

# INTERNATIONAL RSA MEETING 2021

Imaging technology for safe implants and surgery for our patients

Welcome -  
Velkommen i Oslo!

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Dear RSA friends!

Nobody expected that the COVID 19 pandemic would last until May 2021 affecting the biannual international RSA meeting. But, so it did! My plan to welcome you all in Oslo to discuss the latest developments within RSA was crashed. CIRRO, the organizing group, wanted to show you Oslo from its best side. Experiencing the fjord, Viking history, vibrant city life, modern architecture aside of relaxing corners everywhere around the city.

But nevertheless, we try to offer you a taste of exactly that through our virtual conference format. So just relax, make yourself comfortable in front of your PC at work or at home and listen to the newest presentations with and about RSA. In these days we have to learn to look at the bright side of things. This means: No jet leg, no travel expenses, no pollution. Actually, not so bad at all.

Thanks to you, researchers around the world, we could put together an exciting program which I think offers interesting new data for almost any orthopedic surgeon and researcher. New imaging technology is challenging the pole position of RSA in *in vivo* migration measurement and might also offers new possibilities for diagnostics. Further we will touch on hot topics as Artificial Intelligence. Will it change the RSA researchers` life? We have also invited the industry, our dear partner coming up with new ideas and techniques for an interesting debate about the future and the new Medical Device Regulations.

I want to express my deepest gratitude to the whole organizing team that has put in a tremendous effort to make this meeting possible. First, we had everything lined up for a traditional meeting, switched to a hybrid and ended with a virtual one. 3 in 1! Thank you so much for being so flexible Vera, Marte, Finnur, Magnus, Bart and Lars!

Let us see if the internet technology is on our side to combine time zones, presenters, ideas and most important - the smile of each congress participant to a successful international RSA meeting. Virtually, the first of its kind.

Looking forward to meet you all from the studio in Oslo!

Best wishes,

A handwritten signature in black ink, appearing to read 'Stephan Fahl'.

Congress chairman



Dear RSA friends,

Welcome to our first virtual meeting somewhere in the cloud, but feel "at home" in Oslo. Stephan Röhl and his team have put extensive energy into this meeting to give us the latest insights on "Imaging technology for safe implants and surgery for our patients".

The predictive power of early implant migration on future failure is known within our RSA community. Although around for almost 5 decades, RSA is still on the move, some refer to new methodologies (e.g. CT, AI) as to "[Great balls on fire](#)" (Stephan Röhl, *Acta Orthopaedics* 2020).

Also these new implant migration techniques will support, the generation of clinical evidence on implant migration and its association with future implant loosening. The latter still being an essential step in creating clinical evidence for safe new innovative orthopaedic implants for patients.

Enjoy our meeting and take active part in the discussions during or after our congress.

Best wishes,

Prof. Rob Nelissen, MD, PhD  
President International Radiostereometry Society

01:00 PM	06:00 PM	01:30 AM	<b>Sunday May 9<sup>th</sup></b>
1 h			
03:00	08:00	03:30	

<b>Day 1</b> <b>Monday May 10<sup>th</sup></b>			
07:00 AM	12:00 PM	19:30 PM	
<b>Halifax</b>	<b>Oslo</b>	<b>Adelaide</b>	<b>Zoom</b> Check- in 15 min <b>(Webinar attendee link)</b>
07:15 AM	12:15 PM	19:45 PM	<b>Welcome</b>
07:20	12:20	19.50	<b>Session 1: Hip</b>
<b>Session Chair:</b> <i>Stephan M. Röhrl</i> <i>Lars Nordsletten</i>		1. Kok	A 2-year model-based Roentgen Stereophotogrammetry Analysis (RSA) Randomized Control Trial evaluating the stability of the cementless Taperloc hip stem
		2. Polus	Impact of Implant Design on Femoral Stem Migration Following Direct Anterior and Direct Lateral Primary Total Hip Arthroplasty
		3. Jonsson	The early migration behavior of the collared Corail femoral stem
		4. Rilby	Randomized controlled trial comparing the CFP with the Corail stem, a five-year report
		5. Budde	Very early migration of a neck preserving short stem – What happens between surgery and first weight bearing?
		6. Rilby	Similar clinical results and migration with use of either a new anteverted or a straight standard stem after 2 years: randomized study of 72 Total Hip Arthroplasties (THAs) evaluated with clinical parameters, radiostereometry and DXA up to 2 years
07:55	12:55	20:25	<b>Key note: Jazzcode – Carl Størmer: Controll is for beginners. Teamwork when every day is different</b>

08:15	13:15	20:45	Break / Industry	
08:20	13:20	20:50	Session 2: Knee	
Session Chair: <i>Leif Ryd</i> <i>Finnur Snorrason</i>			7. Christensson	Migration comparison between medial congruent and cruciate retaining tibial components in TKA. A randomized controlled trial followed with Radiostereometry for 2 years.
			8. Øhrn	Evaluation of early migration of a medially stabilized arthroplasty as a predictor of long time survivorship
			9. Hasan	Patients with a continuously migrating total knee arthroplasty do not have inferior patient reported outcome scores - 10-year follow-up of 5 randomized controlled trials using radiostereometric analysis
			10. Hasan	Stabilization Of Continuous Migrating Tibial Components Between Two And Five Years: The Need For Longer Term Follow-Up In RSA Studies
			11. Koster	A symmetrical or asymmetrical tibial component total knee replacement 2-year RSA migration results of a randomized controlled trial
			12. Laende	Post-operative Varus Alignment does not increase Tibial Component Migration in Total Knee Arthroplasty
			13. Richardson	Posterior Tibial Slope not Associated with Implant Migration following Total Knee Arthroplasty
09:00	14:00	21:30	Session 3: Deep learning	
Session Chair: <i>Maiken Stilling</i> <i>Sepp de Raedt</i>			14. Batta	Automated identification of orthopedic implants in radiographs using deep learning
			15. Laende	Unsupervised Machine Learning to Identify Implant Migration and Patient Demographic Profiles in Total Knee Arthroplasty
			16. Baronette	Deep Learning-Based Reconstruction for Sparse-View Cone-Beam Computed Tomography to Assess Implant Migration
			17. Jensen	Accuracy of an Autonomous Method for Extracting 3D Knee Replacement Kinematics from Dynamic Single Plane Fluoroscopic Images
09:25	14:25	21:55	<b>General Assembly</b> <b>International RSA Society</b> <span style="background-color: red; color: white; padding: 2px;">(GA social link)</span>	
10:00	15:00	22:30	<b>End of day 1</b>	
1 h			<b>ZOOM - Social time</b> <span style="background-color: red; color: white; padding: 2px;">(GA social link)</span>	

## Day 2 Tuesday May 11th

07:00 AM	12:00 PM	19:30 PM	<b>Zoom</b> Check- in 15 min <span style="background-color: red; color: white; padding: 2px;">(Webinar attendee link)</span>	
Halifax	Oslo	Adelaide		
07:15 AM	12:15 PM	19:45 PM		
07:16	12:16	19:46	<b>Session 4: Various</b>	
Session Chair: Rob Nelissen Berte Bøe			18. Poulsen	Mobility after unstable Lisfranc injury treated with temporary bridge plate fixation
			19. Alm	Trochanteric fractures treated with sliding hip screw with or without trochanteric stabilizing plate
			20. Fraser	Stable glenoid component of reversed shoulder arthroplasty at 2 years measured with model-based RSA
			21. Di Paolo	Dynamic Radiostereometry Evaluation of Two Different Anterior Cruciate Ligament Reconstruction Techniques: Does Single Bundle Reconstruction plus Lateral Plasty Cause Knee Over-Constraint?
			22. Thillemann	Press-fit fixation of a conical shaped trapezium cup is superior in cortical compared to cancellous bone: A radiostereometric analysis in a pig bone model
07:45	12:45	20:15	<b>Key note: Erik Fosse: The Intervention Center – organization of tomorrow`s OR</b>	
08:05	13:05	20:35	<b>Break / Industry</b>	
08:10	13:10	20:40	<b>Session 5: Method</b>	
Session Chair: Johan Kärrholm			23. Pijls	The full migration pattern of tibial components is associated with aseptic loosening: introducing MTPMe-max (MTPM Estimated Maximum)
			24. Niesen	Reorienting the Tibial Baseplate Improves the Registration Accuracy of Model-Based Radiostereometric Analysis
			25. Zhuang Kang	Femoral prosthesis design and patient positioning during RSA examination do influence accuracy and precision of MBRSA-EGS

<i>Stephan M. Röhrli</i>			26. Belt	RSA in revision TKA: difficulties and recommendations
			27. Niesen	Propagation of Registration Errors into the Change in Maximum Total Point Motion to Analyze Tibial Baseplate Stability at Two Years Using Marker-Based and Model Based RSA
			28. Niesen	Propagation of Registration Error into Maximum Total Point Motion to Analyze Tibial Baseplate Stability at Six Months Using Marker-Based and Model-Based RSA
08:45	13:45	21.15	<b>Session 6: Wear</b>	
Session Chair: <i>Lars Nordsletten</i> <i>Bernhard Flatøy</i>			29. Thoen	Results of a randomized controlled trial with five-year radiostereometric analysis of Vitamin E-infused highly crosslinked versus moderately crosslinked polyethylene in reverse hybrid total hip arthroplasty
			30. Bergvinsson	Vitamin-E doped polyethylene show superior wear pattern compared with conventional polyethylene in cemented cups. A randomized 5-year RSA study
			31. Johannessen	Polyethylene wear in total hip arthroplasty; comparing Oxinium and CoCr femoral heads using radiostereometry with 10 years follow-up.
			32. Campbell	Low wear of thin second-generation highly cross-linked polyethylene liners with large articulations at ten years
09:10	14:10	21:40	<b>RSA Work groups: Threshold TKA – Threshold THA – Kinematics - Collaboration</b>	
09:30	14:30	22:00	<b>Session 7: e-Poster</b>	
Session Chair: <i>Lars Nordsletten</i>			33. Abrahams	ACHIEVING ACETABULAR IMPLANT STABILITY AFTER SEVERE BONE LOSS AND PELVIC DISCONTINUITY. LESSONS FROM A CASE REPORT
			34. Balesar	Migration of the BioPro MTP-1 hemiarthroplasty analysed with Roentgen Stereophotogrammetric Analysis: A Pilot Study
			35. Mirulla	In vivo biomechanics assessment of a CR total knee prosthesis during sit to stand: coupling dynamic RSA and FE analysis
			36. Hurry	Methodology for Tracking Scoliosis Spine Fusion in a Standing Low-Dose Biplanar X-ray Imager using RSA
			37. Jürgens-Lahnstein	Stable polyethylene fixation and low polyethylene wear-rate in fixed-bearing total knee arthroplasty at 5-6 years follow-up
			38. Dahl Vind	Migration pattern of cemented Exeter Short Stem in Dorr type A femurs - A prospective radiostereometry study with 2-year follow-up
10:05	15:05	22:35	<b>End of day 2</b>	
1 h			<b>ZOOM social time with breakout rooms for workgroups</b> <b>(GA social link)</b>	

Day 3 Wednesday May 12th			
07:00 AM	12:00 PM	19:30 PM	
Halfax	Oslo	Adelaide	Zoom Check- in 15 min <b>(Webinar attendee link)</b>
07:15 AM	12:15 PM	19:45 PM	Welcome
07:16	12:16	19:46	<b>Session 8: Kinematics</b>
Session Chair: <i>Bart Kaptein</i> <i>Frank David Øhrn</i>		39. Petersen	Patients with knee osteoarthritis can be divided in subgroups based on tibiofemoral joint kinematic clustering of gait – An exploratory and dynamic radiostereometric study
		40. Zinno	Kinematical comparison between ultra-congruent and posterior-stabilized total knee arthroplasty: dynamic RSA study
		41. Alesi	A positive correlation exists between intra- and post-operative kinematics of a Posterior Stabilized total knee arthroplasty: preliminary analysis
		42. Downing	Three months migration and inducible movement predict two years migration and interface radiolucency in a cemented glenoid primary total shoulder arthroplasty study
		43. Bragonzoni	Kinematical patterns through Dynamic RSA reflected clinical outcomes improvement during at two years follow-up
		44. Koster	Is there a difference in kinematics between a symmetrical and an asymmetrical TKA? Fluoroscopic analysis of movements in patients included in an RCT RSA trial
07:50	12:50	20:20	<b>Key note: Henrik Olivecrona - Computer Tomography based Motion analysis: Where are we now?</b>
08:10	13:10	20:40	Break / Industry
08:15	13:15	20.45	<b>Session 9: CT based</b>
		45. Brodén	A three-dimensional CT technique to assess early implant migration and radiolucent lines in total shoulder arthroplasty
		46. Angelomenos	Precision measurements of CTMA and RSA methods. Can the former replace the latter?

<b>Session Chair:</b> <i>Kjell Gunnar Nilsson</i> <i>Stephan M. Röhrl</i>			47. Hansen	Movement of the Sacroiliac (SI) joint, a pilot study comparing RSA with the Sectra Implant Movement Analysis (IMA) using a low dose CT for high accuracy measurement
			48. Poulsen	Precision of computer tomography based micromotion analysis of the Lisfranc joint: a pilot study
			49. Kvamme	Initial experiences with CT-IMA in selected cases of the hip and knee
			50. Stigbrand	Implant migration and bone mineral density changes can be measured simultaneously with low-dose CT scans – a prospective study on 17 acetabular revisions with impaction bone grafting
08:50	13:50	21:20	<b>Debate: Rob Nelissen and Joshua Bridgeons</b> <b>Research perspective with RSA, Industry and new Medical Device Regulation</b>	
09:10	14:10	21.40	<b>Session 10: Uni knee</b>	
<b>Session Chair:</b> <i>Michael Dunbar</i> <i>Justin van Leeuwen</i>			51. Pasma	Early migration in unicompartmental knee arthroplasty with the Persona® Partial Knee: a radiostereometric study with 2 years of follow-up
			52. Mosegaard	Comparison of cementless double-peg, cemented single-peg and cemented double-peg femoral component migration after medial Oxford unicompartmental knee replacement – A 5-year randomized RSA study.
			53. Koppens	Mid-term tibial component fixation of a fixed-bearing and a mobile-bearing cemented unicompartmental knee replacement. A randomized controlled RSA study with 5-year follow-up.
09:30	14:30	22.00	<b>Session 11: Revision</b>	
<b>Session Chair:</b> <i>Finnur Snorrason</i> <i>Lars Nordsletten</i>			54. Callary	The importance of press-fit and three-point fixation in treating large acetabular defects with porous tantalum components
			55. Mills	Long-term micromotion of fully cemented versus hybrid fixation in revision total knee arthroplasty: a 10-year radiostereometric analysis RCT
			56. Laarhoven	Micromotion of a cemented hinged-type knee revision system – 1 year results with model-based RSA
09:50	14:50	22:20	<b>Closing - Session</b>	
10:00	15:00	22:30	<b>The End</b>	
1 h			<b>ZOOM social time</b> <b>(General assembly social link)</b>	

## Key note and invited speakers



**Carl Størmer** is the founder of [JazzCode AS](#). Before, he was the head of marketing (“CMO”) at Norwegian Airshuttle, one of Europe’s largest low-cost carriers. He was also the co-founder and EVP of StudentUniverse.com., the leading U.S. online student travel agency. Carl has also worked as a senior strategy consultant for IBM Global Services, for Weill, Gotshal & Manges in New York, and continuously as a professional jazz musician.

Through Jazzcode AS, he trains executives, analysts, consultants, boards and leaders of high-performing teams deal more effectively with the most challenging part of their work: complexity. JazzCode offers intensive, action-oriented sessions, talks, combined with musical experiences where we learn from jazz – how to innovate, collaborate, learn, and create presence in real-time — hence the name Jazzcode.



**Erik Fosse** is a musician, doctor and professor in medicine at Oslo University. He is a specialist in general surgery and thoracic surgery, and head of the [Intervention center](#) at Rikshospitalet. He got known nationwide in 2008-2009 when he and his colleague Mads Gilbert entered Gaza during the conflict between Israel and Hamas, where they helped in acute care of the wounded victims after the bombing of the Gaza Strip. The intervention

Centre is organized as a department in the Clinic for Emergencies and Critical Care. The Centre provides a shared resource for basic- and clinical research groups inside and outside Oslo University Hospital. All research groups have the same access to the advanced equipment, infrastructure and necessary competent staff needed for research and development of new methods.



**Henrik Olivecrona** is an orthopedic surgeon with his speciality in hand surgery at the Karolinska University Hospital in Sweden. He became interested in the RSA method when attending a lecture given by Professor Johan Kärrholm back in the eighties, and has been working on developing a CT based alternative for the past twenty years. The idea of following implants using CT was

conceived by the late professor Lars Weidenhielm, and the development was performed in his research group

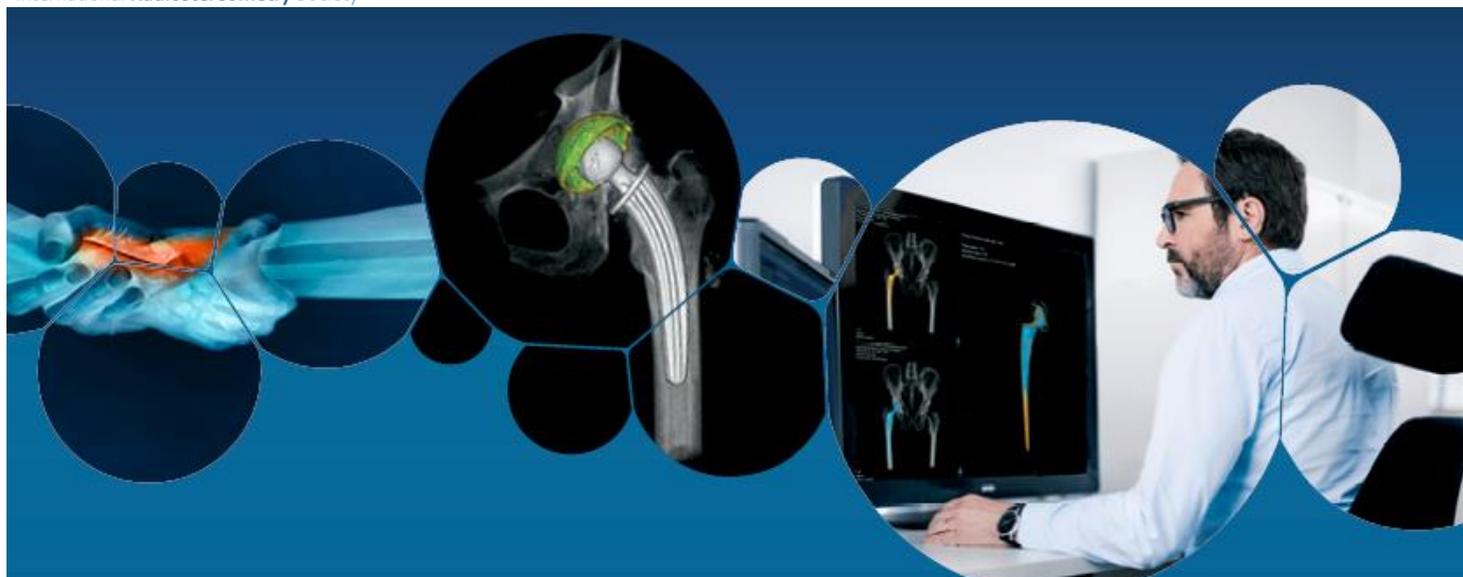


**Joshua Bridgens** is Medical Director at DePuy Synthes Companies of Johnson & Johnson one of the largest medical companies in the world. He trained as a paediatric orthopaedic surgeon and worked as a consultant at Leeds Teaching Hospital. In his current role he has a particular interest in the safe release of orthopaedic implants and research methods which can support this.

## Chairmen

	<p><b>Lars Nordsletten</b> Prof. MD, Head of research dept., co-head of CIRRO, Division of Orthopaedic Surgery, Oslo University Hospital, Norway.</p>		<p><b>Justin van Leeuwen</b> Justin A.M.J. van Leeuwen, Orthopaedic surgeon, Sandefjord Ortopedi, Sandefjord Helsepark, Norway.</p>	
	<p><b>Bernhard Flatøy</b> PhD MD, Orthopedic surgeon, Diakonhjemmet hospital, Oslo, Norway.</p>		<p><b>Michael J Dunbar</b> MD FRCSC PhD FCAHS, Professor of Surgery, Biomedical Engineering, Community Health and Epidemiology, Director of Research, Department of Surgery, QEII Foundation Endowed Chair in Arthroplasty Outcomes</p>	<p><b>Kjell G. Nilsson</b> MD FRCSC PhD Prof. of Orthopaedic Surgery, Head of arthroplasty section, Umeå university hospital, Sweden</p>
	<p><b>Leif Ryd</b> MD, Orthopedic surgeon, earlier professor Karolinska Institute, Stockholm, Episurf medical AB, Malmö, Sweden.</p>		<p><b>Maiken Stilling</b> Prof. MD, Dept. of clinical medicine, Clinical Professor at Aarhus University, Denmark.</p>	

	<p><b>Sepp de Raedt</b> PhD Bioinformatics Engineer, System developer, Institute of Cancer and Genetics (ICGI), Oslo University Hospital, Norway.</p>		<p><b>Bart Kaptein</b> PhD Biomechanical Engineer, Biomechanics and Imaging Group, Dept. of Orthopaedic Surgery, Leiden University Medical Center, the Netherlands.</p>
	<p><b>Berte Bøe</b> PhD MD, President of the Norwegian Society for Surgery of the Shoulder and the Elbow, Division of Orthopaedic Surgery, Oslo University Hospital, Norway.</p>		<p><b>Frank-David Øhrn</b> MD, PhD student, orthopedic surgeon, Dept. of Orthopaedics, Kristiansund hospital, Norway.</p>
	<p><b>Finnur Snorrason</b> PhD MD, Division of Orthopaedic Surgery, Oslo University Hospital, Norway.</p>		<p><b>Johan Kärrholm</b> Prof. at the Department of Orthopaedics, Sahlgrenska Academy, Göteborg University, Sweden.</p>



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<sup>1</sup> Clatworthy, M. (2016). An Early Outcome Study of the ATTUNE® Knee System vs. the SIGMA® CR3D Knee System. DePuy Synthes White Paper. D5US/GR/0916/04810. In an IRB approved early outcomes study, physiotherapists collected data on 40 patients implanted with ATTUNE® Knees and 40 patients with SIGMA® CR3D Knees. The results demonstrated that patients implanted with the ATTUNE® Knee had statistically significant improvements in some early outcomes, other outcomes demonstrated a trend favoring the ATTUNE® Knee, and some outcomes were equivalent. <sup>2</sup> Etter, K, Lerner, J, Kallakur, L, de Moor, C, Yoo, A, Swank, M. Comparative Analysis of Hospital Length of Stay and Discharge Status of Two Contemporary Primary Total Knee Systems. J Knee Surg. 2017; 32(2): 1-10. DOI: <https://doi.org/10.5585/jksj.1604482>. Premier Perspective™ Database analysis including 28 hospitals, representing 178 primary, unilateral TKAs with the ATTUNE® Knee and 5707 primary, unilateral TKAs with Trabecular™.

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## Practical information for attendees and speakers!

The main congress is held on ZOOM in webinar format.

The **links** to attend the congress are sent to all attendees in an email. We recommend to save this email in a designated mailbox on your computer.

This mail includes 3 links:

1. Link to joint the Zoom Meeting webinar: **Attendee link**
2. Link to join Social time: **Social link**
3. Link to Sponsor meeting SECTRA: **SECTRA sponsor link**

Chairmen/women are supposed to raise their hand during the last presentation before their session and as a speakers at the latest during your own presentation. They will then be upgraded to panelist for the session.

This will enable video and sound!

**IMPORTANT:** When you are upgraded to panelist you have to unmute yourself to speak!

Long versions of the presentations will be available at the meetings science channel at the iRSA homepage.

If there are any technical problems please contact: Magnus K. Reiten ([magkar@ous-hf.no](mailto:magkar@ous-hf.no))  
or for urgent matters during the congress: Marte Magnusson: +47 99 61 75 73

## Nominees for best study

**Price: 1 000.- €**

Abstract number	Author	Title
<b>6</b>	<b>Karin Rilby</b> Maziar MOHADDES, Emma NAUCLÉR Johan KÄRRHOLM	Similar clinical results and migration with use of either a new anteverted or a straight standard stem after 2 years: randomized study of 72 Total Hip Arthroplasties (THAs) evaluated with clinical parameters, radiostereometry and DXA up to 2 years
<b>10</b>	<b>Shaho Hasan</b> Bart L Kaptein, Perla J Marang-Van De Mheen, Koen T Van Hamersveld, Rob GHH Nelissen, Sören Toksvig-Larsen	Stabilization of Continuous Migrating Tibial Components Between Two and Five Years: The Need For Longer Term Follow-Up In RSA Studies
<b>31</b>	<b>Håkon G Johannessen</b> Thomas Kadar, Geir Hallan, Anne Marie Fenstad, Kristin Haugan, Paul Johan Høl, Mona Badawy, Terje Stokke, Benedikt Jonsson, Kari Indrekvam, Arild Aamodt, Ove Furnes	Polyethylene wear in total hip arthroplasty; comparing Oxinium and CoCr femoral heads using radiostereometry with 10 years follow-up.
<b>39</b>	<b>Emil Toft Petersen</b> Søren Rytter, Daan Koppens, Jesper Dalsgaard, Torben Bæk Hansen, Nis Elbrønd Larsen, Michael Skipper Andersen, Maiken Stilling	Patients with knee osteoarthritis can be divided in subgroups based on tibiofemoral joint kinematic clustering of gait – An exploratory and dynamic radiostereometric study
<b>55</b>	<b>Kelly Mills</b>	Long-term micromotion of fully cemented versus hybrid fixation in revision total knee arthroplasty: a 10-year radiostereometric analysis RCT

	Nienke Kosse, Ate Wymenga, Gijs van Hellemond, <b>Petra Heesterbeek</b>	
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## Congress organization board contacts:

<b>Stephan M. Röhl</b> , Chair of IRSA 2021:	<a href="mailto:s.m.rohrl@medisin.uio.no"><u>s.m.rohrl@medisin.uio.no</u></a>
<b>Marte Traae Magnusson</b> , org. committee:	<a href="mailto:uxmanu@ous-hf.no"><u>uxmanu@ous-hf.no</u></a>
<b>Bart Kaptein</b> org.committee and web	<a href="mailto:B.L.Kaptein@lumc.nl"><u>B.L.Kaptein@lumc.nl</u></a>
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## **Links:**

<http://meeting2021.radiostereometry.org/>

[IRSA](#)

[CIRRO \(ous-research.no\)](#)

[Sectra](#) and film <https://youtu.be/zbMQWQ7vGsM>

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**Thank you** to Mona Risdal, Alexis Hinojosa, Stein Arve Sjancker, Magnus Poulsen, Erik Jon Erlingsson, Bertin Holme Flatebø, Michael Tindeman, Lennard Koster

**Thank you** to presenters, chairmen/women and keynote-speakers!

**Thank you** to the sponsors, Oslo university hospital, University of Oslo and Visit Oslo and Brik!

**Thank you** to everybody that contributed to this congress!

**Thank you** for the countless hours and for the extra effort that everybody has put in on top of your everyday tasks!

**Thank you** for finding solutions!

**Thank you** to our families to grant us time to do RSA!

