The **Belgian Pain Society** is proud to present the 3rd Young Researchers Day

THE NEXT GENERATION IN PAIN RESEARCH

22nd of March 2025

PROGRAM BOOK

BPS Belgian Pain Society

University of Antwerp

WELCOME FROM THE BELGIAN PAIN SOCIETY

It is our pleasure to welcome you to already the third edition of the “Belgian Pain Society - Young Researchers Day”, a state-of-the-art multidisciplinary scientific meeting that aims to bring together the many researchers and clinicians in Belgium who are actively involved in basic or clinical pain research.

Our primary motivation for organizing this event is to provide early-stage researchers and clinicians with a unique opportunity to meet, learn about each other’s research, exchange ideas, and interact. Our second motivation is to promote “bench-to-bedside” collaborations between basic researchers and clinicians.

As with the previous editions, the Belgian Pain Society has entrusted the scientific organization of the event to a group of 12 highly motivated junior (PhD or postdoctoral) researchers and clinicians affiliated to Belgian institutes including the University of Antwerp, Ghent University, Hasselt University, Université catholique de Louvain, Université de Liège, University Hospital Antwerp and Ziekenhuis Oost-Limburg. This scientific committee collaborated to design the meeting format, organize the call for abstracts, and prepare the scientific program, with the aim of maximally fostering interdisciplinary interactions.

We are delighted to see that the organizing committee succeeded in their aim because the program is an excellent representation of the current status of pain research in our country, consisting of 14 oral presentations and 17 poster presentations. The program will be closed with two keynote presentations and a multidisciplinary debate on the topics of physical activity and sleep. We hope and expect that the diverse perspectives on this topic will spark lively discussions.

On behalf of the Belgian Pain Society, we would like to express our sincere gratitude to the organizing committee for their hard work and dedication, as well as to the University of Antwerp for hosting us today.

We wish all attendees a stimulating and enriching scientific day.

Prof. dr. Guy Hans
President of the Belgian Pain Society

Dr. Koen Van Boxem
Scientific Officer of the Belgian Pain Society

WELCOME TO THE UNIVERSITY OF ANTWERP

The University of Antwerp is proud to host the third Young Researchers Day of the Belgian Pain Society. As a young, dynamic and forward-thinking university, it has an ambitious mentality which is reflected in its mission and vision: Let's define the future! This slogan is what drives UAntwerp to bring about positive change and take on challenges within society. Through its free and innovative research, student-centred academic teaching and targeted service to society, the University of Antwerp aims to have a valuable impact on the development, dissemination and use of scientific knowledge. UAntwerp aims to permanently strengthen its commitment to the further development of a sustainable world and a democratic and inclusive society founded on human rights.

The University of Antwerp has long recognized and encouraged the critical importance of science communication and as such this Young Researchers Day aspires to make a positive impact by bringing together a diverse group of young pain researchers.

Having spent a good part of my life doing pain research at UAntwerp, I couldn't be happier to be part of hosting this great meeting at the University of Antwerp on our beautiful Campus Drie Eiken. I want to express my gratitude to the most helpful personnel at Uantwerp, my colleagues from the organizing committee and the BPS whose tireless efforts made this third edition come together. In name of the organizing committee I would also like to thank all the young researchers for choosing to be a part of this day, and Grunenthal for sponsoring the awards.

Let's define the future!

Prof. dr. Kristof Deseure
Host from University of Antwerp

University of Antwerp

GRÜNENTHAL



THE BELGIAN PAIN SOCIETY

Mission

The Belgian Pain Society, Belgian chapter of the International Association for the Study of Pain (IASP, http://www.iasp-pain.org), is a multidisciplinary scientific association which assembles the medical profession and non-medical professionals involved in chronic and acute pain. The goals of our association is to support the education for the treatment of pain, stimulate the pain research, encourage the treatment of a patient by creating a network that is adapted for the correct treatment and participate in the application of public health care.

Membership

The BPS is a multidisciplinary association which includes doctors, nurses, psychologists, occupational therapists, physiotherapists, dentists, social workers ... As a scientific association, the missions of the BPS are to support training in assessment and pain treatment, stimulate research in this area, encourage patient treatment and participate in the implementation of health care policy. Your contribution will help support the implementation of these objectives.

Membership benefits:

- Reduced rate for the BPS annual scientific congress on Saturday 24th May 2025.
- Free access to the 'online' European Journal of Pain (European Pain Federation)
- The possibility of being part of the European Pain Federation EFIC, of which BPS is the Belgian chapter, and of applying for support to participate in a Pain School.
- The possibility of creating, or being a member of, a Special Interest Group (SIG) or a Professional Interest Group (PIG) in accordance with the statutes.
- Access to the part of our website reserved exclusively for members + forum for SIG/PIG.
- Regular transmission, electronically, of all information in the area of pain that reaches us. Interesting ideas and articles can be sent to info@belgianpainsociety.org

Membership fee 2025:

- You will pay 45€ of contribution per year as psychologist, physiotherapist, nurse, or nurse in training, doctor in training, PhD students
- You will pay 90€ contribution per year as doctors, medical specialists
- You will pay 35€ contribution per year as a retired doctor

To renew your membership status for 2025, you must pay the amount corresponding to your income, to the **IBAN BE89 3101 6231 0085** account of the Belgian Pain Society, mentioning your name, address, e-mail address and **"2025-membership"** .


BPS Congress 2025 **Quality in Pain Management: Pitfalls, Challenges and Improvement for Caregivers and Patients**

Saturday May 24th, 2025, 9h-15h30, Royal Library Brussels

Plenary sessions (simultaneously translated to Dutch and French)

- Quality from different perspectives:
  1. The psychologist point of view - Vera Callebaut (Antwerp), Régine Hermans (Brussels)
  2. What does the nurse think? Nadine Chard'homme (Brussels), Susan Broekmans (Leuven)
  3. Quality for the physiotherapist - Koen Bernar (Leuven)
  4. The patient's perspective - Eddy Claes/Ellen Gepts (Pijnpunt)

- Bridging Quality & Pain Clinic Care: Mind the Gap? - Nelleke de Meij (Maastricht)
- What can we learn from our neighbours? Quality in Pain Medicine in France. Céline Michel-Dhaine (Paris)
- Putting quality into practice. Towards a Value-Driven and Future-Proof Healthcare System. Dominique Vandijck (Ghent)

Parallel Sessions

Session 1: MDs (English) - Chairman: Bert Vanneste (Kortrijk)
- Possibilities for Credentialing in Belgium - Patrick Waterbley (Brussels)
- Credential in Pain Medicine: the UK experience - Hoo Kee Tsang (Liverpool)
- A new government: new standards for quality? Federal Department of Health (Brussels)

Session 2: Paramedics (Dutch) / Moderators: Susan Broekmans & Vera Callebaut + SIG/PIG
- Round-table discussion on quality in a pain center: contribution from paramedics

Session 3: Paramedics (French) / Moderator: Quentin Verwacht + SIG/PIG
- Round-table discussion: demedicalizing pain management?

Accreditation has been requested for medical doctors and physiotherapists (ProQKine)

ORGANIZING COMMITTEE

Guy Hans (representative from the **Belgian Pain Society**)

Conny Goethals (representative from the **Belgian Pain Society**)

Kristof Deseure (host from **University of Antwerp**)

Post-doctoral researcher at the University of Antwerp, Algology lab, Antwerp Surgical Training, Anatomy and Research Centre (ASTARC), Faculty of Medicine and Health Sciences, and scientific collaborator at the Multidisciplinary Pain Center, Antwerp University Hospital.

Research interests: behavioral characterization of spontaneous and evoked trigeminal neuropathic pain and comorbidities in rat and mice models of trigeminal neuralgia, pharmacological and chemogenetic treatment of trigeminal neuropathic pain, the role of endothelin-1 in cancer pain syndromes.

Junior researchers and clinicians from the organizing committee

Iris Meuwissen

Physiotherapist, PhD researcher and teaching assistant at the University of Antwerp and Hasselt University Department of Rehabilitation Medicine.

Research interest: Chronic non-specific low back pain, high intensity training, and pain neuroscience education.

Laurens Peene

Dr. Peene is specialized in Anesthesiology, Intensive Care Medicine and Pain Medicine. In addition he has a special interest in neuromodulation for chronic pain. He obtained the 'Fellow in Interventional Pain (FIPP)' certificate in 2022. He followed a postgraduate 'Neuromodulation and Pain' at the Queen Mary University in London and additional training at the Guy's & St Thomas NHS Foundation Trust hospital, London, UK. He published articles in multiple peer-reviewed journals and contributed to multiple handbooks"

Amber Billens

PhD researcher at Ghent University – Department of Rehabilitation Sciences

Research interests: Influence of psychological factors and physical activity on central pain modulation in healthy people and chronic pain populations

Davina Wildemeersch

Anesthesiologist and pain physician at UZ Antwerpen, visiting professor at the University of Antwerp.

Research interest: Chronic postsurgical pain, telemonitoring in acute and chronic pain conditions.

Lisa Bernaerts

Clinical psychologist and Systemic psychotherapist at the Multidisciplinary Pain Center in the Antwerp University Hospital.

Research interests: Psychosocial factors in chronification of pain, neuromodulation for chronic pain.

Aïcha Boutachkourt

PhD student at Institute of neuroscience, system and cognition axis (COSY, UCLouvain) and at Leuven brain Institute, translational neuropsychiatry (KU Leuven).

Research interest: Neural foundations of thermonociception and social cognition and their interconnections in the context of frontotemporal dementia.

Michel Mertens

Postdoctoral researcher at University of Antwerp - Department of Rehabilitation Sciences and Research School CAPHRI Maastricht University – Department of Rehabilitation Medicine.

Research interest: Chronic shoulder disorders (focus on frozen shoulder and rotator cuff related shoulder pain), underlying mechanisms in patients with shoulder disorders (central pain processing, autonomic function, metabolic factors and inflammatory levels), rehabilitation in patients with chronic shoulder pain and their

underlying mechanisms, quantitative sensory testing in healthy individuals prediction modeling in patients with chronic pain and exercise therapy in patients with chronic pain.

Amy Belba

Dr. Belba is specialized in Anesthesiology and Loco-regional anesthesia. She is currently performing a fellowship in Pain Medicine. She is PhD candidate in the Maastricht University Medical Center+ and University of Hasselt researching minimally invasive techniques on chronic knee pain. She investigates the effect of radiofrequency treatment of the genicular nerves in patients with osteoarthritis of the knee and those who have persistent pain after knee replacement surgery.

Michiel Brandt

PhD student at Spine, Head and Pain Research Unit, Ghent University

Research interest: Validity of clinically assessed lumbopelvic sensorimotor control tests in low back pain.

Jonas Verbrugghe

Guest professor at the University of Antwerp and a postdoctoral researcher at Hasselt University. He is an expert in the application and evaluation of (high intensity) exercise therapy in the treatment of chronic musculoskeletal disorders.

Yanis Mouheb

Neurobiologist and PhD researcher in cognitive neurosciences at the Conscious Care Lab - GIGA Consciousness - Liège University

Research interest: Altered states of consciousness-induced analgesia, contemplative neurosciences.



9.30 - 10.00 Registration + coffee and tea
Entrance Hall

10.00 - 10.30 Welcome by the Host institution (Prof. dr. Kristof Deseure), the President of the Belgian Pain Society (Prof. dr. Guy Hans), the Organizing Committee (Drs. Michiel Brandt)
Aula O7

10.30 - 12.30 Oral presentations
Parallel Oral Session I – *Aula O7*
Parallel Oral Session II – *Aula O8*

12.30 - 13.15 Lunch and Coffee + Poster viewing (optional)
Entrance Hall

13.15 - 14.00 Networking event
Entrance Hall

14.00 - 14.40 Poster presentations (parallel poster walks)
Entrance Hall

14.45 - 16.05 Hot topic debate: Managing lifestyle in chronic pain – A multidisciplinary debate (Moderators: Dr. Michel Mertens, Prof. dr. Jonas Verbrugghe)
Aula O7

- 14.45-14.55 Introduction + opening public voting awards
- 14.55-15.15 Keynote presentation 1: Moving beyond pain: overcoming barriers for physical activity in chronic pain
  Prof. dr. Mira Meeus (University of Antwerp)
- 15.15-15.35 Keynote presentation 2: Putting pain to sleep: the importance of sleep in pain management
  Prof. dr. Anneleen Malfliet (Vrije Universiteit Brussel)
- 15.35-16.05 Debate with the keynote speakers

16.05 - 16.30 Closing and awards ceremony (Dr. Koen Van Boxem, Drs. Yanis Mouheb)
Aula O7

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	Parallel Oral Session I – Aula O7 Moderator: Laurens Peene, MD	**Parallel Oral Session II – Aula O8** Moderator: Dra. Amber Billens
10.30	O1: Pregnancy-Related Lumbopelvic Pain and its Relationship with Postural Control in Multigravid Pregnant Women *(Myrthe Gregoor)*	O8: Is autonomic function associated with (central) pain processing in individuals with chronic pain? A systematic review *(Iris Meuwissen)*
10.47	O2: Protocol for a randomized controlled trial to evaluate the effectiveness of a structured exercise program in preventing chemotherapy-induced peripheral neuropathy *(Elise Aerts)*	O9: *Reaching consensus on the content of a Biopsychosocial Rehabilitation Programme in Chronic Low Back Pain – Checklist: a Delphi Study (Dries Ceulemans)*
11.04	O4: Mitochondrial dysfunction in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: preliminary results on mitochondrial flux analyses *(Jente Van Campenhout)*	O11: Enhancing Postural Control, Pain and Disability through Proprioceptive Training in Individuals with Low Back Pain: A Proof-of-Concept *(Sofie Dierckx)*
11.21	O5: Ultrasound and Shear Wave Elastography in Breast Cancer Patients: Exploring Soft Tissue Changes and Their Relationship to Self-Reported Shoulder Complaints *(Kaat Verbeelen)*	O12: Stress and pain systems: A meta-analysis of their complex physiological interplay *(Joren Vyverman)*
11.38	O6: Quantitative Sensory Testing across Four Body Regions of Healthy Volunteers: a Reproducibility Study *(Flore Van Olmen)*	O13: Patterns in anticipatory postural adjustment onset timing across multiple trunk muscles: Psychological correlates and participant clustering along the low back pain continuum *(Jaap Wijnen)*
11.55	O7: From breast cancer diagnosis to survivorship: analyzing perioperative biopsychosocial phenotypes and their relationship to pain on long term *(Amber De Groote)*	O14: Adrenergic dysfunction in patients with myalgic encephalomyelitis/chronic fatigue syndrome and fibromyalgia: A systematic review and meta-analysis *(Jolien Hendrix)*
12.12	~~O3: Reliability and validity of the Dutch bodily threat monitoring scale in breast cancer survivors *(Marthe Van Overbeke)*~~	~~O10: The effects of Exercise Therapy on Heart Rate Variability in individuals with Chronic Musculoskeletal pain: a systematic review *(Timo Meus)*~~

SCIENTIFIC PROGRAM – POSTER PRESENTATIONS

	Poster Walk A		Poster Walk B		Poster Walk C		Poster Walk D	
	Moderator: Dra. Aïcha Boutachkourt		Moderator: Lisa Bernaerts, MSc		Moderator: Prof. dr. Davina Wildemeersch		Moderator: Dra. Iris Meuwissen	
14.00	P1	Effects of Personalized Transcranial Alternating Current Stimulation (tACS) on Pain Perception (*Yaser Fathi Arateh*)	P5	Study Design and Methods for Investigating T cell Dysfunction in Chronic Pain: A Focus on Immune Exhaustion and Senescence (*Yanthe Buntinx*)	P9	The sleep-MOMagement project: effectiveness of person-centered behavioural interventions for postpartum maternal sleep improvement – A randomized controlled trial protocol (*Manon De deyne*)	P14	Unravelling the neuropsychophysiological link between stress and pain: A protocol (*Joren Vyverman*)
14.06	P2	A novel presurgical risk prediction model for chronic post-surgical pain for adults undergoing any type of surgery: development of the P4-Prevoque questionnaire [PERISCOPE trial] (*Eva Wauters*)	P6	The enigma of subjective lymphedema: How often and why do patients report lymphedema after breast cancer treatment without an objective measurable swelling? The role of lymphatic and sensory processing problems: A protocol for a multicenter prospective longitudinal study (*Laura Spincemaille*)	P10	Pain sensitivity and structural brain changes post breast cancer surgery (*Amber De Groote*)	P15	Stress intolerance in patients with chronic widespread pain: Are epigenetic mechanisms the answer to the mystery? (*Jolien Hendrix*)
14.12	P3	Back muscle characteristics to tailor exercise therapy for low back pain: study protocol and preliminary results of the "Back-to-Back" proof of concept study (*Vasiliki Karagiannopoulou*)	P7	The LipObes study: Understanding the differences and associations of pain characteristics, psychological symptoms, and quality of life in obese patients with and without lipedema (*Ceren Gursen*)	P11	PROFit Primi: The role of proprioceptive, fear-related and inflammatory factors in the persistence of pregnancy-related lumbopelvic pain in primiparous women: study protocol (*Eline Peuskens*)	P16	Effects of test modality and testing site on exercise-induced hypoalgesia in healthy human males (*Vladimir Aron*)
14.18	P4	Can the relationship between migraine and neck pain be explained by clinical and pain threshold variables? (*Amanda Rodrigues*)	P8	Gender, pain and the development of a questionnaire to study their relationship (*Robrecht De Baere*)	P12	Sexual dysfunction and its association with persistent pain after breast and rectal cancer surgery: a study protocol (*Marie Ham*)	P17	The Impact of Sleep and Gut Microbiota on Pain: preliminary results (*Gwenaëlle Mievis*)
14.24					P13	~~Responsiveness of the Dutch Pain Disability Index (PDI) in breast cancer survivors experiencing persistent pain: a protocol (*Marthe Van Overbeke*)~~		

PREGNANCY-RELATED LUMBOPELVIC PAIN AND ITS RELATIONSHIP WITH POSTURAL CONTROL IN MULTIGRAVID PREGNANT WOMEN

Gregoor Myrthe[1] , Goossens Nina[1], Aldabe Daniela[2], Geraerts Inge[3], De Baets Liesbet[4], Bogaerts Annick[5], Gyselaers Wilfried[6], Verboven Kenneth[1], Janssens Lotte[1]

1. Hasselt University, REVAL Rehabilitation Research Center, Diepenbeek, Belgium
2. Curtin University, Faculty of Health Sciences, Curtin Perth, Australia
3. KU Leuven, Dept. Rehabilitation Sciences, Research unit Rehabilitation in Internal Disorders, Leuven, Belgium
4. KU Leuven, Dept. Rehabilitation Sciences, Research unit Musculoskeletal Rehabilitation, Leuven, Belgium
5. KU Leuven, Dept. Development and Regeneration, Research unit Woman and Child, Leuven, Belgium
6. Hasselt University, Faculty of Medicine and Life Sciences, Diepenbeek, Belgium

Background and Aims: Pregnancy-related lumbopelvic pain (PLPP) affects 50-90% of pregnant women, substantially impairing their quality of life. The underlying mechanisms of PLPP remain largely unknown. Altered postural control has gained interest as a potential risk factor for PLPP. This study aims to determine the relationship between postural control and PLPP in the third trimester of pregnancy, while also exploring the differences in postural control between pregnant and non-pregnant women, and across different stages of pregnancy.
Methods: A total of 68 women were included: 17 multigravid women in the first trimester of pregnancy (age 32.1±2.3yr, BMI 23.7±3.5), 25 multigravid women in the third trimester of pregnancy (age 32±2.6yr, BMI 28.4±4.2), and 26 non-pregnant women (age 29.7±3.7yr, BMI 22.2±1.8). Postural control was assessed in upright standing on a force plate under various postural conditions (with/without vision, feet together/20 cm apart, and/or stable/unstable support surface). Center of pressure (COP) variables were measured: COP sway anterior-posterior (AP), mean COP velocity AP, and COP 95% confidence ellipse area (CEA). In the third trimester, PLPP intensity was evaluated with the Numerical Pain Rating Scale (NPRS) to categorize into a no-PLPP subgroup (NPRS=0, N=9) and a PLPP subgroup (NPRS>0, N=16). Linear mixed models or Kruskal-Wallis tests, at nominal significance level 0.05, were used to compare COP variables between the no-PLPP and PLPP subgroups, between pregnant women (first or third trimester) and non-pregnant women, and between trimesters (uncorrected for BMI).
Results: No significant differences in COP variables were found between the subgroups with and without PLPP ($p>0.05$). Pregnant women in the third trimester had significantly greater mean COP sway AP and COP 95% CEA compared to non-pregnant women when standing with feet together ($p<0.05$), though mean COP velocity AP did not differ significantly between these two groups ($p>0.05$). There were no significant differences in any COP variable between pregnant women in the first trimester and non-pregnant women, nor between trimesters ($p>0.05$).
Conclusion: Pregnant women in the third trimester demonstrate larger postural sway compared to non-pregnant women, likely due to the biomechanical adaptations associated with advanced pregnancy. However, no direct relationship between these alterations in postural control and PLPP is identified.

Funding bodies which supported the submitted research: Special Research Fund (BOF) UHasselt with number 23KP07BOF

PROTOCOL FOR A RANDOMIZED CONTROLLED TRIAL TO EVALUATE THE EFFECTIVENESS OF A STRUCTURED EXERCISE PROGRAM IN PREVENTING CHEMOTHERAPY-INDUCED PERIPHERAL NEUROPATHY

Aerts Elise[1,2], Dams Lore[1,2,3], Wildiers Hans[4], Devoogdt Nele[5,6], Peers Koen[7], Altintas Sevilay[8], Papadimitriou Kostas[8], Meeus Mira[1,2], De Groef An[1,2,5]

1. Department of Rehabilitation Sciences and Physiotherapy, MOVANT, University of Antwerp, Antwerp, Belgium.
2. Pain in Motion International Research Group, Belgium.
3. Department of Physical Medicine and Rehabilitation, University Hospitals Leuven, Leuven, Belgium.
4. Department of General Medical Oncology and Multidisciplinary Breast Centre, University Hospitals Leuven, Belgium
5. Department of Rehabilitation Sciences, KU Leuven - University of Leuven, Louvain, Belgium.
6. Center for Lymphedema, Department of Vascular Surgery and Department of Physical Medicine and Rehabilitation, UZ Leuven, Louvain, Belgium.
7. Department of Development and Regeneration, KU Leuven - University, Leuven, Belgium.
8. Multidisciplinary Oncologic Centre Antwerp (MOCA), Antwerp University Hospital, Edegem, Belgium.

Chemotherapy-induced peripheral neuropathy (CIPN) is a common and debilitating side effect of neurotoxic cancer treatment. The most common CIPN symptoms are sensory and motor symptoms in the hands and/or feet. CIPN may interfere with daily activities and cancer treatment. Exercise has shown promise in mitigating CIPN symptoms, however the quality of evidence is rather low. Therefore, this randomized controlled trial aims to determine the effectiveness of a structured exercise program based on the oncology exercise guidelines to prevent CIPN in patients receiving taxane- or platinum-based chemotherapy. In addition, a process evaluation will be performed to investigate the barriers and facilitators of the exercise program.

Breast and colon cancer patients (n=206) scheduled for taxane- or platinum-based chemotherapy will be randomized into usual care (control) or exercise (intervention) group. Both groups will receive a one-time education session on the importance of physical activity during cancer treatment and a physical activity tracker for 24 weeks. The intervention group will follow a 12-week personalized exercise program, including supervised strength training (two sessions per week) and home-based aerobic exercises (three sessions per week). Exercise intensity and duration are aligned with chemotherapy cycles.

The primary outcome are sensory symptoms of CIPN at 12 weeks, evaluated using the EORTC QLQ-CIPN20 questionnaire. Secondary outcomes include motor and autonomic CIPN symptoms, CIPN signs, physical and psychosocial functioning and relative dose intensity of chemotherapy, evaluated at short-term (12 weeks) and long-term (24 weeks). Patient adherence and experiences will be assessed through a questionnaire and focus groups to identify the determinants of exercise program attrition and to provide recommendations for valorization.

Funding bodies which supported the submitted research: /

MITOCHONDRIAL DYSFUNCTION IN MYALGIC ENCEPHALOMYELITIS/CHRONIC FATIGUE SYNDROME: PRELIMINARY RESULTS ON MITOCHONDRIAL FLUX ANALYSES

Van Campenhout Jente[1], Ates Gamze[2,3], Newton Julia[4], Zalewski Pawel[5], Nijs Jo[1,6,7], Polli Andrea[1,3,8], Hendrix Jolien[1,3,8]

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2. Laboratory of Neuro-Aging & Viro-Immunotherapy, Center for Neurosciences, Vrije Universiteit Brussel (VUB), Laarbeeklaan 103, 1090 Brussels, Belgium
3. Research Foundation – Flanders (FWO), Brussels, Belgium
4. Population Health Science Institute, The Medical School, Newcastle University, Framlington Place, Newcastle-upon-Tyne NE2 4HH, UK
5. Department of Hygiene, Epidemiology, Ergonomy and Postgraduate Education, Ludwik Rydygier Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Torun, M. Sklodowskiej-Curie 9, 85-094 Bydgoszcz, Poland
6. Department of Physical Medicine and Physiotherapy, University Hospital Brussels, Brussels, Belgium
7. Department of Health and Rehabilitation, Unit of Physiotherapy, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Sweden. University of Gothenburg Center for Person-Centred Care (GPCC), Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden
8. Centre for Environment and Health, Department of Public Health and Primary Care, Katholieke Universiteit Leuven, Leuven, Belgium

Introduction: Mitochondria have been considered the mere powerhouses of the cell and are central players of cellular health and disease. Emerging evidence suggest that mitochondrial dysfunction may be implicated in chronic pain conditions. Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) is a debilitating disorder characterized by pain, severe fatigue and post-exertional malaise (PEM), drastically impacting the quality of life of patients. Given the central role of mitochondria in energy metabolism, mitochondrial dysfunction has been hypothesized as an underlying pathological mechanism. We aim to investigate whether the level of mitochondrial (dys)function correlates to symptom severity in patients with ME/CFS.

Methods: A randomized cross-over study was conducted involving patients with ME/CFS (N=8) and age and BMI-matched healthy controls (N=8). Participants underwent a single bout of submaximal exercise (Aerobic Power Index) and an orthostatic test (Active standing test). Mitochondrial function in peripheral blood mononuclear cells (PBMCs) was assessed using the Seahorse XF Mito Stress Test, both before and after each procedure. Key parameters of mitochondrial function, including basal respiration, ATP-linked respiration, spare respiratory capacity, and non-mitochondrial respiration, were analysed.

Results: Preliminary findings indicate that mitochondrial function is altered in patients with ME/CFS compared to healthy controls. We anticipate that changes in mitochondrial parameters will correlate with symptom severity, including pain, fatigue and PEM, both at baseline and in response to exercise and an orthostatic test.

Conclusion: These preliminary results suggest a potential link between mitochondrial dysfunction and symptom severity in patients with ME/CFS. Understanding the relationship between mitochondrial function and symptom burden may provide insights into the underlying pathophysiology of ME/CFS and inform targeted therapeutic approaches.

Funding bodies which supported the submitted research: ME Research UK, Wetenschappelijk Fonds Willy Gepts

ULTRASOUND AND SHEAR WAVE ELASTOGRAPHY IN BREAST CANCER PATIENTS: EXPLORING SOFT TISSUE CHANGES AND THEIR RELATIONSHIP TO SELF-REPORTED SHOULDER COMPLAINTS

Verbeelen Kaat[1,2,3], De Groef An[1,2,3], Devoogdt Nele[2,3], Gursen Ceren[1,2,3,4]

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3. CarEdOn Research Group, www.caredon.org, Belgium.
4. Faculty of Physical Therapy and Rehabilitation, Hacettepe University, Ankara, Turkey.

Breast cancer is the most common cancer among women, and treatments such as surgery, radiotherapy, chemotherapy, immunotherapy, and hormone therapy can lead to upper limb (UL) dysfunction. UL dysfunction is multifactorial, with potential contributing factors including treatment-related alterations in the structural (tissue composition and thickness) and mechanical properties (tissue stiffness) of soft tissue. While various methods exist to assess these properties, many lack validity, particularly for deeper tissues. Ultrasound (US) with shear-wave elastography (SWE) is a promising, objective, safe, and non-invasive tool for evaluating soft tissue properties.
The aims of this study are: (1) to determine the intra- and inter-rater reliability of 2D US with SWE in measuring soft tissue properties at the pectoralis region in breast cancer survivors, (2) to compare these methods with non-US techniques (MyotonPRO and Elastimeter) and evaluate their correlation, and (3) to investigate the contribution of soft tissue properties (assessed with US methods) to self-reported UL dysfunctions, measured with the QuickDASH, after breast cancer treatment.
This study will include three groups (n=30 each): breast cancer patients with self-reported UL dysfunction, breast cancer patients without self-reported UL dysfunction, and healthy age-matched women. Soft tissue properties, including tissue thickness and muscle composition, will be measured using B-mode 2D US, while muscle stiffness will be assessed using SWE, MyotonPRO and Elastimeter. Measurements will be taken from both the affected and unaffected sides at predefined locations.
For the first aim, the intra- and inter-rater reliability of US and SWE will be assessed using Intraclass Correlation Coefficients (ICC). For the second aim, Pearson or Spearman correlation analyses will be used to examine the relationships between different methods for assessing muscle stiffness. For the third aim, cross-sectional analysis will explore the relationship between soft tissue characteristics and self-reported UL dysfunction using univariate regression analyses, as well as examining between-group differences using ANOVA. Confounding variables, such as dominant side, type of surgery and therapy, and pain scores, will be included in the analysis to account for their potential influence.

Funding bodies which supported the submitted research: Research Foundation Flanders

QUANTITATIVE SENSORY TESTING ACROSS FOUR BODY REGIONS OF HEALTHY VOLUNTEERS: A REPRODUCIBILITY STUDY

Van Olmen Flore[1], Marynissen Heleen[1], Bamps Dorien[1], Mekahli Djalila[1,2], de Hoon Jan[1,2]

1. KU Leuven, Leuven, Belgium
2. UZ Leuven, Leuven, Belgium

Background: The subjective nature of pain complicates its description and treatment. Quantitative Sensory Testing (QST) characterizes the somatosensory phenotype using a standardized battery of tests, including thresholds for cold detection (CDT) and pain (CPT), warm detection (WDT) and heat pain (HPT), mechanical detection (MDT) and pain (MPT), vibration detection (VDT) and pressure pain (PPT), as well as thermal sensory limen (TSL), paradoxical heat sensations (PHS), mechanical pain sensitivity (MPS), wind-up ratio (WUR) and dynamic mechanical allodynia (DMA). We evaluated the inter-period reproducibility of QST on the hand, forearm, flank and lower back of healthy volunteers. In addition, differences between body regions were explored.
Methods: QST parameters were assessed twice, one to three weeks apart, on the dominant hand, right forearm, right flank and lower back of healthy volunteers according to the protocol of the German Research Network on Neuropathic Pain (Rolke, 2006). The inter-period reproducibility was quantified via an Intraclass Correlation Coefficient (ICC). Linear mixed models evaluated differences between body regions; log-transformations were applied if residuals lacked a normal distribution.
Results: Twenty (20) healthy volunteers (50% female, 21.67 ± 2.11 years [mean ± SD], 25% left-handed) completed both study visits. Neither PHS nor DMA were observed. All parameters showed a fair (ICC ≥ 0.4) to excellent (ICC ≥ 0.8) reproducibility across the four body regions, excluding CDT (ICChand = 0.342), MDT (ICCforearm = 0.311, ICCflank = 0.197, ICCback = 0.109) and MPT (ICChand = 0.388, ICCforearm = 0.330).
Compared to the hand (30.5°C) and forearm (30.7°C), CDT on the flank was lower (30.3°C, both $p<0.001$). CPT was highest on the forearm (13.2°C versus 7.4°C [back], $p<0.05$), while HPT was highest on the hand (44.6°C versus 43.1°C [back], $p<0.05$). The forearm displayed the highest MPS (1.2/100 versus 0.77/100 [back], $p<0.01$). The hand showed the lowest WUR (2.1 versus 2.9 [forearm], 3.3 [flank] and 3.6 [back], $p<0.05$) and the highest VDT (7.7/8 versus 7.0/8 [forearm] and 6.9/8 [flank], $p<0.001$). PPT differed between the hand (466 kPa), forearm (362 kPa) and back (623 kPa) (all $p<0.0001$).
Conclusion: Based on the fair to excellent reproducibility, QST can be considered an accurate method to investigate the somatosensory phenotype in these body regions. Although differences were small, separate reference data per body region are required.

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FROM BREAST CANCER DIAGNOSIS TO SURVIVORSHIP: ANALYZING PERIOPERATIVE BIOPSYCHOSOCIAL PHENOTYPES AND THEIR RELATIONSHIP TO PAIN ON LONG TERM

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Persistent breast cancer treatment-related pain affects up to 40% of patients, decreasing their quality of life (QoL). While current research typically utilizes correlation and regression analysis to identify biopsychosocial phenotypes contributing to this pain, this study employs cluster analysis to identify qualitatively different phenotypes based on somatosensory and psychosocial characteristics both before and one week post-breast cancer surgery. Further, it investigates how these phenotypes are related to pain intensity one year post-surgery and examines the evolution of phenotype membership from pre- to post-surgery. Somatosensory and psychosocial functioning was evaluated pre- and post-surgery in 184 women undergoing unilateral breast cancer surgery. Eight different quantitative sensory testing (QST) methods including mechanical detection and pain thresholds, pressure pain thresholds, thermal detection and pain thresholds, and conditioned pain modulation were performed at the surgical area (trunk, arm, major pectoral muscle) and a distant location (quadriceps muscle). Psychosocial functioning was assessed using the Central Sensitization Inventory, Pain Catastrophizing Scale, Depression Anxiety Stress Scale-21, and the McGill Quality of Life Questionnaire. Pain intensity was evaluated one year post-breast cancer surgery using the Visual Analogue Scale. Latent class analysis identified five distinct phenotypes before and post-surgery, characterized by differences in mechanical and pain thresholds alongside psychosocial factors. Moreover, higher psychosocial distress and lower QoL correlated with elevated pain intensity one year post-surgery. These findings underscore the importance of addressing breast cancer patients' mental health perioperatively. Therefore, future research should explore whether psychological interventions perioperatively can reduce long-term pain intensity.

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IS AUTONOMIC FUNCTION ASSOCIATED WITH (CENTRAL) PAIN PROCESSING IN INDIVIDUALS WITH CHRONIC PAIN? A SYSTEMATIC REVIEW

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Introduction: Chronic pain often involves altered central pain processing (CPP), characterized by widespread allodynia and hyperalgesia. Dysfunction in the Autonomous Nervous System (ANS) is common in patients with chronic pain and may be linked to altered CPP. However, the interaction between (the) ANS (function) and CPP in these patients remains unclear, making it the focus of the present systematic review.
Methods: PubMed, SCOPUS, and Web of Science were searched, followed by a two-phase screening. Risk of bias and level of evidence of the included studies were assessed double-blind, followed by data extraction.
Results: One cohort, one case-control, and eight cross-sectional studies were included. ANS function was assessed by cardiovascular measurements, sympathetic skin response, plasma catecholamines, and skin temperature. Indices of CPP were evaluated by varying quantitative sensory testing modalities in the majority of studies (n=9) and by questionnaires assessing pain characteristics in two studies. Weak evidence was found for the association between autonomic function (heart rate and blood pressure) and pain sensitivity to rectal distension in patients with IBS ($p<0.05$); an inverse relation between plasma catecholamines and pressure pain thresholds ($p=0.042$) in chronic pancreatitis; and lower heart rate variability in patients with chronic musculoskeletal pain and impaired conditioned pain modulation ($p<0.01$). A lack of associations is suggested in chronic Whiplash Associated Disorders, Fibromyalgia, and Complex Regional Pain Syndrome.
Conclusion: The heterogeneity in ANS and CPP measurements complicates comparison and synthesis of results. This review provides preliminary insight into autonomic pathways' role in several chronic pain populations but emphasizes the need for standardized measurements.

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REACHING CONSENSUS ON THE CONTENT OF A BIOPSYCHOSOCIAL REHABILITATION PROGRAMME IN CHRONIC LOW BACK PAIN – CHECKLIST: A DELPHI STUDY

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Background & Aims: Chronic low back pain numbers continue to increase worldwide, causing a high socio-economic burden. Biopsychosocial rehabilitation has already proven to be effective. Nonetheless, in research and practice there is no consensus on the exact content of rehabilitation. A checklist was developed to guide and support the evaluation, comparison, and development of rehabilitation for chronic low back pain.
Methods: A Delphi survey, based on the attributes of a concept analysis containing all possible items of the checklist, was distributed across the international networks of EFIC and IFPOHE. Participants were asked to score all items, subitems and corresponding questions on three content-validity indicators: (1) clarity and comprehensibility, (2) relevance and importance and (3) alignment with the overall goal. A consensus-threshold of 75% was used. General questions were asked about the checklist as a whole, together with feedback on the items and any missing items.
Results: Round one and two of the Delphi study respectfully featured 66 and 50 participants with an average 16.8 and 17.3 years of experience in research or clinical practice. Multiple disciplines from all over the world participated in the study, mostly featuring European countries. After two rounds, consensus was reached on all but two items. Finally, adaptations were made to the remaining two items in agreement with the participants who disagreed on the remaining items. A consensus was reached on a comprehensive checklist comprising 11 key items essential for biopsychosocial rehabilitation in chronic low back pain: therapeutic exercise, psychological support, education, personalization, self-management, participation, follow-up, practice standards, goal-setting, social support, and dietary advice. Additionally, 32 subitems with corresponding questions were identified, ensuring coverage of all relevant aspects of biopsychosocial rehabilitation for chronic low back pain.
Conclusions: We reached consensus on a content valid checklist and comprehensive tool, applicable in research and clinical practice for practitioners and researchers. The checklist could support researchers and practitioners in developing, evaluating and comparing biopsychosocial rehabilitation programs for chronic low back pain. More research is necessary to further the development of the checklist and help implementation in practice and research.

Funding bodies which supported the submitted research: /

ENHANCING POSTURAL CONTROL, PAIN AND DISABILITY THROUGH PRORIOCEPTIVE TRAINING IN INDIVIDUALS WITH LOW BACK PAIN: A PROOF-OF-CONCEPT

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Background: Low back pain (LBP) is a leading cause of global disability. Individuals with LBP often exhibit impaired proprioceptive postural control, which may contribute to the persistence of their condition. The effectiveness of targeted proprioceptive training in addressing these deficits and alleviating pain and disability remains unclear. This study aimed to evaluate the impact of proprioceptive training on (1) proprioceptive postural control and (2) associated pain and disability in individuals with LBP.

Methods: Twenty-five individuals with recurrent LBP (14 men, 11 women; mean age 47 ± 10 years; BMI 24.1 ± 2.3) participated in an 8-week proprioceptive training program focusing on sensing, differentiating, and localizing lumbar postures, movements, and muscle activation. Participants integrated these exercises into their daily routines.

Postural control assessments were performed on stable and unstable surfaces with visual input occluded. Muscle vibration stimulated ankle and back muscle spindles to induce center of pressure (COP) displacements, measured using a force plate. A ratio of COP displacement in response to ankle versus back muscle vibration was calculated. Clinical outcomes were assessed with the Modified Low Back Pain Disability Questionnaire (MDQ). Moreover, patients reported a percentage of improvement in both pain and disability, where 0% indicated no improvement and 100% indicated full reduction/recovery of pain and disability after training.

Results: Proprioceptive training led to increased COP displacement in response to back muscle vibration on stable ($p = 0.036$) and unstable surfaces ($p = 0.043$). The ratio of ankle-to-back muscle vibration indicated greater reliance on lumbar proprioception under unstable conditions ($p = 0.034$). Clinically, MDQ scores improved significantly (pre-training: 27 ± 10; post-training: 14 ± 10, $p < 0.001$), alongside substantial self-reported reductions in disability (51%) and pain (49%).

Conclusions: Proprioceptive training improved lumbar proprioception and postural control, likely through enhanced muscle spindle sensitivity and segmental control. Participants shifted from rigid ankle strategies to adaptive lumbar proprioceptive reliance, improving adaptability to unstable conditions. These benefits were accompanied by significant reductions in pain and disability, underscoring the clinical value of proprioceptive training for individuals with LBP.

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STRESS AND PAIN SYSTEMS: A META-ANALYSIS OF THEIR COMPLEX PHYSIOLOGICAL INTERPLAY

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Background and aims: Besides psychological distress, (dys)functioning of stress systems, i.e. the autonomic nervous system (ANS) and hypothalamic-pituitary-adrenal (HPA-)axis, has been implicated in pain. However, the exact interplay between (re)activity of stress and pain systems in chronic pain remains unclear. This study will synthesize the evidence regarding their interactions in chronic pain.
Methods: A systematic review and meta-analysis was pre-registered on PROSPERO (CRD42024495934). Six databases were searched to identify studies examining at least one physiological stress marker of ANS or HPA-axis reflecting basal levels (i.e., before a stressor), reactivity (i.e., during a stressor) and/or recovery (i.e., after a stressor), and one experimental outcome measure of pain in adults with chronic primary pain. Risk of bias (RoB) was evaluated with the Newcastle-Ottawa Scale, and certainty of evidence (CoE) with GRADE.
Results: Forty-six studies (3 cross-sectional, 43 case-control; n=2407) were included and scored averagely 9/12 (5-11) on RoB. Overall CoE was (very) low. At baseline, qualitative analyses showed significant correlations between lower mean arterial pressure and higher pain sensitivity in patients with chronic pain which was confirmed in the meta-analyses (r=.301-.353, p=.02-.033). Furthermore, meta-analyses showed that higher cortisol levels were associated with lower pressure pain thresholds (PPTs) at baseline (r=.218, p=.01). Higher heart rate was associated with lower PPTs, and lower high-frequency heart rate variability measured at recovery level with lower cold pain tolerance (r=.309-.525, p=.001-.028).
Conclusions: Dysregulation of baroreceptor and HPA-axis functioning seems to be related to higher pain sensitivity at baseline, and autonomic dysfunction might be related to higher pain sensitivity under acute stress in patients. However, the evidence is low and limited.

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PATTERNS IN ANTICIPATORY POSTURAL ADJUSTMENT ONSET TIMING ACROSS MULTIPLE TRUNK MUSCLES: PSYCHOLOGICAL CORRELATES AND PARTICIPANT CLUSTERING ALONG THE LOW BACK PAIN CONTINUUM

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Background and aim: Feedforward activation of the trunk muscles plays a crucial role in spinal control and can be quantified by assessing anticipatory postural adjustments (APA) that precede predictable voluntary movements. This study aimed to: (1) investigate variations in APA onset times of individual trunk muscles along the low back pain (LBP) continuum; (2) identify distinct clusters of participants based on similarities in APA onset timing patterns; and (3) analyze between-cluster differences in pain-related psychological factors.
Methods: In a cohort comprising 30 pain-free controls, 20 persons with recurrent LBP in remission, and 28 persons with chronic LBP, APA onset times of trunk muscles were assessed using surface electromyography during a rapid arm movement task. Pain-related psychological factors including fear of movement, pain-related awareness and vigilance, and pain catastrophizing were evaluated using self-report questionnaires. Mixed linear models were used to compare APA onset times between groups, while k-means clustering was applied to identify subgroups of participants exhibiting similar APA onset timing patterns across trunk muscles. Between-clusters differences in pain-related psychological factors were analyzed using one-way ANOVAs and Kruskal-Wallis tests.
Results: No significant main effect of group on APA onset timing ($p = 0.831$) or group x muscle type interaction ($p = 0.362$) was found. However, cluster analysis identified three distinct subgroups across all participants, independent of LBP-status, characterized by a pattern of early, similar, or delayed APA onsets across trunk muscles relative to anterior deltoid activation. Pain-related awareness and vigilance scores differed significantly between clusters ($p = 0.029$), increasing progressively from the cluster with an early APA onset timing pattern to the cluster with a delayed APA onset timing pattern. Similar trends, though not statistically significant, were observed for other pain-related psychological factors, with large effect sizes.
Conclusions: APA onset times did not progressively differ along the LBP continuum at the level of individual muscles. However, three clusters with distinct APA onset timing patterns across trunk muscles emerged, independent of LBP-status. Participants with a delayed APA onset timing pattern showed heightened pain awareness and vigilance, pain catastrophizing, and fear of movement.

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ADRENERGIC DYSFUNCTION IN PATIENTS WITH MYALGIC ENCEPHALOMYELITIS/CHRONIC FATIGUE SYNDROME AND FIBROMYALGIA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) and fibromyalgia (FM) are co-morbid disorders with overlapping symptoms. Research highlights autonomic dysfunction compared to healthy individuals, particularly involving the sympathetic branch. While past systematic reviews focused on neurophysiological assessments, this systematic review summarises biological adrenergic markers, offering deeper insights into the observed sympathetic dysfunction in ME/CFS and FM aiming to identify targetable pathophysiological mechanisms.

Methods: A systematic search was performed on PubMed, Web of Science, Embase and Scopus. Studies investigating peripheral biological markers of adrenergic function in patients with ME/CFS or FM compared to healthy controls at baseline were included. Meta-analyses were performed using R Statistical Software.

Results: This meta-analysis of 37 studies, encompassing 543 ME/CFS patients and 651 FM patients, compared with 747 and 447 healthy controls, respectively, revealed elevated adrenaline (SMD=0.49[0.31–0.67];Z=5.29,p<0.01) and β1 adrenergic receptor expression (SMD = 0.79 [0.06 – 1.52]; Z = 2.13; p = 0.03) in blood of ME/CFS patients at rest. Additionally, patients with ME/CFS had a greater increase in the expression of α2A adrenergic receptor (AR, SMD = 0.57 [0.18 – 0.97]; Z = 2.85, p < 0.01), β2 AR (SMD = 0.41 [0.02 – 0.81]; Z = 2.04; p = 0.04) and COMT (SMD = 0.42 [0.03 – 0.81]; Z = 2.11; p = 0.03) after exercise and an increased response of noradrenaline to an orthostatic test (SMD = 0.11 [-0.47 – -0.70]; Z = 2.10;p = 0.04), both found in blood. FM patients showed no significant differences at baseline but exhibited a diminished adrenaline response to exercise (SMD = -0.79 [-1.27– -0.30]; Z = -3.14; p < 0.01).

Discussion: This systematic review and meta-analysis revealed adrenergic dysfunction mainly in patients with ME/CFS. Higher baseline adrenaline levels and atypical responses to exercise in ME/CFS indicate that sympathetic dysfunction, underscored by adrenergic abnormalities, is more involved in the pathophysiology of ME/CFS rather than FM. Furthermore, the findings of this systematic review and meta-analysis generate new hypotheses regarding the underlying causes of the observed results and potential compensatory mechanisms that may have developed to mitigate these deviations.

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EFFECTS OF PERSONALIZED TRANSCRANIAL ALTERNATING CURRENT STIMULATION (tACS) ON PAIN PERCEPTION

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Ongoing neural oscillatory activity was suggested to play a crucial role in the experience of pain. Transcranial alternating current stimulation (tACS) offers a promising tool for modulating these oscillations, yet the widespread reliance on protocols with fixed stimulation frequencies has yielded limited and often contradictory findings on its efficacy for pain modulation. By personalizing tACS stimulation frequency on individual peak alpha frequency (IAF), this study aims to investigate how personalized tACS can modulate pain perception and pain related neural oscillations.

We recruited 38 healthy participants in a within subject sham-controlled double-blind study. To induce pain, we used sustained periodic 0.2 Hz thermonociceptive stimuli delivered to forearm of the dominant arm. tACS targeted M1, contralateral to the side of the thermonociceptive stimulation. The frequency of stimulation was set to the individual peak alpha frequency (PAF). We measured painfulness rate (for periodic thermonociceptive stimuli) and heat pain thresholds (HPT) before and after tACS. Statistical tests were performed using linear mixed models using “time” (pre vs post) and “condition” (active vs sham) as factors.

The decreased HPT values in the post-tACS phase suggest mild sensitization of the forearm. While the average values showed that tACS resulted in a less pronounced decrease in HPT, as well as a smaller increase in painfulness ratings compared to sham, these differences were not statistically significant. Nevertheless, the consistency of these trends across the different behavioral measures suggests a potential modulatory effect of tACS on nociception processing and pain perception.

We further conducted an exploratory analysis to examine the influence of sex on tACS, Overall, the comparison of post-phase to pre-phase revealed a more pronounced effect in women than in men, with HPT showing the most significant decrease over time in women and no significant change in men. Additionally, there was a trend for an interaction effect, indicating that women responded better to tACS at SM-IAF.

These findings provide a novel perspective on advancing individualized neuromodulation approaches for pain and neurobiological disorders.

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A NOVEL PRESURGICAL RISK PREDICTION MODEL FOR CHRONIC POST-SURGICAL PAIN FOR ADULTS UNDERGOING ANY TYPE OF SURGERY: DEVELOPMENT OF THE P4-PREVOQUE QUESTIONNAIRE [PERISCOPE TRIAL]

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Background: Chronic post-surgical pain (CPSP) remains a significant global medical, psychological and socioeconomic challenge, with reported incidence ranging from 12.4% to 53.9%. Despite increasing research on risk factors and management strategies, CPSP prevalence remains high. Early identification of patients at high risk for CPSP could improve prevention and management strategies, benefiting patients, healthcare professionals, and society as a whole. However, despite the growing interest, current clinical practice offers limited tools for accurately early identification of high-risk surgical patients. This study aims to develop a preoperative CPSP prediction model useful for integration into a preoperative consultation for any type of surgery.
Methods: An observational pragmatic pilot study [PERISCOPE trial] to develop a prediction model for adult patients at risk of CPSP undergoing any type of elective surgery was conducted at the Antwerp University Hospital, Belgium, between December 2022 and September 2023. Based on clinical knowledge and a review of the literature, 33 candidate predictors were identified and collected at screening (before surgery) including sociodemographic characteristics and different patient-reported outcome measurements including pain intensity, health-related quality of life, anxiety and depression. CPSP was defined as a pain intensity score localized at the surgical area of ≥ 3, reported by the patient on a 11-level Numeric Rating Scale (NRS), three months after surgery.
Results: The final study population included 415 patients (mean age 54.2 ± 15.3 yr, 58.8% female) of which 19.3% reported CPSP. Four predictors; preoperative pain NRS score, education level, type of surgery and concerns about the planned surgery were identified as leading to the best predictive model (P4-Prevoque™ questionnaire) in terms of area under the curve (0.81; 95% confidence interval [0.76, 0.87]) and significance.
Conclusion: The P4-Prevoque™ questionnaire is able to presurgical identify a major part of CPSP patients with a sensitivity of 74%, and specificity of 77% in our study cohort. Using four straightforward easily obtainable questions, the proposed user-friendly prediction model has the strength to be readily deployed in daily practice. Future research should focus on its external validation and impact on the incidence of CPSP.

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BACK MUSCLE CHARACTERISTICS TO TAILOR EXERCISE THERAPY FOR LOW BACK PAIN: STUDY PROTOCOL AND PRELIMINARY RESULTS OF THE "BACK-TO-BACK" PROOF OF CONCEPT STUDY.

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Background: Non-specific low back pain (NSLBP) is the leading cause of disability. People with NSLBP exhibit alterations in their lumbar muscle characteristics and proprioceptive postural control (PPC). Defining shared underlying mechanisms and guiding treatment based on them may improve the limited effects of current treatments. This study will define the most distinctive lumbar muscle characteristics among people with NSLBP and healthy controls, and examine their interrelatedness and correlation with PPC to delineate NSLBP phenotypes. The effects of a proprioceptive intervention on these phenotypes will be investigated.

Methods: In 53 people with recurrent NSLBP and 47 healthy controls, the characteristics of the lumbar multifidus and erector spinae muscles will be investigated and compared. To evaluate PPC, ankle and back muscle vibration are applied during standing on stable and unstable ground with vision occluded. The vibration-induced Center of Pressure (COP) displacements are measured with a force plate and used to calculate relative proprioceptive reliance. Muscle activation and oxygenation are measured with electromyography and near-infrared spectroscopy, respectively, and muscle volume with 3D freehand ultrasound. The 53 people with NSLBP participate in a 16-week proprioceptive intervention, integrated into their daily lives and comprising a high-load lifting exercise. Its effects are evaluated midway, at the end and 16 weeks after the end of-intervention.

Results: Recruitment is in progress and preliminary descriptive results of the five enrolled participants with NSLBP on PPC comprise an increase in back vibration induced COP displacement (Pre: 0.018 ± 0.011 m; Post: 0.020 ± 0.012 m stable and Pre: 0.015 ± 0.013 m; Post: 0.021 ± 0.009 m unstable) at the end of intervention and an increased lumbar proprioceptive reliance at midway (Pre: 0.69 ± 0.04; Post: 0.46 ± 0.30 stable and Pre: 0.58 ± 0.13; Post: 0.44 ± 0.31 unstable) and end (Post: 0.40 ± 0.30 stable and Post: 0.34 ± 0.16 unstable) of intervention.

Conclusions: This proprioceptive intervention improved PPC, based on preliminary results. It increased the use of lumbar proprioception, leading to a shift from dominance in ankle to lumbar proprioception. The lumbar muscle characteristics and their correlation with PPC will be examined and the effects of this intervention on the delineated NSLBP phenotypes will be assessed. Patient-tailored exercise therapy for NSLBP may benefit from these results.

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CAN THE RELATIONSHIP BETWEEN MIGRAINE AND NECK PAIN BE EXPLAINED BY CLINICAL AND PAIN THRESHOLD VARIABLES?

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Background: Migraine and neck pain are often comorbid conditions with overlapping mechanisms that may exacerbate their respective disabilities. Understanding the interplay between migraine-related and neck pain-related disability and identifying clinical characteristics may provide insights for targeted interventions. The purpose of this study was to examine the relationships between migraine-related and neck pain-related disability, clinical variables, and pressure pain thresholds (PPTs) in migraine. Additionally, we aimed to identify the variables that explain the variability in disability scores for migraine and neck pain through multiple linear regression analysis.
Methods: Clinical variables collected included frequency of migraine attacks and neck pain (days/month), migraine and neck pain intensity (numerical rating scale - NRS), and disability scores assessed by the Migraine Disability Assessment (MIDAS) and the Neck Disability Index (NDI). PPTs were measured at the anterior temporal, sternocleidomastoid, and trapezius muscles using a digital algometer.
Results: Sixty-eight women with migraine were included. MIDAS correlated with NDI (rho=0.345; p=0.016) and neck pain intensity (rho=0.288; p=0.017). Similarly, NDI were correlated with MIDAS, neck pain intensity (rho=0.498; p<0.001), and anterior temporal PPT (rho=-0.397; p=0.005). NDI explained 19.9% of MIDAS variability (R^2=0.199; β=0.447; p=0.001). Conversely, NDI variability (R^2=0.447; p<0.001) was explained by MIDAS (β=0.352; p=0.005), anterior temporal PPT (β=-0.916; p<0.001), and trapezius PPT (β=0.690; p=0.006).
Conclusions: Migraine-related disability (MIDAS) is influenced by neck pain-related disability (NDI), while NDI is explained by MIDAS and PPTs of the anterior temporal and trapezius muscles. The findings highlight a bidirectional relationship between migraine and neck pain disabilities. Interestingly, lower anterior temporal PPTs were associated with higher NDI scores (suggesting greater neck sensitization), whereas higher trapezius PPTs were associated with greater neck disability, which may reflect different sensitization patterns. Differences in PPTs may reflect distinct pain processing mechanisms. Targeted management strategies addressing both conditions (migraine and neck disabilities) and their shared mechanisms may contribute to improved patient outcomes.

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STUDY DESIGN AND METHODS FOR INVESTIGATING T CELL DYSFUNCTION IN CHRONIC PAIN: A FOCUS ON IMMUNE EXHAUSTION AND SENESCENCE

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Background: Chronic widespread pain (CWP) is a hallmark of several debilitating conditions and is increasingly linked to immune dysregulation. Studies suggest a role for T cells in CWP pathophysiology, yet research remains limited due to small sample sizes and broad, nonspecific immune analyses, hindering insights into specific immune processes. In particular, the involvement of immune exhaustion and senescence – two fundamental immune states – remains poorly understood in CWP. These processes, well-documented in chronic infections and cancer, involve alterations in the activity of T cells that change immune function. The debilitating condition Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) shares substantial symptom overlap with other chronic pain disorders, including fibromyalgia. In addition to CWP, patients experience a broad range of symptoms, yet its pathophysiology remains poorly understood. Evidence indicates immune dysfunction in ME/CFS, but comprehensive analyses of specific immune states are lacking. We aim to bridge this gap by conducting an in-depth investigation of T cell dysfunction in ME/CFS, focusing on immune exhaustion and senescence in CWP pathophysiology.
Methods: Blood samples from ME/CFS patients (N=60) and matched healthy controls (N=60) have been collected and bio-banked, allowing us to study disease mechanisms without any additional burden. Comprehensive immune profiling by flow cytometry will characterize markers of immune exhaustion (e.g., PD-1, TIM-3) and senescence (e.g., CD57, KLRG1). In addition, proliferative and functional analyses will include measurements of cytokine production (IFN-γ, IL-2, TNF-α). DNA methylation analysis of key genes regulating immune exhaustion and senescence will provide insights into potential epigenetic alterations. Based on the results of this extensive analysis, we will explore the feasibility of reversing immune exhaustion using immune checkpoint inhibitors and small molecules.
Expected results: We hypothesize that ME/CFS patients exhibit signatures of immune exhaustion and senescence in T cells, along with altered functionality indicative of immune dysregulation, compared to healthy controls. By May 2025, we expect preliminary results from our flow cytometry panel, currently in development. These findings will enhance our understanding of T cell dysfunction in CWP and may help identify biomarkers or therapeutic targets, ultimately reducing the significant burden on patients.

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THE ENIGMA OF SUBJECTIVE LYMPHEDEMA: HOW OFTEN AND WHY DO PATIENTS REPORT LYMPHEDEMA AFTER BREAST CANCER TREATMENT WITHOUT AN OBJECTIVE MEASURABLE SWELLING? THE ROLE OF LYMPHATIC AND SENSORY PROCESSING PROBLEMS: A PROTOCOL FOR A MULTICENTER PROSPECTIVE LONGITUDINAL STUDY

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Introduction: Breast cancer treatment can induce breast cancer-related lymphedema (BCRL) at the arm and/or at the trunk/breast. The incidence of objective BCRL is decreasing due to less-invasive breast cancer treatments. However, patients sometimes report a feeling of swelling without objective BCRL. How often subjective BCRL occurs and how it changes over time is still unclear. Besides, it is not known which factors influence the occurrence and the severity of subjective BCRL. Therefore, the primary aim is to investigate the prevalence and the transitions of the arm and breast/ trunk BCRL states over time (no, subjective, and objective BCRL). The second aim is to determine factors related to four underlying mechanisms (1. lymphatic, 2. nociceptive, 3. neuropathic, and 4. central sensory processing problems), that contribute to the development of subjective BCRL in comparison with no BCRL and with objective BCRL. The third aim is to determine the factors related to the four mechanisms, that contribute to the severity of subjective BCRL.

Methods and analysis: This multicenter longitudinal study will include 230 patients with a diagnosis of primary unilateral breast cancer. Patients will be measured at pre-surgery, and 1, 6 and 12 month(s) post-surgery. To determine the prevalence rates and the transitions of BCRL states (aim 1), the patients are divided into three groups: objective BCRL, objective BCRL, subjective BCRL. A multinominal logistic regression model with generalized estimating equations will be used to determine the prevalence of subjective BCRL. To determine factors contributing to the presence/ severity of subjective BCRL (aim 2 and 3), 15 factors related to the potential underlying mechanisms are assessed: (1) amount of swelling, (2) dermal rerouting, (3) myofascial adhesions at the level of the scars, (4) local muscle stiffness, (5) local muscle tenderness, (6) impaired shoulder range of motion, (7) neuropathic pain, (8) sensory loss, (9) altered cold sensation sensitivity, (10) altered heat sensation sensitivity, (11) altered sensory acuity, (12) widespread hyperalgesia, (13) efficacy of the inhibitory pain mechanism, (14) pain facilitation, and (15) altered body perception. Multivariable binary logistic regression models (aim 2) and multivariable longitudinal models (aim 3) will be used.

Conclusion: As a result, the advanced knowledge will contribute to improvements in the monitoring, evaluation, and management of all types of BCRL.

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THE LipObes STUDY: UNDERSTANDING THE DIFFERENCES AND ASSOCIATIONS OF PAIN CHARACTERISTICS, PSYCHOLOGICAL SYMPTOMS, AND QUALITY OF LIFE IN OBESE PATIENTS WITH AND WITHOUT LIPEDEMA

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Background: Lipedema is characterized by painful and disproportionate adipose tissue accumulation. Lipedema remains underrecognized and is often misdiagnosed as obesity, potentially leading to exacerbated pain, reduced psychological well-being, and symptoms of depression, distress, and body image dissatisfaction. As a result, increased pain and psychological symptoms can contribute to a lower quality of life (QoL). No study has compared the pain characteristics, psychological symptoms, and QoL between lipedema and obesity. Additionally, there is limited evidence on how these variables are associated in lipedema. The LipObes study aims to compare pain characteristics, psychological symptoms, and QoL in obese patients with and without lipedema and explore the associations between these variables in obese patients with lipedema.
Methods: This cross-sectional study included 30 obese patients with lipedema (Lip-Obes group) and 29 obese patients without lipedema (nonLip-Obes group). Pain characteristics (pain intensity, pressure pain thresholds (PPTs), pain interference, pain distribution, neuropathic pain), psychological symptoms (pain catastrophizing, body image dissatisfaction, depression, anxiety, and stress, eating problems) and QoL were assessed. Data was analyzed by the independent t-tests, Mann-Whitney U tests, or Spearman's correlation analysis. A p-value of <0.05 was considered statistically significant.
Results: The Lip-Obes group reported higher pain intensity, lower PPTs in the arms and legs, greater pain interference, less frequent widespread pain, and more frequent neuropathic pain symptoms than the nonLip-Obes group ($p<0.05$). Additionally, higher pain catastrophizing and body image dissatisfaction, more pronounced eating problems, and greater impairments in QoL were found in the Lip-Obes group than the nonLip-Obes group ($p<0.05$). Higher pain intensity ($r=0.57$), pain catastrophizing ($r=0.65$), and depression, anxiety, and stress ($r=0.47$) were significantly associated with greater QoL impairment in the Lip-Obes group.
Conclusion: This study confirms a distinct pain profile, greater psychological symptoms, and more impaired QoL in obese patients with lipedema, which might provide preliminary evidence for diagnosing lipedema. Furthermore, the associations between higher pain intensity and psychological symptoms with poorer QoL in lipedema underscore the need for developing targeted interventions that address both physical and psychological aspects.

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GENDER, PAIN AND THE DEVELOPMENT OF A QUESTIONNAIRE TO STUDY THEIR RELATIONSHIP

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Background and Aims: Binominal sex differences (male/female) have been extensively examined in pain research, revealing a trend wherein individuals categorized as female exhibit heightened sensitivity to pain compared to those categorized as male. However, this categorization might be inadequate to capture the diversity of the entire population and elucidate the observed variations in pain experiences. A gender context model of pain encompasses a complex interplay of psychosocial factors, including social expectations, cultural influences and individual perceptions. Hence, it is important that tools are developed to map these interactions. This protocol aims to develop a questionnaire that comprehensively maps gender and gender beliefs about pain, that can be linked to experimental pain outcomes and employed in clinical settings.
Methods: An English questionnaire will be developed containing statements regarding gender conceptualization, gender identity and gender roles in pain, which are scored on a Likert scale. Based on preliminary considerations the authors will develop a first version of the questionnaire, which will be revised based on the input of an international multidisciplinary expert committee. Afterwards, online sequential funnel- based focus groups existing of participants with different profiles will go back and forth with the expert committee, to revise until data saturation is achieved. Five of these focus groups (n/group = 5 – 8) will be organized: a gender-diverse group, a neuro-diverse group, a socio-economically diverse group, a culturally diverse group and a group of pain patients. Finally, the finished questionnaire's reliability and validity will be tested. Content validity will be assessed by the expert committee through a content validity index, content validity ratio and inter-rater agreement. Internal consistency through Cronbach's alpha and test-retest reliability through an intraclass correlation coefficient and Kappa coefficient will be assessed in a larger, separate sample (n = 200 - 400).
Results: The result will be a questionnaire with items that can be organized into various continua which we hypothesize to be interrelated. In a data-driven approach we will then be able to construct different profiles related to intrapersonal gender and pain dynamics.
Conclusions: This new assessment tool will be useful for clinical pain practice and pain research and has the potential to provide valuable insights into the underlying mechanisms of the interaction between pain and gender and for tailoring therapeutic pain interventions.

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THE SLEEP-MOMagement PROJECT: EFFECTIVENESS OF PERSON-CENTERED BEHAVIOURAL INTERVENTIONS FOR POSTPARTUM MATERNAL SLEEP IMPROVEMENT – A RANDOMIZED CONTROLLED TRIAL PROTOCOL

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Background and aims: Two in five postpartum women (40%) experience chronic insomnia complaints up to two years after childbirth. These complaints are strongly associated with reduced physical activity, increased pain intensity, and worsened mood. Despite their high prevalence, effective, tailored interventions for first-time mothers remain scarce. This study will investigate the clinical and cost-effectiveness of two personalized "Sleep-MOMagement" interventions compared to standard care.

Methods: A three-arm randomized controlled trial (RCT) will be conducted to compare two interventions against standard care. The first intervention, Behavioural Sleep Management (BSM), is a personalized approach designed to optimize circadian rhythms and sleep habits. The second intervention, Behavioural Aerobic Exercise Therapy (BAET), aims to enhance daytime physical activity to improve sleep quality. The primary outcome of this study is insomnia severity, assessed using the Insomnia Severity Index (ISI) at a six-month follow-up. Secondary outcomes include various sleep-related parameters (e.g., sleep duration, sleep quality, sleep efficiency, and regularity), pain-related outcomes, physical activity levels, depressive and anxiety symptoms, and maternal quality of life. Pain will be evaluated through self-reported questions regarding its presence, location (body chart), intensity (VAS), and whether it is chronic or recurrent. The study will also explore the relationships between sleep-related parameters, physical activity levels, and the presence and intensity of pain among postpartum women. Outcomes will be measured at baseline, post-intervention (six weeks), three months follow-up, and six months follow-up. A total of 135 participants will be recruited, with a subgroup using GT3X actigraphy devices for objective sleep and activity tracking. In addition, a cost-utility analysis will be conducted to evaluate the economic impact of both interventions. Alongside the RCT, a qualitative process evaluation will examine participant and therapist experiences, the influence of contextual factors (e.g., therapy dosage, fidelity, and demographics), and mechanisms of intervention effectiveness to inform future implementation.

Results: Both interventions are expected to significantly reduce insomnia severity and improve secondary outcomes relative to standard care. Improved sleep is anticipated to reduce pain intensity and potentially prevent the long-term development of chronic pain. Additionally, both strategies are projected to be cost-effective alternatives to standard care.

Conclusion: By tailoring interventions to the unique needs of postpartum women, this study aims to advance personalized postpartum care, enhance maternal health, and promote long-term well-being in new mothers.

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PAIN SENSITIVITY AND STRUCTURAL BRAIN CHANGES POST BREAST CANCER SURGERY

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Introduction: Persistent pain affects 40% of patients with breast cancer (BCA) following treatment, significantly decreasing their quality of life. Current research focuses on identifying biopsychosocial pain biomarkers. Understanding the interplay between structural integrity of the brain and somatosensory function may provide insights into the pain chronification process. This study aimed to explore changes over time and interrelationships among structural integrity, somatosensory function, and pain intensity in patients with BCA compared to healthy volunteers (HV).

Methods: This study included patients with BCA assessed at one and three months post-surgery, alongside HV. Structural integrity was evaluated in the cerebellar peduncles, corpus callosum, and spinothalamic tract using multi-shell multi-tissue constrained spherical deconvolution. Somatosensory functioning was evaluated through quantitative sensory testing (QST) using six methods, including thermal detection and pain thresholds, conditioned pain modulation, and temporal summation. Pain intensity was measured using the McGill Pain Questionnaire. Comparisons were made using paired (i.e., BCA over time) and unpaired (i.e., BCA vs. HV) analyses, and correlations were assessed between structural integrity, QST outcomes, and pain intensity.

Results: It is anticipated that patients with BCA will demonstrate altered pain perception and somatosensory function compared to HV, particularly at one month post-surgery (i.e., acute pain) and that this will be maintained at three months post surgery (i.e., subacute pain). Additionally, microstructural differences are expected to become more apparent at three months post-surgery (i.e., subacute pain). Furthermore, it is hypothesized that structural integrity will correlate with somatosensory function and pain intensity.

Process evaluation: A total of 21 pBCA and 37 HV were included in the study. Assessments have been completed. Preliminary results are expected to be presented at the congress.

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PROFit PRIMI: THE ROLE OF PROPRIOCEPTIVE, FEAR-RELATED AND INFLAMMATORY FACTORS IN THE PERSISTENCE OF PREGNANCY-RELATED LUMBOPELVIC PAIN IN PRIMIPAROUS WOMEN: STUDY PROTOCOL

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Pregnancy-related lumbopelvic pain (PLPP) affects 50-90% of pregnant women and often persists into the postpartum period. It limits the ability to return to work, sports, and daily activities, significantly impacting quality of life and making PLPP a leading cause of sick leave during and after pregnancy. Despite its high prevalence, only a few women with PLPP receive treatment. Healthcare providers often dismiss it as a normal part of pregnancy, which leads women to believe that persistent PLPP is expected. Additionally, existing preventive and therapeutic approaches remain inadequate due to a limited understanding of its multifactorial etiology. This prospective cohort study aims to address this knowledge gap by identifying proprioceptive, fearrelated, and inflammatory predictors for PLPP onset during pregnancy and its persistence postpartum. Specifically, three main objectives will be addressed: (1) to investigate changes in these factors over time and their differences between women with and without PLPP, (2) to examine correlations among these factors in women with PLPP, and (3) to determine their predictive value for developing PLPP during pregnancy and its persistence postpartum. To achieve this, 211 primiparous women without PLPP at the time of inclusion will be recruited and assessed during the 1st and 3rd pregnancy trimesters, and at six weeks and nine months postpartum. Data collection includes sociodemographic variables, lifestyle determinants, and a clinical evaluation of PLPP. Proprioceptive factors include body perception and use of proprioception during postural control, which will be assessed through average response time and accuracy in a left-right judgment task and compensatory center-of-pressure shifts recorded with a force plate during ankle and back muscle vibration, respectively. Fear-related factors will be evaluated by using questionnaires such as the Pain Catastrophizing Scale and the Depression Anxiety Stress Scale-21. Moreover, task-related fear of movement will be determined by asking participants to rate pain intensity, perceived harmfulness, fear, and self-efficacy for three tasks they fear to perform due to their low back or pelvic girdle pain. Finally, inflammatory markers, including serum cytokines and C-reactive protein, will be analysed. Multivariate models will be used to identify predictors of PLPP, while canonical correlation and logistic regression will explore interactions between proprioceptive, psychological, and inflammatory variables. This study aims to establish a predictive framework for PLPP, paving the way for future targeted interventions to improve maternal health outcomes. The study has been approved by the Ethics Committee Research UZ/KU Leuven (EC Research, S69463).

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SEXUAL DYSFUNCTION AND IT'S ASSOCIATION WITH PERSISTENT PAIN AFTER BREAST AND RECTAL CANCER SUGERY: A STUDY PROTOCOL

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Background and aims: As cancer incidence and survival rate continue to rise, a growing number of individuals must cope with the long-term adverse effects. Surgery for breast or rectal cancer leads to significant physical and physiological changes, which may lead to sexual dysfunction. Persistent pain is also common problem in cancer survivors. However the association between sexual function and persistent pain after treatment for breast or rectal cancer remains unexplored. The aim of this study is to evaluate the sexual function and wellbeing of patients treated for breast or rectal cancer, and explore the association with pain and pain-related disability.

Methods: This study included 67 participants assessed 12 months after surgery for breast cancer (40 women) or colon cancer (8 women, 19 men). All participants were randomly recruited from a cohort of participants in a randomized controlled trial investigating the effectiveness of pain neuroscience education (NCT03351075) and in a randomized controlled trial investigating the effect of pelvic floor muscle training on bowel symptoms after low anterior resection for rectal cancer (NTR6383). All participants completed questionnaires evaluating sexual function and well-being (the Sexual Functioning Scale for Cancer Survivors (SFSS), the Body Image Scale, the New Sexual Satisfaction Scale – Short Form, the Maudsley Marital Questionnaire) and pain in general (Visual Analog Scale and Pain Disability Index). The participants have been included, but analyses are yet to be conducted. First, presence of sexual (dys)function (yes/no) will be evaluated with the SFSS, based on DSM-5 criteria (orgasmic-, sexual interest/arousal- and penetration disorder for women and ejaculation-, erectile- and hypoactive sexual desire disorder for men). Second, associations between sexual (dys)function and well-being (sexual, psychological and physical), including pain intensity and pain-related disability will be evaluated with a chi – square test.

Hypothesis and possible implications: We hypothesize that treatment for breast and rectal cancer has a significant impact on sexual function and well-being and that sexual dysfunction is associated with general pain and pain-related disability. By conducting this research, we aim to increase insight into the physical (pain), psychological and sexual implications of cancer and contribute to improving oncological aftercare. A potential limitation of this study is selection bias, arising from both a small sample size and the recruitment of participants from an existing study population.

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UNRAVELLING THE NEUROPHYSIOLOGICAL LINK BETWEEN STRESS AND PAIN: A PROTOCOL

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Background: Stress has been suggested as an important contributing factor in the development and persistence of musculoskeletal pain but the underlying mechanisms between (dys)function of the major stress systems (i.e. the autonomic nervous system and the hypothalamus-pituitary-adrenal axis) and of pain sensitivity and pain processing remain unclear. Although stress and pain interactions may confer vulnerability to pain chronification, a comprehensive characterization of the multiple stress systems and their interactions with pain is lacking.
Aims: The primary aim of this study is to characterize the stress system (dys)function (i.e., including basal levels, their reactivity and recovery to acute stress and chronic stress levels) in musculoskeletal pain groups with varying pain duration and extent, and to investigate the interaction between stress and pain at neuropsychophysiological level. The secondary aim is to define the contribution of stress to trajectories of pain, including chronification and recovery.
Methods: A study with a cross-sectional and a longitudinal arm will be performed in musculoskeletal pain groups with varying pain characteristics, i.e. chronic widespread pain (fibromyalgia) and chronic as well as subacute localized pain (low back pain), and in pain-free controls (n=35/group). Localized pain groups will be reassessed after six months to characterize pain trajectories (recovered versus persisting). A mixture of neuropsychophysiological assessments will be used to assess stress and pain characteristics and functionality including questionnaires, autonomic measures (i.e., alpha-amylase, blood pressure, heart rate (variability), pre-ejection period, respiration rate, skin conductance and temperature), hormonal measures (i.e., cortisol and oxytocin), quantitative sensory testing (i.e., pain thresholds and pain tolerances, conditioned pain modulation and temporal summation of pain), and magnetic resonance imaging (brain activity).
Discussion: The anticipated results will provide crucial insights on the role of stress in the extent of pain symptomatology and in conferring risk for pain chronicity and will shed light on the underlying neuropsychophysiological mechanisms of stress and pain interactions.

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STRESS INTOLERANCE IN PATIENTS WITH CHRONIC WIDESPREAD PAIN: ARE EPIGENETIC MECHANISMS THE ANSWER TO THE MYSTERY?

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Introduction: Many patients with chronic widespread pain (CWP) experience stress intolerance – an exacerbation of symptoms in response to stress. The autonomic nervous system (ANS) may play a key role, as suggested by neurophysiological and biological evidence. Patients with CWP present with sympathetic dominance and elevated catecholamine levels. Moreover, the activity of catecholamine-degrading enzymes, like COMT and MAO-A/B, have been linked to pain. Research also showed that the effect of stress on pain depends on the magnitude of the (autonomic) stress response, which is variable between and even within subjects. While genetic polymorphisms can explain individual differences in stress responses, they are static and do not account for variability. Epigenetic mechanisms, particularly DNA methylation, provide a more dynamic explanation. Our pilot study found higher DNA methylation of COMT in CWP patients, indicating epigenetic regulation may contribute to stress intolerance. This project aims to explain the variability in the autonomic stress response and link it to stress intolerance by investigating the effect of epigenetic mechanisms (DNA methylation) on catecholamine expression (messengers of the autonomic nervous system (ANS)), ANS activity in general and symptom severity, including pain.

Hypothesis: We hypothesize that stress exposure increases DNA methylation of genes encoding for catecholamine-degrading enzymes, reducing their activity and prolonging catecholamine effects. This dysregulation may prevent recovery from stress and contribute to the heightened pain response observed in CWP patients.

Methods: To test this hypothesis, we are conducting a randomized cross-over study with 44 CWP patients and 44 healthy controls. Participants will undergo two procedures: stress induction via the Montreal Imaging Stress Test (MIST) and a relaxation control procedure. The following outcomes are assessed before, during and after each procedure: 1) biological: DNA methylation of genes encoding for catecholamine-degrading enzymes, gene expression of these genes and catecholamine expression; 2) neurophysiological: heart rate variability and blood pressure; 3) clinical: pain thresholds and symptom severity. Symptom severity will also be monitored online one day and seven days after their visits.

Results: At this moment, 42 patients with CWP and 35 healthy controls were included. Laboratory analysis will be performed from February until June.

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EFFECTS OF TEST MODALITY AND TESTING SITE ON EXERCISE-INDUCED HYPOALGESIA IN HEALTHY HUMAN MALES

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The mechanism(s) driving exercise-induced hypoalgesia (EIH)—an acute pain reduction following a single bout of exercise—remain unclear despite proposed contributions of central and peripheral processes. There is inconsistency in the literature as to whether EIH differentially impact the perception of different types of nociceptive stimuli and whether exercise selectively modulates pain at exercising body parts, or also involves non-exercising body parts. This characterization is a crucial first step to clarify the mechanism(s) underpinning EIH as some of the proposed mechanisms can be expected to modulate nociception regardless of testing modality and site, whereas others would predict local changes restricted to the exercising muscle.
Here, we characterized within-subject, the effects of a single session of cycling exercise versus a control condition on the sensitivity to stimuli preferentially activating skin mechano- and heat-sensitive nociceptors versus muscle nociceptors, at the lower- versus the upper-limb, in 40 pain-free males (18-30 years). Specifically, we assessed pressure pain threshold (PPT), heat pain threshold (HPT), cold detection threshold (CDT), mechanical pinprick rating (PP), and auditory detection threshold (ADT) at the upper- and lower-limb before and after both conditions. We found that exercise reduced pain induced by blunt pressure and increased innocuous cold sensitivity only at an exercising limb. We found no effect of exercise on the perception of the other types of stimuli, assessed at exercising and non-exercising body parts. Our findings, which should be replicated in a more general human population, provide possible directions for future mechanistic studies investigating EIH.

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THE IMPACT OF SLEEP AND GUT MICROBIOTICA ON PAIN: PRELIMINARY RESULTS

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Background and aims: The aim of this study was to investigate two factors that could influence the susceptibility to develop peripheral and central sensitization in humans: the intestinal microbiota composition and its metabolites and the sleep quality. Both factors are known to modulate pain perception, but their interference with the induction of peripheral and central sensitization remains largely unknown.
Methods: Healthy human participants took part in two experimental sessions separated by two weeks: a peripheral sensitization session in which we assessed heat hyperalgesia and flare response (using IR imaging) produced by topical capsaicin applied onto the volar forearm, and a central sensitization session in which we assessed secondary mechanical hyperalgesia (sensitivity to pinprick stimulation) induced by high-frequency electrical stimulation (HFS) of the skin. Sleep was assessed using a one-week actimetry and a sleep diary. Blood and fecal samples were collected for analysis of gut microbiota composition and metabolomics. Participants were categorized as short (<6h30), medium (6h30-8h30) or long (>8h30) sleepers.
Results: Data was collected in 42 out of 70 planned participants. Application of topical capsaicin led to a significant reduction of heat pain threshold and increased the skin temperature in the treated area. Application of HFS led to a significant increase in the pinprick intensity ratings. No differences were observed between the classes of sleepers, but only 4/42 participants were short sleepers. Analysis of blood and fecal samples is ongoing.
Conclusions: The very small number of short sleepers recruited so far does not allow assessing the influence of total sleep time on the susceptibility to sensitize.

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