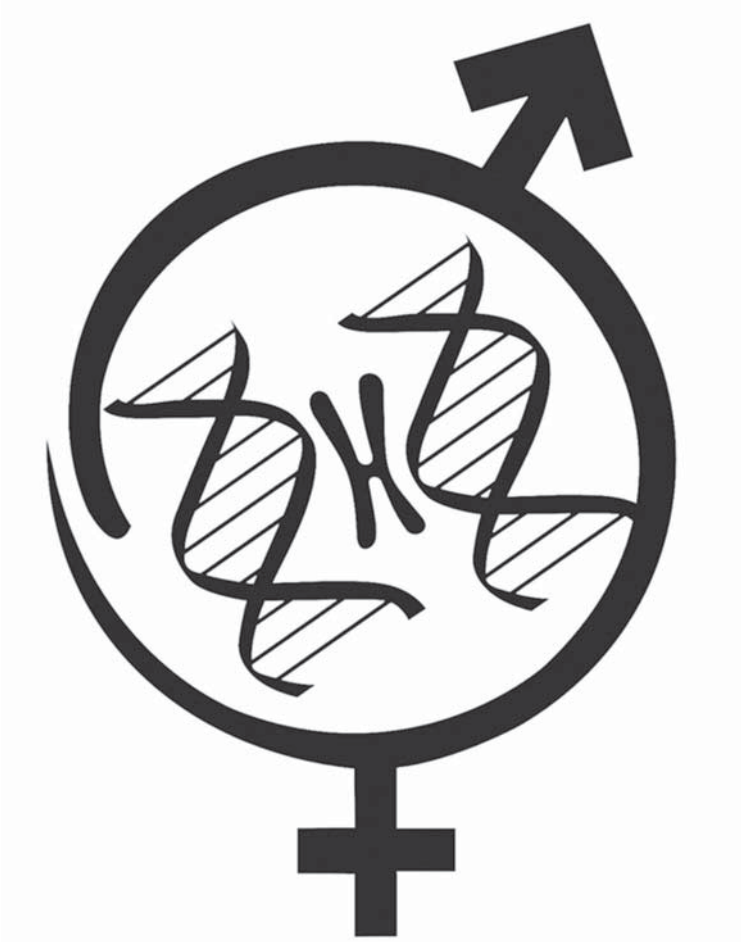
Abstracts of

Royan International Hybrid Twin Congress

24th Hybrid Congress on Reproductive Biomedicine
31 August-1 September 2023

18th Seminar on Nursing and Midwifery
31 August 2023



Royan Institute

Reproductive Biomedicine Research Center
Tehran, Islamic Republic of Iran

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Contents

didate SNVs in POI, the goal of genomic approaches is finding causal SNVs in proband and early diagnosis of genetic susceptibility to POI in relative or unrelated women, to prevent their infertility.
Keywords: Genetics, Premature Ovarian Insufficiency (POI), Single Nucleotide Variants (SNVs), Whole Exome Sequencing (WES)

I-28: A Non-Invasive Artificial Intelligence Approach for The Prediction of Human Blastocyst Ploidy

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In this talk, I present STORK and STORK-A, non-invasive and automated methods of embryo evaluation that use artificial intelligence to predict embryo ploidy status. Our methods used a dataset of 10 378 embryos that consisted of static images captured at 110 h after intracytoplasmic sperm injection, morphokinetic parameters, blastocyst morphological assessments, maternal age, and ploidy status. Independent and external datasets, Weill Cornell Medicine EmbryoScope+ (WCM-ES+; Weill Cornell Medicine Center of Reproductive Medicine, NY, USA) and IVI Valencia (IVI Valencia, Health Research Institute la Fe, Valencia, Spain) were used to test the generalisability of STORK-A and were compared measuring accuracy and area under the receiver operating characteristic curve (AUC).

I-29: Whole-Genome Sequencing Identifies New Candidate Genes for Nonobstructive Azoospermia

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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 whole exome sequencing (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 whole genome sequencing 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).
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 SNVs, 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.

I-30: Genetics of Human Asthenozoospermia: From Structural to Functional Defects of the Sperm Flagellum

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In mammals, sperm fertilization potential relies on efficient progression within the female genital tract to reach and interact with the oocyte. This fundamental property is supported by the flagellum, an evolutionarily conserved organelle that provides the mechanical force for sperm propulsion and motility. As a result, spermatozoa unconditionally require proper assembly, morphology and structure of their flagella. In addition, several maturation events occurring during their journey through the genital tracts are essential to activate their flagellar beating and ultimately confer the fertilization ability. Here we will review data we obtained through our international collaborative network regarding genetic investigation of infertile patients displaying asthenozoospermia due to structural defects of the flagellum (MMAF phenotype). We will also present our recent work on patients with functional asthenozoospermia, which unraveled genes involved in ion-dependent signaling pathways and functional maturation events, providing cues for future developments in terms of therapeuticsof asthenozoospermia and male contraception.

Imaging

I-31: Evaluation of Normal and Abnormal Endometrium

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The integration of endometrium is an important factor in the uterine cavity assessment, and it accounts for one of the most challenging issues in infertility treatment centers since several physiologic and pathologic changes should be ruled out during its assessment.
The first line for assessing the endometrium is ultrasound examination; that is TA ultrasound or TV. The main method is TV since it has more quality compared to the TA. 3-DTV is a proper method for detecting uterine anomalies; not only can it show the transverse and the sagittal views, but it can also show the coronal view save images for further usage. Doppler ultrasound examination provides more information with high quality and accuracy. Hysterosonograghy is a method that depicts lesions of the uterine cavity precisely since the infused liquid detaches the endometrium layers. Apart from mentioned items in the measurement, endometrium outline assessment is of great significance when liquid is infused into the uterus. Additionally, hysteroscopy is considered a diagnostic and therapeutic method

in the case of thin endometrium. For instance, intrauterine adhesion and septum could be treated with hysteroscopy.
Endometrium thickness, which is measured in the thicker part of the endometrium with a mid-sagittal view, is said to be the most important item reported. The two-layer thickness should be reported, and in case that there is intracavitary fluid, the sum of two layers should be mentioned in the report exactly. If the endometrium is thickened asymmetrically, the largest anterior and posterior endometrial thicknesses should also be reported separately. If the endometrial entirety is not clear, a non-measurable endometrium should be reported. When intracavitary pathology is present, the total endometrial thickness including the lesion should be recorded. The volume of intracavitary fluid should be measured using three perpendicular dimensions of intracavitary fluid. Endometrial echogenicity, Endometrium midline, and EMJ should be reported as well.

I-32: Current Strategies to Manage A Thin Endometrium

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Managing patients with thin endometrium still represents a major challenge for clinicians. Endometrium thickness less than 7 mm is the most frequently reported cutoff to define a thin endometrium at the time of final oocyte maturation .The prevalence of thin endometrium varies across published studies: it ranges from 2.4 to 8.5% .Several pathologies like , Asherman syndrome ,history of pelvic radiation ,ovarian stimulation with clomiphene citrate ,postpartum endometritis ,septic abortion , fibroids ,hypothalamic hypogonadism ,Müllerian anomalies ,premature ovarian insufficiency reported . And some time any etiology can be found. Thin endometrium not only implicates lower pregnancy rate but also seems to be associated with adverse perinatal outcomes like miscarriages or abnormal placentation. hysteroscopic evaluation of the uterine cavity should be a priority. the main pathophysiological characteristics of TE include :increased uterine artery blood flow resistance , vascular dysplasia , slow growth of glandular epithelium, low expression of vascular endothelial growth factor .Base on main pathophysiological characteristics of TE the treatment options were classified in four main approaches,(I) "hormonal" treatments,(II) "vascular" treatments (III) "growth factor" treatments (IV) application of stem cell .Hormonal approach includes: adjustment of estradiol administration , low dose priming with human chorionic gonadotropin(hCG) in the follicular phase and administration of GnRH agonists in the luteal phase. High blood flow impedance of uterine radial arteries impairs the growth of the glandular epithelium and decreases blood flow in the endometrium according to this concept "vascular" treatments proposed and several adjuvants like Sildenafil, Aspirin, Pentoxifylline, tocopherol, L-arginine, Neuromuscular electrical stimulation and biofeedback therapy have been studied. Growth factor approaches consist of using Granulocyte colony-stimulating factor and PRP. And finally endometrial regeneration with stem cells have been studied recently. but its efficacy in clinical practice, however, is still limited and this treatment should not be offered outside of rigorous research protocols. There is minimal evidence to support any specific protocols or adjuvants to significantly improve pregnancy outcomes in patients with thin endometrium but at the same time, lack of evidence to favor any of the mentioned approaches does not mean that some of these medical treatments might work in selected particular patients. Physicians must balance the prognosis for patients if they proceed with treatment with a thin endometrium or consider alternative treatments like surrogacy.

I-33: Evaluation of Iatrogenic Endometrial Pathologies

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I-34: Endometrial Myometrial Junction Disturbances and Endometrial Challenges

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Subendometrial lesions, also known as subendometrial cysts or subendometrial diverticula, are abnormal fluid-filled cavities that develop within the endometrium, the inner lining of the uterus. These lesions have been associated with various gynecological conditions and can potentially impact fertility. This abstract aims to provide an overview of the relationship between subendometrial lesions and infertility. Infertility affects a significant number of couples worldwide, and its etiology can be multifactorial. Subendometrial lesions have emerged as a possible contributing factor to infertility in some cases. These lesions may disrupt the normal architecture and function of the endometrium, thereby impairing implantation and subsequent embryo development.
The exact mechanisms by which subendometrial lesions influence fertility remain unclear. However, several hypotheses have been proposed. It is suggested that these lesions may alter blood flow patterns within the endometrium, leading to inadequate perfusion and oxygenation of the uterine lining. Additionally, they may create physical barriers that impede embryo implantation or disrupt the delicate hormonal balance necessary for successful conception. Diagnosing subendometrial lesions typically involves imaging techniques such as transvaginal ultrasound or hysteroscopy. Treatment options vary depending on the size and location of the lesion, as well as its impact on fertility. Conservative management approaches include hormonal therapy or expectant observation for smaller lesions that are not significantly affecting fertility outcomes. Surgical interventions such as hysteroscopic resection or excision may be considered for larger or symptomatic lesions.
While evidence regarding the direct association between subendometrial lesions and infertility is limited, some studies suggest a potential link between these two entities. Further research is needed to elucidate the precise role of subendometrial lesions in infertility and to establish optimal management strategies for affected individuals. In conclusion, subendometrial lesions represent a potential factor contributing to infertility. Understanding their impact on fertility outcomes is crucial for appropriate diagnosis and management. Clinicians should consider the presence of subendometrial lesions in patients experiencing unexplained infertility or recurrent implantation failure, and further investigation may be warranted to guide treatment decisions and improve reproductive outcomes.