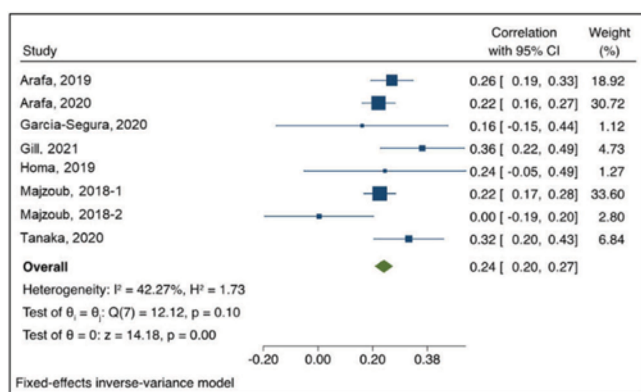
Results: Eight studies that measured both seminal ORP and SDF of 3,491 semen samples from men attending fertility clinics were pooled in this meta-analysis. The fixed-effects model revealed that the pooled correlation coefficient (0.24; p = 0.00) between seminal ORP and SDF was significant (Figure 1). Furthermore, subgroup analyses indicated that the pooled correlation coefficient between ORP and SCD assays was lesser than other SDF assays, which includes TUNEL and SCSA (0.23 vs. 0.29, p > 0.05). There was a moderate level of heterogeneity ($I^2 = 42.27\%$) among the studies with a lack of publication bias.

Conclusion: This is the first meta-analysis to evaluate the relationship between seminal oxidative stress marker and sperm DNA damage. This meta-analysis reveals a positive correlation between seminal ORP and SDF. The present study indicates the role of oxidative stress in the development of sperm DNA damage, thus warrants exploring the clinical value of these sperm function tests in a prospective manner.



Forest plot of correlation coefficient between ORP and SDF

Poster 34

EXPANDING ACCESS TO MALE FERTILITY TESTING THROUGH VALIDATION OF AN AT HOME COLLECTION KIT

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Presented By: G Charles Ostermeier, PhD

Introduction & Objective: G_{M1} localization patterns indicate capacitation status at the single cell level. The Cap-Score™ reports the proportion of sperm displaying G_{M1} localization patterns consistent with capacitation. Two separate studies confirmed that Cap-Score prospectively predicts a man's fertility and his probability of generating a pregnancy. TEST (TES and Tris) yolk buffer (TYB) prolongs the fertilization capacity of sperm. Here, we document that TYB enables home collection for Cap-Score.

Methods: *Validation study:* Following liquefaction, semen samples were split. Half was processed normally for Cap-Score (Control). The other half was diluted with TYB, cooled overnight and then processed the following day (Test). Paired t-tests compared the Control and Test samples.

Real-world observational study: Cap-Score and concentration were obtained from men seeking fertility assistance at reproductive endocrinology offices. Samples were either collected and processed at Clinics using the same process as the control above (Clinic) or with Home Collection kits (HC) like the Test group. Mann-Whitney tests compared the Clinic and HC samples.

Results: Cap-Score and concentration were the same for the Control and Test (33.6±1.2 vs. 34.0±1.2; p = 0.601; n = 40; 76.9±5.2 vs. 79.0±8.8; p = 0.767; n = 35 respectively).

Cap-Score was the same (29.2±0.2 vs. 29.3±0.3; p = 0.484) for Clinic (n = 1889) and HC (n = 763). Concentration (68.0±1.3 vs. 61.9±1.9; p = 0.001) was reduced with HC.

Conclusion: The validation study and real-world data demonstrated Cap-Score was consistent with HC versus immediate processing at the clinic. Reductions in concentration were anticipated with HC, as a minimum of 10×10^6 cells was originally required with processing at clinics, whereas no minimum was set for HC. Home collection would allow clinics with limited andrology staff to focus on other responsibilities. It may help to encourage men who are concerned with producing at an office or delivering samples to a clinic, to pursue fertility workups. It may also increase the availability of fertility evaluations to individuals that live far from clinics and decrease costs related to travel and time off work.

Poster 35

IN MEN SEEKING FERTILITY ASSISTANCE, DEFECTS IN SPERM CAPACITATION/FERTILIZING ABILITY ARE COMMON IN ALL AGE GROUPS, IN CONTRAST, SEMEN VOLUME AND MOTILITY DECLINED WITH AGE

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Presented By: Cristina Cardona, PhD

Introduction & Objective: Sperm must capacitate to become fertilization competent. Cap-Score™, which quantifies capacitation status to functionally assess male fertility, prospectively predicts pregnancy. Semen analysis (SA) does not diagnose sperm function defects and fails to predict fertility. Multiple societal factors including education, career, life goals, financial considerations, and health issues are causing couples to delay having children. Delaying parenthood raises several concerns related to reproductive success. It is generally accepted that maternal age is inversely related with fertility and pregnancy outcome. However, the influence of paternal age on male fertility parameters is largely unknown.

Objective: The objective of this study was to determine how capacitation ability, as measured by Cap-Score, and traditional semen analysis (SA) measures (Volume, Concentration, Motility) change with paternal age. The objective of this study was to determine how capacitation ability, as measured by Cap-Score, and traditional semen analysis (SA) measures (Volume, Concentration, Motility) change with paternal age.

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Methods: Cap-Score and SA measures were collected from men questioning their fertility (MQF; n = 2,652; multicentric design, 35 reproductive endocrinologist (RE) prescribers, n = 16 clinics). A Mann-Whitney test was used to compare Cap-Scores between MQF and a population of men with known recent paternity (n = 76). MQF were separated into the following age groups 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, & 50+ (n = 22, 280, 926, 843, 374, 143, and 64 per group respectively). Mixed model ANOVAs were performed to evaluate associations between SA, Cap-Score, and age groups, and to account for any potential impact of Cap-Score collection kit type within the age groups (n = 763 collected at home and n = 1,889 collected at the clinic).
Results: Men questioning their fertility had reduced capacitation ability (29.2±0.15 vs. 35.3±0.88) $p < 0.001$). There was no change in Cap-Score ($p = 0.916$) or concentration ($p = 0.926$) in association with the age groups. In contrast, both semen volume ($p = 0.008$) and the percent of sperm motility ($p < 0.001$) declined with age.
Conclusion: Capacitation ability is reduced in MQF when compared to men with known paternity. In MQF and actively pursuing fertility assistance with an RE, motility and volume declined with age. Reductions in capacitation, or sperm fertilizing ability, were equally prevalent across the age groups in MQF. These data show that capacitation ability is sensitive to male fertility issues across age groups and shouldn't be reserved for older men.

Poster 37

THE CYTOLOGICAL AND VASCULAR CHANGES IN THE TESTIS FOLLOWING EXPERIMENTAL TRAUMA

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Presented By: Anastasiya Spaska, PhD

Introduction & Objective: Among multiple factors triggering disorders of spermatogenesis, high importance possesses testicular trauma as a result of sports, domestic and industrial activity (blunt scrotal trauma, compression, rupture). In practice, they occur quite often, but their effect on testicle has not been studied enough as it is difficult to predict long-term influence on fertility. Study investigated influence of trauma on testis in a time-dependent manner.
Methods: Study completed with 32 white mature laboratory rats, divided into groups: control, day 7, day 14, day 30, day 90 following trauma. The Commission on Bioethics of the Precarpathian National University has approved the research. We developed the model of the dosed blunt testicular trauma avoiding rupture of the tunica albuginea. Microcirculatory bed of testis was examined, histologically determined diameter of convoluted seminiferous tubules, degree of damage to spermatogenic epithelium, number of cells on stage VII of development cycle, volume of Leydig cells nuclei. Electron microscopy was performed at a magnification of 4000-16,000. Statistical analysis done with the STATISTICA for Windows.
Results: On the day 7 following testicular trauma, weight of testicle and diameter of convoluted seminiferous tubules decreased, compared to control group. Tunica albuginea at the site of injury was thickened due to edema and increased connective tissue. Microcirculatory bed of injured testicle locally lost its arrangement pattern, compared to normal. Basal membrane of seminiferous tubules was thick, 19% of them expressed severe damage of spermatogenic epithelium. In 10% of the tubules only Sertoli cells and spermatogonia were present. Nucleus volume in Leydig cells decreased. On the day 30 normal structural appearance retains only in one third of seminiferous tubules. Number of cells in spermatogenic epithelium was significantly reduced. Due to atrophy of parenchyma, microvascular network around tubules was significantly deformed. With the extended time of experiment atrophic changes in parenchyma of testis were more prominent. Electron microscopy showed changes in all types of testicular cells.
Conclusion: Severe damage to spermatogenic epithelium cells may develop due to micro hematomas, disrupted blood-testis barrier with possible development of inflammation and autoimmune process. Testicular trauma in men can be complicated with hydrocele, adversely affecting spermatogenesis. Experimental data indicated that testicular trauma causes fast onset of spermatogenesis disorders, though emphasize the need for its prevention or early management to avoid inflammation and preserve fertility.

Poster 38

MOUSE ADAPTED SARS-COV-2 INDUCES HISTOPATHOLOGICAL CHANGES IN TESTIS OF LABORATORY MICE

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Introduction & Objective: Testes are susceptible to SARS-CoV-2 systemic infection. Impaired spermatogenesis and leukocyte infiltration were observed in human testicular autopsy samples. Till date there is no suitable animal model available to study the testicular changes induced by SARS-CoV-2. Recently, Mouse Adapted SARS-CoV-2 (SARS-CoV-2 MA10) was reported to infect standard laboratory mice (C57BL/6) and proposed as a promising model to study multiple aspects of SARS-CoV-2 disease pathogenesis. The main objective of our study is to understand the testicular pathogenesis in C57BL/6 and immunodeficient (RAG2-/-) mice infected with SARS-CoV-2 MA10.
Methods: Reproductively mature eight weeks old C57BL/6 (n = 5) and RAG2-/- (n = 5) male mice were infected with 1×10^5 TCID50/mouse of SARS-CoV-2 MA10 virus inoculum (50 μL) by intranasal route. Infected mice were maintained in biosafety level 3 (BSL3) facility and euthanized on day 21 post-infection. Establishment of infection was evaluated by detecting the presence of virus in lung samples using q-RT-PCR technique. Age matched uninfected mice (C57BL/6, n = 5) served as a control group. Testis from all three groups were harvested and fixed in 10% neutral formalin buffer. The fixed samples were then processed

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