# **Center for Implant and Radiostereometric Research Oslo**

# **Annual Report 2023**





### Group Leader

Professor Stephan M. Röhrl, MD, PhD, senior consultant surgeon (s.m.rohrl@medisin.uio.no) Division of Orthopaedic Surgery, OUH, Board member of the Norwegian arthroplasty Registry, (UXRHST@ous-hf.no), Vice president of the Int. RSA society

Social media: homepage: CIRRO.no. Instagram: cirro\_norway

## **Group Members**

#### Senior members:

- Anselm Schultz, MD, PhD, OUH
- Vera Halvorsen, MD, OUH
- Marianne Westberg MDT/PhD, OUH
- Finnur Snorrason, MD/PhD, OUH

#### Alumni (PhD):

- Wender Figwed, MD/PhD Bærum Hospital (2010)
- Berte Bøe, MD/PhD, OUH (2012)
- Einar Lindalen, MD/PhD Lovisenberg Hospital (2013)
- Jon Dahl, MD/PhD, OUH (2014)
- Thomas Kibsgård, MD/PhD, UiO and OUH (2014)
- Bernhard Flatøy, MD/PhD, Diakonhjemmet hospital (2018)
- Eirik Aunan, MD, Lillehammer hospital (2019)
- Justin van Leeuwen, MD, Helse Førde Lerdal hospital (2019)
- Gunnar Petursson, MD, Lovisenberg Hospital (2019)
- Ole-Christian Brun, MD, Lovisenberg Hospital (2021)
- Frank David Ørn, MD, Kristiansund Hospital (2022)
- Peder Thoen, MD, Tønsberg hospital (2022)
- Alexander Fraser, MD, Diakonhjemmet hospital

#### PhD candidates:

- Trygve Glad, MD, OUH
- Carl Erik Alm, MD, OUH, LIS
- Vinjar Brenna Hansen , MD, OUH
- Yasser Rehman, MD, Lovisenberg hospital
- Lars Engseth, MD, Oslo Univsersity hospital
- Engelke Randers, MD, OUH
- Magnus Poulsen, MD, OUH

## **Group Members (continued)**

Single project candidate:

Magnus Høgevold, MD, Diakonhjemmet Hospital

Radiographers:

- Alexis Hinohosa, CT and MRI Radiographer, OUH
- Mona Risdal, CT Radiographer, Application Specialist CT, OUH

Research coordinators:

• Marte Traae Magnusson, PT, MSc, OUH

## **Research profile and aims**

The overall aim of CIRRO is to perform sophisticated basic and clinical research in the field of orthopaedic surgery, imaging science and bone turnover, establish a team of dedicated researchers and collaborate nationally and internationally. Our intention is:

- To use and develop precise measurement methods in musculoskeletal research
- To study new treatment options (implants, surgical techniques, biotechnology, rehabilitation interventions and pharmacological treatment) and to ensure safe treatment to patients
- To study disease development (cartilage wear, bone loss, changes in body composition) together with other methods, in order to gain insight into mechanisms for disease and eventual treatment.
- To further develop CIRRO as a main research centre delivering sophisticated services to researchers in South-Eastern Norway Regional Health Authority and adjoint hopitals nationally as well as internationally.

## Ongoing studies in 2023

Indication and Treatment of adult Kyphoscoliosis (INTRAKS study) Midterm-evaluation by Vinjar Brenna- Hansen (May 2023). Oliver Grundnes, Vinjar Brenna-Hansen, Christian Hellum and Stephan Röhrl at Oslo University Hospital.

We also had several online meetings with our international colleagues in Sweden and Japan of this international multicenter study.

For more comprehensive information about the study: <a href="https://www.intraks.org/">https://www.intraks.org/</a>





#### NaKiD knee study

This study of PhD candidate Lars H. Engseth includes 3 work packages which focus on surgical technique (Ligament piercing), the design of the prosthesis (Medial pivot knees) and a new imaging technique (CT-RSA). 1 and 2- years follow ups are ongoing. The 5- year follow up for 36 patients in the cementet Medacta group with the new MP knee design are finished.



#### Lisfranc study

The ongoing CT-based study of Magnus Poulsen in diagnostics of Lisfranc injuries included 21 patients in 2023. For more information please have a look at the studies homepage: <u>Lisfrancstudien</u>

#### **Trochanteric Stabilizing Plate in Pertrochanteric fractures**

PhD candidate Carl Erik Alm finalizes the manuscript of his final RSA study.

#### **Kinematics in Total Knee Arthroplasty**

We reach out to our colleagues in Århus for the possibility to use automated RSA for the analysis of our kinematic data on the Medacta knee prosthesis. Formalities and REC have to be organized. A new PhD candidate, Fredrik Bru, joins the team for this project. This is a project in collaboration with Ortoforsk-KS (Kristiansund with Frank-David Øhrn)

#### Investigation of the stability of hand arthroplasties (INSTHA-trial)

Wilhelm Johan Mustad starts in a research position to form his PhD on wrist arthroplasty with the register and a CT-RSA diagnostic study on possibly loose implants (TWIST-study). Additionally, a new CMC1 implant will be evaluated for safety and function with CT-RSA (StableTouch).





#### Surgical treatment of pelvic girdle pain

PhD candidate Engelke Randers from the spinal unit at Rikshospitalet won the prestigious research prize at Eurospine 2023 for best national spine societies presentation.





## **Other activities:**

#### 15 year CIRRO anniversary

In January the CIRRO team marked 15 years since its founding. Many PhD candidates and researchers have contributed to and experienced the dynamic spirit of the group. The structures in its core have stayed the test of time. Teambuilding and brainstorming for the future was the focus of the day!



## Orthopedic Research Society 2023

Lars H. Engseth and Stephan M. Röhrl attended at the **Orthopedic Research Society 2023** meeting in Dallas. They present their experimental study on accuracy of total knee implants in a boar knee.



#### IRSA 2023 conference in Nijmegen, Netherlands



Magnus Poulsen presenting his RSA study on the Lisfranc joint and Lars Engseth his methodological and experimental study. Stephan was active as chairman and as board member. Frank-David Øhrn updated his knowledge for his upcoming study in knee robotics.

### NHKK spring meeting in Trondheim

CIRRO members contributed to the spring meeting of the Norwegian Hip and knee society.

#### OrtoForsk KS

Kristiansund sykehus established its own orthopaedic research group and CIRRO is represented by Stephan M. Röhrl in the reference group, and Frank David Øhrn in the board.

#### **Cless TKA**

The first 3D printed medial pivoting TKA study completed patient inclusion at Kristiansund hospital. Frank-David Øhrn and Prof. Otto Schnell Husby are satisfied to have completed the inclusion within 6 months.

#### Internal CIRRO- meeting x 2

Dario Bergadano from Medacta and Frank D. Øhrn attending from Kristiansund hospital. PhD candidates present the status quo of their studies and meet to discuss commen challenges during their PhD times!

Kleivstua 2023: 4 presenters from CIRRO:

- Mid term evaluation for Lars H. Engseth of the the Natural Kinematic Diagnostic (NaKiD) knee study.
  Special thanks to Alex Fraser for critical and important input to keep the study on track!
- Surgical treatment of pelvic Girdle pain by Engelke Randers.
- Advances in diagnosis and treatment of unstable, acute Lisfranc injury by Magnus Poulsen.
- Arthroplasty implants in the hand, their stability and longlivety by Wilhelm Mustad.











## Annual meeting of Norwegian Orthopaedic Society

Strong presentation of the CIRRO group with 4 presentations on CT based RSA. Anselm Schulz presents the new possibility of muscle body composition with the help of AI on CT-RSA images.

#### **Tecres Academy on THA**

Stephan Röhrl is the invited speaker at the Tecres user meeting.

Thank you to radiographer Alexis Hinojosa for over 15 years with RSA and DEXA. We value many memorable moments with the CIRRO group. Thank you for outstanding help with all projects over such a long time. You helped many PhD and built up CIRRO! Good luck with your new challenges in your new position.

## Innsettingssymposium for Prof. Stephan Röhrl

Prof. Nordsletten with current and former CIRRO members invited to a symposium to mark the new position of Stephan

M. Röhrl as a professor at the University of Oslo.

Winner of the best CIRRO picture award 2023: Harald and Lars Engseth celebrating Lucia and CIRRO!







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## **Ongoing projects an overview:**

## **Hip projects**

- RCT on the function of the Trochanteric Support Plate (TSP) in combination with the Dynamic Hip Screw (DHS)
- Long time perfomance of Vit E infused poly in THP with different head sizes

### **Knee projects**

- In vivo kinematics and performance of contemporary knee arthroplasty (PhD project OUH, in collaboration with HF Møre Romsdal)
- Kinematic RSA of three different kneedesignes (collaboration with Lovisenberg Hospital)

#### **Methodological projects**

- Motionanalysis with CTMA and IMA in the forefot and the IS joint (part of the PhD projects)
- Precision of CTMA in the knee in collaboration with Kristiansund and the Radiology department at OUS

#### Ankle and foot projects

- Investigating acute Lisfranc injuries in the foot and a new surgical procedure (PhD project OUH)
- Kinematics of the midfoot after Lisfranc injury (PhD project OUH)

#### Hand project

• A prospective randomized trial comparing two different wrist arthroplasties (PhD project OUH)

#### **Spinal project**

- INTRAKS study on spinal derformities (<u>https://www.intraks.org</u>)
- Surgical treatment of pelvic girdle pain

## Most important national and international collaborators

#### National

- Norwegian Arthroplasty register (NAR)
- Kristiansund hospital
- Diakonhjemmet Hospital
- Lovisenberg Diaconal Hospital
- Regional Health Autority Møre Romsdal
- Haukeland University Hospital
- Arendal Hospital

## International

- Leiden University, The Netherlands
- Kyoto University Orthopaedic Association, Japan
- Skåne University, Sweden
- SECTRA, Sweden
- Umeå University Hospital, Arthroplasty unit, Sweden
- UmRSA Biomedical, Sweden

## Scientific production of the research group in 2023

#### **Dissertations:**

#### Alexander Nilsskog Fraser (25.05.23):

"Reverse total shoulder arthroplasty in the operative treatment of displaced proximal humeral fractures"

First opponent: Consultant Orthopaedic and Trauma Surgeon, Simon Lambert, University College London Hospital, UK Second opponent: Orthopaedic Surgeon/Ass. Professor Theis Muncholm Thillemann, Aarhus Universitetshospital, Denmark



#### Peer reviewed original research articles: 13

#### Selected publications:

- Engseth LHW, Schulz A, Pripp AH, Röhrl SMH, Øhrn FD (2023) CT-based migration analysis is more precise than radiostereometric analysis for tibial implants: a phantom study on a porcine cadaver Acta Orthop, 94, 207-214 DOI <u>10.2340/17453674.2023.12306</u>, PubMed <u>37114404</u>
- Poulsen M, Stødle AH, Nordsletten L, Röhrl SM (2023) CT-based radiostereometric analysis for assessing midfoot kinematics: precision compared with marker-based radiostereometry Acta Orthop, 94, 366-372 DOI <u>10.2340/17453674.2023.16905</u>, PubMed <u>37493528</u>
- Øhrn FD, Engseth LHW, Pripp AH, Röhrl SMH, Schulz A (2023) Dose reduction does not impact the precision of CT-based RSA in tibial implants: a diagnostic accuracy study on precision in a porcine cadaver Acta Orthop, 94, 550-544 DOI <u>10.2340/17453674.2023.24022</u>, PubMed <u>37909103</u>

## Funding

- South-Eastern Norway Regional Health Authority (PhD program)
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- Møre Romsdal Health Authority (PhD program)
- Medacta International AG
- Sophies Minde Health Fund (PhD program)
- The Research Council of Norway
- University of Bergen

