EAA Andrology Training Centre

Centre Report

2024

EUROPEAN ACADEMY OF ANDROLOGY

Centre of Reproductive Medicine and Andrology
Münster University Hospital

CENTRE REPORT
Reporting period 2021 – 2023

History of Centre

To be described in a separated paper following these Guidelines: use maximum 500 words, font Times New Roman 12 and 1.5 space layout. Provide main research lines and specialized areas of clinical attention. Given the brevity of the report, number of clinical activities and personal data of the staff of the Center must be avoided. Published articles must not be included since they are already reported in this document which is renewed every three years. The date of the report must be at the end of the document.

Organization of Centre

Currently, six principal investigators with basic science training and five senior clinicians offer a full range of andrological services and research in independent research groups. Fig. 1 depicts the structure of the CeRA research and clinical environment (until 2023).

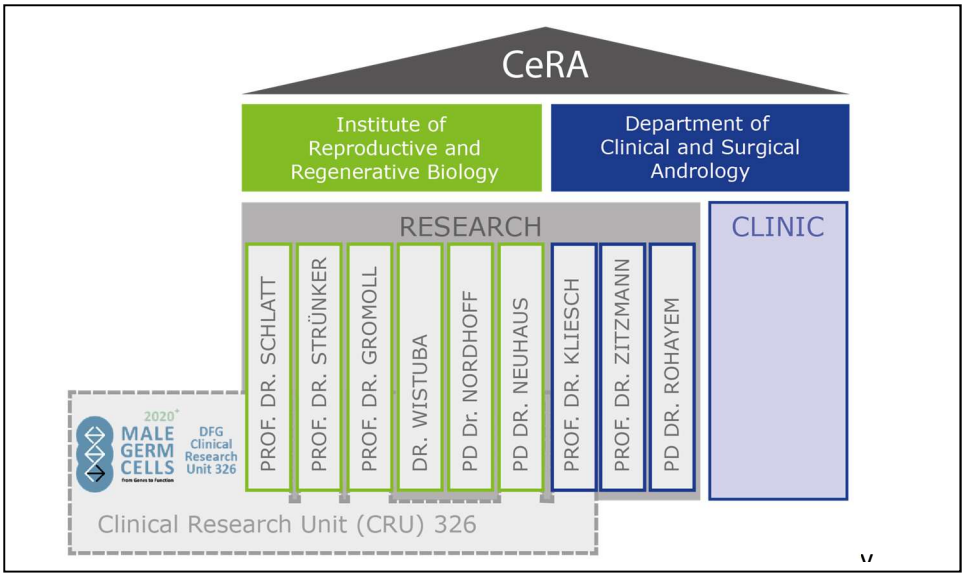

Fig. 1. The Centre consists of the Institute of Reproductive and Regenerative Biology and the Department of Clinical and Surgical Andrology. Andrological patient care, andrological and embryological aspects of the IVF laboratory, medical training of clinical andrologists, andrological teaching of medical students as well as clinical research are performed in the CeRA. Ten research teams cover a broad range of basic, preclinical and clinical research with translational aspects being the primary focus. The DFG Clinical Research Unit provides the core funding for research at CeRA.
Currently, Prof. Rohayem is substituted by Dr. Krallmann und Dr. Scheffer, and in addition Dr. Maria Schubert established the research focus in translational andrology in infertile men. The Clinical Department has additional specialised settings to cover not only the whole spectrum of andrology, but also focusses on surgical andrology, fertility preservation, oncological andrology, and transgender health.

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Educational activities

The CeRA offers a well-established and broad medical education and clinical training program in andrology. Clinicians receive training in all aspects of andrology including male infertility, adolescent and adult endocrinology, erectile and sexual dysfunction, surgical andrology including testicular and penile surgery, oncological andrology, fertility preservation and sperm cryopreservation, spermatology and, in collaboration with the woman's hospital, assisted reproduction. Trainees are initially assigned to a senior assistant and are gradually permitted more responsibility in the clinical care of patients. All patients/couples are presented to the Clinical Director or the Senior Consultants and all cases are discussed in weekly clinical rounds. The trainees perform and/or interpret diagnostic procedures (i.e. endocrine function tests, semen analysis, imaging procedures) and pass through the diagnostic laboratories to obtain training in semen analysis and hormone assays for several weeks. Training is extended after several months to ultrasonography, including transrectal and duplex sonography and histological evaluation of testis samples. Weekly rounds with gynaecologists provide for all trainees insights into optimal treatment for infertile couples. At CeRA trainees have the opportunity to take part in clinical trials and hence receive training in conducting trials subject to the strict rules of the European and USA regulatory agencies. During training clinicians are attending experimental laboratory work performed in various CeRA research groups. In their individual research projects and by participating in the weekly science meetings with all researchers, the clinical trainees learn how to plan, design, conduct and interpret complex research projects. The weekly CeRA Journal Club provides insights into latest research topics and teaches critical evaluation of research data. The language of the CeRA science meeting and Journal Club is English. Trainees are encouraged by individual mentors to apply for smaller grants and travel fellowships to attend scientific meetings and workshops.

From German authorities, Professor Kliesch is licensed to conduct full training in andrology and a 12-month urology training. Professor Zitzmann is licensed for training in internal medicine for twelve months and endocrinology for another twelve months. The Centre is engaged in the curricular teaching program of the Medical Faculty. For more than 30 years, a Summer School in Reproductive Biology and Medicine entitled "Basics and clinics of human reproduction – an interdisciplinary approach" is offered. This one week School is presented every other year in German or English. We are thankful for EAA support for the English School in promoting this andrology training in the EAA network and providing travel stipends to fellows from many countries attending the CeRA Summer School.

Apart from the curricular teaching and training of residents in urology and andrology, the CeRA offers regular public training courses (10 to 12 per year) for semen analysis in accordance to the guidelines of the WHO semen manual. Medical staff attends this one-day course in which participants are trained in all theoretical and practical aspects of semen analysis including internal and external quality control.

Research activities

CeRA consists of an interdisciplinary team of clinicians, biologists, chemists, and physicists. We perform basic research to resolve the physiology of reproduction and organ/tissue regeneration. We study the function of testicular stem and germ cells, pubertal development, testicular ageing, endocrine and cellular mechanisms controlling spermatogenesis and steroidogenesis, sperm function and pre-implantation embryonic development. Moreover, we perform translational and clinical research in reproductive endocrinology, male fertility disorders including genetics and andrology. CeRA holds a biobank and research clinical database. The IT program "Androbase" enables continuous development and to extend this valuable database providing the basis for systematic analysis of andrological diseases. Our research is directed to improve diagnosis and treatment of male infertility, to enable and optimize fertility preservation, optimize the treatment of couples with the unfulfilled desire for a child by improving the assisted reproduction, as well as to establish strategies for utilization of germ cells for therapeutic purposes.

Specifically the following themes are explored by dedicated researchers:

- Spermatogenesis and testicular function (Prof. Dr. Stefan Schlatt, PhD)
- Molecular reproductive physiology and sperm function (Prof. Dr. Timo Strünker, PhD)
- Ion channels in spermatozoa (Dr. Christoph Brenker)
- Endocrine function and molecular genetics (Prof. Dr. Jörg Gromoll, PhD; Dr. Maria Schubert, MD)
- Epi-genetics and ageing of germ cells (Dr. Sandra Laurentino, PhD)
- Testicular development and physiology (Dr. Joachim Wistuba, PhD)
- Experimental embryology (PD Dr. Verena Nordhoff, PhD)
- Germ line stem cells (Prof. Dr. Nina Neuhaus, PhD)
- Clinical, microsurgical and urological Andrology (Prof. Dr. Sabine Kliesch, MD)
- Hypogonadism and Sexual Dysfunction (Prof. Dr. Michael Zitzmann, MD)
- Adolescent Andrology (PD Dr. Julia Rohayem, MD; Dr. Claudia Krallmann, MD)
- Fertility preservation, including Androprotect (Prof. Dr. Sabine Kliesch, MD, Dr. Claudia Krallmann)
- Translational Andrology (Dr. Maria Schubert, MD)
- Surgical Andrology (Dr. Jann-Frederik Cremers, MD)
- Transgender health (Dr. Jann-Frederik Cremers, MD; Dr. Florian Schneider, MD)

Since the beginning of the CeRA in 2008, continuous research funding enables innovative research in Andrology. In 2018, CeRA and its local partners at the University Münster (Department of General Paediatrics, Institute of Cell Biology, Institute of Reproductive Genetics, Institute of Medical Informatics, Max Planck Institute for Molecular Biomedicine and the University Hospital were awarded six years of funding from the Deutsche Forschungsgemeinschaft to build a strong

scientific Clinical Research Unit entitled “Male Germ cells: from genes to function”. (CRU326)”. Fig. 2 depicts the research grants past, present and future.

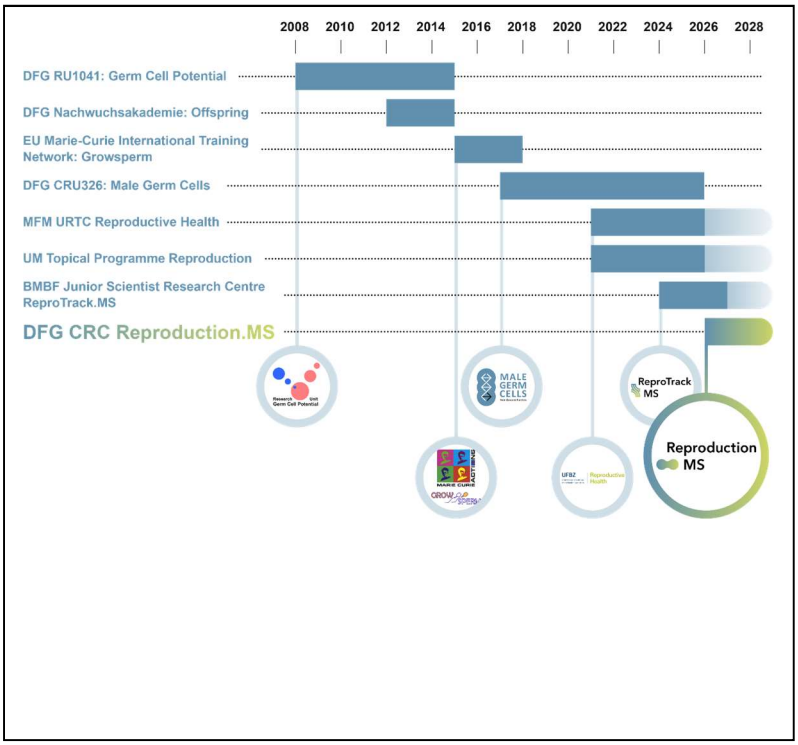


Fig. 2. Scheme representing the research funding since 2008 until present and the aims beyond 2024.

The **Clinical Research Unit 326 “Male Germ Cells: From genes to function”** starting in 2018 and funded by the German Research Foundation (DFG). The spokesperson of the unit is Prof. Dr. Jörg Gromoll, the scientific head is Prof. Dr. Frank Tüttelmann. The CRU investigates male germ cell function on the genetic, epigenetic, and molecular level to resolve the reasons for male infertility which is a genetically and clinical highly heterogenous disease. Its research outcome enabled us to develop an **UFBZ** (University Research and Treatment Centre) supported by the faculty and enabled us to successfully apply for a Young Researcher Centre in Reproductive Health **(ReproTrack.MS)** funded by the Federal Ministry of Education and Research, Germany, which started at the end of 2023 and will last for another 5 years. The local BMBF Junior Scientist Research Centre ‘ReproTrack.MS’ represents another example of the close interconnection of basic researchers and clinician scientists at the Medical Faculty and University Hospital, joining their forces to advance translational science. ReproTrack.MS is coordinated by Sabine Kliesch, Nina Neuhaus, Frank Tüttelmann, and Timo Strünker and also involves the CRC’s PIs Johanna Raidt, Maria Schubert, Heymut Omran, Alexander Bush, Benjamin Risse, and Stefan Schlatt as well as additional scientists and clinicians. The centre is populated for a runtime of initially three years with five postdoctoral basic researchers (PhD) and (advanced) clinician scientists (MD) each. It is interlinked with similar training programmes for postdoctoral scientists that

have been put in place at the Medical Faculty: the DFG-funded CareerS programme offers structured training for early and mid-stage clinician scientists. InFlame, funded by the Else Kröner-Fresenius foundation, supports natural scientists to become group leaders in the field of immunology.

We aim for another **Collaborative Research Centre (CRC) – Reproduction.MS –** funded by the German Research Foundation (DFG) and composed of basic and clinical scientists of the University, University Hospital, and Max Planck Institute Münster as well as one collaborator from the RWTH Aachen – shall take this endeavour further and establish a beacon of excellence set on **Unravelling the Molecular Mechanisms of Male Infertility**. The central objective of the CRC is, thus, to elucidate the genetic, molecular, and cellular mechanisms governing the formation and function of the testis, production and function of sperm, and the fertilisation process – in both health and disease. To this end, we combine interdisciplinary research in molecular, structural, and cell biology as well as physiology, epi-/genetics, (bio)informatics, and multimodal data analysis. The major focus is on humans, capitalising on the close interconnection of medicine, clinical science, and basic science in Münster. This unique setting enables projects relying on thoroughly characterised human material, particularly from male patients suffering from infertility and related disorders, inspiring projects on selected mammalian and non-mammalian model organisms and vice versa. Finally, pivotal central projects that interface clinics with science, generate and analyse genomic data, manage scientific and medical data, and disseminate information on human reproduction and infertility to the scientific community as well as general public maximise the CRC's scientific, clinical, and social impact. Our mission is to **Spur the Translation of Basic Knowledge into the Clinic** to enable early diagnosis of male infertility as well as co-morbidities, increase the fraction of evidence-based treatment decisions for medically assisted reproduction, and, thereby, improve the clinical care of infertile couples. At this time point, we have the invitation for the full application to be submitted April 2025.

Clinical activities

Management of andrological patients

The Department of Clinical and Surgical Andrology is active in the diagnosis and treatment of infertile patients, hypogonadal males, patients with endocrine disorders and those with sexual dysfunction. Oncological patients are provided with care regarding their reproductive health concerns including fertility preservation. In case of germ cell tumours, our Department is accredited as a second-opinion centre of the DKG. Most of the patients present with severe problems, as the Department of Clinical and Surgical Andrology is acknowledged as a secondary and tertiary referral centre. Since 2023 we are the central part of the Centre for Transgender Health and are responsible for fertility preserveration in transpersons and in close collaboration with the Plastic Surgery and Urology Department the driving force in the implementation

of gender affirming surgery. Since 2024 we are officially accredited as PGD Centre in close collaboration with the Human Genetic Department in Munic, the University Fertility Centre Münster and the CeRA.
The CeRA runs several laboratories for semen analysis, cryopreservation and long-term storage of gametes and gonadal tissue, histological analysis, endocrine analysis. The IVF laboratory (Embryology) is part of the CeRA and links closely the andrological treatment with the inhouse Fertility Centre of the University Clinic. In close collaboration with the Institute of Reproductive Genetics and the Clinic of Medical Genetics all relevant genetic analysis are available. The number of consultations and diagnostic and routine laboratory tests are listed in Tables 2 and 3 and increased steadily since 2008.
The outpatient clinic has two different premises since October 2012, with an outpatient clinic located downtown (Von-Vincke-Straße 14) in addition to the main building located at the University Campus (Domagkstraße 11), both under the responsibility of Professor Kliesch. The diagnostic and therapeutic work-flows are identical for the patients seen in both locations.

Diagnostic and laboratory tests:
Ultrasonography of the scrotal content as well as transrectal sonography of the prostate and seminal vesicles is performed routinely as a complement to the physical investigations. Ultrasonography and duplex sonography of the penile structures is performed in patients with erectile dysfunction or ejaculation disorders, including duplex sonography in pharmacologically stimulated patients with erectile dysfunction. Abdominal sonography of the retroperitoneum is offered as well as sonography of the thyroid gland and the peripheral arteries.

Semen analysis is performed according to the new WHO guidelines 2010 with an established internal and external quality control program and may be supported by a computer-assisted sperm motility analysis (CASA: Hamilton-Thorne). With more than 4,000 semen samples analyzed per year (Table 3), the andrology laboratory serves as a WHO reference laboratory providing information and guidance on techniques and instruments employed in the analysis of semen. As such, procedures are conducted as per the WHO guidelines and the veracity of the results assessed by internal and external quality control programs. The laboratory participates in the German (QuaDeGA) scheme, where it also serves also as the instigating centre, and participates in addition in the ESHRE quality control programme. The accuracy and precision of seminal plasma biochemistry assays are gauged by participation in the Karolinska Institute programme. Bacterial culture of semen is performed in collaboration with the Institute of Microbiology. DNA integrity testing can be offered in selected patients if indicated.

For **endocrinological** diagnosis, in 2023 about 40,000 hormone determinations per year are performed using a fully automatic hormone analyser for patient care as well as for research purposes (Table 3). All hormone assays are subject to quality control

according to the stringent criteria of national and international regulating agencies. The development of new techniques for measuring well-known hormones as well as the introduction of methods for new hormones are one of the Centre's core activities. Inhibin B, AMH and DHT as well as 25-hydroxy-vitamin D3 have now been added to the list of laboratory tests measured.

Testicular histology: Testicular biopsies are examined for diagnostic and treatment purposes in cases of azoospermia, for detection of germ cell neoplasia in situ and testicular cancer, and for sperm retrieval. Annually, more than 2,100 PAS and 980 PLAP stainings are performed in our histology lab by trained technicians. For semi-quantitative analysis, the score system according to Bergmann & Kliesch is used.

Genetic diagnostics: Like in the last years we continued to screen infertile men with sperm counts <1 million for microdeletions in the **AZF** region. For this we are applying a multiplex PCR recommended by the EAA guidelines and we are successfully participating on an annual basis in the EMQN External Assessment Quality Schemes for AZF. In addition, we are determining the **CAG** repeat number in the androgen receptor in patients with signs of androgen resistance, being known to be a modulator of androgen action. The unique setting at the CeRA not only allows to perform routine diagnostics (such as AZF deletions and CAG repeat analysis), but also paves the way for DNA-based association studies, screens for mutation analysis of candidate genes as well as the development of new genetic markers for male infertility. Very recently we added **epigenetics** to our DNA diagnostics. Apart from this, **FSH receptor and promotor polymorphism** are within the focus of our very recent and successful work to study genetic causes of male infertility.
As through the close interaction within the CRU and the chance to set up the first and still alone standing Institute of Reproductive Genetics in Germany under the leadership of Prof. Frank Tüttelmann, MD, we had the chance for further developments in modern genetics. Moreover, in cooperation with the former Institute of Human Genetics and the newly re-organised Medical Centre of Genetics of the University Hospital (Director Professor Frank Tüttelmann, MD), we could establish an **azoospermia gene panel** in the frame of the CRU network that was introduced into the routine diagnosis in infertile men. With the start of 2025, we will concentrate almost all routine and also research genetic activities in this facility in close collaboration to ensure cutting edge diagnostic procedures for our patients.

Bone density and body composition measurements: Since January 2014 bone density can be measured by DXA scan, indicated especially in male hypogonadal patients who are at risk for osteopenia. In addition, in patients with metabolic syndrome, body composition can be measured as well. Especially for future studies in hypogonadal patients, this instrument will give access to important and new data.

Specialized outpatient services are offered for:

Male infertility

Systematic work-up of infertile males and – in cooperation with the gynaecological partners – the infertile couple leads to specialization on severe cases of infertility with a high proportion of 12% being azoospermic. Moreover, patients with infertility and hypogonadism are medically treated according to best available evidence. In conjunction with the CRU, we aim to better characterize the "idiopathic" infertile patient and identify subtle (epi-)genetic alterations. Surgical treatment options, mostly microsurgical approaches, are offered if indicated with about 250 patients yearly treated with micro TESE, another 50 males undergoing microsurgical fertilization procedures.

Fertility Clinic of the University Hospital (Medical Assisted Reproduction)

In collaboration with the Women's Hospital, childless couples are cared for in the fertility outpatient clinic. Our department concentrates on the male partner and the IVF laboratory. We conduct a joint program for assisted reproductive techniques including intrauterine insemination, in-vitro fertilization and intracytoplasmic sperm injection and since 2024, PGD is also offered to selected couples. The Fertility Clinic was reorganized with the aim to optimize patient care. Under the interimship of Prof. Hermann Behre, MD, since 2019 and his official leadership of the University Hospital´s Fertility Centre the cooperation could be intensified and new methodologies implemented. He is specialized in Gynaecological Endocrinology and Reproductive Medicine and in Andrology and combines knowledge and expertise. By now, a constant staff of 3-4 gynaecologists for counselling and treating the female patients is present in the Fertility Clinic. Weekly interdisciplinary conferences are part of the routine work-up of the couple. As a result of the structural changes initiated in 2012, the patient numbers treated by IVF and ICSI could be doubled and resulted in more than 500 IVF or ICSI cycles in 2023. Two intracytoplasmic sperm injection (ICSI) microscopes (Nicon Ti-5 microscope equipped with two Eppendorf micromanipulators which operate electronically with a memory function and are thereby faster during an ICSI), new technologies like a laser and polarization filter (PolarAIDETM Octax) which detects the birefringence of dense objects in the oocyte are implemented during routine lab work flow. The laser is useful in selecting sperm for ICSI particularly in azoospermic men, where sperm are retrieved by testicular sperm extraction (TESE). Being an andrological centre, severe andrological cases with only few and immotile sperm in semen or testicular samples are frequent. Up to 25-30% of our patients receive ICSI treatment with testicular spermatozoa. By using the laser microscopy, the distinction of viability of spermatozoa is possible. In addition, we implemented new techniques in the IVF laboratory setting in recent years: Vitrification of oocytes is offered since the end of 2013 and Ca ionophore-assisted ART was implemented in January 2014. In 2022 we could start with blastocyst cultures, as the Medical Board of Westfalia "allowed" us up to three selected pronuclei to culture up to day 5 until blastocyst stage. With this change in clinical routine, pregnancy rates increased significantly and single embryo transfer (SET) is by now

routine. The SET rate increased from 66.1% in 2021 to 96.1% in 2023, and shows for 2024 by now 100% [Data according to the German IVF Registry (DIR) 2023, unpublished DIR centre report from August 2024).

Apart from the close interaction with the Fertility Clinic of our Department, we cooperate with the Private Practice for Reproductive Medicine in Münster (Kinderwunschpraxis an der Promenade, Dr. med. Andrea Mempel / Miriam Espeloer) and in addition since 2023 with the Private Practice for Reproductive Medicine (Wunschkinder Münster, Dr. med. Anke Cordes / Dr. med. Sonja Wüllner). We are the official andrological partners of these two centres. Diagnostic procedures and therapeutic options for the male are performed in our Department. Weekly interdisciplinary conferences ensure the best treatment for the couple.

Endocrine disorders/hypogonadism
The endocrinology outpatient clinic deals with diagnosis and treatment of primary and secondary hypogonadism, including Klinefelter's syndrome, delayed pubertal development and the ageing male as well as patients with gynecomastia. All relevant clinical and hormonal tests are provided. All modern hormone replacement schemes (oral, transdermal and injectable testosterone preparations) are available as well as stimulatory treatment protocols in males with secondary hypogonadal patients and infertility. The panel of hormones analyzed has recently been expanded by dihydrotestosterone (radioimmunoassay), inhibin B, AMH and 25-hydroxy-vitamin D3 (ELISA).

Sexual dysfunction: erectile and ejaculation disorders
Patients with ejaculatory or erectile dysfunction are seen in the outpatient clinic in increasing numbers. This part of the clinic deals with erectile dysfunction, Peyronie's disease, penile curvatures and ejaculation disorders. Diagnostics include duplex sonography of the penile vessels and pharmacostimulatory tests. The treatment options available cover the whole spectrum of medical and pharmacological intracavernous treatment, reconstruction of the penile curvature and implantation of penile prostheses. Especially in patients with Peyronie's disease, surgery comprises plaque incision and grafting techniques as well as penile implants. In 2017, the technology of low-intensity shock wave therapy (Li-ESWT) in patients with mild to moderate erectile dysfunction and/or Peyronie's disease was introduced in the therapeutic setting.

Oncological andrology
This part of our clinic provides the infrastructure and expertise for patients seeking cryopreservation of their semen (or spermatozoa of the testis if azoospermia is diagnosed) prior to undergoing oncological treatment. Most patients have testicular cancer, leukaemia or lymphoma at the time of diagnosis. We see an increasing number of patients seeking help concerning persistent azoospermia after recovery from the oncological disease. We have also established collaboration with the Oncological Department of the Children's Hospital to provide options to pubertal boys with

oncological diseases and their need for fertility preservation. Most patients are referred to us by the Department of Paediatrics, the Department of Oncology and the Department of Urology. In 2012, we founded the Network "Androprotect" with the intention to establish a network of paediatric oncologists, urologists and andrologists that offers male patients with childhood cancer and male patients with prepubertal gonadal insufficiency the option to preserve gonadal stem cells. Meanwhile, cooperation with the universities of Frankfurt, Hamburg and Erlangen could be established.

Surgical andrology (urological andrology)

Since June 2008, we are able to offer all andrological surgical procedures to patients in our Department. These treatment options include all microsurgical procedures such as **microsurgical testicular and epididymal sperm extraction** techniques, **microsurgical varicocele ligation, microsurgical vasovasostomy and vasotubulostomy** for fertilization and **diagnostic testicular biopsies** (to detect GCNIS). Concerning the severest group of infertile males, the azoospermic patients, we extended our activities regarding TESE-ICSI and MESA-ICSI cycles in the last 10 years. The German IVF Registry shows a frequency of 3-5 % of these procedures in all ICSI cycles. In our Centre, the proportion of treatment with TESE or MESA sperm was as high as 29% of patients in 2017. Since June 1, 2008, responsibility for these surgical procedures was transferred from Urology to our Department. The **microsurgical testicular sperm extraction** technique is implemented as a standard procedure for non-obstructive azoospermia since 2008 with about 200 micro TESE patients per year.

Patients with erectile disorder refractory to medical treatment can be treated by the implantation of **penile prostheses**. In case of penile curvatures, mainly in combination with **Peyronie's disease**, the surgical correction of penile curvature can be offered either with simple Nesbit procedures or preferably with plaque incision and grafting procedures with or without combination with penile implants.

Hypogonadal patients or cancer patients whose treatment results in anorchia can be provided with **testicular prostheses**.

Testicular cancer patients diagnosed at our Department can receive surgical treatment in our clinic. Further treatment involving chemotherapy or radiotherapy is undertaken in close collaboration with the Department of Urology and the Department of Radiotherapy.

The surgical procedures are done by Professor Kliesch and Dr. Cremers as her Deputy together with two to three urologists in training at our Department. Since 2008, patient numbers treated have been increasing steadily, but further growth is restricted due to personal shortage and thus only limited capacity for surgeries, a common problem in Germany since the Corona pandemics (2008: 70 pts., 2009: 160 pts., 2013: 253 pats., 2017: 372 pats., 2023:339).

Adolescents' Andrology

In 2015, we started to set up a specialized outpatient service for adolescents with andrological problems. Within 14 months more than 300 new patients with rare and severe diseases were admitted and our collaboration with paediatric colleagues was intensified. This project was part of the permanent clinical and research position of Julia Rohayem, MD, paediatric endocrinologist and andrologist, who became clinical leader of a Department of Endocrinology in a Children´s hospital in Switzerland. This project continues with Dr. Claudia Krallmann, Senior Clinician, and Dr. Bettina Scheffer and ensures to overcome the lack of care of endocrinologically and andrologically ill adolescent patients and aims to improve the standards of care in the field of reproductive health in adolescence. Two projects in DSD care have driven research activities in the last 6 years and we focus on fertility preservation in this patient group. Dr. Florian Schneider, MD, is certified paediatrician and started to complete his training in childrens´ endocrinology with Prof. Omran at our University Hospital. He will focus on Transgender adolescents and patients with DSD in Adolescents Andrology after the end of his training.

Clinical database Androbase©

Due to Professor Nieschlag's activities and the commitment of Professor Frank Tüttelmann, former co-worker of the Centre and now scientist in the Institute of Human Genetics of the University, respectively, a well adopted database for andrological patients was established. Named *Androbase*©, this software allows the digital documentation of all patient- and proband-related entries, all laboratory results and all clinical findings/diagnoses. Furthermore, this software also allows to do continuous development and to build up an enormously valuable database providing the basis for systematic analysis of andrological patients and andrological diseases. After an official evaluation of the University IT Department, Androbase has become the official and fully supported database for the CeRA and the Institute of Human Genetics (GeneSys©). Within the last 3 years all prerequisites were established to switch from patient records to a fully digital patient record system. Since the end of 2014, we rely on a merely electronic patient data system with Androbase. This platform is a central tool for phenotyping our patients and select patient cohorts for research within the frame of our research activities.

Name and address of Centre

Centre of Reproductive Medicine and Andrology, Münster University Hospital
Mailing address: Albert-Schweitzer-Campus 1, Gebäude D11, D-48149 Münster, Germany
Street address: Domagkstr. 11, 48149 Münster, Germany

Type of Centre

University	x
University Hospital	x
Private Centre	
Other (please specify)	

1. Director Prof. Dr. rer. nat Stefan Schlatt (PhD)

Academician [x] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

2. Clinical Director Prof. Dr. med. Sabine Kliesch (MD, Chief Clinician)

Academician [x] Regular Member [ ] EAA Certified Clin. Andrologist [x]

3. Present Staff *(Senior Scientists)*

1) Name: Dr. med. Jann-Frederik Cremers (MD)
Degree: Senior Consultant
Speciality: Andrology, Urology, Surgical Andrology, Gender Affirming Surgery

Academician [ ] Regular Member [x] EAA Certified Clin. Andrologist [x]

2) Name: Prof. Dr. med. Dr. h.c. Michael Zitzmann (MD, PhD)
Degree: Senior Consultant
Speciality: Andrology, Endocrinology, Sexual Medicine, Diabetology, Internal Medicine

Academician [x] Regular Member [ ] EAA Certified Clin. Andrologist [x]

3) Name: Dr. med. Claudia Krallmann (MD)
Degree: Senior Consultant
Speciality: Urology, Andrology, Sexual Medicine, General Medicine

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

4) Name: Prof. Dr. rer. nat. Timo Strünker (PhD)
Degree: Full Professor
Speciality: Molecular Reproductive Physiology

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

5) Name: Prof. Dr. rer. nat. Nina Neuhaus (PhD)
Degree: Associate Professor
Speciality: Germline stem cells

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

Insert any additional staff below *(if required)*

MD/Biologists/Chemists

1) Name: Dr. med. Mattia Anfosso
Degree: MD
Speciality: Assistant Urology, Andrology
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

2) Name: Dr. med. Simone Bier
Degree: MD
Speciality: Urologist, Andrology, Medical Tumor Therapy
Full time/part time: Part time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

3) Name: Dr. med. Cordelia Kaspar
Degree: MD
Speciality: Urology, Andrology
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

4) Name: Dr. med. Bettina Scheffer
Degree: MD
Speciality: Urology, Andrology, Medical Tumor Therapy
Full time/part time: Part time

Academician [ ] Regular Member [X] EAA Certified Clin. Andrologist [X]

5) Name: Dr. med. Florian Schneider
Degree: MD
Speciality: Pediatrician, Neonatologist, Trainee in Diabetology and Endocrinology
Full time/part time: Part time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

6) Name: Dr. med. Valentin Schrodi
Degree: MD
Speciality: Urology (FEBU),Andrology
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

7) Name: Dr. med. Maria Schubert
Degree: MD
Speciality: Urology, Andrology
Full time/part time: Part time

Academician [ ] Regular Member [x] EAA Certified Clin. Andrologist [x]

8) Name: Dr. Dipl.-Phys. Christoph Brenker
Degree: Diploma Physicist
Speciality: Sperm Physiology
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

9) Name: Dr. rer. nat. Sara Di Persio
Degree: PhD
Speciality: Reproductive Biology
Full time/part time: Full time

Academician [ ] Regular Member [x] EAA Certified Clin. Andrologist [ ]

10) Name: Dr. rer. nat. Katharina Fechtmann
Degree: PhD
Speciality: Trainee in Embryology (AGRBM)
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

11) Name: Dr. med. Janice Jeschke
Degree: MD
Speciality: Trainee in Obstetrics and Gynecology
Full time/part time: Part time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

12) Name: Sushmita Nath
Degree: PhD
Speciality: Reproductive Biomedicine
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

13) Name: PD Dr. rer. nat Verena Nordhoff (PhD)
Degree: Assistant Professor, Academic Councellor
Speciality: Embryology, Reproductive Biology
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

14) Name: Dr. Juan Manuel Paturlanne
Degree: PhD
Speciality: Molecular biology
Full time/part time: Full time

Academician [ ] Regular Member [x] EAA Certified Clin. Andrologist [ ]

15) Name: Dr. rer. nat. Tim Pock
Degree: PhD
Speciality: Embryology / IVF-Laboratory
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

16) Name: Fariba Saadati
Degree: PhD
Speciality: Medical Biotechnology
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

17) Name: Dr. rer. nat. Joachim Wistuba
Degree: PhD
Speciality: Animal Models, Physiology, Histology
Full time/part time: Part time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

18) Name: Dr. rer. nat. Hengxi Zhang
Degree: PhD
Speciality: Structure Biology
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

19) Name: Dr. rer. nat. Leonie Herrmann
Degree: PhD
Speciality:
Full time/part time: Full time

Academician [ ] Regular Member [ ] EAA Certified Clin. Andrologist [ ]

20) Name Jacqueline Kockwelp
Degree
Speciality Computer scientist
Full time/part time Full time

Academician ☐ Regular Member ☐ EAA Certified Clin. Andrologist ☐

21) Name Dr. rer. nat. Samuel Young
Degree PhD
Speciality Computer scientist
Full time/part time Full time

Academician ☐ Regular Member ☐ EAA Certified Clin. Andrologist ☐

Insert any additional staff below *(if required)*

Specialists

1) Name See above

PhD Students

1) Name Linda Ebbert
2) Name Pauline Kibui
3) Name Fabian Schlag
4) Name Yihan Wang
5) Name Jannika Patz
6) Name Vesna Bojovic
7) Name Jannika Patz
8) Name Teresa Mittermair
9) Name Jens Münchow
10) Name Thomas Lange

Student Assistants

1) Name Alina Coners
2) Name Safa Öcal
3) Name Justus Rahmann
4) Name Antonia Schubert
5) Name Ben Unterschütz
6) Name Alina Wiegers

Nurses/Doctor's Assistants

1) Name Victoria Adler
2) Name Sonja Barkhaus
3) Name Sandra Niehoff
4) Name Anja Rößler
5) Name Lisa Treichel
6) Name Helena Schneider
7) Name Birgit Wies
8) Name Vivien Röttger

Laboratory Technicians

1) Name	Joachim Esselmann
2) Name	Sabine Forsthoff
3) Name	Daniela Hanke
4) Name	Chantal Döring
5) Name	Barbara Hellenkemper
6) Name	Adelheid Kersebom
7) Name	Elke Kößer
8) Name	Raphaele Kürten
9) Name	Elisabeth Lahrmann
10) Name	Elena Plester
11) Name	Sabine Strüwing
12) Name	Jutta Salzig
13) Name	Reinhild Sandhowe
14) Name	Nicole Terwort
15) Name	Kira Welterlich (on maternal leave)
16) Name	Angelika Derksen
17) Name	Sarah Tiebel

Administrative Personnel

1) Name	Ingrid Rambow
2) Name	Ulla Rüschhoff
3) Name	Dr. rer. nat. Vera Minneker

Animal caretakers

1) Name	Nicole Hoffstätte
2) Name	Sandra Oberdiek-Sperling

4. Clinical Activity

A. Outpatients: Consultations per year in the last 3 years

	2021	2022	2023
New patients	2207	1893	1947
Follow-up patients	4550	4047	3887

Type of patients in the last years	2021	2022	2023
Infertility	1098	1026	1134
Erectile dysfunction	471	540	414
Hypogonadotropic Hypogonadism	195	165	98
Hypergonadotropic Hypogonadism	220	195	176
Other types of Hypogonadism	253	157	174
Klinefelter	114	89	99
Gynaecomastia	86	64	49
Varicocele	356	285	283
Cryptorchidism	287	241	227
Male sex accessory gland infections	2550	2487	2401
Testicular tumours	113	85	79
Disorders of gender identity	18	26	47
Other	1469	932	1018

B. Ultrasound (testis, penile, prostate) *

	2021	2022	2023
Total	3253	2656	2945
Controls	1628	1297	1476

** performed in the CeRA*

C. Andrological surgery procedures

	2021	2022	2023
Microsurgical TESE including Testicular biopsies	274	218	245
Microsurgical Varicocele ligation	18	5	10
Testicular cancer	25	37	20
Vasectomy	15	4	9
Microsurgical Vaso-vasostomy	25	21	28
Corporoplasty	30	17	21
Penile prosthesis	11	6	5
Other	0	0	1

5. A. Andrology laboratory activity

	2021	2022	2023
Semen analyses	4567	3691	3802
Sperm antibodies	1722	1424	1418
Seminal markers	9067	7450	6990

5. B. Andrology laboratory activity

Sperm banking donors Yes [ ] No [x]

Sperm banking cancer patients Yes [x] No [ ]

If yes:			
	2021	2022	2023
Number of samples	246	210	256

5. C. Histopathologial evaluation of biopsies Yes [x] No [ ]

5. D. Reproductive Hormones Assays Yes [x] No [ ]

If yes please specify type of assays and number of samples in the last year
Reproductive Hormones Assays 32475
(FSH, LH, testosterone, SHBG, prolactin)

5. E. Y chromosome microdeletions according to EAA/EMQN guidelines Yes [x] No [ ]

If yes number of tests in the past year 2021: 420, 2022: 318, 2023: 213

Participation to the EAA quality control scheme? Yes [x] No [ ]

If no, specify if available in another lab of the same hospital Yes [ ] No [ ]

Blood karyotyping Yes [ ] No [x]

If no, specify if available in another lab of the same hospital Yes [X] No [ ]

Genetic testing of andrological patients is performed in the Institute of Reproductive Genetics and the Medical Centre of Genetics of the University Hospital (Director Professor Frank Tüttelmann, MD)

Other genetic tests (please specify)
Pre-implantation genetic diagnosis – performed in collaboration with the partner lab in Munich (Medizinisch Genetisches Zentrum München) – yes
Amniotic fluid karyotyping – available in another lab of the same hospital – yes

CAG repeats – yes
AZF – yes
DNA fragmentation (Sperm Chromatin Structure Analysis [SCSA]) – yes
Methylation (MEST) – yes
FSHB SNP -211 – yes
no, but available in another lab of the same hospital:
Complete Azoospermia gene panel
CHH-Gene-Panel
Selective Non-obstructive Azoospermia Gene Panel
Selective Obstructive Azoospermia Gene Panel

6. Collaborations with other Clinical Units of the University/Hospital

IVF Unit	Yes	x	No	

If yes please specify: Children, Endocrinology, IVF, Urology, Genetics, Pathology, Central Lab Unit

Urology Clinic	Yes	x	No	
Endocrine Clinic	Yes	x	No	
Genetics Lab/Unit	Yes	x	No	
Paediatric Unit	Yes	x	No	
Central Hospital Laboratory	Yes	x	No	
Private Centres	Yes	x	No	

If yes please specify:
In addition, there are collaborations with the Institutes of Microbiology, Radiology, Clinic for Psychosomatic Diseases.

7. Clinical teaching activity

Duration of training (years): Up to three years

	Number
A: Trainees in the last five years	
B: Trainees who passed EAA-ESAU\exam for Clinical Andrologist in the last 5 yrs (2018 – 2023)	8
C: Trainees working in the centre preparing to pass the EAA-ESAU examination	3
D: PhD Students	>15
E: Medical Students	>30
F: Other students (MSc)	>15

8. Formal Andrology teaching program* Yes [x] No [ ]

If yes: specify duration (years/months): Years [ ] Months [12]

	Hours of formal teaching per year	Professional training (weeks/months)
Medical Students	8 semester periods per week per teacher	
PhD Students	2 hours per week per student	
Post Graduate students	2 hours per week per student	
Trainees		12 months
Other degrees (please specify)		

*Formal andrology teaching program only exists for clinical trainees in Andrology and covers 12 months full time clinical work.

9. Research Activity (maximum 1 page)

The CeRA combines Research and Clinic: The Center of Reproductive Medicine and Andrology (CeRA) is a Center of Excellence for research and clinical service in andrology and reproduction. Its research is dedicated to solve important questions in basic reproductive functions and clinical applications, providing benefits for patients at the earliest opportunity. Scientists and physicians combine their multi-disciplinary expertise in reproductive medicine/biology and molecular reproductive physiology. Additional expertise from physics, chemistry, gynecology, human genetics and stem cell research are added to elucidate the basic principles of fertilization. Moreover, translational and clinical studies are performed to develop novel treatments for human fertility disorders, the control and maintenance of reproductive functions, and the generation of cells and gametes for therapeutic procedures. CeRA consists of the Institute of Reproductive and Regenerative Biology and the Department of Clinical and Surgical Andrology.

Weblink: https://www.medizin.uni-muenster.de/en/cera.html

The full list of publications (years 2019 – 2023) are presented at the end of this report.

10. Research Funding

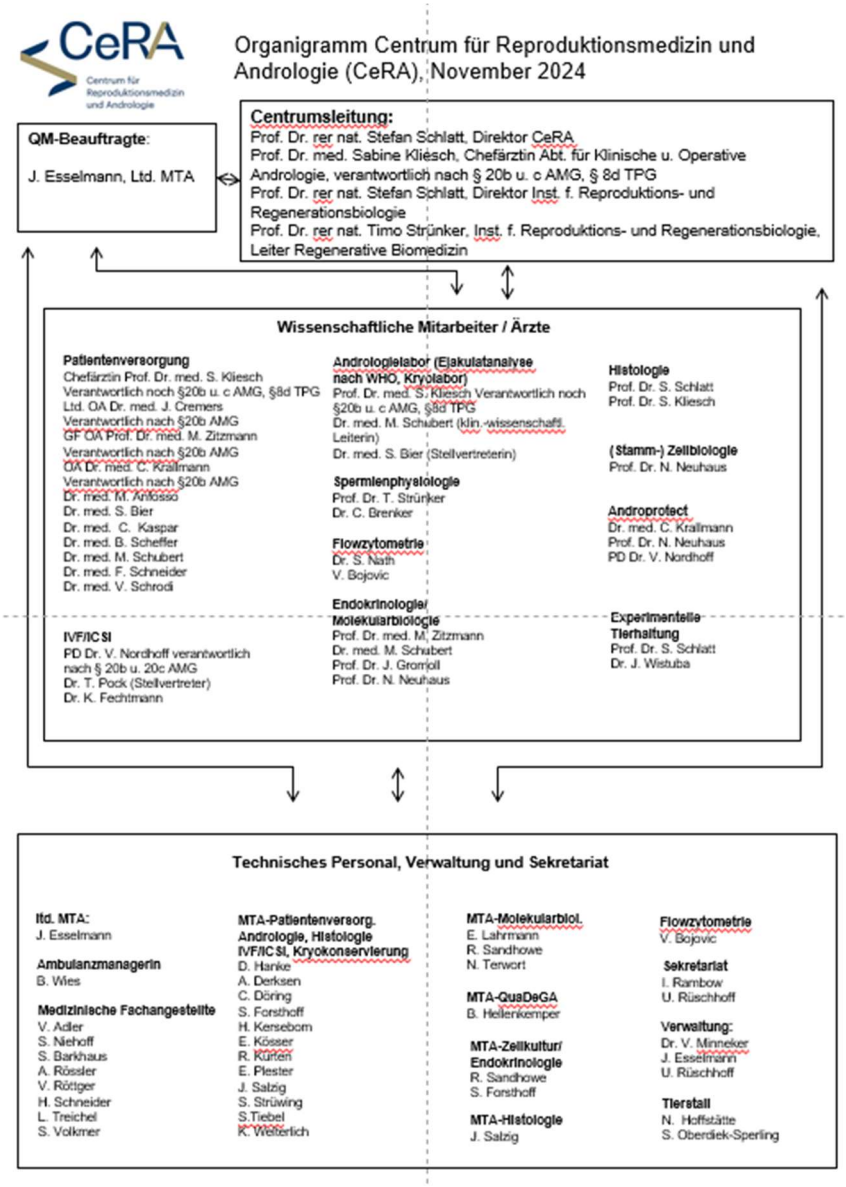
Please specify the amount of available funds in the last 3 years and their source (Government, European Union, University, Local Government, Pharmaceutical Industries, Banks, Foundations….)

Year	2021 – 2023
Total amount (€)	ca. 4.7 Mio €
Funding Source(s)	DFG, BMBF, DAAD, Pharmaceutical Industries, University Münster

Insert any additional funding below if required

ORGANIZATION CHARTS

All facilities are open to EAA trainees depending on their specific interests and a specific training plan is set up after discussion of the background, the needs and aims of the trainee. Either Prof. Kliesch or Prof. Schlatt, together with their teams, care for the clinical and/or scientific training.



CENTRE PHOTOS

FULL LIST OF PUBLICATIONS (with IF) of staff members from the last 5 years

Publications in Journals 2019

Influence of testosterone substitution on glycemic control and endothelial markers in men with newly diagnosed functional hypogonadism and type 2 diabetes mellitus: a randomized controlled trial.
Aging Male 2019; 22(4): 241-249; Impact Factor=n.a.; Impact Factor 2022=2.6; Typ=Journal Article;
Khripun I, Vorobyev S, Belousov I, Kogan M, Zitzmann M

Genetic investigations on causes of male infertility in Western Saudi Arabia.
Andrologia 2019; 51(6): e13272; Impact Factor=1.951; Impact Factor 2022=2.4; Typ=Journal Article;
Beg MA, Nieschlag E, Abdel-Meguid TA, Alam Q, Abdelsalam A, Haque A, Mosli HA, Bajouh OS, Abuzenadah AM, Al-Qahtani M

AMH and INSL3 in testicular and extragonadal pathophysiology: what do we know?
Andrology 2019; 7(2): 131-138; Impact Factor=2.86; Impact Factor 2022=4.5; Typ=Journal Article;Review;
Sansone A, Kliesch S, Isidori AM, Schlatt S

Activin A target genes are differentially expressed between normal and neoplastic adult human testes: clues to gonocyte fate choice.
Andrology 2019; 7(1): 31-41; Impact Factor=2.86; Impact Factor 2022=4.5; Typ=Journal Article;
Szarek M, Bergmann M, Konrad L, Schuppe HC, Kliesch S, Hedger MP, Loveland KL

Ageing in men with normal spermatogenesis alters spermatogonial dynamics and nuclear morphology in Sertoli cells.
Andrology 2019; 7(6): 827-839; Impact Factor=2.86; Impact Factor 2022=4.5; Typ=Journal Article;
Pohl E, Höffken V, Schlatt S, Kliesch S, Gromoll J, Wistuba J

Immunolocalization of DMRTB1 in human testis with normal and impaired spermatogenesis.
Andrology 2019; 7(4): 428-440; Impact Factor=2.86; Impact Factor 2022=4.5; Typ=Journal Article;
Hilbold E, Bergmann M, Fietz D, Kliesch S, Weidner W, Langeheine M, Rode K, Brehm R

Androgen receptor gene polymorphism and sexual function in midlife women.
Arch Gynecol Obstet 2019; 299(4): 1173-1183; Impact Factor=2.283; Impact Factor 2022=2.6; Typ=Journal Article;
Sutter B, Fehr M, Hartmann C, Schmid S, Zitzmann M, Stute P

Seminal plasma (SP) induces a rapid transforming growth factor beta 1 (TGF?1)-independent up-regulation of epithelial-mesenchymal transdifferentiation (EMT) and myofibroblastic metaplasia-markers in endometriotic (EM) and endometrial cells.
Arch Gynecol Obstet 2019; 299(1): 173-183; Impact Factor=2.283; Impact Factor 2022=2.6; Typ=Journal Article;
Ibrahim MG, Elghonaimy EA, Schäfer S, Vennemann M, Kliesch S, Kiesel L, Götte M, Schüring AN

An integrative approach to cisplatin chronic toxicities in mice reveals importance of organic cation-transporter-dependent protein networks for renoprotection.
Arch Toxicol 2019; 93(10): 2835-2848; Impact Factor=5.059; Impact Factor 2022=6.1; Typ=Journal Article;
Hucke A, Rinschen MM, Bauer OB, Sperling M, Karst U, Köppen C, Sommer K, Schröter R, Ceresa C, Chiorazzi A, Canta A, Semperboni S, Marmiroli P, Cavaletti G, Schlatt S, Schlatter E, Pavenstädt H, Heitplatz B, Van Marck V, Sparreboom A, Barz V, Knief A, Deuster D, Zehnhoff-Dinnesen AA, Ciarimboli G

Cyclic Nucleotide-Specific Optogenetics Highlights Compartmentalization of the Sperm Flagellum into cAMP Microdomains.
Cells 2019; 8(7); Impact Factor=4.366; Impact Factor 2022=6.0; Typ=Journal Article;Research Support, Non-U.S. Gov't;
Raju DN, Hansen JN, Rassmann S, Stüven B, Jikeli JF, Strünker T, Körschen HG, Möglich A, Wachten D

High-resolution analysis of germ cells from men with sex chromosomal aneuploidies reveals normal transcriptome but impaired imprinting.
Clin Epigenetics 2019; 11(1): 127; Impact Factor=5.028; Impact Factor 2022=5.7; Typ=Journal Article;Research Support, Non-U.S. Gov't;
Laurentino S, Heckmann L, Di Persio S, Li X, Meyer Zu Hörste G, Wistuba J, Cremers JF, Gromoll J, Kliesch S, Schlatt S, Neuhaus N

A microRNA cluster in the Fragile-X region expressed during spermatogenesis targets FMR1.
EMBO Rep 2019; 20(2); Impact Factor=7.497; Impact Factor 2022=7.7; Typ=Journal Article;
Ramaiah M, Tan K, Plank TM, Song HW, Dumdie JN, Jones S, Shum EY, Sheridan SD, Peterson KJ, Gromoll J, Haggarty SJ, Cook-Andersen H, Wilkinson MF

CRISP2 Is a Regulator of Multiple Aspects of Sperm Function and Male Fertility.
Endocrinology 2019; 160(4): 915-924; Impact Factor=3.934; Impact Factor 2022=4.8; Typ=Journal Article;
Lim S, Kierzek M, O'Connor AE, Brenker C, Merriner DJ, Okuda H, Volpert M, Gaikwad A, Bianco D, Potter D, Prabhakar R, Strünker T, O'Bryan MK

ENDOCRINE HISTORY: The history of discovery, synthesis and development of testosterone for clinical use.
Eur J Endocrinol 2019; 180(6): R201-R212; Impact Factor=5.308; Impact Factor 2022=5.8; Typ=Journal Article;Review;Historical Article;Portrait;
Nieschlag E, Nieschlag S

Age-related distribution and potential role of SNCB in topographically different retinal areas of the common marmoset Callithrix jacchus, including the macula.
Exp Eye Res 2019; 185(): 107676; Impact Factor=3.011; Impact Factor 2022=3.4; Typ=Journal Article;Research Support, Non-U.S. Gov't;
Hadrian K, Melkonyan H, Schlatt S, Wistuba J, Wasmuth S, Heiligenhaus A, Thanos S, Böhm MRR

Pharmacogenetics of FSH Action in the Male.
Front Endocrinol (Lausanne) 2019; 10(): 47-; Impact Factor=3.644; Impact Factor 2022=5.2; Typ=Journal Article
Schubert M, Lanuza LP, Gromoll J

An Assay to Determine Mechanisms of Rapid Autoantibody-Induced Neurotransmitter Receptor Endocytosis and Vesicular Trafficking in Autoimmune Encephalitis.
Front Neurol 2019; 10(): 178-; Impact Factor=2.889; Impact Factor 2022=3.4; Typ=Journal Article
Amedonu E, Brenker C, Barman S, Schreiber JA, Becker S, Peischard S, Strutz-Seebohm N, Strippel C, Dike A, Hartung HP, Budde T, Wiendl H, Strunker T, Wunsch B, Goebels N, Meuth SG, Seebohm G, Melzer N

Andrological diagnostics prior to treatment by assisted reproduction.
GYNAKOLOGISCHE ENDOKRINOLOGIE 2019; 17(4): 257-274; Impact Factor=n.a.; Impact Factor 2022=0.2; Typ=Article;
Kohn FM, Kliesch S, Pinggera GM, Schuppe HC, Tuttelmann F

Infertility due to azoospermia Differential diagnosis, genetic aspects, histopathology of the testis, and surgical sperm retrieval.
GYNAKOLOGISCHE ENDOKRINOLOGIE 2019; 17(4): 219-229; Impact Factor=n.a.; Impact Factor 2022=0.2; Typ=Article;Schuppe HC, Pilatz A, Fietz D, Diemer T, Kohn FM, Tuttelmann F, Kliesch S

Male hypogonadism and infertility.
GYNAKOLOGISCHE ENDOKRINOLOGIE 2019; 17(4): 230-235; Impact Factor=n.a.; Impact Factor 2022=0.2; Typ=Article;
Zitzmann M

The one among many: sperm quality and selection possibilities.
GYNAKOLOGISCHE ENDOKRINOLOGIE 2019; 17(4): 250-256; Impact Factor=n.a.; Impact Factor 2022=0.2; Typ=Article;
Nordhoff V, Kliesch S

Diagnosis and Therapy before Assisted Reproductive Treatments. Guideline of the DGGG, OEGGG and SGGG (S2k Level, AWMF Register Number 015-085, February 2019) - Part 1, Basic Assessment of the Woman.
Geburtsh Frauenheilk 2019; 79(12): 1278-1292; Impact Factor=2.382; Impact Factor 2022=2.7; Typ=Journal Article;
Toth B, Baston-Büst DM, Behre HM, Bielfeld A, Bohlmann M, Bühling K, Dittrich R, Goeckenjan M, Hancke K, Kliesch S, Köhn FM, Krüssel J, Kuon R, Liebenthron J, Nawroth F, Nordhoff V, Pinggera GM, Rogenhofer N, Rudnik-Schöneborn S, Schuppe HC, Schüring A, Seifert-Klauss V, Strowitzki T, Tüttelmann F, Vomstein K, Wildt L, Wischmann T, Wunder D, Zschocke J

Diagnosis and Treatment before Assisted Reproductive Treatments. Guideline of the DGGG, OEGGG and SGGG (S2k Level, AWMF Register Number 015-085, February 2019) - Part 2, Hemostaseology, Andrology, Genetics and History of Malignant Disease.
Geburtsh Frauenheilk 2019; 79(12): 1293-1308; Impact Factor=2.382; Impact Factor 2022=2.7; Typ=Journal Article;
Toth B, Baston-Büst DM, Behre HM, Bielfeld A, Bohlmann M, Bühling K, Dittrich R, Goeckenjan M, Hancke K, Kliesch S, Köhn FM, Krüssel J, Kuon R, Liebenthron J, Nawroth F, Nordhoff V, Pinggera GM, Rogenhofer N, Rudnik-Schöneborn S, Schuppe HC, Schüring A, Seifert-Klauss V, Strowitzki T, Tüttelmann F, Vomstein K, Wildt L, Wischmann T, Wunder D, Zschocke J

Complete spermatogenesis in intratesticular testis tissue xenotransplants from immature non-human primate.
Hum Reprod 2019; 34(3): 403-413; Impact Factor=5.733; Impact Factor 2022=6.1; Typ=Journal Article;
Ntemou E, Kadam P, Van Saen D, Wistuba J, Mitchell RT, Schlatt S, Goossens E

Investigation of activin A in inflammatory responses of the testis and its role in the development of testicular fibrosis.
Hum Reprod 2019; 34(8): 1536-1550; Impact Factor=5.733; Impact Factor 2022=6.1; Typ=Journal Article;
Kauerhof AC, Nicolas N, Bhushan S, Wahle E, Loveland KA, Fietz D, Bergmann M, Groome NP, Kliesch S, Schuppe HC, Pilatz A, Meinhardt A, Hedger MP, Fijak M

Mutations in the stromal antigen 3 (STAG3) gene cause male infertility due to meiotic arrest.
Hum Reprod 2019; 34(11): 2112-2119; Impact Factor=5.733; Impact Factor 2022=6.1; Typ=Journal Article;
van der Bijl N, Röpke A, Biswas U, Wöste M, Jessberger R, Kliesch S, Friedrich C, Tüttelmann F

Sperm recovery and ICSI outcomes in men with non-obstructive azoospermia: a systematic review and meta-analysis.
Hum Reprod Update 2019; 25(6): 733-757; Impact Factor=12.684; Impact Factor 2022=13.3; Typ=Journal Article;
Corona G, Minhas S, Giwercman A, Bettocchi C, Dinkelman-Smit M, Dohle G, Fusco F, Kadioglou A, Kliesch S, Kopa Z, Krausz C, Pelliccione F, Pizzocaro A, Rassweiler J, Verze P, Vignozzi L, Weidner W, Maggi M, Sofikitis N

Spermatogonial stem cells: updates from specification to clinical relevance.
Hum Reprod Update 2019; 25(3): 275-297; Impact Factor=12.684; Impact Factor 2022=13.3; Typ=Journal Article;
Sharma S, Wistuba J, Pock T, Schlatt S, Neuhaus N

The relevance of ANXA5 genetic variants on male fertility.
J Assist Reprod Genet 2019; 36(7): 1355-1359; Impact Factor=2.829; Impact Factor 2022=3.1; Typ=Journal Article;
Lavorato HL, Markoff A, Altholz V, Bogdanova N, Wieacker P, Kliesch S, Schlatt S

FSHB -211 G>T Polymorphism as Predictor for TESE Success in Patients with Unexplained Azoospermia.
J Clin Endocrinol Metab 2019; 104(6): 2315-2324; Impact Factor=5.399; Impact Factor 2022=5.8; Typ=Journal Article;
Busch AS, Tüttelmann F, Cremers JF, Schubert M, Nordhoff V, Schüring AN, Zitzmann M, Gromoll J, Kliesch S

Options for Fertility Treatments for Trans Women in Germany.
J Clin Med 2019; 8(5): ; Impact Factor=3.303; Impact Factor 2022=3.9; Typ=Journal Article;Review;
Schneider F, Scheffer B, Dabel J, Heckmann L, Schlatt S, Kliesch S, Neuhaus N

Monitoring testosterone replacement therapy with transdermal gel: when and how?
J Endocrinol Invest 2019; 42(12): 1491-1496; Impact Factor=3.397; Impact Factor 2022=5.4; Typ=Journal Article;
Sansone A, Sansone M, Selleri R, Schiavo A, Gianfrilli D, Pozza C, Zitzmann M, Lenzi A, Romanelli F

Topographic protein profiling of the age-related proteome in the retinal pigment epithelium of Callithrix jacchus with respect to macular degeneration.
J Proteomics 2019; 191(): 1-15; Impact Factor=3.509; Impact Factor 2022=3.3; Typ=Journal Article;
König S, Hadrian K, Schlatt S, Wistuba J, Thanos S, Böhm MRR

Factors Associated with Low Sexual Desire in 45-Year-Old Men: Findings from the German Male Sex-Study.
J Sex Med 2019; 16(7): 981-991; Impact Factor=3.293; Impact Factor 2022=3.5; Typ=Journal Article;
Meissner VH, Schroeter L, Köhn FM, Kron M, Zitzmann M, Arsov C, Imkamp F, Hadaschik B, Gschwend JE, Herkommer K

Kinetic and photonic techniques to study chemotactic signaling in sea urchin sperm.
Methods Cell Biol 2019; 151(): 487-517; Impact Factor=1.441; Impact Factor 2022=n.a.; Typ=Journal Article;Review;
Hamzeh H, Alvarez L, Strünker T, Kierzek M, Brenker C, Deal PE, Miller EW, Seifert R, Kaupp UB

Differences in blastomere totipotency in 2-cell mouse embryos are a maternal trait mediated by asymmetric mRNA distribution.
Mol Hum Reprod 2019; 25(11): 729-744; Impact Factor=3.636; Impact Factor 2022=4.0; Typ=Journal Article;Research Support, Non-U.S. Gov't;
Casser E, Wdowik S, Israel S, Witten A, Schlatt S, Nordhoff V, Boiani M

Characterization and population dynamics of germ cells in adult macaque testicular cultures.
PLoS ONE 2019; 14(6): e0218194; Impact Factor=2.74; Impact Factor 2022=3.7; Typ=Journal Article;Research Support, Non-U.S. Gov't;
Sharma S, Schlatt S, Van Pelt A, Neuhaus N

Publications in Journals 2020

A germ cell-specific ageing pattern in otherwise healthy men.
Aging Cell 2020; 19(10); Impact Factor=9.304; Impact Factor 2022=7.8; Typ=Journal Article;Research Support, Non-U.S. Gov't;
Laurentino S, Cremers JF, Horsthemke B, Tüttelmann F, Czeloth K, Zitzmann M, Pohl E, Rahmann S, Schröder C, Berres S, Redmann K, Krallmann C, Schlatt S, Kliesch S, Gromoll J

Molecular Aging Markers in Patients with Klinefelter Syndrome.
Aging Dis 2020; 11(3): 470-476; Impact Factor=6.745; Impact Factor 2022=7.4; Typ=Journal Article;
Pohl E, Muschal S, Kliesch S, Zitzmann M, Rohayem J, Gromoll J, Laurentino S

Bi-allelic Mutations in M1AP Are a Frequent Cause of Meiotic Arrest and Severely Impaired Spermatogenesis Leading to Male Infertility.
Am J Hum Genet 2020; 107(2): 342-351; Impact Factor=11.025; Impact Factor 2022=9.8; Typ=Journal Article;Research Support, Non-U.S. Gov't;Research Support, N.I.H., Extramural;
Wyrwoll MJ, Temel ?G, Nagirnaja L, Oud MS, Lopes AM, van der Heijden GW, Heald JS, Rotte N, Wistuba J, Wöste M, Ledig S, Krenz H, Smits RM, Carvalho F, Gonçalves J, Fietz D, Türkgenç B, Ergören MC, Çetinkaya M, Ba?ar M, Kahraman S, McEleny K, Xavier MJ, Turner H, Pilatz A, Röpke A, Dugas M, Kliesch S, Neuhaus N, GEMINI Consortium , Aston KI, Conrad DF, Veltman JA, Friedrich C, Tüttelmann F

SYCP2 Translocation-Mediated Dysregulation and Frameshift Variants Cause Human Male Infertility.
Am J Hum Genet 2020; 106(1): 41-57; Impact Factor=11.025; Impact Factor 2022=9.8; Typ=Journal Article;
Schilit SLP, Menon S, Friedrich C, Kammin T, Wilch E, Hanscom C, Jiang S, Kliesch S, Talkowski ME, Tüttelmann F, MacQueen AJ, Morton CC

41,XXY * male mice: An animal model for Klinefelter syndrome.
Am J Med Genet C Semin Med Genet 2020; 184(2): 267-278; Impact Factor=3.908; Impact Factor 2022=3.1; Typ=Journal Article;Review;Research Support, Non-U.S. Gov't;
Wistuba J, Beumer C, Brehm R, Gromoll J

Gonadal dysfunction and beyond: Clinical challenges in children, adolescents, and adults with 47,XXY Klinefelter syndrome.
Am J Med Genet C Semin Med Genet 2020; 184(2): 302-312; Impact Factor=3.908; Impact Factor 2022=3.1; Typ=Journal Article;Review;
Zitzmann M, Rohayem J

Does the FSHB c.-211G>T polymorphism impact Sertoli cell number and the spermatogenic potential in infertile patients?
Andrology 2020; 8(5): 1030-1037; Impact Factor=3.842; Impact Factor 2022=4.5; Typ=Journal Article;Research Support, Non-U.S. Gov't;
Schubert M, Kaldewey S, Pérez Lanuza L, Krenz H, Dugas M, Berres S, Kliesch S, Wistuba J, Gromoll J

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Date of report: November 25, 2024

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