

2020

Institute for Human Reproduction

Copenhagen Fertility Center

Synopsis (short version)

The Section for Human Reproduction is involved in education, teaching, training and research within mammalian reproduction.

In the years 1999 to 2020 funding has been raised for research, research protocols have been approved, many papers have been published in peer reviewed journals, there has been numerous oral presentations, lectures etc., and a formal collaboration with many international IVF centres in the world. Furthermore, 8 patents have been acquired during this period and 3 theses have been obtained.

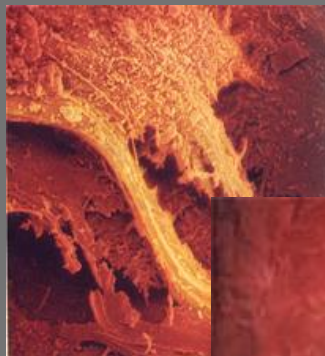
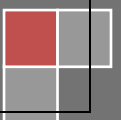


Illustration shows the first attachment and implantation by human blastocyst in vitro from the thesis by Svend Lindenberg.

Photographer Lennart Nilsson



THE UNIT HAS SUPPORTED RESEARCH, TREATMENT AND EDUCATION FROM 1980



Patient Care

Master Class



Science



WE DO MORE THAN 4000 ART RELATED CYCLES PER YEAR

CFC SECTION FOR HUMAN REPRODUCTION



The Section for Human Reproduction has the vision to generate knowledge in human reproductive biology and hereby be a leading institution for implementing new treatments to benefit infertile couples. This is carried out through careful handling of patients, research projects, teaching and international collaboration.

VISION

INTRODUCTION

The Section for Human Reproduction in Copenhagen was founded in 1982 in the Chromosome lab at Rigshospitalet, Copenhagen University, where the first IVF baby was created in Denmark in 1982. The lab was further developed into a research unit as a result of a long lasting scientific collaboration and research between the Department of Obstetrics and Gynaecology, Section for Reproductive Biology and IVF at Herlev Hospital and The Ciconia Fertility Clinics and pharmaceutical industries. Today it consists of collaboration between universities, Copenhagen Fertility Center and several pharmaceuticals - medical industries including veterinary medicine. Copenhagen Fertility Center has in 2016 joined the Eugin Group of Fertility Clinics and expand the research within in this group as well.



PRIMARY RESEARCH AREAS

- Mild stimulation in IVF is our main research area.
- Oocyte morphology/quality check and registration procedure for optimising artificial reproductive technologies such as IVF and ICSI. This work has led to devising instruments and optimising clinical procedures for selection of human embryos prior to embryo transfer.
- Sperm and oocyte apoptosis studies. Following this research better selection criteria for unexplained fertility and oligospermic men have been introduced prior to IVF/ICSI.
- Clinical phase I, II and III pharmaceutical trials.
- Allergy and unexplained infertility.
- IVM



The section is responsible for postgraduate education and training in human reproductive biology including in-vitro maturation techniques for clinical treatments i.e.

- International and national universities and pharmaceutical companies
- Internal database and e-learning
- Reproduction and immunology

We highly appreciate the many visitors from more than 20 different countries visiting our clinic every

year, especially the colleagues coming for training and research.

Members of the staff are GCP-educated and have passed the national boards of examination. The section has been through a FDA audit training program and tests by the pharmaceutical industries, including accreditations for EU tissue regulative and has been ISO Certified for our clinical activities, EU Tissue directive accredited and accepted by the Danish Quality Model clinics.



ONGOING RESEARCH COLLABORATION WITH:

- Copenhagen University, Copenhagen
- Eugin , Barcelona



Professor Lindenberg and Nobel Price Award Bob Edwards in Conference.

VISITING SCIENTIFIC STAFF 2007- 2020

- Edurne Novella Post Doc in Nordica, Valenca IVI clinic (IVM project)
- Prof.Dr Salam Omar Jibrel MD Head of OB-GYN Department Bahrain Specialist Hospital Manama, Bahrain (Cryo biology)
- Lec. Ph.D Gail Jones Researcher, Monash University (IVM project)
- Dr. Sören von Otte, Lübeck IVF Clinic (IVM project)
- Associate Professor cand. Med. Vet Ph.D Nicolai Jarløv, Hørsholm Hestepraksis, Denmark
- Associated Professor Finn Hald, Head of Department for Reproductive Biology, Brædstrup, Denmark
- More than 260 doctors, embryologists in the Fertility School'
- Geeta Narguund, Chairman for ISMAAR, UK
- Professor dr. med Matts Brännström, Göteborg.
- Professor Guang Xiu Lu, China
- Dr. Nie Hongchuan, China
- Alejandro Fernandez Ponce, Post Doc at CFC.
- Olga Zaytseff AVA clinic St Petersburg
- Board of ISMAAR
- Board of ISIVF
- Eugin Research Director dr. Rita Vasenna
- Professor dr. med. Timur Gurgan, Istanbul.
- Professor Stuart Campbell, UK

WORLD CONGRESS OR MEETINGS ORGANIZED OR HELD BY COPENHAGEN FERTILITY CENTER



ISMAAR member visiting the clinic at the ISIVF meeting 2015



ISIVF World Congress in Copenhagen 2015



ISMAR Symposium 2020

PUBLICATIONS 1999 – 2020



SVEND LINDENBERG EXPLAINS VIBEKE STORM RASMUSSEN AND SVEN HARTLING A RESEARCH PROJECT.

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New approach in patients with polycystic ovaries, lessons for everyone

S Lindenberg

Fertility and Sterility 1' 2013

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E Juul Gade, SF Thomsen, S Lindenberg, V Backer, ISRN allergy 2014 1 2014

Asthma affects time to pregnancy and fertility: a register-based twin study

EJ Gade, SF Thomsen, S Lindenberg, KO Kyvik, S Lieberoth, V Backer *European Respiratory Journal* 43 (4), 1077-1085, 6 2014

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Lower values of VEGF in endometrial secretion are a possible cause of subfertility in non-atopic asthmatic patients

EJ Gade, SF Thomsen, S Lindenberg, NS Macklon, V Backer *Journal of Asthma* 52 (4), 336-342, 1 2015

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M Rettenbacher, AN Andersen, JA Garcia-Velasco, M Sator, P Barri, ...*Reproductive biomedicine online* 30 (5), 504-513 6 2015

Method for the preparation of micro-RNA and its therapeutic application

F Velin, S Lindenberg *US Patent* 9,078,914 2015

Fertility outcomes in asthma: a clinical study of 245 women with unexplained infertility

EJ Gade, SF Thomsen, S Lindenberg, V Backer *European Respiratory Journal*, ERJ-01389-2015, 2016.

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Zierau, Louise; Gade, Elisabeth Juul; Lindenberg, Svend; Backer, Vibeke; Thomsen, Simon Francis. *Respiratory Medicine*, Vol. 119, 10.2016, p. 155-159.

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Mild stimulation approach for In Vitro Fertilization treatment: Retrospective data from one Danish Centre.

Almind, E. Faerch, F. Lindenberg, S. Lindenberg Facts, Views & Vision in OBGYN Published online: Feb 20. 2019 vol 10, no 2

Identification of research priorities in infertility and assisted reproduction: an international, multicentre study

Désirée García 1, Sarai Brazal 1, Frederikke Lindenberg 2, Eva Toft 2, Antonio La Marca 3, Rosa Borrás 4, Aline Rodrigues Lorenzon 5, Mauricio Barbour Chehin 5, Leticia Silva 5, Eduardo Leme Alves da Motta 5, Maider Ripero 6, José Ignacio Madero 7, Ricardo Mello Marinho 8, Cristiane Araújo de Oliveira 8, João Pedro Junqueira Caetano 8, Anna Bolívar 9, Amelia Rodríguez 1, Rita Vassena 10 *Reprod Biomed Online*. 2020 Feb;40(2):238-244. doi: 10.1016/j.rbmo.2019.10.012. Epub 2019 Oct 30.

Association between women's age and stage, morphology, and implantation of the competent blastocyst: a multicenter cohort study.

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CHAPTERS IN BOOKS

Mikkelsen AL. Oocyte maturation in vivo and in-vitro. Chapter in the book: Advances in Fertility and Sterility. 2001

Mikkelsen AL, In vitro maturation of human ova. Chapter in the book. Advances in Fertility and Reproductive medicine. 2004. International Congress Series 1266.

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Lindenberg S. **Endometrial Cavity Fluid Collection Aspiration at time of ET.** Dr. Gautam Allahbadia's forthcoming monogram on

"EMBRYO TRANSFER" 2006 Rotunda - The Center For Human Reproduction India

Gabrielsen A, Lindenberg S. **The Human Zona Pellucida and Markers of Viability.** Handbook on choosing the right embryo. Ed Kay Eldder & Jacque Cohen, Medical Publishing Division of Taylor Francis, to be published in 2007

S.Lindenberg: **In vitro maturation in the future.** In: Advances in fertility studies and reproductive medicine, IFFS, 2007, Editor TF Krüger, Z van der Spuy, RD Kempers.

TEACHING

Since 2003 the Department has been involved in teaching in the university and in other medical faculties. This is an ongoing process to attract new staff and participate in sharing new research results.

Master in Embryology in Collaboration with Pompeu Fabra University 2020:

Copenhagen Fertility Center and Institute for Human reproduction are actively offering Master programs for young scientist.

- Patrycja Blaszczyk – Prospective analysis of the ability of an embryologist to foresee the blastocyst formation on day 2/3
- Ainhoa Coco – Study on D-vitamin AMH and insulin resistance interrelation in PCOS patients
- Emilie Færch Sømer – From an existing idea to an actual research project – The journey of IVM in Copenhagen Fertility Center



AWARDS

Svend Lindenberg has been awarded with the "**Commercialization Prize awards**" 2005 from the county mayor, Copenhagen

Awards for the **Best scientific presentation 2009.** 15th World Congress on In Vitro Fertilization, 4th World Congress on In Vitro Maturation, Geneva April 2009.

Svend Lindenberg's work on implantation has contributed to the Virtual Human Embryo, EDH. (<http://www.ehd.org/virtual-human-embryo/figure.php?stage=4&figure=4>)

ONGOING INTERNATIONAL DEVELOPMENT

Transfer Technology Experiment from Digital Innovation Hubs in Healthcare Robotics (DIH-HERO); Grants from European Commission Internal Market, Industry, Entrepreneurship and SMEs Entrepreneurship and SMEs. 2020; december.

INTERNATIONAL REFEREE

Fertility and Sterility, Reproductive BioMedicine Online, Frontiers in Medicine, Human Reproduction.

PATENTS ACQUIRED INTERNATIONAL

1 ASSAY TO INDICATE THE PRESENCE OF NON-FERTILISABLE OVA

Inventor: LINDENBERG SVEND (DK); MIKKELSEN ANNE LIS (DK) Applicant: MEDI CULT AS (DK)
 EC: IPC: G01N33/68 ; G01N33/74
 Publication info: SK19152000 - 2001-12-03

2 IN VITRO FERTILISATION

Inventor: LINDENBERG SVEND (DK) Applicant: KOEBENHAVNS AMTS SYGEHUS HERLEV (DK); LINDENBERG SVEND (DK)
 EC: C12N5/06B4F; C12N5/06B2E; (+1) IPC: C12N5/06 ; C12N5/08 ; (+1)
 Publication info: WO03106662 - 2003-12-24

3 Assay to indicate the presence of non-fertilizable ova

Inventor: LINDENBERG SVEND (DK); MIKKELSEN ANNE LIS (DK) Applicant: MEDI CULT AS (DK)
 EC: C12N5/06B4F; G01N33/68T; (+1) IPC: G01N33/533
 Publication info: US6649344 - 2003-11-18

4 A METHOD FOR IN VITRO MATURATION OF HUMAN GAMETES

Inventor: BERTHEUSSEN KJELL (DK); SMITH STEVEN DALE (DK); (+2) Applicant: MEDI CULT AS (DK)
 EC: C12N5/06B4F IPC: C12N5/08
 Publication info: US2002115211 - 2002-08-22

5 In vitro maturation of human oocytes in one day

Inventor: SMITH STEVEN DALE (DK); LINDENBERG SVEND (DK); (+2) Applicant:
 EC: C12N5/06B4F; G01N33/74B IPC: A01K67/027
 Publication info: US2001028878 - 2001-10-11

6 Assay to indicate the presence of non-fertilizable ova

Inventor: LINDENBERG SVEND (DK); MIKKELSEN ANNE LIS (DK) Applicant: MEDI CULT AS (DK)
 EC: IPC: G01N33/68 ; G01N33/74
 Publication info: CZ20004629 - 2001-06-13

7 EP2416789 - METHOD AND DEVICE FOR TREATMENT OF CONDITIONS ASSOCIATED WITH INFLAMMATION OR UNDESIRABLE ACTIVATION OF THE IMMUNE SYSTEM

8 WO2011029903 - METHOD FOR THE PREPARATION OF MICRO-RNA AND ITS THERAPEUTIC APPLICATION

9. LONG ACTING BIOLOGICALLY ACTIVE LUTEINIZING HORMONE (LH) COMPOUND

P NORDKILD, S LINDENBERG, C ANDERSEN, K ANDERSEN
 WO Patent 2,013,010,840, 2013

10. METHOD FOR THE PREPARATION OF MICRO-RNA AND ITS THERAPEUTIC APPLICATION

F Velin, S Lindenberg EP Patent 2,475,372' 2012

11. Long acting biologically active luteinizing hormone (lh) compound

P NORDKILD, S Lindenberg, CY Andersen, KV Andersen
 WO Patent App. PCT/EP2012/063,373 2012

12. **METHOD AND DEVICE FOR TREATMENT OF CONDITIONS ASSOCIATED WITH INFLAMMATION OR UNDESIRABLE ACTIVATION OF THE IMMUNE SYSTEM**
S Lindenberg, F Velin, EP Patent 2,416,789 2012
13. **METHOD FOR THE PREPARATION OF MICRO-RNA AND ITS THERAPEUTIC APPLICATION**
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WEBSITE ACTIVITIES

www.copenhagenfertilitycenter.com

COPENHAGEN FERTILITY CENTER ACTIVITIES

In total Copenhagen Fertility Center perform more than 4000 treatment cycles every year including IVF/ICSI/IUI and related treatments. This makes Copenhagen Fertility Center one of the largest Scandinavian ART centers.

Copenhagen Fertility Center hosted the ISMAAR congress 2012 and was the host for the ISIVF 2015 in Copenhagen. Workshop ISMAAR feb 2020, Mild Stimulation. Copenhagen.

Yours sincerely



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