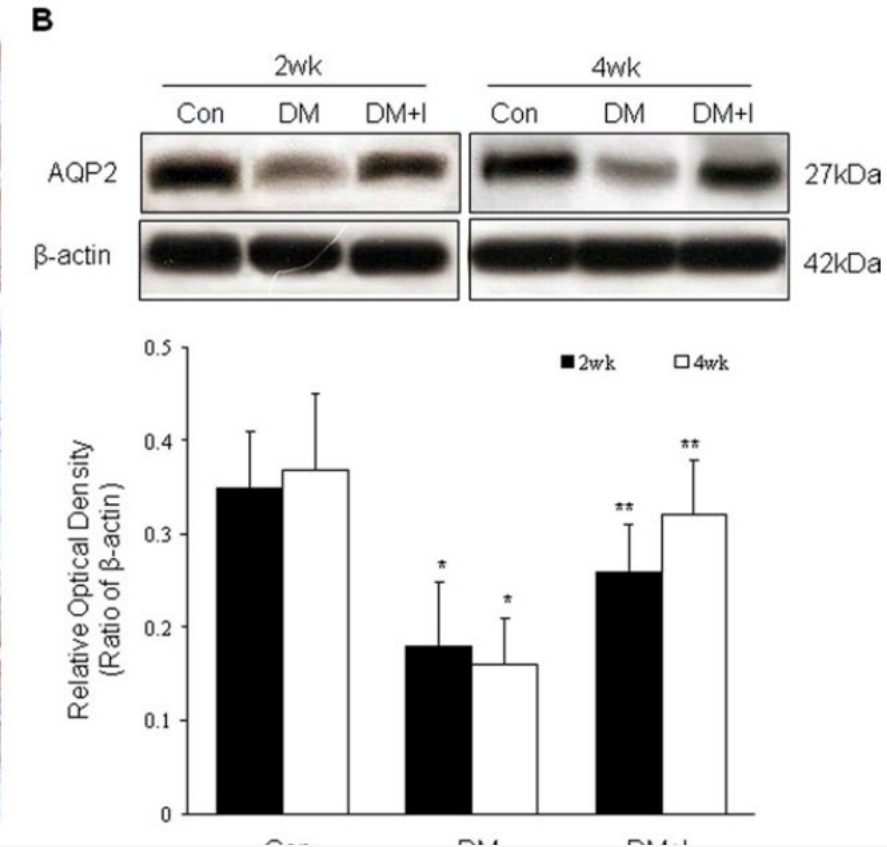
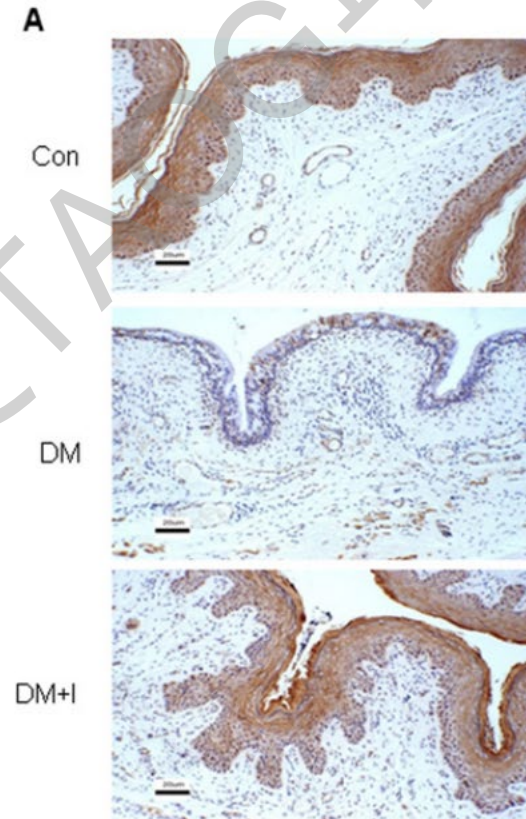
- 64.5% woman with type II DM had sexual dysfunction
- Type I >> Type II



Effect of Hyperglycemia on Expression of Aquaporins in the Rat Vagina

Hyun-Suk Lee, Zhengri Li, Sun-Ouck Kim, Kyuyoun Ahn, Noel N. Kim, and Kwangsung Park

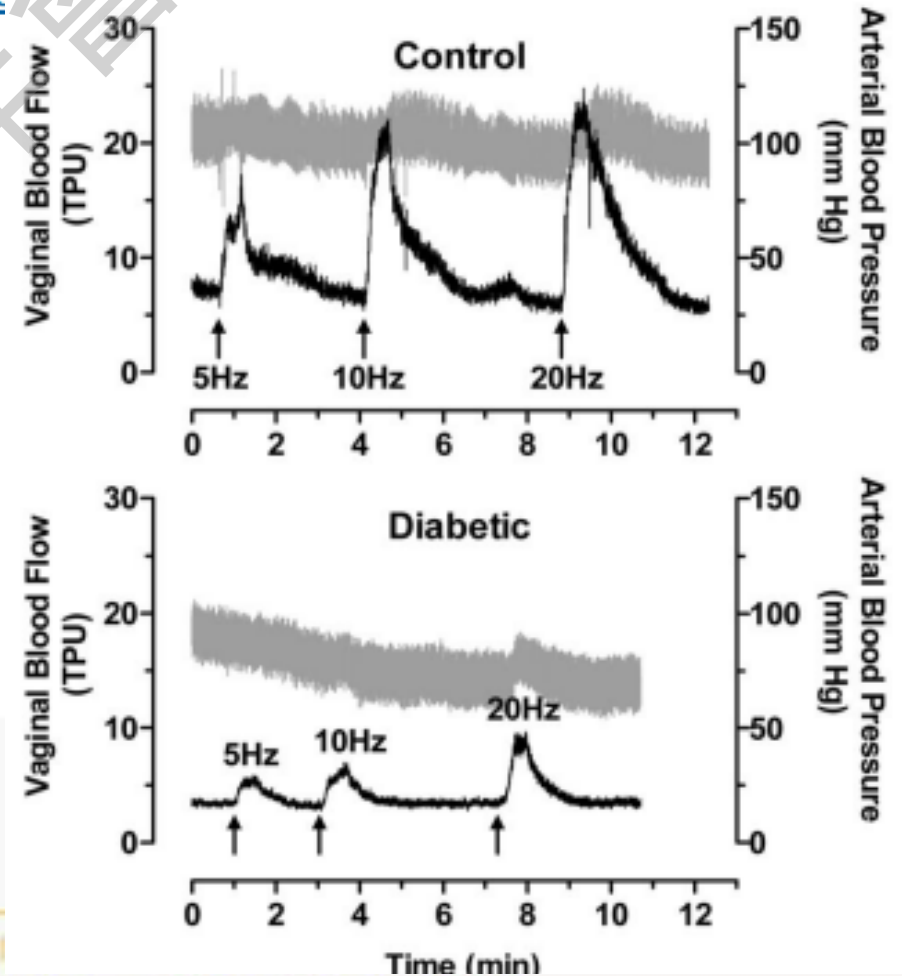
- Aquaporins (AQPs) are membrane proteins that transport water
- decreased vaginal lubrication in diabetic women



Streptozotocin-induced diabetes in the rat is associated with changes in vaginal hemodynamics, morphology and biochemical markers

Noel N Kim^{1,✉}, Miljan Stankovic¹, Tulay T Cushman², Irwin Goldstein¹, Ricardo Traish^{1,3}

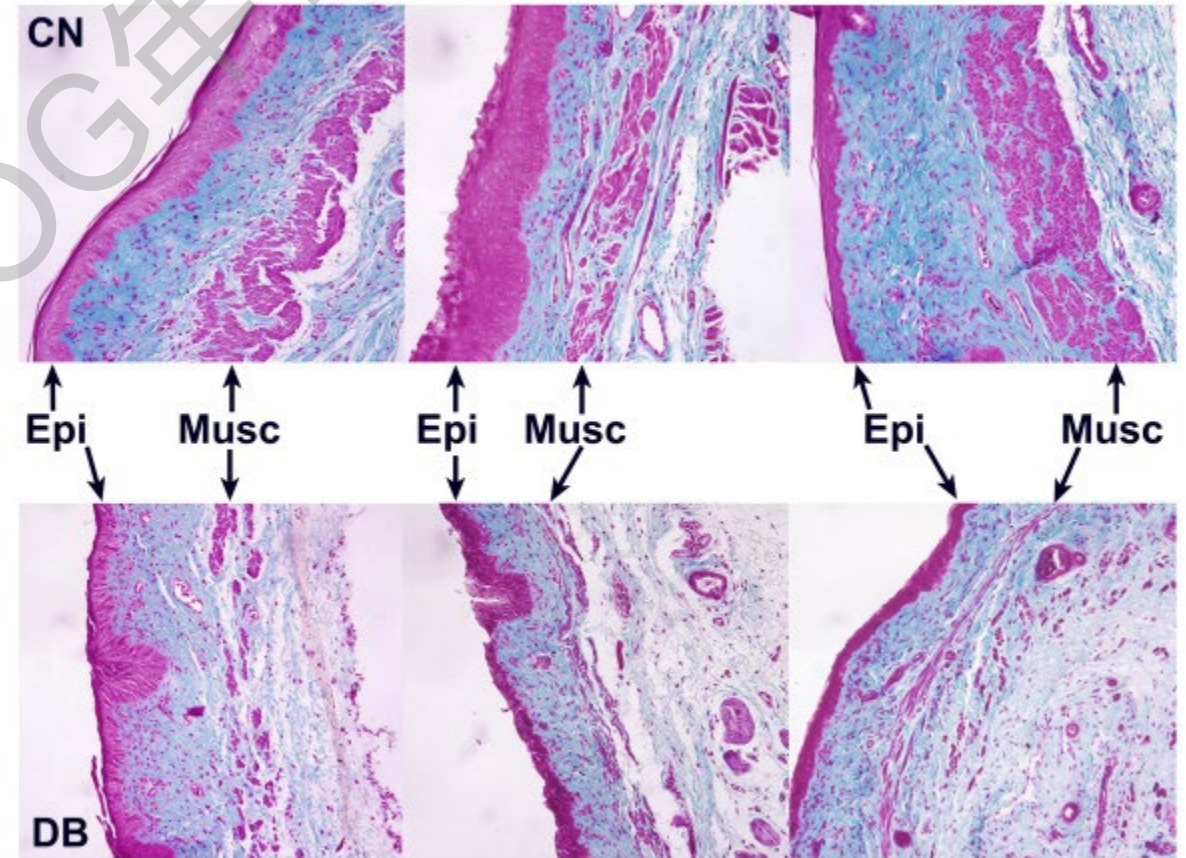
- In control rats, vaginal blood flow in response to pelvic nerve stimulation was proportional to the stimulation frequency.
- However, in diabetic animals, the amplitude of the blood flow response was significantly reduced.



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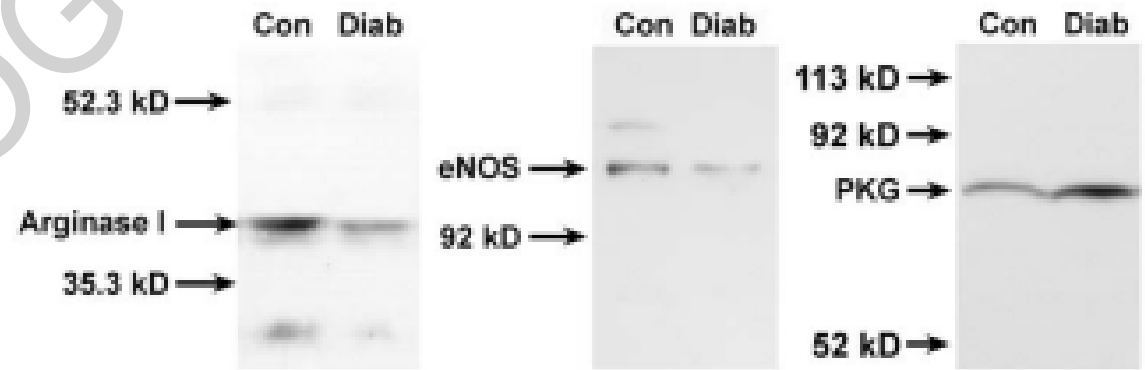
- diabetic rats: **epithelium** more **thin** with fewer layers of cells, **muscularis layer** was **thin** with **less well developed bundles**, suggesting atrophy



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- The protein levels of arginase I, endothelial nitric oxide synthase (eNOS), and cGMP dependent protein kinase (PKG) were key enzymes that are known to regulate **vascular smooth muscle tone** within the vagina.



Arginase I ↓

eNOS ↓

PKG ↑

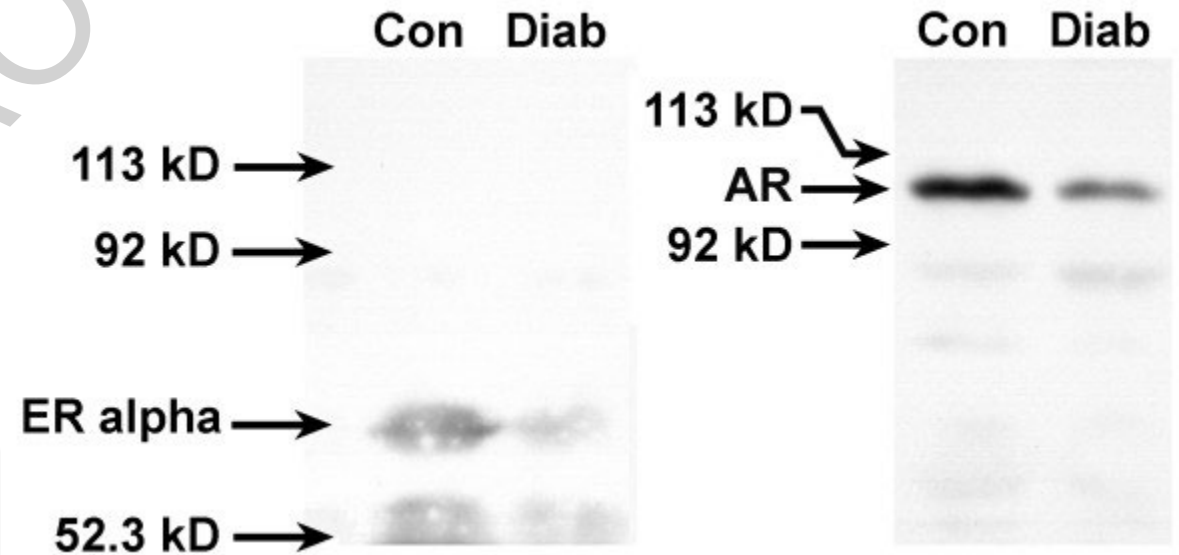


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[Noel N Kim](#)^{1,✉}, [Miljan Stankovic](#)¹, [Tulay T Cushman](#)², [Irwin Goldstein](#)¹, [Ricardo Munarriz](#)¹, [Abdulmaged M Traish](#)^{1,3}

- **Estrogen receptor alpha** (ER α) decreased in vaginal tissue from diabetic rats by 51% and **androgen receptor** (AR) protein levels decreased by 69%



The change of vagina in diabetic

- Diabetes may lead to multiple disruptions in sex steroid hormone synthesis, metabolism and action.
- These pathological events may cause dramatic changes in **tissue structure** and **key enzymes** that regulate cell growth and smooth muscle contractility. → affecting the genital response during sexual arousal
- lubrication↓ , epithelium thickness↓ , blood flow↓ , Muscle tone↓
- These changes are similar to those of **menopause**



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The Effects of Diabetes Mellitus and Obesity to Pelvic Organ Prolapse in Postmenopausal Women

- Conclusion:

- Obesity and DM seem to be risk factors for POP.
- However, obesity as a modifiable risk factor has more effect on developing uterine prolapse than diabetes and it is important for developing new therapy strategies.

Table 2. The evaluation of anterior, apical and posterior defect stage of four groups.

| | Nondiabetic- Non obese | | Non obese-Diabetic | | Obese-Non diabetic | | Obese-Diabetic | | | |
|------------------------|---------------------------|------|--------------------|------|--------------------|------|----------------|------|----------------|----------|
| | n | % | N | % | n | % | n | % | Chi- square | p |
| Anterior defect Stage | | | | | | | | | | |
| 0 | 11 | 35,5 | 3 | 12,5 | 2 | 7,7 | 0 | 0 | | |
| 1 | 14 | 45,2 | 7 | 29,2 | 5 | 19,2 | 3 | 13,0 | | |
| 2-3 | 6 | 19,4 | 14 | 58,3 | 19 | 73,1 | 20 | 87,0 | 31,22 | 0,000*** |
| Apical defect stage | | | | | | | | | | |
| 0 | 12 | 38,7 | 4 | 16,7 | 3 | 11,5 | 1 | 4,3 | | |
| 1 | 14 | 45,2 | 6 | 25,0 | 4 | 15,4 | 2 | 8,7 | | |
| 2-3 | 5 | 16,1 | 14 | 58,3 | 19 | 73,1 | 20 | 87,0 | 32,26 | 0,000*** |
| Posterior defect stage | | | | | | | | | | |
| 0 | 13 | 41,9 | 4 | 16,7 | 2 | 7,7 | 1 | 4,3 | | |
| 1 | 16 | 51,6 | 12 | 50,0 | 12 | 46,2 | 8 | 34,8 | | |
| 2-3 | 2 | 6,5 | 8 | 33,3 | 12 | 46,2 | 14 | 60,9 | 26,45 | 0,000*** |

Are hypertension and diabetes mellitus risk factors for pelvic organ prolapse?

Hatice Isık^{a,*}, Oner Aynioglu^a, Ahmet Sahbaz^a, Refika Selimoglu^b, Hakan Timur^c, Muge Harma^a

- comprising 186 patients with POP and 400 patients without
- comorbidities as **HT + DM together** should be considered as risk factors

Table 3

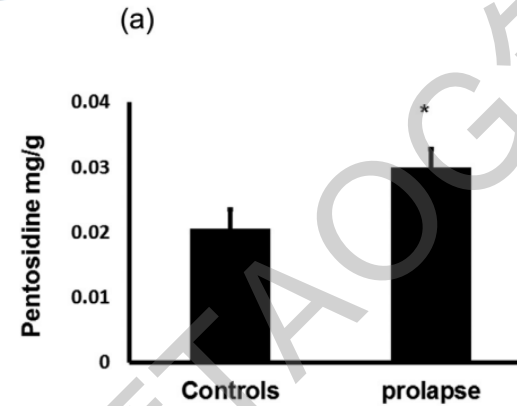
Logistic regression analysis of the risk factors causing pelvic organ prolapse. OR: Odds ratio, CI: confidence interval. BMI: Body mass index, HT: hypertension, DM: Diabetes mellitus.

| | OR (95% CI) | p value |
|----------------------|------------------------|---------|
| Age | 1.02 (1.00–1.04) | 0.026 |
| BMI ≥ 25 | 1.78 (1.05–3.01) | 0.030 |
| Multiparity | 0.56 (0.25–1.22) | 0.146 |
| Maximal birth weight | 1.001 (1.009–1.013) | <0.001 |
| Type of delivery | | |
| Nullipar | 0.735 (0.291–1.86) | 0.517 |
| Cesarean only | Reference ^a | |
| Vaginal + cesarean | 5.56 (3.18–9.73) | <0.001 |
| HT | 0.86 (0.51–1.44) | 0.572 |
| DM | 0.65 (0.60–1.36) | 0.256 |
| HT+DM | 1.9 (1.1–3.16) | 0.014 |

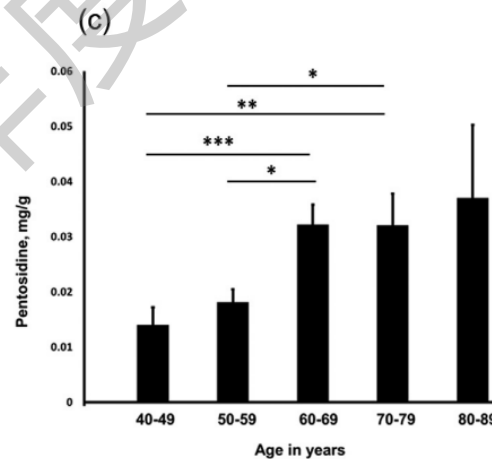
^a Cesarean delivery is supposed to be low risk for POP and designed as reference. The risks of other type of delivery were given with respect to reference.

Full length article

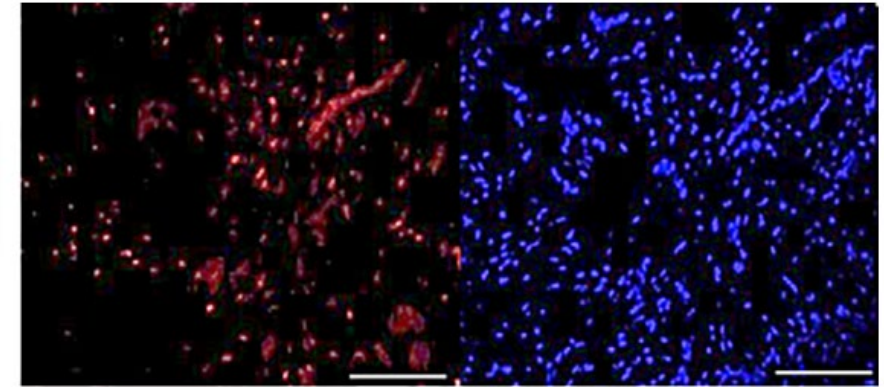
New insight into glycation levels and pelvic organ prolapse - A combination of clinical and biochemical studies



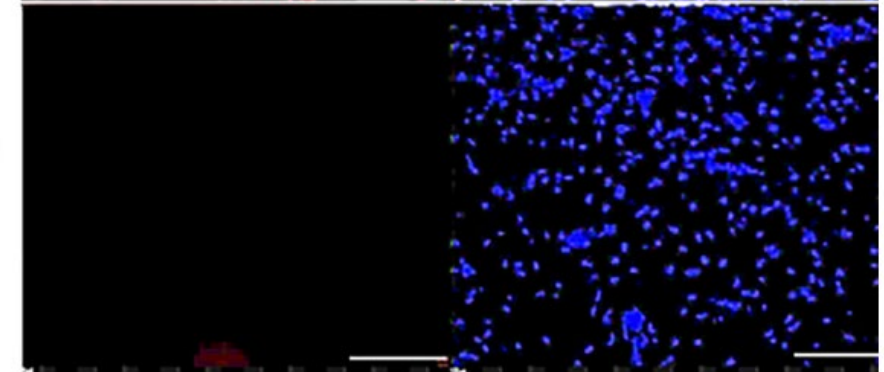
Estrogen receptor alpha



Control



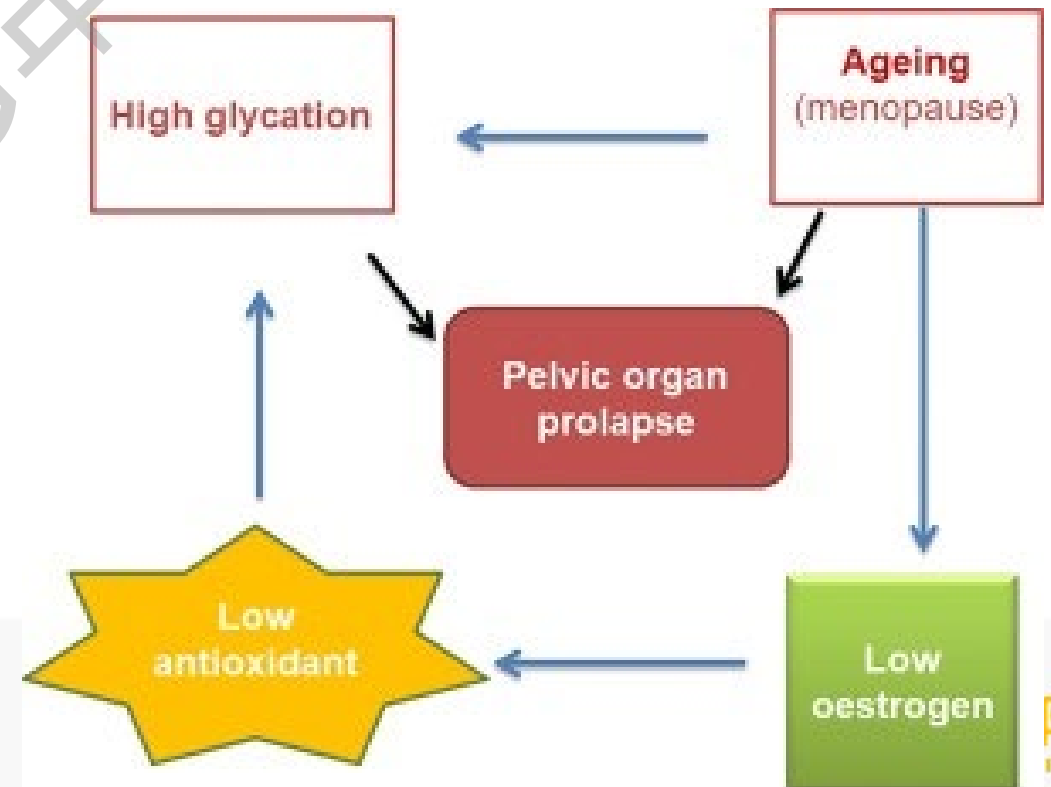
Prolapse




Full length article

New insight into glycation levels and pelvic organ prolapse - A combination of clinical and biochemical studies

- age-related oestrogen decline is a key player in glycation accumulation in prolapsed vaginal tissues



► Int J Womens Health. 2023 Jul 18;15:1093–1105. doi: [10.2147/IJWH.S413729](https://doi.org/10.2147/IJWH.S413729) 

The Outcome of Sacrocolpopexy/Sacrohysteropexy for Patients with Pelvic Organ Prolapse and Predictors of Anatomical Failure

[Jawaher A Alsahabi](#)^{1,2}, [Saeed Alsary](#)^{1,2}, [Mostafa A Abolfotouh](#)², 

- Sacrocolpopexy (n=144) and Sacrohysteropexy (n=56)
- Patient characteristics [age, parity, BMI, and past medical and surgical history], prolapse-related, and Outcome characteristics.
- **Diabetes** (OR=4.93, 95% CI:1.33–18.33, p=0.02) and **elder age** at the time of the surgery **played a role in predicting recurrence**.



> Int Urogynecol J. 2023 Aug;34(8):1859-1866. doi: 10.1007/s00192-023-05455-y. Epub 2023 Feb 13.

The impact of diabetes mellitus on pelvic organ prolapse recurrence after robotic sacrocolpopexy

Sarah Eckhardt¹, Katharina Laus^{2 3}, Samantha DeAndrade^{2 3}, Janet Lee⁴, John Nguyen²

- 547 patients, 100 had DM.
- Women with DM had more advanced prolapse
- DM had increased risk of anterior vaginal prolapse recurrence (13% vs 3%, $p < 0.01$)



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Review > BJU Int. 2016 Feb;117(2):323-43. doi: 10.1111/bju.13158. Epub 2015 Jun 11.

Risk factors for mesh erosion after female pelvic floor reconstructive surgery: a systematic review and meta-analysis

Tuo Deng¹, Banghua Liao¹, Deyi Luo¹, Hong Shen¹, Kunjie Wang¹

Affiliations + expand

PMID: 25906691 DOI: 10.1111/bju.13158

- diabetes mellitus v.s. erosion
- 13 studies
- The meta-analysis showed that concomitant diabetes mellitus was significantly more common in patients suffered from mesh erosion than no erosion groups (OR = 1.87, 95% CI: 1.35-2.57, P = 0.0002)
- This result indicated that **diabetes mellitus was a significant risk factor.**

Analysis of risk factors associated with vaginal erosion after synthetic sling procedures for stress urinary incontinence

Huey-Yi Chen · Ming Ho · Yao-Ching Hung ·
Li-Chia Huang

- diabetes mellitus (DM) was a significant risk factor for vaginal erosion

| Variables | No erosion (<i>n</i> =233), no. (%) | Erosion (<i>n</i> =6), no. (%) | <i>p</i> value |
|--|--|---------------------------------------|-------------------|
| Age (years) | | | 1 |
| 28–46 | 60 (26) | 1 (17) | |
| 47–65 | 140 (60) | 4 (66) | |
| ≥66 | 33 (14) | 1 (17) | |
| Parity | | | 0.227 |
| 0–2 | 55 (24) | 2 (33) | |
| 3–5 | 165 (71) | 3 (50) | |
| ≥6 | 13 (5) | 1 (17) | |
| Body mass index (kg/m ²) | | | 0.781 |
| 17–23 | 106 (46) | 2 (33) | |
| 23.1–29 | 113 (48) | 4 (67) | |
| ≥29.1 | 14 (6) | 0 (0) | |
| Menopause | 125 (54) | 2 (33) | 0.423 |
| Concomitant surgery | | | |
| Hysterectomy | 15 (6) | 1 (17) | 0.343 |
| Reconstructive pelvic floor surgery | 134 (58) | 4 (67) | 1 |
| Tape type | | | |
| TVT | 77 (33) | 1 (17) | 0.667 |
| TVT-O | 142 (61) | 3 (50) | 0.682 |
| TVS | 14 (6) | 2 (33) | 0.054 |
| Diabetes mellitus | | | 0.023 |
| with | 25 (11) | 3 (50) | |
| without | 208 (89) | 3 (50) | |
| Surgical experience | | | 0.873 |
| 0–80 | 78 (33.5) | 2 (33) | |
| 81–160 | 77 (33) | 3 (50) | |

DM – Treatment

PROTECT YOURSELF FROM **DIABETES**
Follow these steps to keep your health on **TRACK**.



Conclusion

- Vagina change in DM: lubrication↓ , epithelium thickness↓ , blood flow↓ , Muscle tone↓ → Like **menopausal change**
- DM is a **risk factor** of POP
- Predict post-operative **recurrent prolapse** and complication with **mesh erosion**
- Control blood sugar is important for every patient!



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Thank you!

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