Brazilian Journal of Mechanical Vibrations in Biosciences

BJMVB

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EDITORIAL

Editorial

Second Joint Congress on Mechanical vibration and technological innovation in health (MEVITIH-2024): Health innovations for evidence-based clinical practice

Sá-Caputo, D.C.[1*] and Bernardo-Filho, M.[1]

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Introduction

In this second issue of volume 2 of the Brazilian Journal of Mechanical Vibrations in Biosciences (BJMVB) will be presented publications about technological innovations with different approaches to promote the prevention and treatment of diseases, using the concept of clinical practice based on evidence. In this context, the use of mechanical vibration and other technologies will be discussed as a modality of intervention to be used in the prevention, diagnostics, rehabilitation approaches, among other.

By harnessing the available science, technology, and innovation, the world can face challenges of different natures that can compromise people's health and the balance of the environment. Moreover, the world's population is aging, and people are living with an increasingly longer life expectancy. In consequence, the proper use of science, technologies and innovations will permit having high-quality health systems in the sustainable development goals era that will bring benefits to everyone (1,2,3).

Another consideration is related to the fact that new diseases have emerged in the last years worldwide and has been necessary the integration of various acknowledgments, such as molecular approaches, through the metabolomic, until the use of various technologies with different sources of physical agents and data-driven technologies. In this context, it is relevant to point out the importance of scientific meetings, that may highlight different technologies that can be used in Health Sciences, like the "The 2nd Joint Congress on Mechanical Vibration and Technological Innovations in Health" (MEVITIH-2024).

The correct use the science, technologies and innovations in health, the discussion about these applications and the sharing of this knowledge to promote better practices are important to face the challenges. Furthermore, the comprehensive view of the individual and the discussion on multidisciplinary care favor better practices and results. This will be the aim of "MEVITIH-2024" to promote the acquisition of knowledge and discussions related to best practices based on evidence and on the evidence that can favor best practices, with a comprehensive and multi-professional view. The MEVITIH-2024 will bring together the activities of "The 3rd Congress Vibration in Biosciences" (VIBMECBIO-2024) and "The 3rd International Congress on Technological Innovations in Health (ICTIH-2024)". Researchers from several states in Brazil and around the

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world will participate in the activities in person and online. This year, the MEVITIH-2024 program will be broadcast live for the various states of Brazil, as *Universidade Federal de Viçosa*, *Universidade Federal de Uberlândia*, *Universidade Federal de Minas Gerais*, *Universidade Federal de Santa Maria*, *Universidade do Estado de Santa Catarina* and other countries, as Italy, Republic of Kazakhstan, Spain, Taiwan, and USA.

The topics covered in the MEVITIH-2024 round tables will involve technological innovations in osteoarticular alterations, oncology, neurology, tissue repair, metabolic alterations, diagnosis and therapy, health monitoring, health monitoring, rehabilitation, chronic disease care, sleep and performance disorders, recovery and assessment. Discussion forums on the importance of standardizing anthropometric measurements and on innovation and entrepreneurship in health (from the bench to Startup) will also be promoted at MEVITIH-2024.

The program of the MEVITIH-2024 will involve: A- workshops, (i) Practice involving systemic vibratory therapy, (ii) Practice on the use of transcranial stimulation, (iii) How to set up your Biobank and (iv) Check your motion as a functionality assessment tool; B- a Keynote Lecture entitled "Evolution of science in the Brazilian scenario", C- Round Tables such as:

Round table 1: Technological innovations in osteoarticular changes and oncology with the lectures - "Effects of systemic vibratory therapy in individuals with knee osteoarthritis", "Somatotype in spondyloarthritis and its clinical and social interactions", "Balance assessment with Techbalance in knee arthrosis" and "Robotic surgery in oncology".

Round table 2: Technological innovations in neurology with the lectures - "Transcranial direct current stimulation in stroke treatment", "Implantation of spinal devices with navigation", "Deep brain stimulation implant for Parkinson's" and "Subacute stroke and modular therapies".

Round table 3: Technological innovations in tissue repair with the lectures - "Introduction to scar acceleration methodology (MAC)", "Efficacy of systemic vibratory therapy in lymphedema", "Compression therapy in the treatment of lymphedema: how and why?" and Effect of systemic vibratory therapy on tissue repair".

Round table 4: Technological innovations in metabolic changes with the lectures - "Analysis of intestinal microbiota as a health marker", "Systemic vibratory therapy in the management of obesity and metabolic syndrome", " Whole Body Vibration in diabetic patients: partial results" and "Metabolic semiological interpretation and the use of probiotics in Metabolic Syndrome".

Round table 5: Technological innovations in diagnosis and in therapy with the lectures - "Clinical thermography: criteria for use and applicability", "Metabolomics in precision medicine", and "Dental pre-screening system for profile analysis for undergraduate subjects".

Round table 6: Technological Innovations in health monitoring with the lectures - "Peripheral and cerebral muscle oxygenation: clinical applicability and research with near infrared spectroscopy", "Functional assessment of hospitalized patients", "Smart fabrics for monitoring the body's physical and medical conditions".

Round table 7: Technological Innovations in rehabilitation with the lectures - "Transcranial photobiomodulation in neurological disorders", "Wearable technologies for movement disorders", and "Orthopedic workshops: rehabilitation and care for people with disabilities".

Round table 8: Innovations in chronic diseases with the lectures - "Innovation in the management of COPD", "Effects of systemic vibratory therapy on the symptoms of Parkinson's disease" and Innovative approaches to patient care with metabolic changes.

Round table 9: Technological innovations in sleep disorders and performance with the lectures - "New technologies for sleep apnea diagnosis and therapy", "High-performance sport: Is there a safe limit?", "Precision medicine in the assessment of excessive daytime sleepiness" and " Technological innovations in the analysis of human movement".

Round table 10: Approaches to recovery and evaluation with the lectures "Importance of the Enhanced Recovery After Surgery (ERAS) protocol in patient recovery", "Applicability of the baropodometry test in the health sector", "Diagnostic criteria for sarcopenic obesity" and "Child development assessment tools".

In addition, a Satellite lecture - "Clinical applicability and viability for the use of canabidiol" and another one with "Presentation of researchers from Germany and Taiwan", a "Discussion forum" "From Jury Panel to a Startup: Innovation and Entrepreneurship in Health", and another one "Measurement of anthropometric measures: the importance of standardization" will be presented throughout the MEVITIH-2024.

Besides the workshops, round-tables, satellite lectures and discussion forum, several researches will present findings about studies that are ongoing in the "Poster presentation"

Conclusion

This issue of the BJMVB is about actual and important theme that are related to clinical practices based on evidence considering science, technology, and innovation. The discussion of multidisciplinary approaches involving the care of the patient and research about better techniques to improve assistance are desirable in health management to optimize the cost-effectiveness of the actions in health.

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MEVITIH 2024

- PROGRAM -

The 2nd Joint Congress on Mechanical Vibration and Technological Innovations in Health (MEVITIH-2024)
Chairman – Danúbia de Sá-Caputo, Brazil
Co-Chairman – Redha Taiar, France
November 6-8th, 2024

The 3rd Congress of the Brazilian Association of Mechanical Vibration in Biosciences (VIBMECBIO-2024)
Chairman – Mario Bernardo-Filho, Brazil
Co-Chairman – François Constant, France

The 3rd International Congress on Technological Innovations in Health (ICTIH-2024)
Chairman – Anelise Sonza, Brazil
Co-Chairman – Adérito Seixas, Portugal

Program

November 6th, 2024

9am – Application/Accreditation
9:30 am – 11:30 am – Pre-congress workshops

Workshop 1 – Practice involving systemic vibratory therapy
Prof. Dr. Danúbia da Cunha de Sá Caputo; Prof. MSc. Marcia Cristina Moura Fernandes; Prof. MSc. Ana Carolina Coelho

Workshop 2 – Practice on the use of transcranial stimulation
Prof. Dr. Egas Caparelli Dáquer

Workshop 3 – How to set up your Biobank
Prof. Dr. Diego Pinheiro Aguiar

Workshop 4 – Check your motion as a funcionality assessment tool
Prof. MSc. Samuel Brandão

1pm – Opening ceremony

1:30 pm – Keynote Lecture - Evolution of science in the Brazilian scenario
Prof. Dr. Eliete Bouskela

2pm – Presentation by the UERJ Choir

2:30 pm – Opening cocktail

3:30 pm – Round table 1: Technological innovations in osteoarticular changes and oncology
Coordinators: Prof. Dr Redha Taiar; Prof. Dr. José Alexandre Bachur; Dr. Ana Gabriellie Valério Penha
3:30 pm – Effects of systemic vibratory therapy in individuals with knee osteoarthritis - Prof. Dr. Mario Bernardo Filho
3:50 pm – Somatotype in spondyloarthritis and its clinical and social interactions - Prof. Dr. Paulo César Handam
4:10 pm – Balance assessment with Techbalance in knee arthrosis - Prof. Dr. Liszt Palmeira
4:30 pm – Robotic surgery in oncology - Prof. Dr. Paulo Roberto Salustiano de Carvalho
4:50 pm – Discussion

5pm – Round-table 2: Technological innovations in neurology
Coordinators: Dr. Adérito Seixas; Dr. Paulo César Handam; Dr. Luelia Teles Jaques de Albuquerque
5pm – Transcranial direct current stimulation in stroke treatment - Prof. Dr. Egas Caparelli Dáquer
5:20 pm – Implantation of spinal devices with navigation - Prof. Dr. Flávio Nigri
5:40 pm – Deep brain stimulation implant for Parkinson's - Prof. Dr. Elington Simões
6pm – Subacute stroke and modular therapies - Prof. Dr. François Constant Boyer
6:20 pm – Discussion

Closing of the day's activities

November 7 th, 2024

8:40 am - Round-table 3 – Technological innovations in tissue repair
Coordinators: Prof. Dr. François Constant Boyer; Prof. Dr. Danúbia de Sá Caputo; Dr. Rosane da Silva Rodrigues
8:40 am – Introduction to scar acceleration methodology (MAC) - Prof. Dr. Marcus Vinícius Mello Pinto
9am – Efficacy of systemic vibratory therapy in lymphedema - Prof. Dr. José Alexandre Bachur
9:20 am – Compression therapy in the treatment of lymphedema: how and why? - Prof. Dr. Anke Bergmann
9:40 am – Effect of systemic vibratory therapy on tissue repair - Prof. Dr. Thais Porto Amadeu
10am – Discussion

10:20 am – 10:40 am – coffee break

10:40 am – Round-table 4 – Technological innovations in metabolic changes
Coordinators: Prof. Dr. Anelise Sonza; Prof. Dr. Thais Porto Amadeu; Dr. Aline Reis Silva
10:40 am – Analysis of intestinal microbiota as a health marker - Prof. Dr. Antonio Martins Tieppo
11am – Systemic vibratory therapy in the management of obesity and metabolic syndrome - Prof. Dr. Danúbia de Sá Caputo
11h:20 am – Whole Body Vibration in diabetic patients: partial results - Prof. Dr. Maria das Graças Rodrigues de Araújo

12pm – 1:30 pm – **Satellite lecture with lunch box "Clinical applicability and viability for the use of canabidiol" Offer by Biopharm/Brown Cannabis Institute.**

1:30 pm – Discussion forum - "Measurement of anthropometric measurements: the importance of standardization" - Prof. Dr. LucianePires; Vanessa de Moraes Tenius

2pm – Round-table 5 – Technological innovations in diagnosis and in therapy
Coordinators: Prof. Dr. Alessandro dos Santos Pin; Prof. Dr. Luciane Pires; Dr. Alessandra Andrade
2pm – Clinical thermography: criteria for use and applicability – Prof. Dr. Adérito Seixas
2:20 pm – Metabolomics in precision medicine – Prof. Dr. Gilson Costa dos Santos Junior
2:40 pm – Dental pre-screening system for profile analysis for undergraduate subjects - Prof. Dr. Maria Isabel de Castro de Souza
3pm – Discussion
3:30 pm-4:20 pm - Coffee break and poster presentation

4:20 pm – Round-table 6 - Technological innovations in health monitoring
Coordinators: Prof. Dr. François Constant Boyer; Prof. Dr. Gilson Costa dos Santos Junior; Prof. MSc. Marcia Cristina Moura Fernandes
4:20 pm – Peripheral and cerebral muscle oxygenation: clinical applicability and research with near infrared spectroscopy - Prof. Dr. Anelise Sonza
4:40 pm – Functional assessment of hospitalized patients - Prof. Dr. Fernando Silva Guimarães
5pm – Smart fabrics for monitoring the body's physical and medical conditions - Prof. Dr. Redha Taiar
5:20 pm – Discussion

Closing of the day's activities

November 8th, 2024

9am – Round-table 7 – Technological innovations in rehabilitation
Coordinators: Dr. Adérito Seixas; Prof. Dr. José Alexandre Bachur; Dr. Gabriel Siriano
9am – Transcranial photobiomodulation in neurological disorders - Prof. Dr. Nivaldo Parizoto
9:20 am – Wearable technologies for movement disorders - Prof. Dr. Denise Hack Nicaretta
9:40 am – Orthopedic workshops: rehabilitation and care for people with disabilities - Prof. Dr. Denise Flávio de Carvalho Botelho
10am – Discussion

10:20 am – 10:40 am – Coffee break

10:40 am – Round-table 8 – Innovations in chronic diseases
Coordinators: Prof. Dr. Nivaldo Parizoto; Prof. Dr. Anelise Sonza; Dr. Jennyfer Mazini
10:40 am – Innovation in the management of COPD - Prof. Dr. Cláudia Henrique da Costa
11am – Effects of systemic vibratory therapy on the symptoms of Parkinson's disease - Prof. Dr. Alessandro dos Santos Pin
11:20 am – Innovative approaches to patient care with metabolic changes - Prof. Dr. Rogério Bosignoli
11:40 am – Discussion
12pm – 2pm – Lunch and poster presentation

2pm – Round-table 9 – Technological innovations in sleep disorders and performance

Coordinators: Prof. Dr. André Luiz B Dionizio Cardoso; Prof. Dr. Ariane da Silva Pires; Dr. Larissa Berto

2pm – New technologies for sleep apnea diagnosis and therapy - Prof. Dr. Pedro Lopes de Melo

2:20 pm – High-performance sport: ss there a safe limit? - Prof. Dr. Rodolfo Alkmim

2:40 pm – Precision medicine in the assessment of excessive daytime sleepiness - Prof. Dr. Christiane Bahia

3pm – Technological innovations in the analysis of human movement - Prof. Dr. Adriane Mara de Souza Muniz

3:20 pm – Discussion

3:40 pm – 4:10 pm - Coffee break

4:10 pm – Discussion forum - From Jury Panel to a Startup: Innovation and Entrepreneurship in Health - Prof. Dr. Renata Angeli

4:40 pm – Round-table 10- Approaches to recovery and evaluation

Coordinators: Prof. Dr Redha Taiar; Prof. Dr. Christiane Bahia; Dr. Yasmin Moura Fernandes

4:40 pm – Importance of the Enhanced Recovery After Surgery (ERAS) protocol in patient recovery - Prof. Dr. Flávio de Sá Ribeiro

5pm – Applicability of the baropodometry test in the health sector - Prof. Dr. Ariane da Silva Pires and Prof. Dr. Eugênio Fuentes Pérez Júnior

5:20 pm – Diagnostic criteria for sarcopenic obesity - Prof. Dr. Alessandra Mulder

5:40 pm – Child development assessment tools - Prof. Dr. Renata Alves Paes

6pm – Discussion

6:20 pm – Closing ceremony and poster awards

ABSTRACTS OF
THE LECTURES

Abstracts of the lectures

Effects of systemic vibratory therapy in individuals with knee osteoarthritis

Bernardo-Filho, M[1]*, Sá-Caputo, D.C[1] and Moura-Fernandes, M.C[1]

Laboratório de Vibrações Mecânicas e Práticas Integrativas, Instituto de Biologia Roberto Alcantara Gomes, and Policlínica Universitária Piquet Carneiro, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, RJ, Brazil

The knee joint allows leg flexion and extension, besides other movements. Moreover, the knee also contributes to vertical posture and the balance of an individual, and to walk, run, sit, and stand. The aging can commit the knee joint, and a progressive inflammatory and degenerative process appears and favors the arising of knee osteoarthritis (KOA). Other risk factors for the KOA have been described, involving biomechanical and genetic factors that contribute to the imbalance between the synthesis and destruction of articular cartilage of the knee joint. The KOA prevalence is higher in the women than in the men. Besides clinical symptoms, such as pain, stiffness, swelling, crepitation and decreased muscle strength; radiological findings aid the diagnosis of the KOA. Medications, biological agents, surgery, and physical treatments have been used for the management of KOA individuals to alleviate the symptoms. Physical activity has been suggested as an important option of intervention, but these individuals are unmotivated to perform exercise. In this context, systemic vibratory therapy (SVT) has been an important alternative. In the SVT, the mechanical vibration (MV) produced in vibrating platform (VP) is transmitted to the individual producing the whole-body vibration exercise (WBVE), a modality of physical activity. WBVE is a safe, suitable, and effective intervention is a potentially feasible intervention for those patients who cannot perform conventional physical activity, such as the KOA individuals. The desirable effects of SVT include increasing muscle strength and power, and bone mineral density, reduction of pain reduction and risk of falls, and improvement of the quality of life, functionality, and cognition. In a protocol of SVT, biomechanical parameters of the MV, such as frequency and peak-to-peak displacement, and type of the VP, exposure time (work time) and rest time to the MV in the SVT session, number of sessions, week periodicity and total time of the SVT must be considered. In conclusion, although several studies have been published and shown that SVT is a feasible intervention to manage KOA individuals, it is necessary more studies to establish effective and proper protocols of SVT to consolidate this intervention as safe and effective in reducing pain and stiffness, and improving the physical function and quality of life, and increasing the muscle strength of KOA individuals.

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Abstracts of the lectures

Spinal device implant with navigation

Nigri F[1], Pinto, P.H.C.F[1] and Simões, E.L[1]*.

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Introduction: Pedicle screws are the mainstream for spinal fixation since late 1980's and early 1990's. Approximately 2 million pedicle screws are placed each year in the U.S. for spinal surgery. Pedicle screw malpositioning is a current problem with 443 articles retrieved from PUBMED-Medline with the words "pedicle screw malposition" of which 161 articles were published in the last 5 years. Between 5% and 15% of pedicle screws placed by free-hand technique have been reported as malpositioned and 1/300 patients will have to return to the operating room because of screw malpositioning. Redirection to optimize positioning may compromise biomechanical integrity, with a potential 28% loss of pull-out strength. Screw malpositioning has several implications causing vascular and neural lesions, revisions and prolonged hospitalization. **Objective:** Describe and discuss current options for pedicle screw placement with focus on our initial experience with intraoperative 2D/3D images coupled with navigation. **Methods**: Literature review and report of our initial experience with intraoperative 2D/3D images and navigation. **Results:** Many options have been directed to optimized pedicle screw implants. Intraoperative fluoroscopy and X-rays are the most frequently applied but is still resulting in screw malpositioning. Shaded areas in upper thoracic and cervical axial spine and parallax phenomenon may compromise screw positioning. Intraoperative electromyographic monitoring and electrical conductivity measurement systems may detect malpositioned screws causing neural compression but cannot determined other forms of screw malposition. 3D-printed targeting systems are still experimental with just a few reported cases. Intraoperative 2D/3D imaging system coupled with navigation system have been shown to reduce surgical team X-ray exposition and to optimize pedicle screw positioning. Intraoperative checking of final screw position is obtained with high quality 2d and 3D tomographic images. Our initial experience with Loop-X imaging System coupled with BrainLab navigation device showed excellent results and perfect pedicle screw positioning. **Conclusion**: Intraoperative 2D/3D imaging system coupled with navigation system seems to be a definitive tool to avoid screw malpositioning. Evaluation of cost and time effectiveness are necessary to encourage investment.

Keywords: Navigation, spine, pedicle screw.

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Abstracts of the lectures

Deep brain stimulation for Parkinson´s disease

Simões, E.L[1*], Nigri, F[1], Parise, M[1,] Cunha, A.M[1], Senior, M.E.F.L[1], Spitz, M[2,] Panichelli, B.O.S[2], Terrana, D[2], Molina, P.V[2], Barbosa, E.N.B [2], Faria, A.S[2] and Corrêa, D.G[3]

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[2]*Department of Neurology, Rio de Janeiro State University, Rio de Janeiro, RJ, Brazil*
[3]*Department of Radiology, Rio de Janeiro State University, Rio de Janeiro, RJ, Brazil*

Introduction: Parkinson´s disease is a degenerative movement disorder that affects motor circuits within central nervous system. Initial pharmacologic therapy includes L-DOPA and MAO-B inhibitors, but as the disease progresses, loss of efficacy and side effects like dyskinesia appear. **Objective**: Implant of deep brain electrodes for stimulation at specific targets within basal nuclei has been used to reduce severe motor symptoms when medications are ineffective. **Methods**: present the multidisciplinary team approach for selecting Parkinson´s disease patients and the technique of bilateral deep brain stimulation implants, performed in single surgical session at Pedro Ernesto University Hospital (UERJ), Rio de Janeiro. **Results**: Sixty-one patients were operated between January 2020 and September 2024. Fifty-nine patients received bilateral subthalamic nucleus implants and two patients bilateral globus pallidus internus nucleus (GPi) implants. **Conclusion**: Bilateral deep brain stimulation for Parkinson´s disease is a safe and effective procedure for reducing the symptoms of the disease and can be performed within the Brazilian public health system.

Keywords: Parkinson´s disease; DBS; deep brain stimulation; movement disorder; neuromodulation.

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Abstracts of the lectures

Whole-body vibration on tissue repair

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Introduction: Tissue repair is a complex, multifactorial process that involves molecular, biochemical and cellular events. In certain cases, the healing process can be impaired, leading to delayed wound closure or incomplete healing. This issue poses a notable challenge to public health. Various therapies have been investigated to accelerate abnormal tissue repair in wounds; however, many of these approaches have limitations due to side effects or inconsistent outcomes. Physical exercise is recognized as an important factor that impacts healing. Among alternative therapies, whole-body vibration (WBV) has attracted interest for its potential benefits in diverse conditions, although its effects on skin healing remain unclear. **Aim:** This lecture aims to offer a thorough overview of the primary effects of whole-body vibration (WBV) on the healing of skin wounds, both in human and murine pathological and non-pathological conditions. **Results**: An experimental study, conducted by our group, evaluated the effects of whole-body vibration (WBV) on cutaneous tissue repair in male rats. After a 15-day intervention, preliminary evidence of potential benefits, such as increased angiogenesis and Galectin-3 expression, was observed. Other studies corroborate these findings and show promising results. It is also crucial to recognize that each case is distinct, making it essential to evaluate the potential benefits and risks of WBV therapy on an individual basis. **Conclusion:** In summary, current data on WBV indicates its potential as a therapeutic approach to accelerating wound healing. Data highlights the relevance of further investigations to elucidate the underlying mechanisms and confirm the role of WBV in wound healing. However, additional research is necessary to validate these findings and develop standardized protocols for using WBV as a treatment for skin wound healing.

Keywords: Whole-body vibration; wound healing; skin.

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Abstracts of the lectures

Dental pre-screening system for profile analysis for undergraduate subjects

Souza, M.I.C[1]*, Pacheco, G[1] and Santos de Melo, T.S[1].

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Introduction: Access to dental treatment is still a challenge in Brazil, where there is a deficit in the provision of services by the public health system, with emphasis on specialized treatments. There is often a large geographic shift for patients, who seek out dental Specialty Centers and services offered by higher education institutions in large cities to carry out evaluation and treatment consultations. However, academic training activities presuppose the development of skills and competencies as well as a degree of technical maturity that need to be linked to the patient's clinical profile. **Objective:** The objective of the present study was the development of responsive software (STO) capable of carrying out dental pre-screening of patients who seek undergraduate teaching clinics at Dentistry/UERJ, to be associated with the degree of training of undergraduate students. **Methods:** Phase 1) A sample of participants (35 patients and 10 developers) with a mixed methodology was used to evaluate usability (System Usability Scale - SUS) and to measure patients' perception (semi-structured interview) about the STO components. Phase 2) After this preliminary analysis, the software was disseminated among different academic units at UERJ for use of the software and clinical care to verify users' self-perception of their oral health and appropriate indication within the undergraduate clinical care flow and; Phase 3) Development of explanatory and guidance material for patients who did not have the profile for care in undergraduate clinics. **Results**: Phase 1) The overall SUS rating for the system was 76.92. Among patients, 24 described the system as easy to use, 83% agree or strongly agree with question 1 "I think I would like to use this system often" and 83% of them agree or strongly agree that people would learn to use it quickly. Qualitative data collected showed that 100% of patients would recommend the software to someone they know. Phase 2) 87 patients enrolled virtually, but only 61 (70.1%) received clinical care for comparison between reported and clinical data. 22 patients were enrolled and 18 are in care. The procedures most demanded by patients using the software were cleaning (53/86.8%), orthodontic appliances (25/40.9%) and restoration (18/29.5%). Phase 3) All patients who did not qualify for graduated care received guidance via cell phone message about possible locations for their needs. **Conclusion**: The results of the SUS and the semi-structured interview showed that the STO achieved its objective and can optimize the in-person screening process in a public dental service. The comparison between the perception of their oral health and the software questionnaire proved to be positive, reinforcing the promise of using the software for dental pre-screening in institutions.

Keywords: User-centered design; dentistry; teledentistry; usability test.

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Abstracts of the lectures

Assessing brain and peripheral muscle oxygenation: clinical applications and research insights using near-infrared spectroscopy.

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Introduction: Near-infrared Spectroscopy (NIRS) is a non-invasive optical imaging technique that assesses tissue oxygenation and hemodynamics. By measuring the absorption of near-infrared light in tissues, NIRS evaluates concentrations of oxygenated and deoxygenated hemoglobin. The aim of this lecture is to present the historical development, clinical applications, and research surrounding NIRS for brain and peripheral muscle oxygenation. **Methods**: A literature search was conducted in three databases (PubMed, Scopus, and Web of Science) up to October 2024 to highlight key findings related to the history, clinical applications, and NIRS research. **Results**: The foundational principles of spectroscopy were established in the 19th century, however, by the 1970s, the NIRS´ concept began to materialize. This technology enables the observation of changes in muscle oxygenation and other parameters in clinical trials involving patients with chronic diseases, facilitating the assessment of muscle oxygenation during rehabilitation exercises and the adjustment of therapy. Additionally, NIRS is employed in critical care and surgical settings and brain oxygenation, particularly in cases of traumatic brain injury, stroke, and neonatal monitoring. Clinical studies have also investigated the effects of physical exercise training or during clinical tests in different populations. Another area of interest is the investigation of brain activity associated with cognitive processes, such as attention, memory, decision-making, and cognitive performance. However, NIRS does have limitations, such as depth sensitivity. Factors such as skin pigmentation, movement that increases artifacts, and ambient light can also affect readings, requiring careful interpretation. **Conclusion**: NIRS technology has evolved from theoretical principles into a widely used clinical tool. Its non-invasive nature and ability to provide real-time data make it particularly valuable for managing various medical conditions and understanding physiological responses in research settings. While the limitations of technology must be considered, ongoing advancements are likely to enhance its accuracy and broaden its applications in healthcare and scientific research, furthering our understanding of physiological processes.

Keywords: near-infrared spectroscopy; muscle oxygenation; brain oxygenation; clinical application; hemodynamics.

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Abstracts of the lectures

Effects of systemic vibratory therapy on the symptoms of Parkinson's disease.

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Introduction: Parkinson's Disease (PD) is a neurodegenerative condition that compromises motor control, caused by a deficit in cortical dopamine, leading to significant functional difficulties. Whole Body Vibration (WBV) is a therapeutic approach that has gained attention for its potential to improve patient mobility and quality of life. **Objective**: To review the effect of WBV in the treatment of PD, highlighting the parameters used and the effects achieved. **Method**: A bibliographic review was conducted using databases such as PubMed and Scopus, focusing on studies published in the last ten years that explored the application of WBV in patients with PD. The analyzed parameters included frequency, amplitude, and session duration. **Results and Discussion**: The review identified that WBV, with frequencies ranging from 20 to 40 Hz and amplitudes of 2 to 4 mm, resulted in significant improvements in balance, muscle strength, and functional mobility. Additionally, patients reported reductions in motor symptoms and improvements in quality of life. The results suggest that WBV may be an effective and safe intervention, complementing traditional approaches. However, the variability among studies indicates the need for standardized protocols. **Final Considerations**: WBV shows promise in the management of PD, requiring further research to establish specific clinical guidelines and optimize interaction with conventional therapeutic treatments.

Keywords: Whole-body vibration, Parkinson's disease, treatment

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Abstracts of the lectures

Management of chronic obstructive pulmonary disease: what is early disease?

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Introduction: Chronic obstructive pulmonary disease (COPD) is currently the third leading cause of death worldwide and continues to be underdiagnosed. The main causes of delayed diagnosis include the difficulty in performing spirometry, the insidious onset of the disease, which causes few respiratory symptoms at first, which are usually associated with smoking or aging, and the idea that COPD manifests itself after many years of exposure to aggressive agents, therefore, it is a disease of the age group over 60 years. **Objective:** To present data that support the need for earlier diagnosis. **Method:** bibliographic survey on the subject. **Results:** Most patients (54%) diagnosed with COPD are already in spirometric stage 3 or 4. On the other hand, data from COPDGene, evaluating 4,388 patients without spirometric alterations, found that these patients were younger than patients with COPD, but could present many respiratory symptoms and tomographic alterations such as emphysema and bronchial thickening. Other publications confirmed the fact that smokers without functional alterations can exacerbate more than patients with an established diagnosis of COPD. These data confirm the unmet need to expand and improve the way we diagnose COPD. One of the proposals is to use artificial intelligence to read chest computerized tomography (CT) scans. Several recent publications indicate that it will be possible, in the near future, for new technologies to be able to expand the diagnosis, increasing the number of confirmed patients. **Conclusion:** COPD is still a very underdiagnosed disease. The use of new technologies to facilitate and expand diagnosis is essential so that appropriate treatment can be implemented in earlier stages of the disease, when structural damage can be reversed or minimized.

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Abstracts of the lectures

Precision Medicine in Narcolepsy.

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Introduction: Narcolepsy is the most significant central disorder of hypersomnolence. While HLA-DQB1*06:02 is the primary genetic risk factor for narcolepsy, other alleles have also been identified. However, data on these conditions in Brazil is limited, with previous studies not exploring HLA high-resolution sequencing and hypocretin measurement, now considered a biomarker for NT1. Additionally, there is ongoing research to find a biomarker for diagnosing narcolepsy type 2 (NT2) and IH. Therefore, genetic studies in a diverse population like Brazil can provide valuable information on primary hypersomnias. The latest edition of the International Classification of Sleep Disorders (ICSD-3) has redefined narcolepsy terminology, replacing the subdivisions "with" or "without" cataplexy to narcolepsy type 1 (NT1) and type 2 (NT2), based on the discovery that low levels of hypocretin-1 (Hcrt) in cerebrospinal fluid (CSF) is the hallmark of NT1. However, the measurement of this biomarker is not readily available in many countries, including Brazil, and the lumbar puncture may deter patients. Cataplexy and a positive multiple sleep latency test (MSLT) are still used to diagnose NT1 without hypocretin data. Nevertheless, these criteria have limitations, as both NT1 and NT2 patients may exhibit atypical or absent cataplexy, and most episodes are not witnessed by the specialist, leading to diagnostic challenges. **Objective:** This study aimed to investigate genetic characteristics associated with susceptibility or protection for narcolepsy in the Brazilian population using Precision Medicine to diagnose NT1 and NT2 and to compare clinical and genetic variables between NT1 and NT2 classified based on biomarker criteria, focusing on which variables can better predict NT1 diagnosis beyond cataplexy. **Methods**: Diagnosis of narcolepsy was based on the third version of the International Classification of Sleep Disorders, with sub-classification into NT1 and NT2 determined by the concentration of CSF hypocretin 1 using radioimmunoassay. Mass parallel sequencing was conducted for High-resolution HLA sequencing for class I (A, B, and C) and class II (DPB1, DRB1, and DQB1) alleles. The study compared the data obtained with the National Registry of Bone Marrow Donors (REDOME) database, matching by sex, self-declared ethnicity, and geographic location in a ratio of 1 case to 5 controls. Clinical, neurophysiological, and genetic data from high-resolution HLA-sequencing were obtained. Univariate analysis was performed to compare the two groups (Epinfo©). Regarding multivariate analysis, a biological model was made by omitting hypocretin information to unveil which variables were better in differentiating NT1 from NT2 (MetaboAnalyst 6.0©) **Results**: The study included 43 narcolepsy patients and 215 controls, 15 NT1, 16 NT2 and 12 narcolepsy without hypocretin measurement. NT1 patients exhibited a higher frequency of the HLA-DQB1*06:02 allele compared to controls and NT2 patients (100% vs. 20% vs. 18.75%, respectively; p<0.001). Following DQB1*06:02,

DRB1*15:03 was identified as the most common allele associated with NT1, forming a haplotype with an odds ratio of 14.47 compared to controls (95% CI: 4-53.1, p<0.005).DRB1*15:01 was not associated with a significant risk after the Bonferroni correction. All 43 patients presented at least one risk, as already described in the literature. Thirty-one patients (15 NT1 and 16 NT2) and 73 variables were compared. Typical cataplexy was absent in 20% (n=3) of NT1 patients. Atypical cataplexy was present in 43,7% of NT2 (n=7). NT1 subjects exhibited significantly higher body mass index (BMI) and frequency of typical cataplexy and lower sleep latency (SL), total sleep time (TST), and mean sleep latency in MSLT compared to NT2 (p<0.05). These results are compatible with the Hcrt deficit. In multivariate analysis, the Variance Importance of Projection (VIP Score) "ranking" of the variables highlighted in multivariate analysis. The top five: HLA-DQB1*06:02, SL, DRB1*15:03, DRB1*15:03~DQB1*06:02, typical cataplexy.

Conclusion: These preliminary results of the first Brazilian study on narcolepsy using precision medicine revealed that HLA-DQB1*06:02 is the primary genetic risk factor for NT1 but not NT2, with a higher frequency than previous reports. The DRB1*15:03 was more prevalent among NT1 Brazilian patients in this sample, suggesting the influence of African heritage. No single test alone is perfect for distinguishing NT1 and NT2, but the importance of cataplexy may be overrated. Therefore, objective parameters beyond cataplexy, especially HLA-DQB1*06:02, SL, and BMI, are attractive to compose multimodal criteria that provide a more accurate diagnosis of NT1 and NT2 even without Hcrt information. This differentiation can be helpful in public health in selecting the best candidates for new drugs based on hypocretin function since they are more effective in NT1 patients.

Keywords: Narcolepsy, hypocretin, HLA-DQB1*06:02, precision medicine.

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Abstracts of the lectures

Technological advancements in the analysis of human motion.

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Human motion analysis is essential in monitoring disease progression, guiding rehabilitation, assessing athletic performance, and designing assistive devices. Optical motion capture systems, using cameras and reflective markers, remain the gold standard for analyzing diverse human movements. These systems capture three-dimensional kinematics, such as joint angles, limb positions, and motion velocities, facilitating early detection of movement abnormalities and supporting health professionals throughout the rehabilitation process. Alternatively, inertial measurement units (IMUs), which incorporate triaxial gyroscopes and accelerometers, provide a cost-effective means of estimating kinematic parameters through measurements of angular velocity and acceleration. These wearable sensors offer practical and efficient data collection, independent of environmental constraints, as demonstrated by smartphone-based assessments for gait abnormalities. Recent advances in artificial intelligence, particularly deep neural networks, have enabled markerless motion analysis, expanding its applicability to outdoor settings. Despite ongoing challenges in the reliability of these techniques, markerless methods support efforts to standardize three-dimensional kinematic assessments. These innovations enhance tools for clinical practice, enabling early musculoskeletal diagnoses and continuous patient progress monitoring. Additionally, advances in machine learning have improved the sensitivity of motion capture systems to subtle gait variations, aiding therapeutic decision-making and refining rehabilitation evaluations.

Keywords: Motion analysis, gait analysis, inertial measurement units, markerless.

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Abstracts of the lectures

Applicability of the baropodometry exam in the health field.

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Introduction: Computerized baropodometric assessment is an important diagnostic tool in the health field that allows recording plantar impressions and pressure, ground reaction forces in the support area during the vertical position, in addition to allowing the analysis of postural balance through stabilometry and the relationship of the foot with posture, not only during the static position, but also dynamically, during walking. **Objective**: to describe the applicability of the baropodometry exam in the health field correlating it with clinical practice. **Methods**: expository lecture with panel presentation and debate on the topic addressed. **Results**: Data obtained about the analysis of plantar pressure can help to understand and correlate postural problems and establish an appropriate form of treatment for musculoskeletal, integumentary and neurological disorders. **Conclusion**: Based on the data obtained from baropodometry and stabilometry, health professionals can use them to identify the population at risk, as well as to modify or establish a new treatment program through changes in footwear, orthoses and therapeutic exercises. This information is also useful to improve understanding of the possible relationships between plantar pressure and lower limb posture.

Keywords: Clinical analysis; pressure; foot; posture; gait.

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Abstracts of the lectures

Child development assessment tools.

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Introduction: Child development is a multifaceted process and an adequate assessment of this development allows not only the early identification of possible delays and disorders, but also the planning of interventions that favor the child's healthy evolution. Developmental assessment tools have been used to track development indicators in several areas, including motor, cognitive, emotional and linguistic skills. These instruments provide valuable and comparable parameters, allowing health and education professionals to monitor children's progress and identify early signs of neurological and psychosocial disorders. We will discuss the main tools for assessing child development, addressing their theoretical foundations and practical applicability in clinical and educational contexts. **Objective**: To present the main instruments that assess child development, highlight advantages and disadvantages of the instruments, helping professionals choose the best tool for each situation and age group, highlight the limitations of the tools regarding cultural, social or economic issues and present the tools as aid for understanding development, for diagnoses and treatments. **Methods**: choice of widely used and validated tools for assessing child development. **Results**: The age range covered in each tool reflects the basic theory, with Weschler intelligence scales. Some tools offer broader age monitoring, but have specific developmental limitations, such as the Denver Developmental Scale. There are no complete tools that cover emotional and social development and behaviors with the Child Behavior Checklist. Therefore, an assessment requires several tools evaluating different aspects of cognition and behavior. **Conclusion**: We conclude that the tools are fundamental for identifying delays and difficulties in child development, allowing early interventions whether in the clinical or pedagogical area. Accurate assessments make it possible to monitor different areas of development. In addition to the benefit for children and adolescents, they offer support and guidance to family members and caregivers, which positively impacts the quality of interventions given to individuals.

Keywords: child development, assessment tools, neuropsychological assessment, diagnostic tools.

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