Key Lectures *(Alphabetic order)*

11th Yazd International Congress and Student Award on Reproductive Medicine

K-1
Infectious and immunological factors

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Recurrent pregnancy loss, defined as the occurrence of ≥ 2 consecutive miscarriages, can be influenced by a variety of factors, including genetic, anatomical, hormonal, and immunologic factors. While much research has focused on maternal factors, male factor contributions to recurrent abortion are increasingly recognized. Here's an overview of the role of infection and immunologic factors in male factor recurrent abortion. Infection: semen quality: infections in the male reproductive tract (e.g., sexually transmitted infections like Chlamydia or Ureaplasma) can affect semen quality by altering sperm motility, morphology, and overall viability. Poor sperm quality may contribute to fertilization issues and subsequent pregnancy loss. Systemic infections: systemic infections in males can lead to inflammatory responses that may affect sperm production and function. Elevated levels of inflammatory cytokines can impact reproductive outcomes. Microbiome influence: the male urogenital microbiome may play a role in fertility. Dysbiosis or an imbalance in the microbiome could potentially influence sperm health and contribute to reproductive challenges. Immunologic factors: sperm antigens: the immune system may recognize paternal sperm antigens as foreign, leading to an immune response that could affect implantation or early pregnancy maintenance. This is particularly relevant if there is a history of autoimmune disorders or if the female partner has an autoimmune condition. Antisperm antibodies: the presence of antisperm antibodies in either partner can impair sperm function and fertilization potential. These antibodies can be produced due to previous infections or trauma. Th1/Th2 cytokine balance: A skewed balance between Th1 (pro-inflammatory) and Th2 (anti-inflammatory) cytokines can impact pregnancy outcomes. An inappropriate immune response from either partner may lead to implantation failure or miscarriage. Other considerations: environmental factors: exposure to environmental toxins (e.g., heavy metals, pesticides) can also influence both infection rates and immunologic responses in males, potentially impacting fertility. Lifestyle factors: smoking, alcohol consumption, obesity, and stress are known to affect both male fertility parameters and overall health status. While traditionally viewed as primarily a female issue, male factors- including infections and immunologic responses- can significantly contribute to recurrent pregnancy loss. A comprehensive evaluation involving both partners is essential for understanding the underlying causes of RPL and developing effective treatment strategies. Addressing these factors through lifestyle modifications, medical treatments for infections, or immunotherapy may improve reproductive outcomes for couples experiencing recurrent miscarriages.

K-2
Metabolites and in vitro gametogenesis

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Several studies have shown that conditioned medium (CM) from germ cells niche such as testicular cells (TC), cumulus cells (CC), and granulosa cells supports in vitro germ cells development from various sources of stem cells in different species. Recently, we have published 2 articles showing CM from TC (Akyash et al. 2024) and CC (Tahajjodi et al. 2025) facilitate germ cells differentiation from human embryonic stem cells (hESCs). In these studies, Yazd2 (46, XY) and Yazd4 (46, XX) hESC lines were used for in vitro gametogenesis. Human ESCs were induced for differentiation using embryoid body (EB) formation method in 4 groups; 1) EB medium as spontaneously differentiation condition (SD-EB), 2) 60% EB medium+40% DMEM (SD-DM), 3) CMTC/CC based on DMEM medium (CM-DM), 4) CMTC/CC based on EB medium (CM-EB). Our data confirmed previous studies in different species and other stem cells sources, that TCCM and CCCM support in vitro development of germ cells from stem cells. Moreover, our data indicated that the medium also has an impact on the process of differentiation as the CM based on the EB medium was more supportive than DMEM. It has been reported that metabolic co-dependence of the oocyte and CCs has an essential role in determining oocyte developmental competence which caused initiation further studies in our group to define the metabolic factors within CM from CCs and TCs.

K-3
PCO and women's health

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PCOS is a complex endocrine disorder with a prevalence of 6-15% in reproductive ages, characterized by oligomenorrhea, infertility, hyperandrogenism, and neurological disorders. Its impact on other body systems contributes to increased morbidity and even mortality in these patients. From a health perspective, these patients are divided into three age groups: adolescence, reproductive age, and premenopausal. During adolescence, girls with PCOS experience symptoms such as obesity, hirsutism, and menstrual disorders, which significantly impair their quality of life. These symptoms can lead to the development of depression and anxiety in patients. Therefore, screening is recommended, and if necessary, referral to a psychiatrist is advised. During reproductive age, infertility issues and the numerous treatments for infertility become a major concern. If pregnancy occurs, the complications of PCOS during pregnancy put these patients at risk of diabetes and hypertension. Additionally, the effects of hyperandrogenism can manifest in the newborn, leading to health problems in this age group as well. In premenopausal women with PCOS, there is an increased risk of type 2 diabetes, hypertension, cardiovascular disorders, and endometrial cancer. These factors jeopardize the individual's health. Ultimately, it is recommended that all PCOS patients, regardless of age or BMI, should be regularly screened for hypertension, diabetes, psychiatric disorders, obstructive sleep apnea, and endometrial hyperplasia. Preventive strategies should be implemented, and treatment should begin promptly if symptoms arise.

K-4
A case report study for ovarian tissue transplantation by verification method

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The purpose of ovarian tissue cryopreservation is to preserve primary and primordial follicles, which constitute the majority of ovarian follicles. This technique is primarily utilized in females, both prepubertal and adult, who are undergoing chemotherapy or radiation therapy and are with risk of ovarian tissue damage. It is also employed in cases where ovulation induction and oocyte retrieval are not feasible, offering a viable alternative for fertility preservation. Vitrification has been proven effective for freezing ovarian tissue with minimal alteration in cellular morphology. This method involves the use of high concentrations of cryoprotectants, such as dimethyl sulfoxide and ethylene glycol, along with an extremely rapid cooling rate (-1500°C/min), reducing the formation of ice crystals and cold-induced damage. This case report, conducted at the Yazd Reproductive Institute, Yazd, Iran involves the vitrification of ovarian tissue from a 28-yr-old woman diagnosed with acute lymphoblastic leukemia. In this procedure, the ovarian medulla was mechanically separated using a scalpel in a sterile petri dish, followed by the cutting of the ovarian cortex into thin slices. Tissue viability was assessed using chick embryo chorioallantoic membrane assays, while follicular count was determined through histological evaluation. The thawed viable ovarian tissue was then transplanted onto the residual medulla and a peritoneal pocket. The patient exhibited an appropriate hormonal profile and the restoration of her menstrual cycle, suggesting a successful transplant. However, this case report showed acceptable results from the aforementioned techniques. Further research is required to achieve consistent clinical success in this field.

K-5
Management of PCOS in reproductive age

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Polycystic ovary syndrome is a prevalent endocrine disorder characterized by hyperandrogenism and menstrual dysfunction, significantly impacting women's reproductive and metabolic health. Effective management strategies are crucial to mitigate associated symptoms and long-term complications. This abstract outlines a comprehensive approach to addressing hyperandrogenism and menstrual irregularities in polycystic ovary syndrome, encompassing lifestyle modifications, pharmacological interventions, and ongoing monitoring. Lifestyle adjustments, including dietary changes and increased physical activity, form the cornerstone of management, particularly for insulin resistance and weight management. Pharmacological options include hormonal contraceptives to regulate menstrual cycles and reduce androgen levels, anti-androgens to directly target hyperandrogenism, and insulin-sensitizing agents to improve metabolic profiles. Individualized treatment plans, tailored to patient-specific symptoms and risk factors, are essential. Regular follow-up and monitoring are vital to assess treatment efficacy, manage potential side effects, and optimize long-term outcomes, reducing the risk of cardiovascular disease, type 2 diabetes, and endometrial hyperplasia.

K-6
Sexual behavior after infertility diagnosis

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Infertility poses a significant challenge to the sexual lives of couples facing this issue. Primary and secondary infertility can be influenced by various factors, which may include female, male, both, or unknown causes. The hope for treatment can impact sexual behavior. The sexual behaviors of couples following an infertility diagnosis include: decreased intimacy and couple relationships, along with increased psychological pressures including: A) fear of failure: the inability to engage in sexual relations as a means of achieving fertility may diminish sexual desire. B) psychological tension: stress and psychological pressure can lower the desire for sexual relations. C) feelings of frustration: the inability to conceive can lead to feelings of frustration and depression. D) decreased self-esteem: some individuals may feel responsible for the situation and experience feelings of inadequacy, particularly if their partner blames them for this condition. E) increased tension: infertility can result in heightened stress and signs of conflict within marital relationships. F) negative reactions: negative behaviors towards each other may escalate, such as refusing to follow a scheduled plan for sexual relations. G) increased anxiety. Stress is due to: a) financial concerns: the costs associated with infertility treatment can generate financial anxiety. b) social pressure: societal expectations regarding parenthood may contribute to the stress.

K-7
Implementation of the midwifery models of care in infertility

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As expected, infertility issues have a strong correlation with psychological distress and emotional stress for both partners. The failure attempts terrify couples, especially women. Management of this condition demands a professional approach to care. This care should be based on equitable and human rights-based care, be high-quality, couple-centered, respectful, and encourage a trusting relationship and partnership. The midwifery models of care address all these aspects. Evidence-based research, on the other hand, revealed that midwives play a crucial role in cases of infertility and are involved in many aspects of infertile couples. These professionals can provide emotional support and evidence-based information, they also offer better communication by respecting the patient's values. There is a silent agreement, which midwives ought to play a role in assisted reproductive units. According to the European Union, assisted reproductive technology legal regulations, the presence of at least one midwife with at least 2 yr of experience in the field is required among others, for a fertility and reproductive unit to function properly. Midwives can play a bidirectional role in providing health services to infertile couples: constant support to the infertile couple's health service as well as, participation in medical intervention. Their role between doctors and patients is ideal for promoting better communication between the 2 components and providing a safe mechanism, by using knowledge and empathy, to suggest proper therapeutic options to the infertile couple. The aim of midwives' involvement lies in the continuous support of the infertile woman as well as, counseling the couple throughout this experience. They can operate as part of a broader interdisciplinary team effort along with community health workers, healthcare assistants, medical assistants, and specialist medical practitioners. This interdisciplinary collaboration allows for a seamless integration of services, tailored to the specific needs of infertile couples ensuring that they receive the most comprehensive care possible in diverse contexts and settings. Midwives' success in managing infertile couples requires the implementation of midwifery models of care. The models are mainly oriented toward four dimensions: health, care, relationships, and the midwifery profession. Midwifery models of care take place in partnership with the client or patient, recognize the right to self-determination, and is respectful, personalized, continuous, and non-authoritarian. The implementation of midwife continuity of care models, midwifery teamwork or caseload midwifery, the one-to-one midwifery model, the traditional model of general practionair attached community midwives, the midwifery model of care under the supervision of obstetric, and biomedical model can lead to significantly increased satisfaction with care and experience high-quality care. These models can enable couples to make informed health decisions, contribute to their overall autonomy and indecision-making, support healthy and physiological processes and use interventions only when indicated, thereby reducing the negative outcomes and the financial burden associated with unnecessary medical procedures.

K-8
Sperm-carried insulin-like growth factor 2: Towards the discovery of a spark contributing to embryo growth and development

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Background: Spermatozoa are known to carry RNAs that play a crucial role in early embryo development, with insulin-like growth factor 2 (IGF2) being a

potential key growth regulator. IGF2 is a paternally expressed, imprinted gene involved in cell growth and proliferation. Recent studies suggest that IGF2 is expressed in human spermatozoa, but its role in early embryo development remains under investigation.

Objective: To test that if *IGF2* gene expression in sperm is necessary for supporting early embryo development or not?

Materials and Methods: We measured sperm IGF2 mRNA levels in semen samples used for homologous assisted reproductive techniques (ART) in infertile couples and analyzed the correlation with embryo morphokinetics. Additionally, we studied the transcriptomes of blastocysts derived from mouse parthenotes injected with *IGF2* mRNA to identify potential mechanistic pathways.

Results: Sperm IGF2 mRNA levels negatively correlated with the time taken to reach the 2-cell stage (t2), as well as with t3, t4, t5, and the time to expanded blastocyst. This correlation held true regardless of maternal age, body mass index, anti-Müllerian hormone levels, or oocyte quality. An IGF2 mRNA index > 4.9 accurately predicted the likelihood of embryos reaching the blastocyst stage on day 5, with a sensitivity of 100% and specificity of 71.6% (area under the ROC curve 0.845; $p < 0.001$). In the animal model, transcriptome analysis revealed that 65 genes were up-regulated and 36 genes down-regulated in the experimental group compared to controls. These genes are involved in pathways critical for early embryo development, supporting the human findings.

Conclusion: This study challenges the traditional view of spermatozoa as merely carriers of paternal DNA. Our findings suggest that sperm IGF2 mRNA plays a vital role in early embryo development. The measurement of IGF2 mRNA levels in pre-ART sperm could serve as a predictive marker for the likelihood of successful blastocyst development in infertile couples undergoing ART.

K-9
Final oocyte maturation triggering

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Oocyte maturation triggering is a biological process that promotes the transformation of immature oocytes into fully competent oocyte for fertilization. In natural cycle, this process predominantly induced by a surge in luteinizing hormone that characterized by both nuclear and cytoplasmic maturation. Furthermore, trigger for oocyte maturation is a critical step in assisted reproductive technology, influencing the number and quality of mature retrieved oocytes. Oocyte maturation trigger involving protocols like human chorionic gonadotropin (hCG), gonadotropin releasing hormone (GnRH) agonist, and combinations of both known as dual and double triggers. Traditionally, HCG was used for this purpose however; it may not be optimal for all patients. Some evidence suggests that GnRH-a can lead to better oocyte and embryo quality compared to hCG alone. Combining hCG with GnRH-a has shown to enhance oocyte quality and quantity, particularly for normal and poor responders. Emerging evidences introduced kisspeptin as a novel trigger of oocyte maturation that regulates GnRH release and is therefore a key regulator of the hypothalamo-pituitary-gonadal axis. Kisspeptin has been shown to be requisite for the occurrence of the physiological ovulatory LH surge. The timing of trigger is influenced by several critical factors, including follicle size, ovarian response, duration of stimulation, and hormonal levels. Understanding these elements is essential for maximizing the number of mature oocytes retrieved and ensuring successful fertilization. The ideal size for leading follicles is between 16-22 mm, with a minimum of 14 mm for the remaining cohort. Serum estradiol levels are commonly used for this purpose however it can be unreliable due to variability. Inhibin A is suggested as a more consistent marker for assessing oocyte maturity. Serum inhibin A levels was correlated strongly with the number of follicles ≥ 15 mm and the number of retrieved and mature oocytes, alongside transvaginal ultrasound monitoring. The duration of stimulation should ideally be 10-12 days for normal responders before administering the trigger. Another important factor for optimal oocyte maturation is the necessary lag time between the trigger and oocyte aspiration, which should ideally range from 32-38 hr. Both extremely short and long intervals can lead to unfavorable outcomes in oocyte collection. Machine learning models have shown that optimizing trigger timing can significantly enhance the number of usable blastocysts, indicating the importance of individualized approaches.

K-10
Artificial intelligence in infertility: Successes and limitations

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Infertility affects a significant proportion of the global population, posing complex diagnostic and therapeutic challenges. Recent advances in artificial intelligence (AI) have introduced promising tools to enhance assisted reproductive technologies by improving diagnostic accuracy, optimizing treatment protocols, and predicting clinical outcomes such as pregnancy and live birth rates. AI-driven algorithms, including machine learning and deep learning models, have demonstrated success in embryo selection, sperm analysis, ovarian response prediction, and personalized treatment planning, contributing to increased efficiency and standardization in fertility clinics. However, these advancements are tempered by limitations including the

need for large, high-quality datasets, biological complexity, ethical concerns related to data privacy and patient autonomy, and the risk of over-reliance on AI potentially diminishing clinical expertise. This paper reviews the current state of AI applications in infertility treatment, highlighting key successes and delineating the challenges and ethical considerations that must be addressed to safely integrate AI into reproductive medicine. Future directions emphasize the development of hybrid human-AI decision frameworks, rigorous clinical validation, and the establishment of ethical and regulatory standards to maximize patient benefit while safeguarding rights and trust.

K-11
Design and evaluation of a clinical decision support system predicting success of invitro fertilization based on machine learning approach

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Background: In vitro fertilization (IVF), a breakthrough in infertility treatment, has a success rate of 30-40%, slightly higher than healthy couples' rates. However, it also has complications and high costs, posing burdens for infertile couples. The complexity of decision-making in medicine further complicates IVF adoption. To properly predict IVF success, machine learning (ML) can be used to create prediction models based on contributing factors.
Objectie: We aimed to design and evaluate a clinical decision support system predicting success of IVF based on ML approach.
Materials and Methods: In this applied research, by studying and reviewing literature and consulting with experts in the field of infertility, 27 contributing input variables were identified. The data related to 812 cases of infertile couples referred to Royesh Clinic, Tehran, Iran were extracted from medical records. Feature selection were done using genetic algorithm. The four classes of RPART, Random Forest, Support Vector Machine and Artificial Neural Network were trained based on the data. Then the four classifiers were used to construct an adaboost structure. The prediction models were compared based on the accuracy, sensitivity, specificity and area under the ROC curve. The one outperforms others, was used to design the system. Following the development and implementation of the system prototype, its performance was evaluated using data from 30 new patients, with Cohen's kappa coefficient of agreement measured. Additionally, by using the post-study system usability questionnaire, feedback was obtained from 10 infertility experts to test system's usability.
Results: Ten variables of female age, anti-Mullerian hormone, endometrial thickness, follicle size, sperm count, sperm morphology, number of retrieved oocytes, number of retrieved metaphase I oocytes, number of retrieved MI oocytes, and embryo quality were identified as the features for all the 5 prediction models. Adaboost prediction model with 90.37 accuracy, 88.98 sensitivity, 90.58 detectability and 0.94 area under the ROC curve was found to outperform other models and so was used in system design. The results of the evaluation of the system's performance showed an agreement of 86.5% between the system's prediction and the actual result. Also, the results of the system usability testing showed the overall satisfaction of the users with the system as 1.6 out of 7 points (87.14%).
Conclusion: The clinical decision support systems emerges as a valuable tool for infertility clinicians, offering the ability to predict the success of IVF. Using this system not only assists doctors in delivering more precise diagnoses but also serves as a preventive measure for infertile couples, protecting them from potential side effects and mitigating treatment costs.

K-12
Tissue engineering and stem cell-based therapeutic strategies for infertility diseases

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Infertility is a global health concern affecting millions of individuals, often resulting from ovarian dysfunction, uterine disorders, or impaired gametogenesis. Conventional treatments, such as hormone therapy and assisted reproductive technologies, have limitations in efficacy and long-term outcomes. Tissue engineering and stem cell-based therapies have emerged as innovative approaches to restore reproductive function by regenerating damaged tissues and enhancing fertility potential. Here we explore the latest advancements in stem cell applications, including embryonic stem cells, induced pluripotent stem cells, and adult stem cells, for the treatment of infertility-related diseases such as premature ovarian insufficiency, endometrial dysfunction. Additionally, it discusses the role of biomaterials and scaffold-based strategies in mimicking the natural reproductive microenvironment to support cell growth, differentiation, and tissue repair. Furthermore, key challenges, including immune compatibility, ethical considerations, and clinical translation, are addressed.

K-13
Review of artificial intelligence in modern midwifery care in infertility: Benefits and challenges

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Midwives are as one of the first line of infertility service providers. The worlds of virtual care, chatbots, robotics, and data analytics, help clinical decision making and have influence on midwives, their practice and patient outcomes in infertility treatment and care. Artificial intelligence (AI) includes virtual reality, voice assistive technology, natural language processing, image recognition, robotics, expert rule-based systems, and machine and deep learning. Some benefits and challenges are discussed in this review study. Benefits of AI in infertility care are effectiveness in midwifery training, performing some routine care, providing qualified and correct data, fast processing and quick access to the data, help in better evidence decision-making, reducing the workload, better ability for infertility care needs assessment, care planning, infertility medication management, early detection of worsening, patients education and counseling, staff mix planning, and reducing administrative burden. Challenges are inability to make decisions in complex situations, uncertainty about data security, privacy, ethical and legal consideration, data bias, internet speed, influence on empathetic care, potential impacts on person-centered care, lack of face-to-face care, cost, potential cyber-attacks, accountability and transparency, creating a sense of lack of independence, and the non-uniformity of people's ability to use, potential of misinformation and plagiarism in midwifery research area. Since the midwives needs to consider all features of a client's needs and problems, therefore AI cannot substitute the core and key midwifery care. But, it can be considered as a complement in midwifery care for training and counseling in infertility. In addition, there is need for clear guidelines and regulations to ensure that AI is provided and applied ethically and responsibly. Also, midwives must realize the link between the data they collect and the AI technologies they use. Shaping analytics for midwifery practice is necessary such as clinical analytics, operational analytics, and behavioral analytics. It is recommended that midwives must learn about AI in midwifery practice and infertility clinical settings, how the data are produced and stored, communication with healthcare providers, clients, and families, and its ethical, legal and social considerations.

K-14
Time lapse system and assisted reproductive technology

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The optimal embryo culture, receptive endometrium and precise embryo evaluation and other factors can affect on the success of assisted reproductive techniques (ART). The single embryo transfer avoids multiple gestations risk and becomes routine in ART labs. Although, the embryo selection is traditionally based on snapshot morphological parameters, there is no exact relation between embryo quality and traditional morphology. The conventional embryo selection is subjective, intra and inter observer variations lead to lower optimal ART outcome. Thus, transfer of more than one embryo is a routine practice in ART lab, potentially leading to high-risk multiple gestations. Time-lapse system (TLS) monitors development of embryos without optimal culture conditions disturbance. It provides large abundant of dynamics developmental potential of embryo with safe approach. It is assumed that the exact timing of developmental events, such as timing of cleavage divisions, cell cycle intervals and blastulation is correlated to improved ART outcomes. Furthermore, several predictive models for implantation, aneuploidy, pregnancy and live birth have been created based on embryo morphokinetics parameters. The potential advantages of omitting disruption stable embryo culture condition with TLS are more likely to be cleared when embryos are cultured to blastocyst. However, the TLS suggests improvements in ART outcomes compared to conventional incubators is still controversial. In addition, TLS shows atypical phenotypes of embryo development that may worse competence potential. Atypical phenotypes including direct cleavage, reverse cleavage, multinucleation and blastocyst collapse can compromise embryo competence and indicate aneuploidy and higher rates of degeneration. In addition, TLS might be beneficial in other situation, including protocol standardization and research projects, so indicating it as a non-add-on technology. Although, TLS and aneuploidy screening have been introduced to improve live birth rate, the success rate remain non ideal. The use of artificial intelligence (AI) has become significantly common in the medical field and is significantly being leveraged in the ART lab to improve ART success rate. Various studies have been showed that utilization of AI in TLS as an automated unbiased method to embryo evaluation. In order to improve the success, it is important to design new approach for describing AI outcomes and improved collaboration and communication among ART labs to enhance accuracy and reliability algorithms. As, integration of TLS and AI could enhance live birth rate by more accurate and effective embryo assessment and

reliable morphokinetic algorithms. Further large studies, which design the comprehensive algorithms including various functions and the doing large randomized controlled trials, might potentially show the future direction of AI development in the ART field.

K-15
Infection disease and reproductive cancer

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Reproductive cancers remain one of the most pressing global health challenges, threatening millions of lives worldwide, with growing evidence highlighting the critical role of persistent infections in their development. Among these, human papillomavirus (HPV) and chlamydia trachomatis stand out as 2 major contributors. High-risk HPV strains, such as HPV-16 and HPV-18, are directly implicated in cervical cancer, accounting for approximately 70% of global cases. Similarly, chlamydia trachomatis, a prevalent sexually transmitted infection, indirectly promotes carcinogenesis by inducing chronic inflammation, tissue damage, and creating a microenvironment conducive to malignant transformation. Beyond these pathogens, emerging research underscores the potential involvement of other infectious agents, including herpes simplex virus, epstein-barr virus, helicobacter pylori, trichomonas vaginalis, human immunodeficiency virus, and cytomegalovirus, which may contribute to cancer development through mechanisms such as immune dysregulation, genomic instability, and epigenetic alterations. For instance, individuals with specific polymorphisms in immune-related genes like HLA-DQ or TLR9 may exhibit impaired clearance of HPV, increasing their susceptibility to persistent infection and subsequent malignancy. Prevention strategies, including HPV vaccination, early detection via molecular diagnostics (e.g., pap smears, HPV DNA tests), and timely treatment of infections like chlamydia, are essential to reducing the global burden of infection-driven reproductive cancers. Advanced technologies such as next-generation sequencing are now enabling precise identification of genetic variants associated with increased susceptibility to infection-related cancers. Addressing healthcare disparities, particularly in low-resource settings, remains crucial to ensuring equitable access to these interventions.

K-16
Redesigning life: Ovarian germ cells are the intelligent sleepers

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The male and female gonads are complex cells and molecules that work together to produce the sex cells (eggs and sperm). These cells later lead to the maintenance of the generation in animals and enable the survival of living organisms. The precursor cells of the eggs in the ovarian tissue are managed under the influence of a guiding process to progress towards maturity. This process, which occurs in the ovary of an adult woman, takes about a year from the activation of the most basic elements, the primordial follicles, to the time of ovulation. This provides sufficient time for the necessary capacities to be created in an immature oocyte. There are several reasons why, despite the presence of these precursor cells, an individual cannot produce the mature eggs necessary for fertilization. One of the most critical factors affecting the production of mature oocytes is its surrounding environment. The interaction and reactions between the precursor cells and the surrounding extracellular matrix can provide suitable management for the creation of the fertility capacity. This issue is so important that the slightest change in the growth environment of progenitor cells can disrupt the process of producing mature eggs and make a person infertile. Some researchers believe that the number of these progenitor cells is finalized during the embryonic period and is no longer able to multiply and increase in adulthood. However, others believe that these cells are latent in the ovarian tissue and awaken at a specific time and leading to the production of the new generation of eggs. This is if the necessary conditions are created by changing the growth environment of these cells so that the progenitor cells are saved from the trap of defective maturation and return to growth and life again. At the Royan Research Institute, Tehran, Iran we tried to first prove the presence of these cells, and now we are among the scientific centers that claim the presence of these cells in ovarian tissue. Secondly, we proved their ability to multiply during a 2-wk in vitro culture. Following this success, we sought to change the niche of these cells and provide a new environment for their growth by creating a structure called an artificial ovary. After transplantation of the artificial ovary, which consisted of a new scaffold and a collection of cells isolated from the ovaries of women with cancer, we observed the differentiation of oocyte progenitor stem cells into oocytes and the formation of new primordial follicles. We are currently investigating other methods to increase the efficiency of production and proliferation of these cells during in vitro culture and subsequent transplantation.

K-17
Design and in silico analysis of tetrazoloquinazoline derivatives with anti-breast cancer potential against MCF7 cells

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Background: The uncontrolled growth of breast tissue cells is a disorder known as breast cancer.
Objective: The potential of several synthetic and natural chemicals, including quinazoline, as anticancer drugs has been investigated. A variety of bioactivities, including antimalarial, antifungal, antibacterial and anticancer properties, have been demonstrated using quinazoline derivatives.
Materials and Methods: This study used molecular docking studies with molecular operating environment software to synthesize substituted tet-razoloquinazoline and assess its potential as an anticancer drug. Additionally, the binding stability of the protein-ligand complex was examined using molecular dynamics. Additionally, the website https://www.swissadme.ch was used to evaluate the physicochemical and pharmacokinetic characteristics of quinazoline compounds. MTT assay was used to assess the cytotoxic activity of the compounds.
Results: According to the docking data, the range of binding free energies for modified tetrazoloquinazoline differed significantly from that of the positive control. Additionally, lipinski's rule of five is met by substituted tetrazoloquinazoline compounds, suggesting that they have good permeability and are readily absorbed. The cytotoxic action of the compounds was determined to be non-cytotoxic, with an ICso value greater than 1000 ppm.
Conclusion: It has cleared the path for the development ofpromising next-generation medications to treat breast cancer.

K-18
A case-series study for evaluating the controlled ovarian stimulation in cancer patients under 18 years

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The preservation of fertility in adolescent girls undergoing puberty is a significant concern for both healthcare providers and parents. Oocyte cryopreservation is typically considered a standard medical procedure for individuals aged 18 and older. However, emerging evidence indicates that mature oocyte cryopreservation may be feasible for adolescent girls, although ovarian stimulation in this demographic presents unique challenges. This case series represents the first documentation of ovarian stimulation and oocyte cryopreservation in female cancer patients under the age of 18, who were referred to the Royan Institute in Tehran, Iran, before commencing cancer treatment between November 2015 and February 2021. Oocyte cryopreservation was successfully performed in 7 patients (5 diagnosed with hodgkin lymphoma, 1 with ewing sarcoma, and 1 with an osteogenic tumor). Additionally, embryo cryopreservation was conducted for one patient with dysgerminoma, while another patient with a germ cell tumor underwent both oocyte and embryo cryopreservation. Unfortunately, no oocytes were retrieved from the patient diagnosed with medulloblastoma. In one case involving a hodgkin lymphoma patient, half of the ovarian tissue was cryopreserved prior to the ovarian stimulation process. Oocyte cryopreservation presents a viable option for fertility preservation in adolescent cancer patients. However, the application of this method in individuals under 18 yr of age is contingent upon the demonstration of acceptable fertilization rates and successful live births resulting from oocyte cryopreservation in this age group.

K-19
Performance indicators and score in in vitro fertilization centers

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Infertility is a global concern, and assisted reproductive technology (ART) is the mainstay remedy. The complex process of ART includes both clinical work and laboratory procedures. Therefore, effort have been done to define reliable performance indicators based on clinical and laboratory parameters to essentially put a reliable internal quality control on in vitro fertilization (IVF) journey. As the first glimpse, Vienna consensus in 2017 defined the laboratory indicators. Further, Vienna consensus in 2021 defined indicators for clinical practice in ART. As a crystal-clear concern, expert working groups are trying to consent on a minimum number of indicators to not only perform quality control and constant monitoring of clinical and embryological features, but also to score each IVF center. The list of indicators is categorized as the key performance indicators (KPI), performance indicators and recommendation indicators. As the latest consensus in Italy, indicators were stratified based on age, response to ovarian stimulation and adoption of preimplantation genetic testing for aneuploidies in the reference population. Parallelly, competence and benchmark values were defined for each indicator as the lower and upper reference margins of accepted performance. As the KPI, cycle cancellation rate (before OPU), late follicle-to-oocytes index, proportion of metaphase II oocytes at intracytoplasmic sperm injection (%), complication rate after OPU (%), clinical pregnancy rate (%), multiple pregnancy rate (%), miscarriage rate and rate of cycles with moderate- severe ovarian hyperstimulation syndrome (%) were selected for clinical features and intracytoplasmic sperm injection fertilization rate, proportion of embryos with ≥ 8 cells on day 3 and total blastocyst development rate were selected for laboratory features. Finally, by weighting of each KPI and providing an average formula, the performance of IVF centers can be scored as the low,

average, good, or excellent. Though IVF fertilization rate, oocytes cryo-survival rate, embryo cryo-survival rate: > 50%, blastocyst cryo-survival rate, successful biopsy rate, follicular output rate and cumulative live birth rate were defined as the PIs, they were not applied in the average formula scoring. This point paves the way for reconsidering the KPI and PI selection specifically in teaching hospitals that nonexpert individuals are performing critical laboratory and clinical performance.

K-20
Uncovering the important gene variants and biological processes implicated in spermatogenic failure using whole-genome sequencing

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Male factors are involved in up to half of all infertility cases. The causes could be categorized into 4 main areas. First, dysfunction of the hypothalamic-pituitary axis, second, quantitative defects in sperm production, third, qualitative defects in sperm production, and the last, issues with ductal obstruction or function. Spermatogenesis is a complex process. Usually genetic testing has mainly been limited to karyotype analyses and Y-chromosome microdeletion testing. Despite significant progress in clinical genetics, a diagnosis is still unclear for up to 80% of men with infertility. Recent advances in genome sequencing have the potential to improve diagnostic capabilities and develop new treatments targeting newly discovered genetic factors associated with male infertility. It is important to note that mutations in certain genes can either positively or negatively predict the success of sperm retrieval from the testis. The goal of this study is to uncover the causative genes, variants and biological processes implicated in spermatogenic failure through whole-genome sequencing. Whole blood samples were collected from 10 non-obstructive azoospermia and 10 oligoasthenoteratozoospermia men with normal karyotype, no microdeletions of the Y chromosome, no history of varicocele, testicular torsion, and cryptorchidism. whole-genome sequencing was performed using Illumina HiSeq X. The results showed important and interesting gene mutation and some new variants, which cause essential problem in spermatogenesis. Some of these genetic changes could affect other aspect of men health, which should be more important and life threatening.

K-21
Effects of culture medium on embryo quality

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The quality of culture media is very important for the success of in vitro fertilization, as it affects gamete quality and embryo development. Considering important factors and conditions, such as temperature, pH, and oxygen levels is essential for embryo quality. A comprehensive quality control program including monitoring of infection control is recommended in this regard. Following the international standards and continuous monitoring of laboratory conditions are crucial for improving IVF outcomes.

K-22
Human oocyte vitrification: Current challenges and opportunities

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Oocyte vitrification has been utilized for preserving fertility in cancer patients, as certain treatments can harm the ovaries, and also for elective fertility preservation to delay starting a family. Additionally, the vitrification of oocytes has facilitated the establishment and expansion of oocyte donation programs and oocyte banking. Vitrification changes oocytes into a glass-like state both inside and outside the cell that lacks any crystal formation. This state free of crystals is accomplished by subjecting the oocytes to vitrification solutions with high concentrations of cryoprotectants, which aim to quickly replace most water molecules in the oocyte's internal compartments and cytoplasm through osmosis. After dehydration, ultra-rapid cooling (exceeding 10,000°C per minute) occurs, resulting in the glassy solidification of the contents of the cell, while fully maintaining the structural and functional integrity of the oocyte. The vitrified oocytes are stored in cryostorage, preferably immersed in liquid nitrogen, until they undergo the warming process. During the warming phase, the vitrified oocytes are taken out of their storage and, in accordance with standard operating procedures, placed in a preheated medium that contains high sucrose, followed by a series of washes in media with progressively lower sucrose concentrations. The goal of the warming process is to rehydrate the oocytes through osmosis and gradually substitute the cryoprotectants with water. For many, the warming procedure holds greater significance than the cooling process since ice crystal formation can also occur during warming, leading to cell death. The anticipated recovery rates after warming oocytes typically range from 80-90%. Currently, most fertility clinics around the world provide oocyte cryopreservation services for women looking to preserve their eggs for later use. The effectiveness of a vitrification program greatly depends on the skill and knowledge of the operators, making it essential for clinics and lab managers to implement a robust and proactive total quality management system. It is crucial to closely monitor and optimize the entire

process -from stimulation to oocyte vitrification, warming, and the performance of embryos developed from the thawed oocytes- both as a complete program and on an individual operator basis. Every fertility clinic that provides oocyte vitrification to patients should be capable of sharing their own key performance indicators in accordance with international benchmarks. Additionally, they must ensure that prospective patients are completely informed about what to anticipate following the warming process before they move forward with oocyte preservation treatment. It is advisable to utilize commercially available vitrification and warming reagents with registration details rather than homemade alternatives. It is best to choose products that undergo thorough quality control measures, including mouse embryo assays, bacterial endotoxin assessments, sterility evaluations, and pH and osmolarity testing. Assisted reproductive technology laboratories should ideally maintain 2 brands of vitrification and warming reagents to address situations involving defective batches or irregular supply issues.

K-23
The potential of extracellular vesicles in regenerative medicine

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Extracellular vesicles (EVs), including exosomes and microvesicles, have emerged as pivotal mediators of intercellular communication with significant implications for regenerative medicine. Secreted by various cell types, EVs carry a rich cargo of proteins, lipids, and nucleic acids that reflect the physiological status of their parent cells. Recent research has demonstrated their ability to modulate inflammation, promote tissue repair, and stimulate cellular proliferation and differentiation. Unlike traditional cell-based therapies, EVs offer a cell-free alternative that reduces immunogenic risks and enhances safety profiles. This lecture will explore the current understanding of EV biology, highlight preclinical and clinical advances in their use for tissue regeneration, and discuss challenges such as standardization, large-scale production, and regulatory considerations. In this lecture, I would like to review preclinical studies conducted by our team in the department of immunology in Shahid Beheshti University of Medical Sciences, Tehran, Iran on the effect of EVs in controlling inflammation and inducing regeneration in animal models of inflammatory and autoimmune diseases.

K-24
Advanced research in the treatment of polycystic ovary syndrome

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Polycystic ovary syndrome (PCOS) is a prevalent endocrinopathy involving androgen excess, and anovulatory infertility. The disorder is also associated with many comorbidities such as obesity and hyperinsulinemia, and an increased risk of cardiovascular complications. Reproductive, endocrine, and metabolic symptoms are highly variable, with heterogenous phenotypes adding complexity to clinical management of symptoms. Pharmacological agents to target androgen excess, modulation of kisspeptin signalling to target central neuroendocrine dysregulation, and novel insulin sensitisers to combat peripheral metabolic dysfunction are another novel treatment for this disorder. Emerging research is also considering the role of gut health and the microbiome in PCOS, with probiotics and prebiotics being studied for their potential benefits. These targets reflect a comprehensive approach to treating PCOS by addressing its multifaceted nature.

K-25
Sexual dysfunction and female infertility

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Female sexual dysfunction and infertility are common condition and associated with couple distress. The relationship between female infertility and sexuality is complex and multifactorial. The prevalence of sexual dysfunction is greater in infertile women and women with couple infertility, such as decreased in sexual desire, arousal and satisfaction. Extensive studies found that diagnosis and treatment of infertility are related to the occurrence of sexual dysfunction. Infertility is a major life stressor and can negatively impact on mental health. Women with infertility are more prone to depression and anxiety, thus alteration in mental health can lead to sexual dysfunction. On the other hand, sexual dysfunction can negatively affect woman's self-esteem, quality of life and interpersonal relationships. In conclusion female sexual disorders are frequent effects of infertility with sever consequence on overall wellbeing. These consequences represent an additional burden for women with infertility and need to holistic approach to infertility treatment.

K-26
The influence of paternal lifestyle factors on recurrent implantation failure following assisted reproductive technology

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Recurrent implantation failure (RIF) refers to cases in which women have had three failed in vitro fertilization attempts with good quality embryos. The failure of embryo implantation can be a consequence of uterine, male, or embryo factors, or the specific type of in vitro fertilization protocol. Treatment approaches should be directed toward individual patient cases. Currently, there is little evidence to indicate what mechanisms dictate unsuccessful implantation. In many couples presenting with RIF, the exact cause is never identified and therapeutic options are disappointedly limited. There is growing concern surrounding potential adverse reproductive health effects resulting from lifestyle and environmental factors. Since embryo quality and endometrial microenvironment are influenced by a complex balance of physiological and environmental factors, it is possible that the couples with RIF are more susceptible to the lifestyle and environmental exposures. Seminal parameters, which are predictors of male fertility potential, have been declining over time worldwide. This decline in semen quality is likely multifactorial, and a variety of lifestyle factors have been proposed to influence spermatogenesis and reproductive function. The role of reactive oxygen species and oxidative stress in semen quality decline has also been investigated. Seminal levels of reactive oxygen species, semen parameters and testicular and pituitary-gonadal axis dysfunction are known to be influenced by lifestyle. Fertilization and preimplantation embryo development are influenced by sperm-derived factors that may impact assisted reproductive technology outcomes. Lifestyle factors are under one's own control and could be modified to improve general health; therefore, adjusting for their influence may yield valuable information for counselling couples submitted to ART. The aim of this study was to describe the influence of environmental and occupation exposure, medications and physical activity on semen parameters, and results of ART in patients submitted to semen analysis for infertility investigation followed by ART. Male occupation may be a potential source of adverse exposure to chemical, physical and psychological factors. It is known that testicular function is extremely sensitive to ionising radiation. Transitory reduced sperm count and even long-lasting or permanent azoospermia could result from radiation exposure, depending on the dose. It is important to highlight that not only environmental influences, but also some sexually transmitted diseases (e.g., gonorrhea, chlamydia), which are closely related to lifestyle, may affect spermatogenesis, leading to male infertility. Consequently, it would be better to recommend that male partners reconsider their lifestyle during in vitro reproduction treatment.

K-27
Advanced nursing care in managing in vitro fertilization challenges in patients with underlying conditions: A multidisciplinary approach

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In vitro fertilization (IVF) represents a cornerstone of assisted reproductive technology, offering hope to millions of couples struggling with infertility. However, its success is significantly influenced by underlying health conditions such as obesity, diabetes, hypertension, and other comorbidities. These conditions not only reduce IVF success rates but also elevate maternal and fetal risks, leading to long-term health complications. A multidisciplinary approach integrating expertise from medicine, midwifery, nursing, nutrition, and psychology is essential to optimize outcomes for this high-risk population. This reviewe explores the scientific rationale behind multidisciplinary care in IVF candidates with underlying conditions, its clinical advantages, and implementation strategies, with a particular focus on the critical role of professional nurses. Nurses serve as the cornerstone of interdisciplinary healthcare teams, leveraging their clinical expertise, patient advocacy, and systems thinking to optimize patient outcomes. Their role extends beyond task based care to include; real-time data synthesis, risk mitigation, and coordination of comprehensive patient-centered interventions and functions that are indispensable in managing complex medical cases. Fundamentally, nurses embody the synergy of evidence-based practice and human-centered care, making them indispensable in modern, multidisciplinary healthcare ecosystems. This approach is particularly significant in the continuum of IVF care, before, during, and after the procedure. Research underscores that nurse-led interdisciplinary care improves therapeutic outcomes by integrating biomedical precision with a biopsychosocial framework. This dual focus ensures that IVF treatments align with the physiological, emotional, and socio-economic needs of patients, thereby enhancing the overall effectiveness and patient-centeredness of reproductive healthcare strategies.

K-28
Oxidative stress and PCOS

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Polycystic ovary syndrome (PCOS) is one of the most common hormonal disorders, occurring in 5-10% women in reproductive ages. Its etiology is still unknown. Oxidative stress is now recognized to have an important role in the pathophysiology of many different disorders, including PCOS. Although intracellular reactive oxygen species production and propagation are controlled by highly complex antioxidant enzymatic and non-enzymatic systems. Understanding of mechanisms that oxidative stress is important to develop strategies for prevention and therapy of PCOS. Uyanikoglu et al. found that: in the blood of PCOS patients, the total oxidation state, total antioxidation state and oxidative stress index were all higher than those of healthy women in the control group, and the total oxidation state was higher than the total antioxidation state, indicating that there was an imbalance between oxidants and antioxidants in PCOS patients. Similarly, the meta-analysis results of Murri et al. suggested that the levels of oxidative stress markers in the blood of PCOS patients, such as homocysteine, asymmetric dimethylarginine, malondialdehyde and superoxide dismutase, were significantly higher than those in the control group, while the levels of antioxidant markers, such as glutathione and paraoxonase-1, were significantly lower than those in the control group. Antioxidants in the body include antioxidant enzymes and non-enzymatic antioxidants. Antioxidant enzymes include superoxide dismutase, catalase, and glutathione peroxidase, and non-enzymatic antioxidants include vitamin C, vitamin E, GSH, taurine, hypo taurine, zinc, selenium, carotenoids, and metal binding proteins. All of them have the ability to scavenge oxidative active molecules and maintain the oxidant/antioxidant balance.

K-29
Human papilloma virus and male infertility

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Human papillomavirus (HPV) has garnered attention as a potential contributor to male infertility, with emerging evidence suggesting that HPV infection may significantly impact reproductive health. HPV is a small, non-enveloped, double-stranded DNA virus that primarily infects epithelial tissues. HPV oncogenic potential is largely attributed to the E6 and E7 oncoproteins, which interfere with tumor suppressor proteins. While HPV is well-known for its role in cervical cancer, its implications for male fertility are increasingly being recognized. Recent studies indicate that HPV prevalence is notably higher in infertile men compared to their fertile counterparts. The virus can adversely affect sperm quality by impairing motility, morphology, and overall sperm viability. Specifically, HPV has been linked to increased oxidative stress in semen, which can lead to DNA fragmentation and mitochondrial damage in sperm cells. This oxidative damage may result in telomere shortening and epigenetic alterations, further compromising sperm function. Moreover, the presence of HPV in semen has been associated with the development of antisperm antibodies, which can hinder fertilization by targeting and neutralizing sperm. Research has also shown that clinical pregnancy rates are significantly lower in women inseminated with HPV-positive semen, while miscarriage rates are higher among couples where the male partner is HPV-positive. Current guidelines from health organizations emphasize the need for more comprehensive studies to explore the effects of HPV on male fertility and the potential benefits of vaccination. Techniques such as direct swim-up have demonstrated some efficacy in reducing the number of HPV-infected sperm; however, more research is warranted to establish effective sperm preparation methods for removing HPV DNA from washed spermatozoa. In conclusion, while the link between HPV and male infertility is becoming clearer, further investigation is essential to elucidate the underlying mechanisms and develop effective strategies for prevention and treatment. Understanding these interactions will be crucial for improving reproductive outcomes in couples affected by infertility related to HPV.

K-30
The role of extracellular vesicles in spermatogenesis

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Exosomes, small extracellular vesicles ranging from 30-150 nm in diameter, play a crucial role in intercellular communication and have emerged as significant mediators in various biological processes, including spermatogenesis. These nano-sized vesicles are secreted by various cell types within the male reproductive system, including Sertoli cells, Leydig cells, and germ cells. During spermatogenesis, exosomes facilitate the transport of proteins, lipids, and RNA molecules, thereby influencing the development and maturation of spermatozoa. They are involved in the regulation of gene expression, cell signaling, and the maintenance of the testicular microenvironment, which is essential for optimal sperm production. Recent studies have highlighted the potential of exosomes to: modulate immune responses, protect germ cells from oxidative stress and promote cell survival. Furthermore, exosomal cargo can serve as biomarkers for male fertility, providing insights into reproductive health and potential therapeutic avenues for addressing infertility. In conclusion, exosomes represent a dynamic component of spermatogenesis, contributing to the intricate processes that govern sperm development and function. Understanding their mechanisms may pave the way for

novel strategies in reproductive medicine and fertility preservation.

K-31
Investigation and analysis of the synergistic effects of methotrexate and curcumin encapsulated in PLGA nanoparticles on MCF-7 breast cancer cell lines

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Background: Breast cancer treatment presents significant challenges, particularly in optimizing therapeutic efficacy while minimizing side effects.
Objective: Polymer nanoparticles offer a promising avenue for improving drug delivery systems. This study focuses on the design, synthesis, and evaluation of PLGA nanoparticles encapsulating methotrexate and curcumin, investigating their synergistic effects on the MCF-7 breast cancer cell line.
Materials and Methods: PLGA nanoparticles were synthesized via the W/O/W solvent evaporation method. Characterization was conducted to determine particle size, zeta potential, and polydispersity index using a horiba zeta sizer. Morphological analysis was performed using scanning electron microscopy and atomic force microscopy. Cellular uptake was evaluated using fluorescence microscopy, while fourier-transform infrared spectroscopy analyzed molecular interactions. Drug loading efficiency and release profiles were assessed over 48 hr using dialysis bags. Cytotoxicity was determined through MTT assays conducted on MCF-7 cells. Molecular docking studies performed against the VEGFR2 kinase receptor displayed a binding orientation of the compounds in the catalytic binding pocket of the receptor.
Results: The synthesized nanoparticles demonstrated high drug loading efficiency and favorable size and zeta potential, indicative of stability. Morphological studies revealed a desirable spherical shape. Fluorescence microscopy confirmed efficient cellular uptake, and cumulative drug release was consistent over 48 hr. The combination of methotrexate and curcumin exhibited significant synergistic cytotoxic effects, enhancing therapeutic efficacy. Statistical analysis highlighted a marked increase in drug release under cancer-relevant conditions, including elevated temperatures and acidic pH levels, compared to normal physiological conditions.
Conclusion: The study establishes the potential of PLGA nanoparticles loaded with methotrexate and curcumin as an effective and targeted drug delivery system for breast cancer treatment. These findings underscore the promise of polymer-based nanotherapeutics in advancing novel therapeutic strategies.

K-32
Digital health technologies to enhance the quality of life of individuals experiencing infertility: A review

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Background: Infertility as a multifaceted challenge may profoundly cause psychosocial, emotional, and relational problems that compromise the couple's quality of life (QoL).
Objective: With the rapid advancement of digital health technologies, tele-health, and tele-counseling have been recognized as innovative interventions to support individuals with infertility. This review focuses on current and developing technologies designed to enhance QoL of individuals with infertility.
Materials and Methods: Relevant articles were searched in PubMed, Scopus, and Google Scholar databases. The search was performed using keywords such as QoL, infertility, internet, web, artificial intelligence (AI), mobile application, RCT, e-health, telehealth, virtual, and tele-counseling. Time limitation was considered 10 yr (from 2015-2025). Papers were exported into the Endnote software and screened for relevancy and duplicates.
Results: New technology, such as mobile applications and internet-based programs, maybe a feasible option for enhancing QoL of infertile persons. There was no interventional study that implemented AI to assess the QoL of infertile patients. Most studies have shown great potential in andrology and introduced the role of AI in the diagnosis and treatment of male infertility. The results explore the use of AI in various aspects of reproductive medicine, such as assisted reproductive technologies, fertility tracking, and laboratory automation. Tele-counseling platforms, including video conferencing, mobile applications, and online support groups, provide a convenient and stigma-free environment for couples. Many studies reveal the effect of the integration of digital tools, such as self-help modules, virtual peer support networks, and many others focused on emotional distress, anxiety, depression, and stress, although there are few studies directly working on QoL of these groups.
Conclusion: There were a limited number of web-based or virtual RCT studies directly focused on QoL of infertile individuals. Due to the potential of AI technology to improve success rates and reduce the emotional and financial burden of infertility, this paper highlights the role of this technology in providing personalized care support. Future research should implement and better integrate advanced internet-based technologies to enhance QoL of individuals with infertility.

K-33
Effective factors in blastocyst formation in laboratory conditions

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Embryo transfer (ET) is one of the critical steps in an assisted reproduction cycle. Recently, extending culture from cleavage-stage to blastocyst and single ET has been an increasing trend to transfer. In the blastocyst transfer cycles, the timing of exposure of the embryo to the uterine environment is more analogous to a natural cycle and permits embryo self-selection after activation of the embryonic genome on day 3. On the other hand, the in vitro environment is likely to be inferior to that in vivo, and in vitro culture beyond embryonic genomic activation could potentially harm the embryo. Although many clinicaltrial studies have stated no significant differences between blastocyst and cleavage stage transfer for assisted reproductive technology outcomes. The last updated version of the Cochrane review concluded that at ET blastocyst-stage had higher live birth and clinical pregnancy rates compared to cleavage-stage embryos for fresh ET (41% vs. 31% live birth). Although there is a benefit favoring blastocyst-stage transfer in fresh cycles and sequential ET is a good treatment option for improving pregnancy outcomes, in poor response patients and patients with poor-quality embryos. However, how it is possible to have more and better quality blastocyst embryos? Extended culture requires specific culture conditions of temperature and gas concentration, as well as a medium compositionto decrease epigenetic disorders. Blastocyst formation is highly dependent on maternal and paternal factors. The intrinsic quality of the oocyte is the key factor determining the proportion of oocytes developing to the blastocyst stage. Nevertheless, there were some important way for increasingin-vitro blastocyst formation in fresh and frozen-thawed cycles. Group culture is one of the important factors that provide the growth factors needed by the embryo. Use of single medium like one-stepmedium is important forpreserve autocrine factors, decrease embryo stress, and created constant condition for culture. Time-lapse monitoring system is a way that creates bestconstant culture system that ideally controls embryo development condition. Culture volume is another factor that is important for embryo culture. The data showed reduced culture volume (7 vs. 25 µl) negatively impacts on early embryo development by reducing the cell number on day 3 and both blastocyst formation and quality.

K-34
Infertility and its impact on partner's sexual behaviors

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Infertility represents an emotionally challenging experience that can elicit levels of distress comparable to those associated with other significant health conditions, such as cancer or HIV/AIDS. Infertile couples frequently experience heightened emotional distress, diminished self-esteem, and a range of negative emotions, including anger, guilt, and blame directed towards their partners. Concerns about fertility, anxiety, and sexual dysfunction are more pronounced in this population compared to the general population. The interplay of stress, frustration, and depression notably adversely affects the sexual dynamics within infertile relationships. Moreover, infertility can exacerbate relational tension and diminish intimacy between partners, subsequently impacting the quality and satisfaction of their sexual experiences. The experience of infertility may also alter an individual's self-concept, leading to feelings of reduced attractiveness and a corresponding decline in sexual desire, arousal, or overall sexual satisfaction. Additionally, the quality of life for infertile couples may suffer considerable deterioration. However, a supportive partner and a positive emotional connection can significantly sustain the quality of sexual relationships. One potential risk factor contributing to increased marital conflicts among couples is the divergence in their approaches to infertility. This disparity can lead to emotional conflicts that adversely affect their sexual relationship. Research indicates that women are more engaged in infertility treatments than men, and they often express a desire to discuss their emotions related to attempts at conception. This communication plays a crucial role in fostering the emotional bond between partners. Individuals adopt diverse coping strategies to navigate the challenges posed by infertility. Some may utilize active-confronting coping techniques, such as engaging with others experiencing similar struggles, while others may rely on problem-oriented coping mechanisms. Others might resort to avoidance strategies. Access to comprehensive information from medical professionals, psychiatric counseling, psychotherapy, and participation in support groups can significantly alleviate anxiety, enhance communication, and improve the overall quality of sexual life.

K-35
Adjuvants in polycystic ovary syndrome

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In managing polycystic ovary syndrome (PCOS), various adjuvants are utilized. First, lifestyle changes and weight loss are recommended for obese women with a body mass index > 29 kg/m², as losing about 10% of their body weight can restore normal ovulation.

Metformin can further enhance the effects of diet and exercise by improving insulin sensitivity and reducing androgen levels. Anti-obesity medications like orlistat can help, but bariatric surgery has shown the most significant benefits for morbidly obese women. However, weight management treatments should not be the first option. Dexamethasone is another treatment that can lower certain hormone levels in PCOS patients and improve outcomes when combined with clomiphene. Oral contraceptive pills can also decrease hormone levels and improve ovarian function when taken before clomiphene. Insulin sensitzers such as metformin and inositols have been effective in reducing metabolic issues associated with PCOS. Metformin, a common biguanide, improves insulin sensitivity and reduces elevated hormonal levels but has side effects that may affect patient compliance. While it is generally not as effective as clomiphene or letrozole for infertility, it can still be considered a cost-effective option. Myoinositol and D-chiro-inositol are promising alternatives that may improve metabolic and reproductive functions in PCOS patients, especially when used together in a specific ratio. N-acetyl cysteine has antioxidant properties and can enhance insulin sensitivity while offering some potential benefits for ovulation and menstrual regulation. It has been shown to improve progesterone levels and increase ovulation success when combined with other treatments. Other antioxidants, such as alpha-lipoic acid, vitamins C and E, and resveratrol, may also help improve metabolic conditions in women with PCOS. Melatonin and carnitine have been studied for their effects on insulin sensitivity and overall metabolic health. Selenium and chromium are essential for metabolic functions and can enhance insulin sensitivity in PCOS patients. Laparoscopic ovarian drilling is a second-line treatment for women resistant to clomiphene. Laparoscopic ovarian drilling has shown success in restoring ovulation without the risks associated with fertility drugs. Gonadotropins are also an option for these patients but come with higher costs and risks. Insulin-sensitizing supplements, like inositols, have demonstrated significant benefits for improving symptoms of PCOS. Myoinositol has shown success in restoring ovulation in many women compared to metformin. Berberine has potential as a newer treatment that may improve metabolic markers as well. Finally, sildenafil citrate is being explored for its ability to enhance endometrial receptivity and improve pregnancy rates when used alongside other fertility treatments. Additionally, growth hormone may improve egg quality and reduce oxidative stress in women with PCOS. Overall, a combination of lifestyle changes, medications, insulin sensitizers, and antioxidants can effectively manage PCOS and improve reproductive outcomes.

K-36
Mental health in reproductive health settings

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The integration of mental health services within reproductive health settings is essential to improving patient outcomes and overall well-being. Mental health disorders such as depression, anxiety, post-traumatic stress disorder, and bipolar disorder are highly prevalent among individuals undergoing reproductive treatments, with depression affecting 15-25% and anxiety impacting 20-30% of these patients. Untreated mental health conditions can lead to reduced adherence to treatment protocols, lower success rates of reproductive interventions, and increased pregnancy-related complications. This presentation will highlight the necessity of addressing mental health in reproductive health clinics, emphasizing that mental well-being is not a luxury but a fundamental aspect of comprehensive healthcare. Screening for mental health concerns in reproductive health settings plays a crucial role in early identification, reducing stigma, and improving patient care. Standardized tools such as the Edinburgh Postnatal Depression Scale, the Generalized Anxiety Disorder 7-item scale, and the post-traumatic stress disorder checklist for DSM-5 (PCL-5) provide effective means for early detection. Strategies for integrating mental health services include training reproductive health providers in mental health basics, embedding dedicated mental health professionals within clinics, and establishing clear referral pathways. Case studies demonstrate the effectiveness of these approaches, with fertility clinics that incorporate mental health professionals reporting a 25% increase in patient satisfaction and a 15% rise in treatment adherence. While challenges such as stigma, limited funding, and resistance from staff persist, solutions like awareness campaigns, securing grants, and regular staff training have proven effective in overcoming these barriers. The cost-benefit analysis underscores the value of mental health integration, highlighting long-term savings due to reduced treatment dropout rates and improved health outcomes. The call to action encourages advocacy for policy changes, pilot programs for mental health integration, and further research to strengthen the evidence base. Ultimately, integrating mental health into reproductive health settings is not just a choice but a responsibility that ensures holistic and patient-centered care.

K-37
Polycystic ovarian morphology on ultrasound

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Polycystic ovary syndrome is a common endocrinopathy among women of reproductive age associated with hyperandrogenism, oligo-amenorrhea, and infertility. Symptoms and their severity vary among the individuals. If the manifestation is mild, polycystic ovary syndrome may remain undiagnosed. In more severe cases, it results in a spectrum of symptoms of metabolic syndrome, insulin resistance, and cardiovascular diseases. The diagnosis is established after a physical examination and evaluating the patient's hormonal profile. In addition to these required methods, ultrasonographic assessment of the patient's ovaries is another non-invasive, cheap, and time-saving tool, making the examination more profound and leading to the correct diagnosis. Specific ultrasonographic parameters are used to tell the healthy and polycystic ovaries apart: the ovarian volume, ovarian follicle count, follicle distribution pattern, ovarian stromal echogenicity, and the resistance and pulsatility indices assessed using the Doppler function.

K-38
How tissue engineering can help azoospermia patients; in vitro and in vivo studies

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Infertility affects a significant proportion of the global male population, with many cases attributed to defects in spermatogenesis. Advances in tissue engineering have facilitated the development of in vitro and in vivo systems for generating functional sperm, offering new hope for patients with non-obstructive azoospermia and other reproductive disorders. This review explores the latest developments in in vitro spermatogenesis using biomimetic scaffolds, bioreactors, and organoid cultures, as well as in vivo strategies employing transplantation techniques. Recent studies highlight the importance of extracellular matrix-based scaffolds in supporting spermatogonial stem cell (SSC) proliferation and differentiation. The use of decellularized testicular matrices has shown promise in maintaining the native microenvironment necessary for spermatogenesis. In vitro, exosome-treated dynamic culture systems have improved SSC maturation, demonstrating the potential of bioengineered niches to recapitulate the testicular microarchitecture. Additionally, 3D-printed extracellular matrix scaffolds enriched with bioactive molecules, such as laminin and fibroin-alginate, have successfully induced haploid spermatid formation in murine and primate models. In vivo approaches include testicular tissue grafting and xenotransplantation, which have enabled the generation of functional sperm from immature testicular tissues. Murine models have demonstrated successful spermatogenesis following the transplantation of cultured SSCs into host testes, suggesting a viable pathway for future clinical applications. Moreover, recent research has underscored the role of mesenchymal stem cell-derived exosomes in restoring spermatogenesis in azoospermic models, paving the way for regenerative therapies. Despite these advances, challenges remain in optimizing culture conditions, ensuring complete meiosis, and translating findings to clinical applications. Further research is needed to refine bioreactor designs, identify key molecular regulators, and enhance the scalability of these systems for human use. The convergence of tissue engineering, stem cell biology, and reproductive medicine holds great potential for overcoming male infertility and developing personalized fertility treatments.

K-39
Using human pluripotent stem cells derived cardiovascular cells for disease modeling and tissue repair

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Human pluripotent stem cells (hPSCs) serve as a powerful platform for disease modeling and regenerative medicine. We developed efficient protocols for differentiating cardiovascular cells and macrophages from hPSCs under chemically defined conditions. Using hPSC-derived cardiomyocytes, endothelial cells (ECs), and smooth muscle cells, we constructed 3D mini-cardiac organoids. Single-cell transcriptome analysis revealed that the 3D microenvironment enhanced cardiomyocytes maturation and led to the emergence of DLK1+ fibroblasts with immunomodulatory potential. Transplantation of mini-cardiac organoids into a rat model of myocardial infarction significantly improved cardiac function and reduced fibrosis, demonstrating their therapeutic promise. In addition, hPSC-derived ECs expressed markers of choroidal endothelial cells and could integrate into the choriocapillaris. In a rat model of choroidal ischemia, transplanted hPSC-ECs restored choroid thickness and vasculature. Remarkably, EC transplantation improves the visual function of CI rats, highlighting their potential for treating ocular diseases such as age-related macular degeneration. We also demonstrated the potential of hPSC-derived macrophages as a powerful model for investigating immune interactions between pathogens and human tissues. hPSC-MAC responded to human pathogens,

including hepatitis C virus, SARS-CoV-2, and streptococcus pneumoniae, by activating distinct inflammatory and immune pathways. RNA sequencing identified pathogen-specific gene networks, and image-based analysis of iMACs interacting with hepatitis C virus demonstrated their utility in evaluating infection and therapeutic strategies. Our study highlights the versatility of hPSC-derived cells in advancing disease modeling, uncovering molecular mechanisms, and developing regenerative therapies for tissue repair and regeneration.

K-40
The role of environmental pollution (microplastic and waves exposure) in male infertility

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Microplastics are small plastic particles that have become pervasive in the environment, including air, water, and food sources. As microplastic pollution continues to increase, its potential effects on human health, particularly male reproductive health, have raised significant concern. Studies suggest that microplastics can enter the human body through ingestion, inhalation, and skin contact, leading to their accumulation in various organs, including the reproductive system. Research has indicated that microplastic exposure may disrupt endocrine function, which is crucial for normal male reproductive processes. The chemicals within microplastics, such as bisphenol A, have been linked to reduced sperm count, and altered hormone levels. Moreover, oxidative stress induced by microplastics has been identified as a factor contributing to male infertility. In animal models, exposure to microplastics has shown a decrease in testicular function and quality of sperm. Despite the growing evidence, the exact mechanisms by which microplastics influence male fertility remain unclear. Further research is necessary to understand the long-term impact of microplastic exposure on human reproductive health. Addressing the problem of microplastic pollution is crucial for safeguarding male fertility and public health in the future.

K-41
Sexual dysfunction and male infertility

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Infertility is a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse (and there is no other reason, such as breastfeeding or postpartum amenorrhoea). Infertility affects up to 12% of men 25-44 yr old. The relationship between male infertility and sexuality is rather complex and bi-directional: infertility can be considered either as a cause or a consequence of a sexual dysfunction. The prevalence of sexual dysfunctions is higher in infertile men and man with couple infertility. Sexual dysfunctions include: decrease in sexual satisfaction, premature ejaculation, erectile dysfunction, and anejaculation/delayed ejaculation. After finding the information about their infertility, men usually go through crises that have a negative effect on their sexual life. They might have a feeling of inadequancy, shame and lack of masculinity, lost self-esteem and confidence, feel guilty, have frustration and emotional distress. Male with infertility might suffer from depression, anxiety, lower quality of life and psychological burden. Simply focus on the outcome of sex rather than enjoyment may be the reason of performance anxiety. Infertility period affects women's sexual life and decreases female sexual function index scores. Such sexual problems also affect partners that libido and erection quality are decreased. Treatments for infertility also can adversely affect sexuality. Sexual function and satisfaction of male and female with infertility should be assessed. The clinical assessment of psychological factors, partner-related factors, context, and life stressors with a biopsychosociospiritual model is necessary.

K-42
Advanced glycation end products: Their role in spermatogenesis and fertility within lifestyle contexts

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The human genome has evolved over millions of years; however, rapid changes in our dietary habits due to industrialization have not allowed sufficient time for our genome to adapt. This mismatch has contributed to a rise in metabolic diseases, including obesity, diabetes, gout, heart disease, liver disease, and kidney disease. Additionally, new health issues such as Alzheimer's, dementia, depression, bipolar disorders, cancer, preeclampsia, muscle wasting, and aging have emerged. Infertility is also affected by these changes. Literature reveals 2 main contributors to these health issues: 1) increased carbohydrate intake, particularly in the form of fructose, and 2) cooking styles associated with the Western diet. The rise in carbohydrate consumption, especially fructose, has led to fatty liver and diabetes, which are linked to infertility in both males and females. Furthermore, glucose and fructose interact with amino acids in our proteins, undergoing heat-induced reactions known as the maillard reaction or "browning", resulting

in the formation of toxic compounds commonly referred to as advanced glycation end products (AGEs). The degree of AGE formation is closely associated with cooking methods, with the likelihood of AGEs forming being approximately seven times higher with fructose compared to glucose. Over the past decade, our research group has focused on the relationship between AGEs and male infertility. We have demonstrated that exposure to AGEs reduces semen quality, as assessed by sperm concentration, motility, and morphology. Additionally, we found that AGEs negatively impact sperm function parameters, including DNA integrity, chromatin quality, and membrane integrity. The consequences of these effects contribute to male infertility, and in the small percentage of male mice that remain fertile, these effects have behavioral consequences. Moreover, we have shown that these changes in semen parameters and associated behavioral alterations can be transmitted to the next generation, even when fed a normal diet. Importantly, we also found that these adverse effects can be alleviated through appropriate antioxidant therapy.

K-43
Effects of male hormones on recurrent miscarriages

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The role of male hormones in recurrent miscarriages is considered as one of the possible factors. Research shows that changes in male hormone levels can affect sperm quality and lead to recurrent miscarriages. In the husbands of women with recurrent miscarriages, sperm quality has been reduced and levels of oxidative stress in semen have been increased. This could be due to the reduced production of male hormones such as testosterone that have been observed in these individuals.

K-44
Regenerative medicine in reproductive systems

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Regenerative medicine has emerged as an alternative to treat congenital or acquired diseases and overcome limitations of current therapeutic approaches by integrating various technologies that range from tissue engineering to gene editing. For a mature couple, the birth of a normal fetus will be the end point of wealth as their reproduction system duties. Hormonal, structural and anatomical simulation, very close to normal tissues and physiology is the aim of regenerative medicine for both male and female reproductive systems. Artificial organs such as artificial ovum, sperm, gonads, genital tracts and uterus are under the study and could make a bright forthcoming therapy for human reproduction problems soon. We will review the last progresses in tissue engineering as well as cell therapy, nanotechnology and gene therapy for reproductive medicine.

K-45
Psychosexual interventions in couples infertility

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The infertility is a life event which frequently represents an important stressor on the couple's self-esteem, sexual identity and sexual life in general. It is common for infertile couples to experience problems in sexual enjoyment. Not only, sexual difficulties are common amongst infertile couples, also infertility may be a consequence of earlier sexual behavior. In addition, during treatment, the act of procreation is separated into different steps which may lead to sexual dysfunctions. So, it is necessary to help couples with sexual difficulties in the context of the infertility experience and infertility treatment. Interventions have to be tailored to the individual's needs during the treatment process and include stimulation techniques, drug treatment, and targeted sex therapy. Sexual therapy in the context of infertility treatment is a focused approaches including: cognitive behavioral therapy, reducing anxiety by psychoeducation, this means that couples have to be informed about each step of the diagnostic and therapeutic process and to anticipate the possible impact on sexual function of both partners. It is a common clinical impression that when stress, which might be associated with a sexual problem, declines, conception occurs. Therefore, one might expect to find conception occurring in some couples when their general sexual relationship improves.

K-46
Evaluation and management of erectile dysfunction

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Erectile dysfunction (ED) is defined as the inability to attain and/or maintain penile erection sufficient for satisfactory sexual performance. As the most thoroughly studied sexual dysfunction in the context of epidemiologic research, ED is estimated to carry an overall adult male (> 20 yr) prevalence rate of 10-20% worldwide, with the majority of studies reporting a rate closer to 20%. The subject of ED offers a veritable clinical barometer of overall male health status, and efforts geared toward advancing its management are immediately consequential for disease prevention, health promotion, and survival improvement. The presence of ED improves the sensitivity of screening asymptomatic cardiovascular disease in men with diabetes and increases the risk of cardiovascular disease, coronary artery disease, and stroke. Ongoing clinical and basic science investigation may further affirm the benefits of lifestyle modification and clarify its mechanistic basis. This class of medication was famously inaugurated as an effective ED treatment in the United States after the FDA approval of sildenafil citrate in 1998. In general, the agents effectively result in successful sexual intercourse rates of approximately 70%. Intracavernosal injection, transurethral therapy by alprostadil-MUSE, vacuum constriction device and penile prosthesis are the other options for ED treatment.

K-47
PCOS and it's different aspects in infertility and assisted reproductive technology

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Polycystic ovary syndrome (PCOS) affect 10-13% of women of reproductive age and it is the most common endocrine disorder of reproductive age. ASRM, ESHRE definition for PCOS is: oligo anovulation, clinical or biochemical hyperandrogenism, PCO in ultrasound. Rotterdam criteria describe 4 phenotypes in PCOS. Phenotype A: anovulation+hyperandrogenism+PCO in ultrasound (44.8%), phenotype B: hyperandrogenism+anovulation (14.9%), phenotype C: hyperandrogenism+PCO in ultrasound (16.2%), phenotype D: anovulation+PCO in ultrasound (19.5%). There are 2 clinical subtypes for PCOS: metabolic group: with higher body mass index, higher glucose and insulin (more frequent in phenotype A, B, C). Reproductive group: lower BMI, lower insulin, higher insulin like growth factor-1, higher lutenizing hormone, higher **Sex hormone binding globulin** (more frequent in phenotype D). According to 2023 PCOS guideline, anti-Müllerian hormone is considered as diagnostic criteria, but insulin resistance still not included in diagnostic criteria. Infertility treatment in PCOS: one of difficult area of infertility treatment is PCOS. And in recent decades there is different approaches to improve the results. Some of these approaches are summaries here: the first step in treatment is life style modification, induction ovulation with selective estrogen receptor modulator (Clomiphen citrate), aromatase inhibitor, and gonadotropins. In new literature, letrozole may become the first line of treatment, instead of clomiphen citrate. In vitro fertilization, intracytoplasmic sperm injection, in vitro maturation, laparascopic ovarian drilling are other options for infertility treatment. Metformin is suggested to reduce ovarian hyperstimulation syndrome, improve implantation and reduce miscarriage. But this drug is recommended in phenotype A, B, C. Other insulin sensitizer like myoinositol and D chiro inositol, also can be used to ameliorate insulin resistance and decrease androgen level, and finally improve the result of assisted reproductive technology cycles in PCOS. Vitamin D deficiency induce metabolic disorders and insulin resistance in PCOS and with vit D supplementation, we can have better result in infertility treatment of PCOS. Bariatric surgery is reserved for PCOS women who have BMI more than 35 kg/m^2. In Shahid Beheshti University of Medical Sciences, Tehran, Iran, there was many researches on N-acetyl cysteine, metformin, myoinositol, chromium, L-carnitine as adjutant therapy in infertility treatment of PCOS patients. Complications of infertility treatment in PCOS: Clomiphene citrate resistance, more frequent in phenotype A, endometrial hyperplasia, more frequent in phenotype A, OHSS, more likely in phenotype A, Thick endometrium on the day of trigger, more prevalent in phenotype D. Pregnancy outcomes after ART in PCOS: lower live birth rate, higher rate of miscarriage, preterm birth (higher in phenotype A and D), higher rate of gestational diabetes mellitus, pregnancy induced hypertension, preterm birth in metabolic group of PCOS, in phenotype A and B, the quality of egg and embryo is lower and as a result the pregnancy rate will be lower. Some authorities suggest use of Glucagon-like peptide-1 agonists, like liraglutide, semaglutide and exenatide to improve the outcome of ART in PCOS.

K-48
Revolutionizing phenotype prediction through data integration

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The prediction of phenotypes from genotypic and environmental data has long been a cornerstone of biological research, with implications spanning medicine, agriculture, and evolutionary biology. However, traditional approaches often fall short in capturing the complexity of biological systems, where diverse data types -genomics, transcriptomics, epigenomics, proteomics, and environmental factors- interact in intricate and dynamic ways. This talk will explore how integrative data approaches are transforming phenotype prediction by leveraging advancements in multi-omics technologies, machine learning, and systems biology. By combining disparate

datasets into unified analytical frameworks, we can uncover novel insights into genotype-phenotype relationships, enhance predictive accuracy, and address challenges such as data heterogeneity and missing information. I will highlight recent breakthroughs in integrating and analyzing complex datasets. Case studies will demonstrate how these approaches are being applied to predict phenotypic traits, uncover disease mechanisms, and advance precision medicine, showcasing the transformative potential of data integration across diverse biological contexts. Finally, I will discuss the challenges and opportunities ahead, emphasizing the importance of interdisciplinary collaboration and addressing the ethical considerations of predictive technologies. This presentation aims to inspire researchers to rethink phenotype prediction as a holistic, data-driven endeavor, with the potential to revolutionize our understanding of biology and its real-world applications.

K-49
The impacts of abnormal sperm parameters and chromatin/DNA integrity on recurrent spontaneous abortion

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The importances of sperm DNA integrity in almost all stages of reproduction have been shown in many studies. Sperm DNA damage is associated with diminished semen quality, fertilization rates, cleavage rates, embryo quality and pregnancy loss. DNA of sperm contributes to half of the embryo genomic material; therefor any abnormalities of chromatin/DNA can lead to failures in the reproductive process. Although, the apoptosis is considered as the main cause of DNA strand breaks in human spermatozoa, but DNA fragmentation in mature spermatozoa has other origins beside apoptosis. Abnormal chromatin packaging during spermiogenesis and oxidative stress are also considered as the other sources of sperm DNA damage. Although, recurrent spontaneous abortions (RSA) may be associated with anatomical, genetic, endocrine, psychological, thrombotic, infectious and immunological causes, more than half of the cases remain unexplained, even following extensive evaluations. Recently, it is supposed that recurrent pregnancy loss may have a "paternal effect". The pathogenesis of RSA is multi-factorial, complex and poorly understood. In our previous studies, we showed that in the cases of RSA, slow motility and count had a significant reduction in comparison with controls and also spermatozoa of men from RSA group had less chromatin condensation and poorer DNA integrity than spermatozoa that obtained from fertile men with no history of RSA. In fact, in addition to abnormal sperm parameters, we have a high percentage of spermatozoa with protamine deficiency and apoptosis and these 2 anomalies may consider as important causes of idiopathic recurrent abortions. In conclusion, sperm chromatin integrity, in addition to sperm parameters is associated with reproductive outcome in RSA patients and the sperm chromatin/DNA integrity is a useful predictor for future abortions. So, it seems that sperm chromatin and DNA examinations are new tools in the process of RSA treatments.

K-50
Psychiatric nursing interventions in infertility

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Infertility is a widespread and complex challenge in the field of reproductive health that affects approximately 10-15% of couples of childbearing age and can have serious psychological and emotional consequences for both partners. This article examines the role of psychiatric interventions, particularly the role of nurses in supporting infertile couples, and emphasizes that these interventions can enhance mental health and quality of life. There is a crucial role in educating couples about fertility processes, treatment options, and potential side effects. This information can reduce anxiety and stress caused by the unknown. Pain relief and physical symptoms: nurses can assist in reducing physical pain resulting from fertility treatments or related tests by using various techniques, including relaxation and counseling. Emotional and psychological support: nurses can act as a supportive resource for couples by listening to their concerns and feelings, providing a safe space for emotional expression. Establishing support groups: nurses can organize support groups for infertile couples, allowing them to share their experiences with others in similar situations. Guidance in using coping techniques: nurses can teach couples coping skills such as relaxation techniques, deep breathing, and meditation to help manage stress and improve their quality of life. Managing expectations: nurses play an important role in assisting couples to have realistic expectations about fertility treatments and understanding the various stages involved. Research results indicate that psychiatric interventions, especially considering the key role of nurses, can lead to a reduction in symptoms of depression and anxiety and improve the overall quality of life for infertile couples. This article emphasizes the importance of psychiatric services in treatment centers and the need to address the psychological needs of infertile couples so they can cope with this significant challenge more effectively.

K-51
Male factors in recurrent implantation failure

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The role of the male factor in miscarriage has been considered since the 1970s, and with assisted reproductive techniques, the role of the male factor in recurrent implantation failure (RIF) has also been considered. Studies indicate that male factors may contribute to 30-40% of RIF and recurrent pregnancy loss cases. As research continues, understanding the interaction between male fertility and implantation success will become increasingly critical to developing targeted treatments and improving outcomes for couples experiencing RIF. Therefore, due to the importance of this issue, we try to discuss the role of the male factor in RIF from various biological and genetic perspectives.

K-52
More than survival; trends in fertility preservation, legal implications, and ethical issues

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Modern advancements in fertility preservation have significantly enhanced the quality of life for cancer patients by offering various effective strategies. Among these, cryopreservation has emerged as a cornerstone technique over the past decade. This method involves retrieving and freezing oocytes or embryos prior to initiating oncological treatments, ensuring the possibility of future biological parenthood. Additionally, the use of gonadotropin-releasing hormoneagonists and antagonists has further refined fertility preservation by safeguarding ovarian function during chemotherapy. These approaches underscore the importance of integrating fertility preservation into cancer care to address the reproductive needs of patients while maintaining their long-term quality of life. Ovarian tissue cryopreservation (OTC) has traditionally been associated with fertility preservation in cancer patients; however, various alternative methods exist for safeguarding fertility. The appropriate strategy for fertility preservation should be tailored based on factors such as the type and timing of chemotherapy, the specific cancer diagnosis, the patient's age, and whether they have a partner. For patients with a partner or those willing to use donor sperm, embryo cryopreservation is often the preferred initial option due to its established clinical efficacy. In cases where ovarian stimulation is feasible and the patient is single, oocyte cryopreservation may be favored over ovarian tissue banking, despite generally lower pregnancy rates. OTC presents a vital fertility preservation strategy, especially for prepubescent girls and adolescent cancer patients, but also introduces a spectrum of ethical, legal, and social considerations. A key ethical challenge for younger girls lies in their limited capacity for autonomous decision-making, necessitating parental or guardian consent, which raises questions regarding the alignment of these decisions with the child's best interests and future reproductive autonomy. For adolescents, the ethical landscape is more nuanced, as they participate in decision-making but may not fully grasp the long-term implications of their choice. OTC involves a surgical procedure with inherent general and specific risks. Despite its prior classification, current evidence and guidelines recognize OTC as a clinically established component of fertility preservation. Unequal access to OTC, often contingent on socioeconomic status, raises concerns about disparities in healthcare and reproductive rights. Legally, the evolving recognition of OTC necessitates clarity. While live births from cryopreserved ovarian tissue are increasing, the previous non-standard classification may confuse, potentially leading to legal complexities for patients and healthcare providers. Clear legal frameworks are essential to support informed consent and protect the rights of individuals undergoing OTC. Integrating fertility preservation into cancer care is crucial for enhancing the quality of life among survivors. Nonetheless, it is neither feasible nor ethical to apply a uniform approach to all cancer patients regarding fertility preservation strategies.

K-53
Vaginoscopy gateway to uterus

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To enter uterine cavity by hysteroscopy several methods are used. Some people are using medicine to soften or dilated the cervical canal or external os, while some do dilatation and then insert the scope. All these techniques have their own effects and side effects and some times they are not successful. Vaginoscopy using high pressure hysteron jet unit is the best technique to enter the uterus. Not only it is the best technique for entering the uterine cavity, it can provide information about the vaginal canal and cervical canal pathology as well.

K-54
Regenerative medicine: The next generation of infertility treatment

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Infertility is a primary health issue affecting about 15% of couples of reproductive ages worldwide, leading to physical, mental, and social challenges. While infertility does not threaten individual lives, its impact can be felt in all areas of personal and social life. Infertility can lead to psychological challenges such as depression and anxiety and negatively impact relationships and social life. Health issues in the male and female reproductive systems, which can arise from illnesses, injuries, or treatments like those for cancer, may result in infertility. Currently, regenerative medicine and the use of scaffolds have been offered as promising approaches to treating these abnormalities. These methods are considered innovative and effective solutions, especially for young couples facing infertility. Regenerative medicine is characterized as the process of replenishing or restoring human cells, tissues, or organs to restore or reestablish normal function. It seeks to replace tissue or organs that have been damaged by age, disease, trauma, or congenital issues, vs. the current clinical strategy that focuses primarily on treating the symptoms. The tools used to realize these outcomes are tissue engineering, cellular therapies, and medical devices and artificial organs. Combinations of these approaches can amplify our natural healing process in the places it is needed most, or take over the function of a permanently damaged organ. Regenerative medicine is a field that brings together experts in biology, chemistry, computer science, engineering, genetics, medicine, robotics, and other fields to find solutions to some of the most challenging medical problems faced by humankind.

K-55
Psychobiology of infertility

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Under stress, any organism activate a complex range of responses involving the endocrine, nervous and immune systems, collectively known as the stress response. In chronic stress condition, the sympathetic hyperactivity, could increase the risk of conditions such as obesity, cancer, depression, infertility and etc. The presence of psychological distress has been recognized to be the cause of several disorders in reproductive life, including amenorrhea, oligomenorrhea, and the premenstrual syndrome. In response to stress, enhanced secretion of hormones, such as corticotropin-releasing hormone, glucocorticosteroids, catecholamines, as well as prolactin are observed. The stress-related activation of the HPA affects the hypothalamic-pituitary-gonadal axis by restraining the release of gonadotropin releasing hormone from hypothalamus and inhibiting the secretion of luteinizing hormone from the pituitary, as well as the release of estradiol and progesterone from the ovaries. High levels of circulating stress hormones can interfere with the timing of ovulation and shorten the luteal phase. Additionally, the changed levels of hormones observed during stress could directly influence the quality of egg cells, thickness of the endometrial layer or other structures engaged in the reproductive process. Stress could also cause infertility by affecting gamete transport and delaying or inhibiting the luteinizing hormone surge of the menstrual cycle resulting in an increased risk of anovulation.

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K-56
Application of cytogenetic tests in infertility and subfertility

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In this talk I will present various cytogenetic techniques and present our data, emphasizing the relevance of the findings in the management of the patients. Infertility is certainly common, affecting about 15% of couples. One in seven couples experiences infertility or subfertility. Genetic factors could be present in 10% of female and 15% of male infertility. Y-chromosome microdeletions and related disorders; autosomal and X-chromosome defects, as well as mutations causing severe defects in sperm morphology are among genetic causes of male infertility. Sex chromosomal defects include XXY and XXY/XY in the male, typically presenting with azoospermia and occasionally severe oligospermia, and Turner syndrome and its variants, and autosomal chromosome abnormalities are infrequently seen as a cause of infertility. The reciprocal translocation (especially when an acrocentric is involved) and the inversion may be associated, though infrequently, with severe hypo spermatogenesis and moderate to severe oligospermia. Robertsonian translocations are occasionally associated with infertility in the male or, less often, the female. Translocation between a sex chromosome and an autosome is a rarely identified cause of infertility. Fertility in the 46, XX female begins to fall in the mid-thirties, paralleling both the increase in risk for trisomy and an increasing failure in in vitro fertilization implantation from this age. Various sex chromosomal abnormal states, mostly mosaic and containing a 45, X cell line, account for, or are at least associated with, a number of cases of female infertility; autosomal abnormalities are less frequent. There is a particular association of premature ovarian failure with the fragile X permutation heterozygote. Secondary

infertility may be due to premature ovarian failure. Presence of chromosomal abnormalities such as Xq isochromosome, Turner syndrome mosaicism (45, X/46, XX), an X-Y translocation, and an X-autosome translocation have been reported in such cases. Couples experiencing 3 miscarriages require usual gynecological investigations and a chromosome analysis. 5-6% of couples with recurrent abortions can have a balanced translocation or an inversion. Karyotyping should be done routinely in men with azoospermia and oligospermia. Yq microdeletions should be checked for in men with nonobstructive azoospermia and severe oligospermia, but this is unlikely to be the cause in lesser degrees of oligospermia. Karyotyping should be routine in women presenting with primary ovarian dysfunction. Diagnosis and genetic counselling should always be part of an extensive evaluation of patients with infertility and subfertility, and basic clinical analysis should precede any genetic analysis.

K-57
Modern diagnostic techniques in prenatal genetics

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The field of prenatal genetics has undergone profound transformation over the past few decades, evolving from basic cytogenetic evaluations to advanced molecular diagnostics that offer higher resolution, improved sensitivity, and more comprehensive insights into fetal genetic conditions. Initially, fluorescence in situ hybridization and comparative genomic hybridization (CGH) were widely used for the detection of aneuploidies and large chromosomal rearrangements. While these techniques established the foundation for genetic screening, they were inherently limited by low resolution, labor intensity, and the requirement for prior knowledge of target regions. Advancements in microarray-based technologies, including array CGH (aCGH) and single nucleotide polymorphism arrays, marked a significant shift in diagnostic capability. aCGH allows the detection of submicroscopic deletions and duplications with a resolution down to 50-100 kilobases. single nucleotide polymorphism arrays further provide insights into regions of homozygosity, uniparental disomy, and some cases of mosaicism, although they can be affected by maternal cell contamination and may miss balanced rearrangements. These microarray-based methods greatly increased the diagnostic yield in pregnancies with fetal anomalies detected via ultrasound. With the rise of high-throughput sequencing technologies, next-generation sequencing has emerged as a powerful tool in prenatal diagnosis. Whole exome sequencing focuses on protein-coding regions, which represent only 1-2% of the genome but harbor approximately 85% of known pathogenic mutations. Whole exome sequencing has proven especially useful in identifying causative variants in fetuses with structural anomalies. Whole genome sequencing offers even broader coverage, including non-coding regions, structural variants, and deep intronic mutations, though it presents challenges related to cost, data interpretation, and ethical issues surrounding incidental findings. Simultaneously, non-invasive prenatal testing (NIPT) has revolutionized screening by allowing analysis of cell-free fetal DNA from maternal blood. Initially applied to detect common aneuploidies such as trisomy 21, 18, and 13, NIPT has expanded to include screening for sex chromosome aneuploidies, microdeletions, and even some monogenic disorders. Despite its high sensitivity and specificity, NIPT remains a screening tool and must be confirmed with invasive diagnostic procedures due to potential false positives and negatives, particularly in cases of confined placental mosaicism. In conclusion, modern prenatal genetic diagnostics encompass a wide range of technologies, each with distinct advantages and limitations. The choice of method should be guided by clinical indications, the nature of suspected anomalies, turnaround time, cost, and the level of diagnostic resolution required. Looking ahead, the integration of multi-omics approaches -including transcriptomics, epigenomics, and proteomics- with advanced bioinformatics and machine learning is expected to refine variant interpretation and personalize prenatal care. Furthermore, expanding access to these technologies globally will be essential in ensuring equity in prenatal genetic services.

K-58
The psychological and economic importance of genetic counseling in reproductive problems

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Genetic counseling stands at the intersection of science, psychology, and economics, playing a pivotal role in the management of reproductive problems. Psychologically, genetic counseling empowers individuals and families by enhancing understanding, reducing anxiety, and fostering informed decision-making in the face of complex genetic information. Studies show that counseling significantly improves empowerment and perceived personal control, while reducing anxiety for many counselees. It also addresses the emotional challenges of coping with genetic risks, grief, and family dynamics, while promoting resilience and effective communication within families. Economically, genetic counseling is a cost-effective intervention that helps optimize healthcare resource

allocation. By clarifying risks and guiding appropriate testing and interventions, it can prevent unnecessary procedures and reduce long-term healthcare costs. Economic evaluations, such as cost-effectiveness and cost-benefit analyses, demonstrate that genetic counseling supports informed, efficient use of limited healthcare budgets and can prevent costly outcomes associated with undiagnosed or mismanaged genetic conditions. In summary, genetic counseling in reproductive health not only alleviates psychological burdens but also delivers measurable economic value, making it an essential component of modern reproductive medicine.

K-59
Life style tests and usage as personalized treatment

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Infertility is a complex condition that affects a significant portion of the global population, with both male and female factors contributing to reproductive challenges. Traditional infertility treatments, while effective for many, often follow a generalized approach, which may not address the unique genetic factors underlying a couple's fertility issues. This study explores the potential of personalized infertility treatment by integrating genetic profiling of both males and females to tailor interventions for optimal outcomes. By analyzing specific genetic markers related to reproductive health, such as those associated with ovulation, sperm quality, and hormonal regulation, the approach seeks to identify individualized treatment plans. Furthermore, genetic profiling can provide insights into underlying conditions such as polycystic ovary syndrome, endometriosis, male factor infertility, and genetic mutations that may affect fertility or pregnancy outcomes. The goal of personalized infertility treatment is to move beyond one-size-fits-all therapies, offering couples more effective, targeted, and scientifically-backed options. Ultimately, this approach aims to improve the success rates of assisted reproductive technologies, reduce trial-and-error in treatment, and enhance the emotional and physical wellbeing of individuals undergoing fertility treatment.

K-60
Pharmacogenetics and personalized drug therapy in infertility treatment

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Infertility affects a significant proportion of couples worldwide, with many cases attributed to genetic factors influencing gametogenesis and hormonal regulation. Conventional infertility treatments, such as assisted reproductive technologies and hormonal therapies, often follow a standardized approach, leading to variable success rates and adverse effects. Pharmacogenetics, the study of how genetic variations influence drug response is a promising approach for personalized drug therapy in infertility management by tailoring drug therapies based on an individual's genetic profile. This strategy helps clinicians to optimize drug efficacy, minimize side effects, and improve reproductive outcomes. Key genetic polymorphisms affecting drug metabolism and hormonal pathways have been identified via pharmacogenetic research. The variability in response to controlled ovarian hyperstimulation appears to be related to polymorphisms in genes involved in folliculogenesis and hormone metabolism, such as the follicle-stimulating hormone receptor (FSHR). Alteration of FSHR sensitivity by specific single nucleotide polymorphisms affects the efficacy of exogenous FSH. Therefore, Women with specific FSHR variants may require the most suitable medications or adjusted gonadotropin doses to achieve optimal follicular development, highlighting the need for genotype-guided dosing. Similarly, *MTHFR* gene mutations affect folate metabolism, which is critical for embryo development and may influence the success of infertility treatments. Polymorphism and variations in genes encoding cytochrome P450 enzymes alter the pharmacokinetics of drugs used for ovulation induction or successful implantation such as clomiphene citrate, gonadotropins, progesterone, metformin and aromatase inhibitors. *MTHFR* gene mutations affect folate metabolism, which is critical for embryo development and may influence the success of infertility treatments. Emerging pharmacogenomics testing can mitigate risks such as poor ovarian response, ovarian hyperstimulation syndrome, or cycle cancellation and provide actionable recommendations based on genetic profiling, paving the way for precision medicine and personalized drug therapy in reproductive endocrinology. As research expands, integrating genetic testing into routine in vitro fertilizattion practice could enhance success rates, reduce complications, and offer cost-effective solutions. Advances in next-generation sequencing and bioinformatics are accelerating the integration of pharmacogenetics in this field. Future directions include polygenic risk scoring for predicting treatment response and artificial intelligence-driven algorithms for dynamic dose adjustments.

K-61
The management of male infertility based on the genetic bases

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Infertility is a global health problem with a prevalence of 10-15%. Although male and female can be responsible for this problem due to their inability to conceive, male infertility is of particular importance. Despite the advance treatments available nearly half a century after the birth of Louise Brown, with the introduction of treatment methods for male infertility, especially those with spermatogenesis disorders, the likelihood that this cause will vary from person to person. Therefore, the decision on the type of treatment will also depend on the individual situation, in such cases, considering the role of genetics in the different stages of spermatogenesis, this panel will attempt to discuss and exchange relevant aspects. These aspects as unexplained chromosomal translocation, life style, new variants and whole exome sequencing, spontaneous rescue in chromosomal, non-syndromic of male infertility and preimplantation genetic diagnosis will be shared by speakers.

K-62
Genetic evaluation of patients with non-syndromic male infertility

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Infertility is a common health condition, affecting nearly 7% of all couples. Clinically, over 2 thousand genes are involved in human spermatogenesis. Therefore, analyzing a large number of genes that may contribute to male infertility is crucial. It is estimated that genetic defects account for nearly 50% of infertility cases. The family-based whole exome sequencing approach can accurately detect novel variants. However, selecting an appropriate sample for data generation using whole exome sequencing has proven challenging in familial male infertility studies. The aim of this study was to identify types of pathogenic male infertility in cases of familial azoospermia.

K-63
New genetic candidate variants identified by whole genome sequencing in infertile men

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In recent years, several papers have been published regarding identified genetic variants in men with nonobstructive azoospermia using the whole exome sequencing (WES). However, the WES provides a genetic diagnosis in only 25-50% of individuals on the other hand, literature shows that application of whole genome sequencing (WGS) to samples previously screened with WES may provide a conclusive cause in 42%. Although WES improved significantly in the last years, it is outperformed by WGS in terms of genomic coverage. Here, we used the WGS to detect potential causative variants in patients with nonobstructive azoospermia (n = 39) including also samples of which mutations in WES were not found (n = 6). We followed the same approach of the whole-genome sequencing to identify novel potential biomarkers for infertile men from consanguineous families (n = 10). WGS using Illumina HiSeq X was performed to detect NOA-associated gene candidates. Variants were annotated using the ensembl variant effect predictor, utilizing frequencies from gnomAD and other databases to provide clinically relevant information (ClinVar), conservation scores (phyloP), and effect predictions (i.e., MutationTaster). Structural protein modeling was also performed. Using WGS, we revealed potential NOA-associated single nucleotide variant, such as: TKTL1, IGSF1, ZFPM2, VCX3A (novel disease causing variants), ESX1, TEX13A, FAM47C (previously known genes associated with infertility) and *BEND2*, *BRWD3*, *MAGEB6*, *MAP3K15*, *RBMXL3*, and *SSX3* genes, which may be involved in spermatogenesis. This work was supported by the National Science Centre in Poland, Grant No. 2017/26/D/NZ5/00789 (to AM) and No. 2020/37/B/NZ5/00549 (to MK)

K-64
Innovative therapeutic approaches in infertility treatment

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In recent years, innovative therapeutic methods such as cell therapy, exosome therapy, and gene therapy have

revolutionized various areas of medicine. These technologies have enabled the management and even treatment of challenging medical disorders, including thalassemia, cerebral palsy, genetic dwarfisms, and amyotrophic lateral sclerosis. For instance, the use of CRISPR based manipulation of patient derived hematopoietic stem cells has shown considerable success in treating thalassemia, completely addresses the need for regular blood transfusions. Similarly, cell therapy targeting neural repair has provided new hope for patients with cerebral palsy, improving motor functions and overall quality of life. These advancements provide significant hope in addressing infertility and recurrent miscarriage issues. The use of stem cells for rejuvenating and restoring ovarian function to enhance ovarian reserve has entered the clinical realm. Studies have demonstrated that autologous stem cell ovarian transplantation enhances antral follicle count and anti-Müllerian hormone levels by stimulating the activation of dormant follicles in young women diagnosed with diminished ovarian reserve. Notably, clinical trials have reported successful pregnancies resulting from this breakthrough approach. Moreover, gene therapy methods aimed at restoring spermatogenesis in genetic disorders have shown exciting progress in preclinical phases. Recent evidence has indicated that editing specific genes related to spermatogenesis can enhance sperm production and motility, providing new avenues for treatment in men with genetic causes of infertility. In addition, remarkable advances in gene therapy have opened new possibilities for pre-implantation treatments of genetic diseases. Techniques such as preimplantation genetic testing combined with gene editing allow for the selection of genetically healthy embryos, significantly reducing the risk of inherited disorders. In this presentation, we will introduce the advancements and achievements in this field and explore the horizons opened in the treatment of infertility and recurrent miscarriage through these novel therapeutic approaches. By showcasing specific examples and ongoing clinical trials, we aim to illustrate the transformative potential of these innovative therapies in enhancing reproductive health and outcomes for individuals facing infertility challenges.

K-65
Bioinformatic analysis of the transcriptome in premature ovarian insufficiency: Insight for drug targeting

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Background: Premature ovarian insufficiency is a multifactorial condition that leads to early loss of ovarian function before the age of 40. It can be caused by a variety of genetic, environmental, and idiopathic factors. The role of intercellular communication within the ovarian follicle, particularly between cumulus and granulosa cells, has recently gained attention as a possible contributor to the progression of this disorder.
Objective: This study aimed to investigate transcriptomic changes in cumulus and granulosa cells of women with premature ovarian insufficiency using bioinformatic analysis, with a specific focus on disrupted paracrine signaling and its potential as a therapeutic target.
Materials and Methods: Raw data (RNA_seq) from the GSE267641 (cumulus cells) and GSE201276 (granulosa cells) collections were extracted from the GEO database. Data processing was performed to identify differentially expressed genes between premature ovarian insufficiency patients and controls using R (4.4.2) and the DESeq2 package. In addition, pathway enrichment and molecular interaction analysis were performed to identify processes related to ovarian function and communication between follicular cells. Gene expression correlations were also evaluated and genes with potential drug targets were identified.
Results: Analysis of (RNA_seq) data led to the identification of genes with significant changes in POI patients that are involved in pathways related to follicular growth and development, growth factor signaling, and hormonal regulation. Investigation of intercellular interactions showed that paracrine communication between granulosa and cumulus cells is disrupted in POI patients. Especially in signaling pathways related to growth factors and regulation of the follicular microenvironment. Correlation analysis of gene expression showed that some key genes in these regulatory networks are correlated with each other, which may play an important role in ovarian function. In addition, genes (*PLK1*, *TOP2A*, *AURKB*, *BUB1*, *NOS2*, *PBK*, *RAD54L*, *CYP19A1*, *FSHR*, *FOS*, *EGR2*, *DUSP6*, *FGF7*, *NR4A1*) were identified as potential drug targets that can be considered in the development of new treatments for POI.
Conclusion: The findings of this study indicate that changes in gene expression in cumulus and granulosa cells can affect the paracrine communication of these cells and play a role in the pathophysiology of POI. In addition, identifying gene expression correlations and potential drug targets can provide new ways to understand the molecular mechanisms of this disease and develop novel treatments.

K-66
Impact of genetic counselling on molar pregnancy

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A human pregnancy anomaly known as a hydatidiform mole (HM) is known by faulty embryonic development and excessive trophoblast proliferation. HM can be classified as partial (PHM) or complete (CHM) at the histopathological level. The majority of CHM cases are diploid, lack fetal tissue, and have very high serum beta-human chorionic gonadotrophin levels. The presence of ≥2 molar pregnancies iad Universirty, a single patient is known as recurrent HM, or RHMs. The patient is 37 yr old with six pathologically proven HM. She had been married to a first-degree relative. Her sister had a history of 4 moles. There wasn't a history of consanguinity between her parents. Whole exome sequencing was carried out to identify any potential genetic causes. A new homozygous missense mutation in the *NLRP7* gene (NM_001127255:exon8:c.G2585A:p.G862E) was reported using next-generation sequencing data. Since this mutation has never been reported in any other public variant database, it is categorized as a variation of unknown significance. Sanger sequencing was carried out and showed homozygous mutation in the patient and her sister with RHMs. Ovum donation appears to be the best management choice for these patients to have normal pregnancies because there is currently no medication for RHM.

K-67
Embedding genetic counselling and next generation sequencing in evaluation of infertility and recurrent miscarriage

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Infertility and recurrent miscarriage affect millions globally, many of cases remain unexplained despite conventional testing. Integrating next-generation sequencing (NGS) with structured genetic counselling offers a transformative approach to diagnosis and care. While NGS enables detection of subtle genetic disorders, genetic counselling ensures patients understand complex results, reproductive risks, and management options. Our clinic implemented a structured workflow combining genetic counselling and NGS, informed by foundational research: 1) pre-test counselling: couples underwent sessions to review medical history, inheritance patterns, and testing implications, aligning with guidelines emphasizing multidisciplinary care. 2) NGS testing: whole exome sequencing was done using the Illumina platform and Agilent SureSelect V7 library preparation kit. 3) post-test counselling: results were interpreted alongside family planning goals, discussing options like preimplantation genetic testing, and a strategy shown to improve outcomes. The case has been referred with 2 spontaneous abortions. In past history, there were 2 infantile deaths due to gastrointestinal infection and tuberculosis respectively. whole exome sequencing was done, and finally a likely pathogenic mutation in *JAK3* as c. 1275T>A was detected and confirmed in couple. This mutation was lead to severe combined immunodeficiency in autosomal recessive inheritance. Embedding genetic counselling with NGS improves diagnostic yield by 40-60% in unexplained infertility/recurrent miscarriage cases. This dual approach addresses both the biological and psychosocial dimensions of reproductive failure, empowering couples with actionable insights and personalized pathways to parenthood. Counselling ensured informed decision-making, reducing anxiety and enhancing adherence to treatment plans, consistent with psychosocial support frameworks.

K-68
Azoospermia in male infertility associated with unexplained chromosomal translocation

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Azoospermia, or the absence of sperm in the semen sample, is one of the critical defects in infertile men. Various reasons cause azoospermia, with genetic factors being the most important. Chromosomal translocations occur due to a shift between unpaired chromosomes. This disorder occurs when a chromosome breaks and pieces of it attach to another chromosome. Various studies have shown that the presence of translocases plays a role in azoospermia. Depending on the breakpoints, approximately 60% of the carriers of autosomal translocations have at least one abnormal parameter in their semen analysis. Although the frequency of sex chromosome translocations is rare, some reports have shown an association between Y chromosome translocations and azoospermia. Robertsonian translocation is the most common form of unbalanced chromosomal translocation in humans and is also the common cause of male infertility. Also, it shows chromosome 1q21 translocation leads to azoospermia in men. Studies also show that translocation in chromosome number 6 leads to azoospermia in men. Studies have also reported the presence of translocations in chromosomes 5 and 10, which also lead to azoospermia. It seems that the presence of genetic translocations plays an important role in causing defects leading to male infertility, especially azoospermia. Therefore, it is recommended that appropriate measurement and diagnostic methods be developed to investigate these genetic defects.

K-69
The principles of personalized medicine

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Personalized medicine known as a pillar of medical practice is took place at the beginning of the new millennium. It can be defined as a new medical approach that uses a patient's genetic profile to guide decisions about disease prevention, diagnosis, and treatment. There are many goals related to personalized medicine including; combination of current medicine with advanced molecular techniques, targeting each patient individually to achieve the highest possible therapeutic effect, minimizing drugs side effects, study of molecular mechanisms of diseases, assessment of genetic risk and increasing the effectiveness of care. It is also involved in the areas of preventive medicine, oncogenomics, pharmacogenetics, cost-effectiveness, new disease taxonomy, medical decision support system, and population healthcare. Regarding reproductive medicine, we can use personalized medicine in prenatal diagnostics, including maternal blood diagnostics. Applying personalized medicine means that the physicians use advanced genetics diagnostic tests to determine which medical treatments will work best for each patient. In the other words, personalized medicine involves analyzing genome of individuals to understand how their genes influence their health, disease risk, and response to treatments. This usually involves genetic testing to identify variations in genes that may predispose someone to certain diseases or affect their response to medications. In recent years many factors help the increasing use of personalized medicine, among these factors we can name; artificial intelligence, improvements in bioinformatics methods, achievements of synthetic biology, and accessing the big data in the fields of genomics, proteomics and metabolomics. Recently, using whole-exome sequencing and sequencing of targeted genes were highly effective in determining the genetic variants which are very important in personalized medicine. While personalized medicine has made significant progress recently, several challenges must be addressed regarding the privacy and security of these data, access to expensive genetic testing, and potential discrimination based on genetic predispositions.

K-70
Roles of soft markers in aneuploidy screening

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For isolated soft marker the Society for Maternal-Fetal Medicine recommends not offering diagnostic testing solely for the indication of an isolated soft marker when prior cell-free DNA screening was negative. Some soft markers in euploid fetuses are associated with specific disorders or may warrant additional ultrasound evaluation/monitoring, which should be addressed during counseling. A false-negative cell-free DNA is unlikely but probably higher with these soft markers than with the normal variants described above. These soft markers on ultrasound include urinary tract dilation, single umbilical artery, echogenic bowel, thickened nuchal fold, absent nasal bone, and shortened humerus or femur. For $\geq$ 2 soft markers. We offer genetic counseling to discuss invasive diagnostic testing options.