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泌尿道結石與男性性腺功能低下的臨床新進展

The New Frontier of Stone Management and Male Hypogonadism: From Genetics to Robotics

時間：115 年 6 月 27 日(星期六) 13:30~17:30
地點：臺北榮民總醫院 致德樓第五會議室

13:30-13:35 Opening Remarks

鍾孝仁 主任
Hsiao-Jen Chung

Session I : The New Frontier of Stone Management: From Genetics to Robotics

座長：鍾孝仁 主任 (Hsiao-Jen Chung)
林承家 主任 (Cheng-Chia Lin)

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|------------------------------------|---|--------------------------|
| 13:35-14:05 | 探尋特發性背後：腎結石的可能遺傳成因
Beyond Idiopathic: Unraveling the Genetic Basis in
Nephrolithiasis | 陳威任 醫師
Wei-Jen Chen |
| 14:05-14:35 | 優化雷射碎石術效率：比較 Holmium laser and Thulium laser
Optimizing Lithotripsy Efficiency: The Rivalry of Holmium
Laser and Thulium Laser | 戴逸昇 醫師
Yi-Sheng Tai |
| 14:35-15:05 | 機器輔助逆行性腎內手術 (RIRS)：提升泌尿內視鏡手術
中的精準度、人因工程與手術成效
Robotic-Assisted Retrograde Intrarenal Surgery (RIRS):
Enhancing Precision, Ergonomics, and Surgical Outcomes in
Endourology | 顏敬恆 醫師
Ching-Heng Yen |
| 15:05-15:20 | Discussion | |
| 15:20-15:35 Coffee Break | | |

Session II : Emerging Perspectives on Male Hypogonadism and Testosterone Replacement Therapy

座長：黃志賢 院長 (William JS Huang)
吳建志 教授 (Chien-Chih Wu)

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| 15:35-16:05 | 男性性腺功能低下睪固酮補充治療之新興趨勢：從注射、
經皮到鼻內給藥
Emerging trends in Androgen Replacement Therapy for Male
Hypogonadism: From Injectable and Transdermal to
Intranasal Administration | 張奕凱 醫師
Yi-Kai Chang |
| 16:05-16:35 | 年輕男性睪固酮缺乏症之臨床處置：生育力保存的考量
Clinical Management of Testosterone Deficiency in Young
and Fertile Men | 林宗彥 醫師
Tsung-Yen Lin |

16:35-17:05	睪固酮補充治療的心血管安全性：TRAVERSE 試驗的關鍵啟示 Cardiovascular Safety of Testosterone Replacement Therapy: Key Insights from the TRAVERSE Trial	謝宗頤醫師 Tsung-Yi Hsieh
17:05-17:25	Discussion	
17:25-17:30	<i>Closing Remarks</i>	鍾孝仁主任 Hsiao-Jen Chung

Beyond idiopathic: Unraveling the genetic basis in nephrolithiasis

探尋特發性背後：腎結石的可能遺傳成因

Wei-Jen Chen

陳威任

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Nephrolithiasis affects a substantial proportion of the global population and carries a significant burden of recurrence and long-term renal morbidity. Although dietary and environmental factors have long been recognized as contributors, the label of “idiopathic” nephrolithiasis has obscured a meaningful understanding of the disease’s molecular drivers. However, recent advancements in genomic sequencing are fundamentally shifting the paradigm. Beyond the well-known monogenetic disorders such as cystinuria (SLC3A1, SLC7A9) and primary hyperoxaluria (AGXT, GRHPR, HOGA1), recent clinical genetic studies have identified an expanding list of potential genetic mutations in previously categorized as idiopathic

Monogenic mutations account for a diagnostically important subset of nephrolithiasis cases, particularly in pediatric populations and those with early-onset or recurrent disease. Currently, there are more than 40 Mendelian genes reported to be causative of stone formation. The majority of these monogenic mutations follow an autosomal recessive inheritance pattern. However, growing evidence suggests that heterozygous carriers of pathogenic variants in these genes are not entirely protected, and may still carry an elevated risk of nephrolithiasis in adulthood. In parallel, genome-wide association studies have identified multiple common variants associated with stone risk, underscoring the polygenic architecture that modulates susceptibility across broader patient populations.

Despite these advances, the translation of genetic findings into routine clinical practice remains limited. Barriers include the heterogeneity of stone phenotypes, incomplete genotype-phenotype correlations, and restricted access to comprehensive genetic testing in clinical settings. Nevertheless, emerging evidence supports the integration of genetic evaluation into the diagnostic workup of selected patients, with the potential to refine risk stratification and guide targeted therapeutic strategies. The trajectory of primary hyperoxaluria type 1 stands as the most compelling example nowadays: precise identification of AGXT mutations has directly enabled the clinical deployment of Lumasiran and Nedosiran.

This presentation highlights that the designation of “idiopathic” nephrolithiasis might not be a final diagnosis, but as an indication for further molecular investigation. A deeper understanding of the genetic basis of stone disease holds potential for moving the field toward more precise, individualized approaches to prevention and care.

Optimizing lithotripsy efficiency: The rivalry of Holmium laser and Thulium laser

優化雷射碎石術效率：比較 Holmium laser and Thulium laser

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Preoperative evaluation is critically important, as the choice of surgical approach and required instruments is determined by stone characteristics and the patient's clinical condition. Laser systems are an indispensable component of contemporary stone surgery.

Holmium:YAG laser technology has a long history and well-established clinical efficacy, remaining the dominant modality in most stone procedures. However, its high peak power can increase retropulsion and reduce fragmentation efficiency, which has been a persistent target for technological improvement. In addition, the large machine footprint and high energy consumption raise concerns regarding medical resource utilization in an era that increasingly emphasizes sustainability and ESG principles.

The parameter settings of the thulium fiber laser (TFL) are highly diverse and complex. Surgeons must be thoroughly familiar with the system to apply it effectively across different clinical scenarios. While TFL offers advantages such as ultra-high frequency and extensive parameter adjustability, practical challenges, including carbonization and excessive laser flash (char and char formation)—may interfere with surgical visualization and efficiency.

The pulsed thulium laser (pTM:YAG) is an emerging laser system characterized by high peak power combined with pulsed modulation, producing effective coagulation and cavitation effects. This technology is well suited for both lithotripsy and prostate surgery, offering strong versatility across urological applications.

Every laser platform has its own clinical value. Technological evolution should not be limited to the machines themselves; only through a deep understanding of each system can surgeons fully exploit its potential, optimize surgical performance, and ultimately enhance the quality of patient care.

Robotic-assisted retrograde intrarenal surgery (RIRS): Enhancing precision, ergonomics, and surgical outcomes in endourology

機器輔助逆行性腎內手術（RIRS）：提升泌尿內視鏡手術中的精準度、人因工程與手術成效

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Retrograde intrarenal surgery (RIRS) has become a cornerstone in the management of upper urinary tract calculi, driven by advancements in flexible ureteroscopy and laser technology. However, conventional RIRS remains technically demanding, with challenges including surgeon fatigue, limited instrument stability, and a steep learning curve. The integration of robotic assistance into RIRS represents a promising evolution aimed at addressing these limitations.

Robotic-assisted RIRS (RA-RIRS) platforms provide enhanced scope stability, tremor filtration, and intuitive control, allowing for more precise navigation within the intrarenal collecting system. These systems also offer improved ergonomics, potentially reducing operator fatigue during prolonged procedures. Emerging evidence suggests that RA-RIRS may improve stone-free rates, particularly in complex or lower pole stones, while maintaining comparable safety profiles to conventional techniques.

In addition, robotic platforms facilitate integration with adjunctive technologies such as real-time imaging, automated scope positioning, and potentially artificial intelligence-driven stone targeting. These innovations may further optimize operative efficiency and reproducibility across varying levels of surgical expertise.

Despite its advantages, challenges remain, including cost considerations, system accessibility, and the need for further high-quality comparative studies to establish clear clinical benefits. As technology continues to evolve, RA-RIRS may play a pivotal role in shaping the future of minimally invasive stone surgery.

This presentation will review current robotic platforms, clinical outcomes, technical considerations, and future directions of robotic-assisted RIRS, highlighting its potential to redefine precision and efficiency in endourological practice.

Emerging trends in androgen replacement therapy for male hypogonadism: From injectable and transdermal to intranasal administration

男性性腺功能低下睪固酮補充治療之新興趨勢：從注射、經皮到鼻內給藥

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Male hypogonadism is an increasingly recognized clinical entity, with a reported prevalence of approximately 20% among men in the primary care setting and a rising trend with advancing age. Testosterone replacement therapy (TRT) remains the cornerstone of management for symptomatic men with consistently low serum testosterone concentrations, and aims to restore physiological testosterone levels—typically within the mid-adult male reference range of 400 to 800 ng/dL—while alleviating symptoms and improving body composition, bone mineral density, sexual function, and quality of life. Since the introduction of transdermal testosterone gels in 2003, the landscape of TRT has evolved substantially. Prescriptions in the United States rose more than threefold between 2000 and 2011, followed by a 48% decline from 2013 to 2016 in response to FDA warnings regarding cardiovascular risk and refined indications for use. This shifting landscape underscores the importance of individualized therapy guided by both efficacy and safety considerations.

This lecture will provide a contemporary overview of the available routes of testosterone administration, including their pharmacokinetic profiles, efficacy, safety, and practical considerations for clinical use. Intramuscular testosterone esters (enanthate, cypionate, and long-acting undecanoate) offer proven long-term efficacy but are associated with peak-and-trough fluctuations and, in the case of undecanoate, a rare risk of pulmonary oil microembolism. Subcutaneous testosterone enanthate delivered by autoinjector represents a more recent option that provides steadier serum concentrations with improved patient comfort. Transdermal patches and gels deliver relatively stable physiological testosterone levels but carry the risk of skin irritation and secondary transfer through close skin contact. Newly available oral testosterone undecanoate self-emulsifying formulations have re-introduced an oral option without hepatotoxicity concerns. Intranasal testosterone gel, administered three times daily, offers a distinct advantage in that it appears to cause less suppression of gonadotropins and spermatogenesis, making it a potentially attractive option for younger hypogonadal men who wish to preserve fertility. Non-testosterone strategies, including human chorionic gonadotropin, selective estrogen receptor modulators, and aromatase inhibitors, will also be briefly discussed in the context of fertility-preserving treatment. Through case-based discussion and current evidence, this presentation aims to equip urologists with a practical framework for selecting the most appropriate androgen replacement modality based on patient preference, treatment goals, pharmacokinetic considerations, and long-term safety.

Clinical management of testosterone deficiency in young and fertile men

年輕男性睪固酮缺乏症之臨床處置：生育力保存的考量

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Testosterone deficiency (TD) in young men presents unique clinical challenges, particularly in those who desire current or future fertility. Unlike older hypogonadal men, management strategies in reproductive-aged patients must balance symptomatic improvement with preservation of spermatogenesis, as conventional testosterone replacement therapy (TRT) suppresses the hypothalamic–pituitary–gonadal axis and may result in oligospermia or azoospermia. Accurate diagnosis requires characteristic symptoms together with consistently low morning serum testosterone levels, confirmed on repeated testing. Recent evidence suggests that hypogonadism is increasingly recognized among infertile men, with reported prevalence rates ranging from 16% to 45%, depending on semen quality and diagnostic criteria.

This lecture will review the contemporary clinical approach to testosterone deficiency in young and fertile men, including diagnostic evaluation, identification of reversible causes, and differentiation between primary and secondary hypogonadism. The reproductive risks and limitations associated with exogenous testosterone therapy will also be discussed. Special emphasis will be placed on fertility-preserving therapeutic strategies, including selective estrogen receptor modulators (SERMs), aromatase inhibitors, human chorionic gonadotropin (hCG), and intranasal testosterone formulations. Evidence-based treatment selection, combination regimens, and monitoring strategies for testosterone levels, hematocrit, prostate safety, and reproductive outcomes will also be reviewed. Through case-based discussion and current guideline recommendations, this presentation aims to provide practical and evidence-based management strategies for urologists caring for young men with testosterone deficiency while preserving reproductive potential.

Cardiovascular safety of testosterone replacement therapy: Key insights from the TRAVERSE trial

睪固酮補充治療的心血管安全性：TRAVERSE 試驗的關鍵啟示

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The cardiovascular safety of testosterone replacement therapy (TRT) in men with hypogonadism has long been a clinical concern. The TRAVERSE Study is the largest randomized, double-blind, placebo-controlled trial designed to determine the effects of TRT on the incidence of major adverse cardiac events (MACE) among middle-aged and older men with hypogonadism and preexisting or high-risk cardiovascular disease. The trial provided robust evidence that TRT does not significantly increase the risk of MACE compared to placebo. However, patients receiving TRT demonstrated a higher incidence of atrial fibrillation, acute kidney injury, and pulmonary embolism. These findings warrant careful interpretation. This presentation reviews the trial's design and primary outcomes, examine these secondary safety signals, and discuss how a balanced interpretation of the evidence can inform individualized clinical decision-making regarding the potential benefits and risks of TRT in middle-aged and older men with hypogonadism.