EAA Andrology Training Centre

Centre Report

2024

EUROPEAN ACADEMY OF ANDROLOGY

EAA training centre of the Dutch-speaking Brussels Free-University - Brussels IVF

CENTRE REPORT

History of Centre

In 1983 the Centre for Reproductive Medicine, now called BrusselsIVF, was established as an interdepartmental institute within the University Hospital of the Brussels Free University (Vrije Universiteit Brussels). Our center pioneered several innovative techniques in assisted reproduction and over the years, including techniques with a special focus on male infertility. Eventually, this resulted in the world-first successful introduction of intracytoplasmic sperm injection (ICSI) in 1992 and of the first prepubertal testicular tissue bankings in 2002. This catalyzed the application for becoming an EAA training centre and eventually the Brussels center was approved as an EAA training centre in 1997 (auditors: Prof. N.E. Skakkebaek, Copenhagen; Prof. G. Verhoeven, Leuven; Prof. G. Forti, Firenze). A second on-site visitation took place in 2005 (auditors: Prof. F. Wu, Manchester; Prof. D. Vanderschueren, Leuven; Prof. G. Forti, Firenze).

In 2008 our fundamental research group BITE (Biology of the Testis) was established at the medical faculty with a focus on spermatogenesis and testicular stem cells (see https://bite.research.vub.be/welcome-at-the-research-unit-biology-of-the-testis-bite). While the focus in Brussels IVF is on reproductive andrology, the broader spectrum of andrology is covered via interdepartemental collaborations within our hospital. A third on-site audit took place in 2012 (auditors: Prof. F. Wu, Manchester; Prof. G. Dohle, Rotterdam).

In 2013 a dedicated 'Klinefelter's Clinic' was was established together with our partners involved in the Brussels EAA training centre.

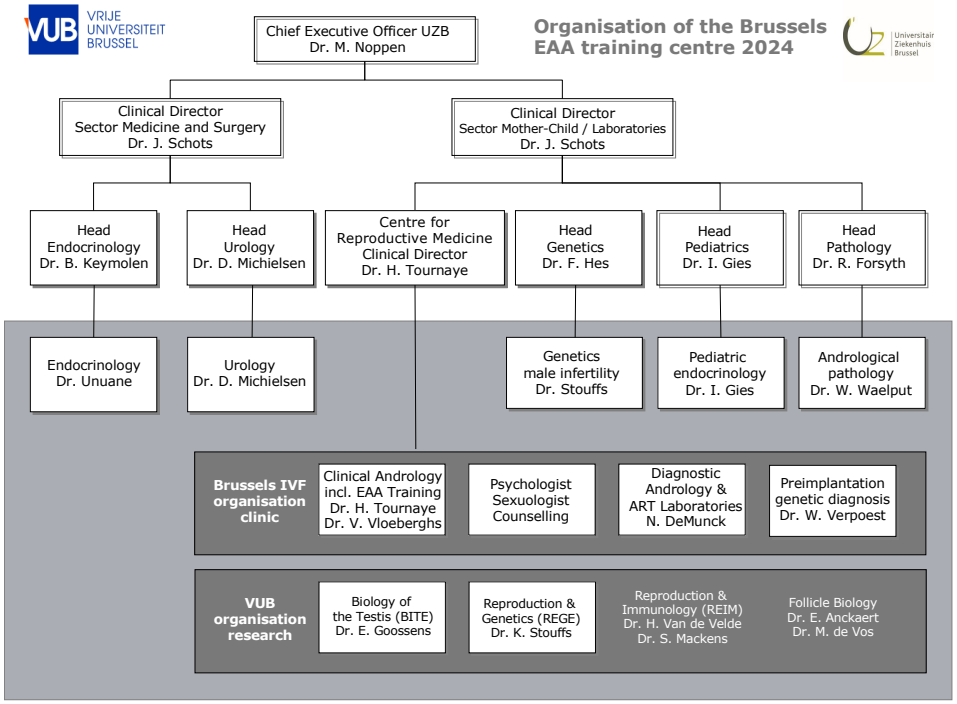
Our current research and clinical activities are focusing on the application and innovation of assisted reproductive techniques to alleviate or prevent male infertility, genetics of male infertility, Klinefelter syndrome and testicular stem cell banking and transplantation.

Organization of Centre

The EAA training centre is organized as a clinical conglomerate with a inter-departemental organisation similar to the other EAA training centres in Belgium. Aditionally, formal training agreements do exist with the two other EAA training centres, i.e. the EAA training centre of the Catholic University of Leuven (Centre director Prof. D. Vanderschueren and co-director Prof. L. Antonio) and the training centre of the State University of Gent (Centre director Prof. G. T'Sjoen and co-director Dr. A. Mahmoud)

The training conglomerate (outlined in figure 1) in Brussels is coordinated by the EAA centre director Prof. Dr. H. Tournaye, head of the Centre for Reproductive Medicine since 2011 and co-director Dr. Veerle Vloeberghs. Both are in charge for the reproductive andrology clinic and the clinical andrology training at the University Hospital of Brussels.

figure 1.



Both Drs. Tournaye and Vloeberghs work in close collaboration with the Centre for Medical Genetics (head Prof. Dr. F. Hes and andrology liaison Dr. K Stouffs for male genetics and Dr. F. Belva for children follow-up), with the department of Endocrinology (head Prof. Dr. B. Keymeulen, liaison Dr. D. Unuane), the department of Urology (head and liaison Prof. Dr. D. Michielsen), the department of Pathology (head Prof. Dr. R. Forsyth, liaison Prof. W. Waelput) and the department of Pediatrics (head and liaison Prof. Dr. I. Gies). While most visiting fellows have their main interest into the reproductive andrological activities of our centre, EAA fellows can combine observerships in all liaison departements as outlined.

Besides his clinical work, Prof. Tournaye is appointed as full professor at the Vrije Universiteit Brussels (VUB, Brussels Free University) for teaching developmental biology/embryology and reproductive medicine at the bachelor and master level respectively and for coordinating the master-after-master in obstetrics-gynecology-fertility. He is past-chairman of the Belgian Society for Reproductive Medicine (BSRM 2011-2013) and past-member of the Infertility Guidelines Group of the European Association of Urology (EAU 2010-2018). He is past chairman of the Special Interest group in Andrology of the European Society of Human Reproduction and Embryology (ESHRE) (1999-2004) and the Dutch-Flemish Society for the study of Fertility (Vereniging Fertiliteitsstudie) (2001-2006).

The CRM clinic has also been accredited for EBCOG-certified training centre for both subspecialty training in reproductive medicine and basic training in OBGYN. The subspeciality includes theoretical and practical training in andrology.

Educational activities

In Belgium, andrology is not recognized as a specialty. However, the law of February 15, 1999 specifies that any clinic officially recognized for assisted reproduction must include a "medical doctor with a special expertise in andrology", however, without stating how this expertise must be obtained. The Brussels EAA training can provide andrological training to OB/GYN, endocrinologists and urologists. Trainees can easily circulate between the different departments involved in the EAA conglomerate and get a training in a full range of diagnostic and therapeutic facilities.

Dr. V. Vernaeve was the first EAA-certified andrologist who graduated from the Brussels EAA training centre (currently working in Barcelona, Spain). In 2008 Dr. Ashraf Zeidan became an EAA-certified andrologist (currently working in Cairo, Egypt) and Dr. Biljana Popovic-Todorovic obtained the EAA-certification in 2009 (currently working in Belgrade, Serbia). Since then, several colleagues joined in for training in reproductive andrology, however, without the intention to obtain an EAA certification given the significant time investment it requires.

In 2007 and 2018 joint EAA courses on reproductive andrology were organized. This were respectively 3- and 2-day courses followed by a post-course MC test.

Topics in reproductive andrology are also organized within the framework of the "Brussels IVF Academy", our educational platform for medical and paramedical staff, and the teaching modules for obtaining ESHRE certification (see appendix 1 and 2).

Prof. Tournaye was editor of two books in our domain:

Clinical Andrology ,Eds. Bjorndahl L, Giwercman A, Tournaye H and Weidner W Informa Healthcare, London (UK) 2010

Artificial insemination: an update Eds. Ombelet W and Tournaye H. Universa Press Wetteren (Belgium) 2010

Research activities

Brussels IVF has extensive research activities in the field of fertilization, early embryonic development, genetics and reproductive andrology.
In our clinical setting, research in reproductive andrology focusses on automation in sperm analysis, sperm selection by microfluidics, AI-driven automation for testicular sperm selection, sperm cryopreservation, work-up and treatment of azoospermia, follow-up of IVF and ICSI children and oncofertility in the male.
More fundamental research in the field of andrology and genetics is conducted in two of our 4 research units which are outlined below. Together with the University of Amsterdam, our research unit BITE initiated a pan-European network aiming to propagate research and train young scientists in testicular biology. The focus is on propagation of human SSCs *in vitro* followed by their transplantation, sperm development *in vitro* from stem cells or early germ cells, and sperm development in human testis tissue grafts *in vivo. Apart from our centre and the* Center for Reproductive Medicine of the Academic Medical Center (AMC), The Netherlands (initiators of the network), the network also includes the Hubrecht Institute (KNAW, Utrecht, The Netherlands), the Centre for Reproductive Medicine and Andrology of the Westfällische Wilhelms-Universität, Münster (Germany), the Department of Women's and Children's Health and Pediatric Endocrinology Unit of the Karolinska Institutet (KI) and Karolinska University Hospital, Stockholm (Sweden), the MRC Centre for Reproductive Health (CRH), University of Edindurgh (United Kingdom), the Department of Anatomical, Histological, Forensic and Orthopaedic Sciences (DAHFMO), Sapienza University of Rome (Italy) and the Division of Hematology-Oncology & Stem Cell Transplantation, Children's Hospital Helsinky University Central Hospital & Helsinki University (Finland). (see www.growsperm.eu for more information)

Research unit Biology of the Testis (BITE)

This research unit includes research projects focussing on:

- Strategies for preventing loss of gametogenic cells by gonadotoxicity.
- The generation of sperm cells in-vitro.
- Strategies for preventing the loss of spermatogenesis in 47XXY syndrome.

scientific coordinator: Prof. Dr.Sc. E. Goossens, PhD

clinical cordinator: Prof. Dr. H. Tournaye, MD, PhD

Pre-doctoral Researcher: Mrs E. Delgouffe

Post-doctoral Researchers: Dr.Sc. A. Braye and Prof. Dr. Sc. Y. Baert

* Research on 3-D in-vitro spermatogenesis under supervision of Dr. Yoni Baert is also performed at the VUB research group IVTD, i.e. in-vitro toxicology and dermato-cosmetology with as pre-doctoral researchers Mr. Samuel Madureira Silva and Mrs. Katarina Papageourgeou.

Research unit Reproduction and Genetics (REGE)

This research unit includes research projects focusing on

- research projects on the genetics aspects of male infertility
- research focusing on preimplantation genetic testing (PGT) mainly for monogenic diseases, chromosomal abnormalities and polygenic diseases
- research assessing the safety of ART techniques, research on the epigenetics of human development and long-term follow-up of children born after ART
- research on human embryonic stem cells and induced pluripotent cells
- research on mitochondrial (dys)function

scientific coordinator: Prof. Dr. K. Sermon, MD, PhD

clinical cordinator: Prof. Dr. M. Blockeel, MD, phD

Pre-doctoral Researcher: Mrs E. Delgouffe

Post-doctoral Researchers: Prof. Dr. Sc. C. Spits and Prof. Dr.Sc. K. Stoufs

Projects with a focus on reproductive andrology running in 2024 include:

- Research on the molecular mechanisms causing male infertility Research on testicular stem cell cryopreservation, transplantation and grafting in prepubertal boys facing gonadotoxic cancer treatment
- Research on testicular stem cell loss and preservation in 47, XXY Klinefelter patients, including prepubertal boys
- Follow-up studies of children, adolescents and young adults born after in-vitro fertilisation and intracytoplasmatic sperm injection
- High dose rFSH to treat unexplained oligoasthenoteratozoospermia

With a focus on fertilization and early embryonic development

- Research on imprinting in human gametes and embryos
- Research on preimplantation genetic testing on human embryos
- Research on implantation and microbiome of the genital tract

Besides these two units related to research in andrology, two other research units are associated to Brussels IVF:

- Research unit Reproductive Immunology and Implantation (REIM)
- Research unit Follicle Biology (FOBI)

Our research work has been published in many peer-reviewed journals
Per April 1, 2024, the Web of Science H-index of Dr Tournaye was 73 (publications n=416) and 12 for Dr. Vloeberghs (publications n= 22)
In the last 5 years, within the field of andrology, 5 phD theses and 6 master theses were defended:

Guillaume Richer, *Formation of testicular organoids for male reproductive health*; academic year 2023-2024 (PhD in Medical Sciences)

Aude Braye, *Immature testicular tissue banking for fertility preservation in (pre)pubertal boys: patient enrolment and follow-up*; academic year 2022-2023 (PhD in Medical Sciences)

Margo Willems, *Unravelling the mechanisms behind testicular fibrosis in Klinefelter men*; academic year 2022-2023 (PhD in Medical Sciences)

Prashant Kadam, *Spermatogonial stem cell transplantation: co-transplantation of*

supporting cells; academic year 2018-2019 (PhD in Medical Sciences)

Elissavet Ntemou, *Experimental approaches to improve immature testis tissue transplantation for fertility restoration*; academic year 2018-2019 (PhD in Medical Sciences)

Jaime Onofre Meza, *Testicular cell freezing to preserve fertility in prepubertal boys undergoing gonadotoxic therapy*; academic year 2018-2019 (PhD in Medical Sciences)

Katerina Papageorgiou, *Testicular organoids derived from transgender testicular tissue*; academic year 2022-2023 (MSC in Medical Sciences)

Lorna Marchandise, *Optimization of murine testicular organoid culture for in-vitro spermatogenesis*; academic year 2021-2022 (MSC in Medical Sciences)

Céline Devriendt, *Characterization of testicular fibrosis in Klinefelter men and identification of spermatogonia-specific biomarkers*; academic year 2021-2022 (MSC in Medical Sciences)

Julie Kerckx, *The influence of transgender therapy on the testicular environment;* academic year 2020-2021 (in collaboration w Universiteit Antwerpen) (MSC in Medical Sciences)

Mariella Obermeier, *Differentiation of gene-manipulated spermatogonial stem cells in testicular organoid cultures*; academic year 2020-2021 (MSC in Medical Sciences)

Pia Seßenhausen, *Mechanisms of testicular fibrosis in Klinefelter Syndrome;* academic year 2020-2021 (MSC in Medical Sciences)

Alicja Hatamnejad, *Infertility in Klinefelter syndrome*; academic year 2019-2020 (MSC in Medical Sciences)

Serafien Depoorter, *Impact of a testicular tissue biopsy procedure for fertility preservation on pubertal development of pre- and peripubertal boys needing gonadotoxic treatment*; academic year 2019-2020 (MSC in Medical Sciences)

Clinical activities

In Belgium, andrological patients either are primary (by GP), secondary (by OB/Gyn, urologist or endocrinologist) or even sometimes tertiary (e.g. from another IVF-centre) referrals. Patients can contact either section of the Brussels EAA conglomerate but will be looked after by, or navigated to the appropriate expert within our conglomerate.

The majority of our andrological patients are dealing with reproductive failure, sometimes in combination with other andrological problems. Together with the other departments in the EAA conglomerate, a broad spectrum of diagnostic tools and treatments within the field of andrology can be provided.

Most visiting clinical fellows have an interest in the clinical activities and research projects in reproductive andrology. These activities are mainly performed in the centre for reproductive medicine and the research unit 'Biology of the Testis" (BITE), one of our four associated research units focusing on spermatogenesis (see above).

As per April 1, 2024, the centre for reproductive medicine has currently about 200 staff members. The clinical activities in reproductive andrology at Brussels IVF comprise the diagnostic work-up of men with reproductive failure and the treatment of this failure by medical strategies, e.g. induction of spermatogenesis in hypogonadotropic men, by assisted ejaculation, e.g. penile vibrostimulation and electro-ejaculation, by surgery, e.g. microsurgical vasovasostomy or (micro)TESE and by a variety of reproductive technologies, e.g. cryopreservation of spermatozoa and testicular tissues, insemination and IVF/ICSI (see also appendix 3). For their clinical activities Drs. Tournaye and Vloeberghs are in close liaison with dedicated embryologists (Mrs. N. De Munck, Mr. K. Wouters and Mrs I. Mateizel) in charge of our ISO-15189 accredited andrology lab, cryobank and IVF lab, the latter including an infectious ART laboratory compliant with the European tissue directives to treat viral-infected patients. For its inter- and intra-observer quality control for basic semen analysis, the andrology laboratory is also participating in

the external quality control program of ESHRE and the national external quality control for andrology laboratory techniques provided through the federal ministery of health. All laboratories are audited by the Belgian Federal Agency for Medicines and Health Products (FAMHP). Brussels IVF has also an ESHRE certification for 'Good Clinical Practice'.

Other clinical activities are subject of referral to our in-house EAA liaisons, e.g. work-up and treatment of erectile dysfunction, genital tract infections and inflammations penile surgery, andrological cancers, premature and delayed puberty, disorders of sexual development, hypogonadism and ageing male. For the treatment of gender identity disorders formal agreements also exists with our two Belgian EAA partners. For male oncofertility there are collaborations for referral of oncological patients from other hospitals in Belgium as we can offer all potential preventive strategies to male patients of all ages, including prepubertal boys facing germ-cell loss.

The clinical management of patients with andrological disease is evidence-based whenever possible. The overview of our core activities is presented below.

For patients with reproductive failure with no evidence-based medical or surgical treatment, assisted reproductive techniques are proposed. A detailed activity and management report is produced on a yearly basis for the core activities of Brussels IVF.

Name and address of Centre

Training Centre of the European Academy of Andrology Brussels IVF

Universitair Ziekenhuis Brussel, Laarbeeklaan 101

B-1090 Brussels, Belgium

Type of Centre

University	x
University Hospital	x
Private Centre	

Other (please specify)

1. Director Prof. Dr. Herman Tournaye

Academician	x	Regular Member		EAA Certified Clin. Andrologist	

2a. Clinical responsible Dr. Veerle Vloeberghs

Academician		Regular Member	x	EAA Certified Clin. Andrologist	

2b. Clinical responsible Prof. Dr. Inge Gies

Academician	☐	Regular Member	☐	EAA Certified Clin. Andrologist	☐

2c. Clinical responsible Prof. Dr. David Unuane

Academician	☐	Regular Member	☐	EAA Certified Clin. Andrologist	☐

2d. Clinical responsible Prof. Dr. Dirk Michielsen

Academician	☐	Regular Member	☐	EAA Certified Clin. Andrologist	☐

3. Present Staff *(Senior Scientists involved in research in andrology)*

1) Name: Prof. Dr.Sc. Ellen Goossens
Degree: phD
Speciality: testicular stem cells

Academician		Regular Member		EAA Certified Clin. Andrologist	

2) Name: Prof. Dr. Sc. Yoni Baert
Degree: phD
Speciality: in-vitro spermatogenesis

Academician		Regular Member		EAA Certified Clin. Andrologist	

3) Name Dr. Sc. Neelke de Munck
Degree phD
Speciality in-vitro fertilization / ICSI

Academician ☐ Regular Member ☐ EAA Certified Clin. Andrologist ☐

4) Name Dr. Sc. Matija Krunic
Degree phD
Speciality sperm analysis and selection

Academician ☐ Regular Member ☐ EAA Certified Clin. Andrologist ☐

5) Name Mrs Ileana Mateizel
Degree MSc
Speciality sperm cryopreservation

Academician ☐ Regular Member ☐ EAA Certified Clin. Andrologist ☐

6) Name Mr Koen Wouters
Degree MSc
Speciality AI in andrology

Academician ☐ Regular Member ☐ EAA Certified Clin. Andrologist ☐

Additional co-workers at the EAA training Centre -Centre for Reproductive Medicine of the Dutch-speaking Brussels Free-University as per April 1, 2024

Clinical Staff

Permanent medical staff

Prof. Dr. C. Blockeel	Senior Medical Director
Prof. Dr. M. De Vos	Senior Medical Director
Prof. Dr. S. Mackens	Senior Medical Director
Prof. Dr. M. De Brucker	Senior Medical Director
Dr. C. Roelens	Junior Medical Director
Dr. L. Boudry	Junior Medical Director
Dr. M. Soares	Junior Medical Director
Dr. J. Praet	Junior Medical Director
Dr. V. Uvin	Junior Medical Director

Clinical fellows (ESHRE-EBCOG)

Dr. S. Hendrickx	Sr. Clinical Fellow MD
Dr. M. Bogaerts	Sr. Clinical Fellow MD
Dr. E. Umans	Sr. Clinical Fellow MD
Dr. C. van Overberghe	Sr. Clinical Fellow MD
Dr. N. Semrl	International Jr. Clinical fellow MD (Graz)
Dr. I. Carton	International Jr. Clinical fellow MD (Rennes)
Dr. Palumbo	International Jr. Clinical fellow MD (Tenerife)

Clinical Research fellow

Dr. M. Moeykens, MD (FWO-funded)

Statistical counsellor

Dr. P. Drakopoulos, MD

Psychologists/sexuologist

Mrs. E. Buyse (coordinator)

Dr. Sc. J. Nekkebroeck

Dr. Sc. L. Leunens

Mrs. R. Cooreman

Mrs. E. Devriese

Mrs. J. Van de Putte

Paramedical staff (with n=number of staff members)

Mr. G. De Mesmaeker general paramedical coordinator

Counsellors/ Patient navigators (n= 26)

Mrs. B. Schoonjans counsellors coordinator

Clinical study coordinators (n=8)

Mrs. E. Nulens clinical study nurses coordinator

Gamete donation programme (n=3)

Mrs. S. Ruttens patient navigator coordinator

Oncofertility programme (n=2)

Mrs. I. De Quick patient navigator coordinator

Dedicated operating theatre (n=24)

Mrs. K.Pieters nurse coordinator

Nursing unit (n= 16)

Mrs. Y. Elhadra nurse coordinator

Daily patient monitoring (n=16)

Mrs. A. Vankelecom patient navigator coordinator

Administration/contact centre (n=15)

Mrs. K. Dekoning secretarial coordinator

ISO 15224 Quality manager

Mrs. D. Brackman

Data manager

Mr. W. Meul

Financial manager

Mrs. U. Dragon

Project manager

Mrs. S. Peert

Staff Laboratories Andrology and Assisted Reproduction

Dr. Sc. N. de Munck	laboratory director

Embryologists (n=11)

Dr. Sc. N. de Munck	embryologist coordinator

IVF laboratory technicians (n=22)

Mrs. M. Abrahams	IVF technicians coordinator

Andrology laboratory (n=14)

Mrs. C. Verbesselt	technicians coordinator

ISO 15189 Quality manager

Mr. J. Sterckx

ISO 15189 Technical equipment manager

Mr. Y. Guns

Secretarial staff Laboratories

Mrs. V. De Wolf

Preimplantation genetic diagnosis laboratory (Department of Genetics)

Prof Dr F. Hes	Head Medical Genetics
Dr. Ir. M. de Rycke	coordinator PGT-M
Dr. Sc. E. Ferndez-Gallardo	coordinator PGT-S and PGT-A

4. Clinical Activity

A. Outpatients: Consultations per year in the last 3 years (NR: not registered)

	2021	2022	2023
New patients Brussels IVF	3439	3368	3359
Follow-up patients Brussels IVF	15 695	13 654	14 582

Type of patients in the last years (%)	2021	2022	2023
Infertility	19134	17022	17941
Erectile dysfunction	120	130	140
Hypogonadotropic Hypogonadism	16	29	25
Klinefelter	38	25	32
Gynaecomastia	8	10	9
Varicocele	NR	NR	NR
Cryptorchidism	NR	NR	NR
Male sex accessory gland infections	NR	NR	NR
Testicular tumours	3	1	4
Disorders of gender identity	17	13	5
low testo patients	112	157	652
oncofertility (andrology visit, semen cryopreservation and follow-up) in the center	59	27	44

B. Ultrasound (testis, penile, prostate) *

	2021	2022	2023
scrotum*	406	442	479
penile*	96	63	56
prostate (TRUS)**	648	498	508

** performed at the Department of Radiology or **Urology*

C. Andrological surgery procedures

	2021	2022	2023
Testicular biopsies	96	95	94
Varicocele ligation	9	12	9
Prostate biopsies	101	116	115
TURP	61	47	65
Prostate cancer	90	104	91
Vasectomy	140	321	350
Vaso-vasostomy	4	5	6
PVS/EEJ	2	4	0
Testicular aspirations	120	96	110

5. A. Andrology laboratory activity

	2021	2022	2023
Semen analyses	9919	9299	9784
Sperm antibodies	1408	1176	1244
Seminal markers	0	0	0
DNA fragmentation tests	257	373	383

5. B. Andrology laboratory activity

Sperm banking donors Yes [x] No [ ]

Sperm banking cancer patients Yes [x] No [ ]

If yes:			
	2017	2018	2019
Number of samples	497	547	663

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
(FSH, LH, testosterone, SHBG, prolactin)
normative to new male patients: 1679

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

If yes number of tests in the past year: 466

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

Other genetic tests (please specify)

FISH sperm: occasionally

Pre-implantation genetic diagnosis: n=1039

Amniotic fluid karyotyping: selective after NIPT

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

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:

Formal collaboration for EAA training with university hospital Leuven and Gent (both EAA training centres in Belgium)

7. Clinical teaching activity

Duration of training (years): 1-2

	Number
A: Trainees in the last five years	0
B: Trainees who passed EAA-ESAU\exam for Clinical Andrologist in the last 5 yrs	0
C: Trainees working in the centre preparing to pass the EAA-ESAU examination	1
D: PhD Students (in andrology)	3

E: Medical Students	6
F: Other students (MSc)	4

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

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

	Hours of formal teaching per year	**Professional training (weeks/months)**
Medical Students		
PhD Students		
Post Graduate students		
Trainees	6-8	
Other degrees (please specify) paramedical staff		

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9. Research Activity (maximum 1 page)

Please shortly describe the main research topics of the center and list the most relevant papers in peer review journals (with IF) related to these activities.

The full list of publications (years 2015 - 2020) are presented at the end of this report.

- Research on the molecular mechanisms causing male infertility
- Research on testicular stem cell cryopreservation, transplantation and grafting in prepubertal boys facing gonadotoxic cancer treatment
- Research on testicular stem cell loss and preservation in 47, XXY Klinefelter patients, including prepubertal boys
- Follow-up studies of children, adolescents and young adults born after in-vitro fertilisation and intracytoplasmatic sperm injection
- High dose rFSH to treat unexplained oligoasthenoteratozoospermia
- Research on imprinting in human gametes and embryos
- Research on preimplantation genetic testing on human embryos
- Research on implantation and microbiome of the genital tract

Relevant papers in andrology (>100 citations):

Tournaye H, Verheyen G, Nagy P, Ubaldi F, Goossens A, Silber S, Van Steirteghem AC, Devroey P. Are there any predictive factors for successful testicular sperm recovery in azoospermic patients? Hum Reprod. 1997 Jan;12(1):80-6

297 citations per April 1, 2024

Tournaye H, Devroey P, Liu J, Nagy Z, Lissens W, Van Steirteghem A. Microsurgical epididymal sperm aspiration and intracytoplasmic sperm injection: a new effective approach to infertility as a result of congenital bilateral absence of the vas deferens. Fertil Steril. 1994 Jun;61(6):1045-51.

270 citations per April 1, 2024

Tournaye H, Liu J, Nagy PZ, Camus M, Goossens A, Silber S, Van Steirteghem AC, Devroey P. Correlation between testicular histology and outcome after

intracytoplasmic sperm injection using testicular spermatozoa. Hum Reprod. 1996 Jan;11(1):127-32.
231 citations per April 1, 2024

Tournaye H, Krausz C, Oates RD. Novel concepts in the aetiology of male reproductive impairment. Lancet Diabetes Endocrinol. 2017 Jul;5(7):544-553
170 citations per April 1, 2024

Donoso P, Tournaye H, Devroey P. Which is the best sperm retrieval technique for non-obstructive azoospermia? A systematic review. Hum Reprod Update. 2007 Nov-Dec;13(6):539-49.
160 citations per April 1, 2024

Tournaye H, Staessen C, Liebaers I, Van Assche E, Devroey P, Bonduelle M, Van Steirteghem A. Testicular sperm recovery in nine 47,XXY Klinefelter patients. Hum Reprod. 1996 Aug;11(8):1644-9
146 citations per April 1, 2024

Tournaye H, Camus M, Goossens A, Liu J, Nagy P, Silber S, Van Steirteghem AC, Devroey P. Recent concepts in the management of infertility because of non-obstructive azoospermia. Hum Reprod. 1995 Oct;10 Suppl 1:115-9
129 citations per April 1, 2024

Staessen C, Tournaye H, Van Assche E, Michiels A, Van Landuyt L, Devroey P, Liebaers I, Van Steirteghem A. PGD in 47,XXY Klinefelter's syndrome patients. Hum Reprod Update. 2003 Jul-Aug;9(4):319-30
122 citations per April 1, 2024

Den Hond E, Tournaye H, De Sutter P, Ombelet W, Baeyens W, Covaci A, Cox B, Nawrot TS, Van Larebeke N, D'Hooghe T. Human exposure to endocrine disrupting chemicals and fertility: A case-control study in male subfertility patients. Environ Int. 2015 Nov;84:154-60.
120 citations per April 1, 2024

Goossens E, Van Saen D, Tournaye H. Spermatogonial stem cell preservation and transplantation: from research to clinic. Hum Reprod 2013 Apr;28(4):897-907
111 citations per April 1, 2024

Geens M, Van de Velde H, De Block G, Goossens E, Van Steirteghem A, Tournaye H. The efficiency of magnetic-activated cell sorting and fluorescence-activated cell sorting in the decontamination of testicular cell suspensions in cancer patients. Hum Reprod. 2007 Mar;22(3):733-42
110 citations per April 1, 2024

Tournaye H, Goossens E, Verheyen G, Frederickx V, De Block G, Devroey P, Van Steirteghem A. Preserving the reproductive potential of men and boys with cancer: current concepts and future prospects. Hum Reprod Update. 2004 Nov-Dec;10(6):525-32.
102 citations per April 1, 2024

ORGANIZATION CHARTS

Brussels IVF

Prof. Dr. H. Tournaye

Dr. Veerle Vloeberghs
Prof. Dr.Sc. Ellen Goossens
Prof. Dr. Sc. Yoni Baert
Prof. Dr. Inge Gies
Prof. Dr. David Unuane
Prof. Dr. Dirk Michielsen
Dr. Sc. Matija Krunic
Dr. Sc. Neelke de Munck
Mrs Ileana Mateizel
Mr Koen Wouters
Prof. Dr. C. Blockeel
Prof. Dr. M. De Vos
Prof. Dr. S. Mackens
Prof. Dr. M. De Brucker
Dr. C. Roelens
Dr. L. Boudry
Dr. M. Soares
Dr. J. Praet
Dr. V. Uvin

Organization charts legend: Department / Unit Structure

Outpatient Clinics
Embryology
Ovarian stimulation
Ultrasound
Oocyte retrieval
Embryo transfer
FNA / TESE
IUI

Diagnosis of infertility
Counseling of infertile couple
Cryopreservation of sperm
Ethics in Andrology

CENTRE PHOTOS

Please, include at least one high resolution photos

FULL LIST OF PUBLICATIONS of staff members from the last 5 years in the field of andrology

1: Vloeberghs V, De Munck N, Racca A, Mateizel I, Wouters K, Tournaye H. Enzymatic tissue processing after testicular biopsy in non-obstructive azoospermia enhances sperm retrieval. Hum Reprod Open. 2023 Oct 18;2023(4):hoad039. doi: 10.1093/hropen/hoad039. PMID: 37936829; PMCID: PMC10627277.

2: Delgouffe E, Braye A, Vloeberghs V, Mateizel I, Ernst C, Ferster A, Devalck C, Tournaye H, Gies I, Goossens E. Spermatogenesis after gonadotoxic childhood treatment: follow-up of 12 patients. Hum Reprod Open. 2023 Jul 31;2023(3):hoad029. doi: 10.1093/hropen/hoad029. PMID: 37547664; PMCID: PMC10403430.

3: Willems M, Devriendt C, Olsen C, Caljon B, Janssen T, Gies I, Vloeberghs V, Tournaye H, Van Saen D, Goossens E. Micro RNA in Semen/Urine from Non-Obstructive Azoospermia Patients as Biomarkers to Predict the Presence of Testicular Spermatozoa and Spermatogonia. Life (Basel). 2023 Feb 23;13(3):616. doi: 10.3390/life13030616. PMID: 36983773; PMCID: PMC10051987.

4: Willems M, Olsen C, Caljon B, Vloeberghs V, De Schepper J, Tournaye H, Van Saen D, Goossens E. Transcriptomic differences between fibrotic and non-fibrotic testicular tissue reveal possible key players in Klinefelter syndrome-related testicular fibrosis. Sci Rep. 2022 Dec 13;12(1):21518. doi: 10.1038/s41598-022-26011-6. PMID: 36513788; PMCID: PMC9748020.

5: Willems M, Seβenhausen P, Gies I, Vloeberghs V, Tournaye H, Van Saen D, Goossens E. Intratesticular xenografting of Klinefelter pre-pubertal testis tissue as potential model to study testicular fibrosis. Reprod Biomed Online. 2022 May;44(5):896-906. doi: 10.1016/j.rbmo.2022.01.009. Epub 2022 Jan 31. PMID: 35282995.

6:Willems M, Devriendt C, Olsen C, Caljon B, Janssen T, Gies I, Vloeberghs V, Tournaye H, Van Saen D, Goossens E. Micro RNA in Semen/Urine from Non-Obstructive Azoospermia Patients as Biomarkers to Predict the Presence of Testicular Spermatozoa and Spermatogonia. Life (Basel). 2023 Feb 23;13(3):616. doi: 10.3390/life13030616. PMID: 36983773; PMCID: PMC10051987.

7:Braye A, Delgouffe E, van der Werff Ten Bosch J, Gies I, Ferster A, Goossens E. Gonadal development and function after immature testicular tissue banking as part of high-risk gonadotoxic treatment. Pediatr Blood Cancer. 2023 Aug;70(8):e30370. doi: 10.1002/pbc.30370.

8:Braye A, Böhler S, Vloeberghs V, De Boe V, De Schepper J, Gies I, Goossens E. Testicular biopsy for fertility preservation in early-diagnosed Klinefelter patients: patient characteristics and long-term follow-up. Reprod Biomed Online. 2022 May;44(5):889-895.

9:Björndahl L, Barratt CLR, Mortimer D, Agarwal A, Aitken RJ, Alvarez JG, Aneck-Hahn N, Arver S, Baldi E, Bassas L, Boitrelle F, Bornman R, Carrell DT, Castilla JA, Cerezo Parra G, Check JH, Cuasnicu PS, Darney SP, de Jager C, De Jonge CJ, Drevet JR, Drobnis EZ, Du Plessis SS, Eisenberg ML, Esteves SC, Evgeni EA, Ferlin A, Garrido N, Giwercman A, Goovaerts IGF, Haugen TB, Henkel R, Henningsohn L, Hofmann MC, Hotaling JM, Jedrzejczak P, Jouannet P, Jørgensen N, Kirkman Brown JC, Krausz C, Kurpisz M, Kvist U, Lamb DJ, Levine H, Loveland KL,
McLachlan RI, Mahran A, Maree L, Martins da Silva S, Mbizvo MT, Meinhardt A, Menkveld R, Mortimer ST, Moskovtsev S, Muller CH, Munuce MJ, Muratori M, Niederberger C, O'Flaherty C, Oliva R, Ombelet W, Pacey AA, Palladino MA, Ramasamy R, Ramos L, Rives N, Roldan ER, Rothmann S, Sakkas D, Salonia A, Sánchez-Pozo MC, Sapiro R, Schlatt S, Schlegel PN, Schuppe HC, Shah R, Skakkebæk
NE, Teerds K, Toskin I, Tournaye H, Turek PJ, van der Horst G, Vazquez-Levin M, Wang C, Wetzels A, Zeginiadou T, Zini A. Standards in semen examination: publishing reproducible and reliable data based on high-quality methodology. Hum Reprod. 2022 Oct 31;37(11):2497-2502. doi: 10.1093/humrep/deac189. PMID: 36112046; PMCID: PMC9627864.

10:Mazzilli R, Vaiarelli A, Dovere L, Cimadomo D, Ubaldi N, Ferrero S, Rienzi L, Lombardo F, Lenzi A, Tournaye H, Ubaldi FM. Severe male factor in in vitro fertilization: definition, prevalence, and treatment. An update. Asian J Androl. 2022 Mar-Apr;24(2):125-134. doi: 10.4103/aja.aja_53_21. PMID: 34259196; PMCID: PMC8887096.

11:Mulder RL, Font-Gonzalez A, Green DM, Loeffen EAH, Hudson MM, Loonen J, Yu R, Ginsberg JP, Mitchell RT, Byrne J, Skinner R, Anazodo A, Constine LS, de Vries A, Jahnukainen K, Lorenzo A, Meissner A, Nahata L, Dinkelman-Smit M, Tournaye H, Haupt R, van den Heuvel-Eibrink MM, van Santen HM, van Pelt AMM, Dirksen U, den Hartogh J, van Dulmen-den Broeder E, Wallace WH, Levine J, Tissing WJE, Kremer LCM, Kenney LB, van de Wetering MD; PanCareLIFE Consortium. Fertility preservation for male patients with childhood, adolescent, and young adult cancer: recommendations from the PanCareLIFE Consortium and the International Late Effects of Childhood Cancer Guideline Harmonization Group. Lancet Oncol. 2021 Feb;22(2):e57-e67. doi: 10.1016/S1470-2045(20)30582-9. PMID: 33539754.

12:Medrano JV, Hervás D, Vilanova-Pérez T, Navarro-Gomezlechon A, Goossens E, Pellicer A, Andrés MM, Novella-Maestre E. Histologic Analysis of Testes from Prepubertal Patients Treated with Chemotherapy Associates Impaired Germ Cell Counts with Cumulative Doses of Cyclophosphamide, Ifosfamide, Cytarabine, and Asparaginase. Reprod Sci. 2021 Feb;28(2):603-613. doi: 10.1007/s43032-020-00357-6. Epub 2020 Nov 4. PMID: 33150486.

13: Willems M, Gies I, Van Saen D. Germ cell loss in Klinefelter syndrome: When and why? Am J Med Genet C Semin Med Genet. 2020 Jun;184(2):356-370.

14: Drakopoulos P. Low Testosterone and Semen Parameters in Male Partners of

Infertile Couples Undergoing IVF with a Total Sperm Count Greater than 5 Million. J Clin Med. 2020 Nov 26;9(12):3824. doi: 10.3390/jcm9123824. PMID: 33255908; PMCID: PMC7761260.

15: Belva F, Bonduelle M, Buysse A, Van den Bogaert A, Hes F, Roelants M, Verheyen G, Tournaye H, Keymolen K. Chromosomal abnormalities after ICSI in relation to semen parameters: results in 1114 fetuses and 1391 neonates from a single center. Hum Reprod. 2020 Sep 1;35(9):2149-2162. doi: 10.1093/humrep/deaa162. PMID: 32772109.

16: Hutka M, Kadam P, Van Saen D, Homer NZM, Onofre J, Wallace WHB, Smith LB, Stukenborg JB, Goossens E, Mitchell RT. Fertility Preservation in Childhood Cancer: Endocrine Activity in Prepubertal Human Testis Xenografts Exposed to a Pubertal Hormone Environment. Cancers (Basel). 2020 Sep 30;12(10):2830. doi: 10.3390/cancers12102830. PMID: 33008013; PMCID: PMC7600569.

17: Gul M, Hildorf S, Dong L, Thorup J, Hoffmann ER, Jensen CFS, Sønksen J, Cortes D, Fedder J, Andersen CY, Goossens E. Review of injection techniques for spermatogonial stem cell transplantation. Hum Reprod Update. 2020 Apr 15;26(3):368-391. doi: 10.1093/humupd/dmaa003. PMID: 32163572.

18: Willems M, Vloeberghs V, Gies I, De Schepper J, Tournaye H, Goossens E, Van Saen D. Testicular immune cells and vasculature in Klinefelter syndrome from childhood up to adulthood. Hum Reprod. 2020 Aug 1;35(8):1753-1764. doi: 10.1093/humrep/deaa132. PMID: 32649748.

19: De Brucker S, Drakopoulos P, Dhooghe E, De Geeter J, Uvin V, Santos-Ribeiro S, Michielsen D, Tournaye H, De Brucker M. The effect of cigarette smoking on the semen parameters of infertile men. Gynecol Endocrinol. 2020 Dec;36(12):1127-1130. doi: 10.1080/09513590.2020.1775195. Epub 2020 Jul 1. PMID:
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20: Van Saen D, Vloeberghs V, Gies I, De Schepper J, Tournaye H, Goossens E. Characterization of the stem cell niche components within the seminiferous tubules in testicular biopsies of Klinefelter patients. Fertil Steril. 2020 Jun;113(6):1183-1195.e3. doi: 10.1016/j.fertnstert.2020.01.018. Epub 2020 May 14. PMID: 32418646.

21: Di Guardo F, Vloeberghs V, Bardhi E, Blockeel C, Verheyen G, Tournaye H, Drakopoulos P. Low Testosterone and Semen Parameters in Male Partners of Infertile Couples Undergoing IVF with a Total Sperm Count Greater than 5 Million. J Clin Med. 2020 Nov 26;9(12):3824. doi: 10.3390/jcm9123824. PMID: 33255908; PMCID: PMC7761260.

22: Hutka M, Smith LB, Goossens E, Wallace WHB, Stukenborg JB, Mitchell RT. Exogenous Gonadotrophin Stimulation Induces Partial Maturation of Human Sertoli Cells in a Testicular Xenotransplantation Model for Fertility Preservation. J Clin Med. 2020 Jan 18;9(1):266. doi: 10.3390/jcm9010266. PMID: 31963729; PMCID:

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23: Richer G, Baert Y, Goossens E. In-vitro spermatogenesis through testis modelling: Toward the generation of testicular organoids. Andrology. 2020 Jul;8(4):879-891. doi: 10.1111/andr.12741. Epub 2020 Jan 9. PMID: 31823507; PMCID: PMC7496450.

24: Belva F, Bonduelle M, Buysse A, Van den Bogaert A, Hes F, Roelants M, Verheyen G, Tournaye H, Keymolen K. Chromosomal abnormalities after ICSI in relation to semen parameters: results in 1114 fetuses and 1391 neonates from a single center. Hum Reprod. 2020 Sep 1;35(9):2149-2162. doi: 10.1093/humrep/deaa162. PMID: 32772109.

25: Braye A, Tournaye H, Goossens E. Setting Up a Cryopreservation Programme for Immature Testicular Tissue: Lessons Learned After More Than 15 Years of Experience. Clin Med Insights Reprod Health. 2019 Nov 20;13:1179558119886342. doi: 10.1177/1179558119886342. PMID: 31798308; PMCID: PMC6868573.

26: Onofre J, Kadam P, Baert Y, Goossens E. Testicular tissue cryopreservation is the preferred method to preserve spermatogonial stem cells prior to transplantation. Reprod Biomed Online. 2020 Feb;40(2):261-269. doi: 10.1016/j.rbmo.2019.10.016. Epub 2019 Nov 7. PMID: 32001160.

27: Belva F, Bonduelle M, Tournaye H. Endocrine and reproductive profile of boys and young adults conceived after ICSI. Curr Opin Obstet Gynecol. 2019 Jun;31(3):163-169. doi: 10.1097/GCO.0000000000000538. PMID: 30870183.

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29: Ntemou E, Kadam P, Van Saen D, Wistuba J, Mitchell RT, Schlatt S, Goossens E. Complete spermatogenesis in intratesticular testis tissue xenotransplants from immature non-human primate. Hum Reprod. 2019 Mar 1;34(3):403-413. doi: 10.1093/humrep/dey373. PMID: 30753464; PMCID: PMC6389866

30: Baert Y, Rombaut C, Goossens E. Scaffold-Based and Scaffold-Free Testicular Organoids from Primary Human Testicular Cells. Methods Mol Biol. 2019;1576:283-290. doi: 10.1007/7651_2017_48. PMID: 28674937.

31: Baert Y, Dvorakova-Hortova K, Margaryan H, Goossens E. Mouse in vitro spermatogenesis on alginate-based 3D bioprinted scaffolds. Biofabrication. 2019 Apr 26;11(3):035011. doi: 10.1088/1758-5090/ab1452. PMID: 30921781.

32: Ntemou E, Alexandri C, Lybaert P, Goossens E, Demeestere I. Oncofertility: Pharmacological Protection and Immature Testicular Tissue (ITT)-Based Strategies for Prepubertal and Adolescent Male Cancer Patients. Int J Mol Sci. 2019 Oct;20(20):5223. doi: 10.3390/ijms20205223. PMID: 31640294; PMCID: PMC6834329.

33: Omar MI, Pal RP, Kelly BD, Bruins HM, Yuan Y, Diemer T, Krausz C, Tournaye H, Kopa Z, Jungwirth A, Minhas S. Benefits of Empiric Nutritional and Medical Therapy for Semen Parameters and Pregnancy and Live Birth Rates in Couples with Idiopathic Infertility: A Systematic Review and Meta-analysis. Eur Urol. 2019 Apr;75(4):615-625. doi: 10.1016/j.eururo.2018.12.022. Epub 2019 Jan 8. PMID: 30630643.