

Human resources image developed in Human Health Science Graduate School

The Graduate School of Human Health Sciences focuses on research related to the “health” of people living in large cities. In particular, research that contributes to the realization of a vibrant longevity society, which is the mission of Tokyo Metropolitan University, is one of the major issues of this major. Based on a well-established academic system based on theory and practical knowledge in a wide range of fields, in addition to deepening it, graduate education is conducted under an interdisciplinary and integrated research system. We aim to foster “highly practical experts” and “leading researchers” in various fields related to health.

Characteristics of the physical therapy science area

Today, in the area of health, medical care and welfare, the need for highly skilled professionals with advanced physical therapy expertise is increasing. In the Physical Therapy Science area of this Graduate School, we set up a wide research field from pediatric to the elderly, and aim to foster clinicians, educators and researchers who can respond to various physical therapy problems.

Therefore, we set up research areas of physical function recovery physical therapy, movement disorder analysis physical therapy, and community-based physical therapy, and set up a master’s program and a doctoral program respectively.

In addition, it is possible to advance research while adopting clinical day and night lecture system and accumulating clinical experience as a medical profession such as a physical therapist, and it is possible to plan an organic development of clinical and research.

Admission policy

Master's program

We teach the latest knowledge for the purpose of acquiring advanced knowledge of physiotherapist and technical improvement, advanced practice specialists and education with self-directed behavioral skills based on creative and scientific thinking for professional development. Aims to train researchers and researchers

Doctoral program

The purpose is to further develop learning and research in the field of master's program, and to train human resources who can research autonomously in universities, research institutes, companies, etc.

The pillar of education and research in the physical therapy science area

Common to all fields (required courses)

○ Master's program

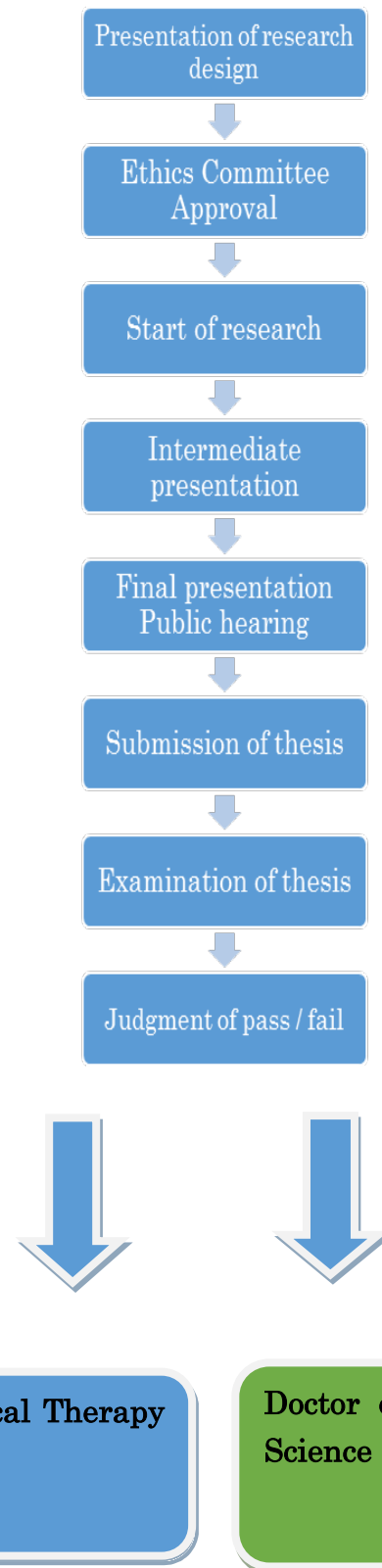
○ Doctoral program

Movement disorder analysis physical therapy field
Physical function recovery physical therapy field
Community-based physical therapy field
Manual Physical Therapy Course (Master)

Thesis in Physical therapy
Physical Therapy Research Method

Thesis in Physical therapy

**Thesis in Physical
therapy (master's and
doctoral thesis)
teaching process**



Pediatric Physical Therapy Gima Lab.



This laboratory's research topics include fetal, neonatal, infant, and childhood developmental characteristics and all issues related to movement disorders and developmental disabilities. These topics will be examined with respect to the developmental mechanisms of sensorimotor experience, with the aim of gaining a deeper understanding of how the interaction between the brain, body, and environment affects human development, and identifying the implications for pediatric physical therapy.



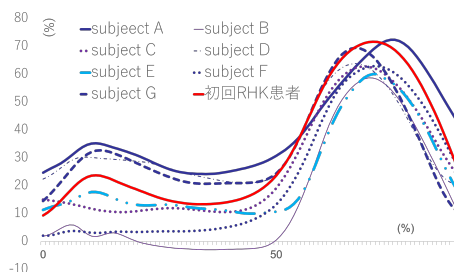
In addition, the assessment of and early intervention of physical therapy for low birth weight infants, and methods of developmental care that promote development will be discussed.

Our research uses various instruments for measuring movement (triaxial accelerometer, 3D motion analyzer system, body pressure sensor, etc.) and also seeks, proposes, and develops ideas for instruments and methods that can be applied in clinical practice.

Disability prevention physical therapy Yamada Lab.

In disability prevention physical therapy, we conduct research from the perspective of prevention of physical therapy for internal disorder and exercise disorder including health promotion, long term care prevention, dementia prevention in elderly generation and lifestyle-related disease.

In this laboratory, in addition to clinical research on long term care prevention, respiration and internal disorders, we developed by biomechanics research mutually using a three-dimensional motion analysis device, an ultrasonic diagnostic device, and MRI (magnetic resonance image) equipment. We are verifying the effectiveness of the prevention program.



Gait analysis study differences by type CR, UK and RHK artificial knee joints



Development of Arakawa-Koroban exercise fall prevention exercise program

Clinical study of Honda Walking Assist device in hemiplegic stroke patients



【Research papers 2021】

○Characteristics of Regional Cerebral Blood Flow in Alzheimer Disease and Amnesic Mild Cognitive Impairment by Single-Photon Emission Computerized Tomography: A Cross-Sectional Study. Yota Kunieda, Chiaki Arakawa, Takumi Yamada, Mizue Suzuki, Shingo Koyama, Yosuke Kimura, Takeo Ichikawa, Shuhei Shino, Minoru Yamada, Ryuto Hirokawa, Tadimitsu Matsuda, Tomokazu Takakura, Tomohide Adachi, Haruhiko Hoshino. Dement Geriatr Cogn Dis Extra. 2021 May 6;11(2):91-98.

○Movement patterns of the functional reach test do not reflect physical function in healthy young and older participants」 Yoshinao Moriyama , Takumi Yamada, Ryota Shimamura, Takehiro Ohmi, Masaki Hirose, Tomoyuki Yamauchi, Tomohiro Tazawa, Junpei Kat,PlosOne 2022.3.15 accepted 2022.3.31 published

○Gait Analysis of Patients with a Rotating Hinge Knee Prosthesis after Revision Total Knee Arthroplasty. Takehiro Ohmi , Takumi Yamada, Sadaya Misaki, Tomohiro Tazawa, Ryota Shimamura, Junpei Kato and Kazutaka Sugimoto. Int J Phys Ther Rehabil, 8: IJPTR-180

○Relationship of Phase Angle, Echo Intensity, and Muscle Thickness with Isokinetic Knee Extensor Strength and Associated Motor Functions in Young Adults, Tomoyuki Yamauchi, Takumi Yamada, Int J Phys Ther Rehabil, 7: IJPTR-178

• Relationship between muscle echo intensity on ultrasound and isokinetic strength of the three superficial quadriceps femoris muscles in healthy young adults. Yamauchi T, Yamada T, Satoh Y. J Phys Ther Sci. 2021 Apr;33(4):334-338.

○The Effects of Exergames on Muscle Architecture: A Systematic Review and Meta-Analysis, Nami Shida, Gokhan Yagiz, Takumi Yamada, Appl. Sci. 2021.11

Cardiovascular, Pulmonary and Metabolic Physical Therapy Furukawa Lab.

In Cardiovascular, Pulmonary and Metabolic Physical Therapy, we conduct research and instruction on physical fitness and physical activities for people with internal impediment, and physical therapy evaluations and therapeutic techniques, and prevention methods for internal disorders: circulatory, respiratory, and metabolic disorders, and lifestyle-related diseases.

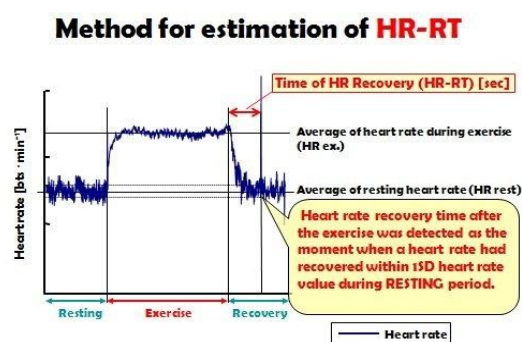
Our goal is to understand the physical activities of people with internal impediment, including motor system disorders, and prevention of internal disorders through intensive study of the literature and analysis of clinical data, and to examine exercise prescriptions and appropriate physical therapy approaches based on scientific evidence.

The main research theme in recent years in this field is as follows.

1. Study on the Evaluation of physical fitness and physical activity
2. Study on the relationship between attitude change and respiratory muscle strength
3. Study on the cardiorespiratory response during exercise testing
4. Study on the development of a fall prediction assessment tool in hemodialysis patients
5. Study on the perioperative rehabilitation effect after upper abdominal laparotomy
6. Study of the combined effects of respiratory physical therapy and music therapy
7. Study on the relationship between the waist and trunk fat percentage
8. Study on the effect of electrical stimulation of skeletal muscle on energy metabolic rate



CPX and analysis of heart rate recovery time



Neurocognitive Therapy Ikeda Lab.

Cognitive and motion science and physical therapy studies neural mechanisms of voluntary movements, plasticity of the nervous system, motor images, motor learning, etc. The purpose is to elucidate the pathophysiology of movement disorders, to examine the evaluation methods so far, and to develop specific strategies for physical therapy.

【What kind of thing do you learn】

Each graduate student will select a theme of interest from among the following themes, and will read a research paper on the theme, summarize its contents, give a presentation, and discuss the contents.

Teaching Policy Theme

Neural mechanisms of voluntary movements, Neural plasticity, Motor imagery, Motor learning and control, Visual–motor illusion Subjective experience, Multi-sensory integration, Recovery of motor function, Recovery of ability of action, Neurocognitive rehabilitation

【Research paper and conference presentation】

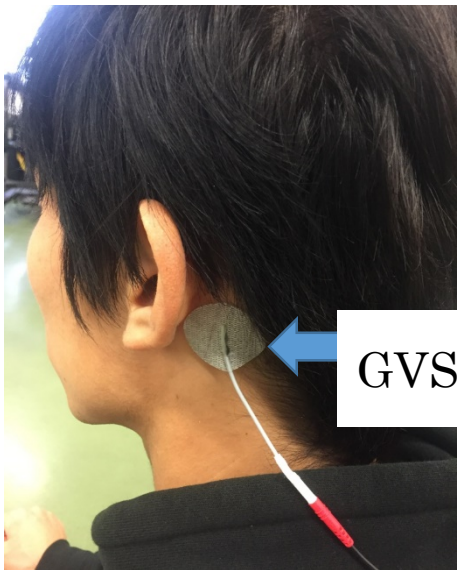
- K. Sakai, K. Goto, R. Watanabe, J. Tanabe, K. Amimoto, K. Kumai, K. Shibata, K. Morikawa, Y. Ikeda: Immediate effects of visual–motor illusion on resting-state functional connectivity. *Brain and Cognition* 146(105632), 2020.12.
- K. Sakai, Y. Ikeda, K. Amimoto, K. Goto, K. Morikawa, K. Kumai: Brain regions activated during visual motor illusion of the ankle joint movement. *J. Asi. Reha. Sci*, 3(2): 17-22, 2020.07.
- K. Sakai, T. Kawasaki, Y. Ikeda, K. Tominaga, K. Kurihara: Relationship between motor estimation error and physical function in patients with Parkinson’s disease. *Medicines* 7(43), 2020.07.
- Keiichiro Shibata, Yumi Ikeda : Effects of a mental rotation intervention on sensory discrimination functions and body perception. 11th WORLD CONGRESS FOR NEUROREHABILITATION. 2020.10.



Measurement of cerebral blood flow during kinesthetic illusion induced by visual stimulation task using fNIRS

Neuroscience and Physical Therapy Amimoto Lab.

Neuroscience and physical therapy, we will deal with the characterization of physical and cognitive dysfunctions due to brain damage, literature review of therapeutic approaches and empirical clinical research. In particular, research will be conducted on the application and development of evaluation and treatment methods taking into account the pathological condition of acute phase, chronic phase, in patients with hemiplegia and higher cortical dysfunctions. In recent years, we investigate the effects of vestibular stimulation, the influence of vibration stimulation on postural control, generation of a unilateral spatial neglect model using virtual reality, and research on the effect of delayed feedback for balance improvement.



Neuro-Physiotherapy Kaneko Lab.

The goal of our research is to attain a novel neuroscience founded rehabilitation treatment. To explore the scientific principles of the nervous system, we employ brain function imaging such as fMRI, electrophysiology such as non-invasive brain stimulation, EEG, evoked potentials, and motion analysis using surface EMG.

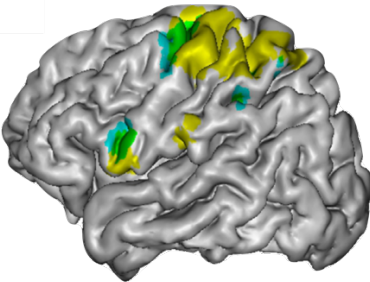
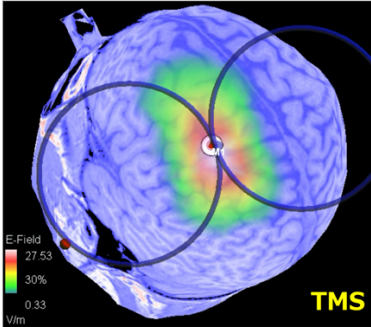
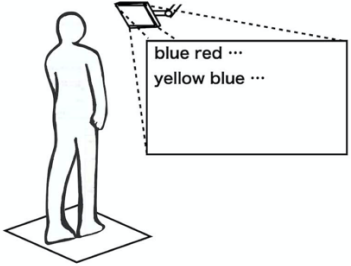
Clinically, in order to realize the brain functional reorganization and motor function repair in a survivor after stroke, we are developing the original product of xR system to represent visually induced kinesthetic illusion in the brain, and robotic devices. Those effects are examined in clinical trials.

Our laboratory collaborates with external hospitals and research organizations and carries out from experimental research to clinical trials.

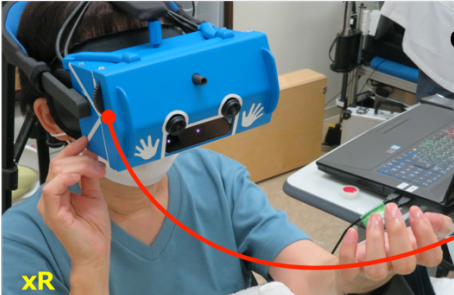


We hope you will complete creative original research, and we will transmit significant information to the world.



Neuroscience Focused Physiotherapy

Brain imaging & Physiology	Cognitive health
 <p>fMRI (Kaneko F, et al, PLOS ONE, 2015)</p>	 <p>TMS</p>
 <p>Word-tandem dual-task (Kimura T, et al, Frontiers Hum Neurosci, 2021)</p>	

Embodied-brain system science Robotic devices

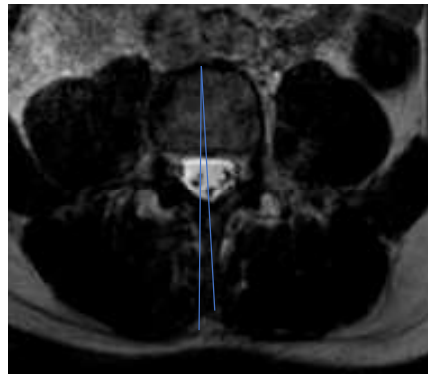
 <p>xR</p>	<p style="text-align: center;">Cognitive body augmentation</p>  <p style="text-align: right;">CG</p>
	

Physical therapy for the musculoskeletal system Kuruma Lab.

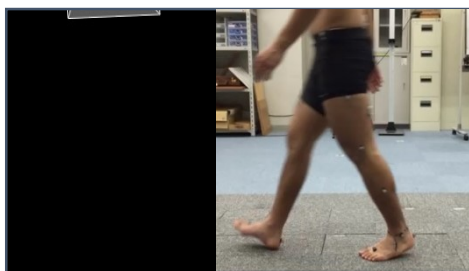
Our laboratory conducts fundamental and clinical research about the physical therapy for the musculoskeletal system. We study motion analysis and the intervention effect of the physical therapy for healthy subjects and movement disorders. The research methods are an electromyogram and dynamometer, three-dimensional movement analysis, MRI and the ultrasound etc.



Trunk harness



Analysis of lumbar rotation angle



Gait analysis

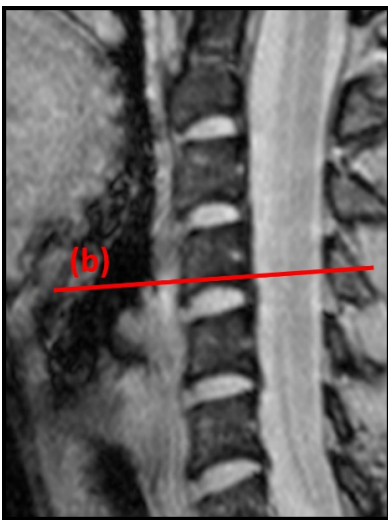


Muscle stiffness using shear wave elastography of ultrasound

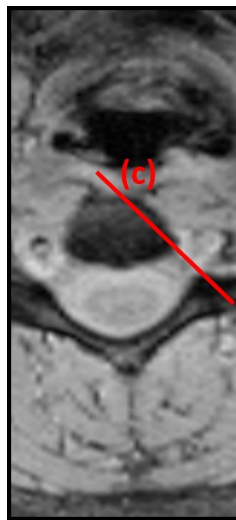
Orthopaedic physical therapy Usa Lab.

We focus on the dysfunction of nerves, muscles and joints, and conduct studies on the function of these tissues, mechanism of dysfunction, and the effectiveness of the therapeutic exercises and manual therapy for dysfunction in musculoskeletal system.

To accomplish those studies, we apply the image analyses using MR image (Magnetic Resonance image) and ultrasound image, the analyses using electromyography, and the muscle function analyses using dynamometers and tissue hardness meters.



(a)Midsagittal plane of cervical vertebrae

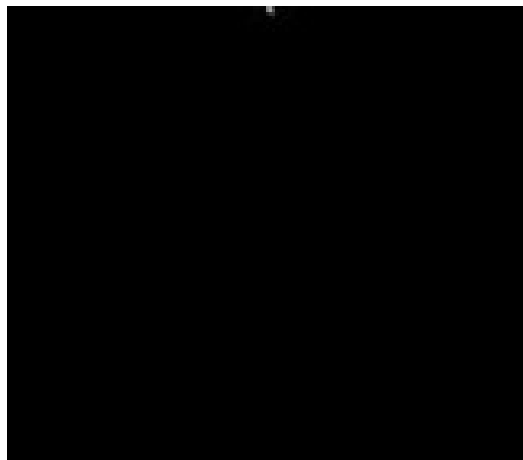


(b)Oblique horizontal plane parallel to the base of C4



(c)Oblique coronal plane perpendicular to C5 nerve root

MR image to measure the area of foramen in cervical vertebrae

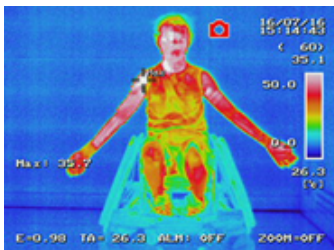


Ultrasound image to measure Sciatic Nerve Displacement

Adapted Sports Physical Therapy Shida Lab.

In this field, we research living support for persons with disability, focusing on improvement the ability of athletes with disability and prevention of dysfunction. We are conducting research on activities that consider the health of people with disabilities and the elderly, as well as wheelchairs and welfare equipment.

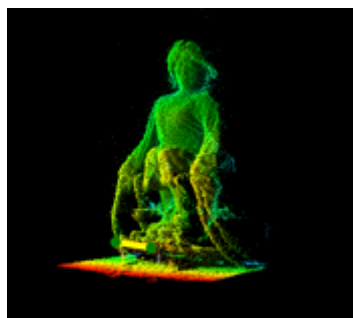
Regarding sports activities for persons with disability, there are many divergent perspectives concerning not only physical and psychological effects, but also the effects of sports equipment and development and dissemination systems. We conduct multifaceted examination of activities and sports activities for persons with disability to live better, not only with respect to the persons themselves, but also surrounding persons, the environment, etc. Research methods include observational research and practical intervention research using kinematic methods such as motion analysis, in addition to survey research.



Body temperature research by thermograph



Breath gas analysis using upper body ergometer



Analysis of wheelchair propulsion in sports using Mobile Motion Visualizer

Community-Based Physical Therapy Asakawa Lab

The research of Community-Based Physical Therapy focuses on community dwelling people and community living in the following four objectives, 1. policy making for community-based rehabilitation and community-based physical therapy, 2. Therapeutic exercise for independent daily living among older adults with disabilities, 3. Environmental arrangement/improvement for comfortable and safety care, 4. preventive and supportive physical therapy for social participation among older adults.

Manual Physical Therapy Course (Master)

The Manual Physical Therapy Course offers lectures including practical skill training based on the educational standards of the International Federation of Orthopedic and Physical Therapists (IFOMPT). This is a sub-group of the World Physiotherapy (WCPT).

This course enables the acquisition of comprehensive knowledge and the development of clinical reasoning skills, and its application for advanced clinical practice. In the second year, clinical practice is set as an opportunity to receive clinical experience. In the future, successful completion of this courses qualifies you for membership of IFOMPT as an Orthopaedic Manual Physical Therapist (OMPT).

The students are required to attend classes for an average of three days per week. This course provides opportunities for a discussion in order to cultivate the ability to attain knowledge and critical skills.

The University accepts international students from other Asian countries; therefore, you need to be able to express your opinions in English.

The ideal student profile for this course are students who keep challenging themselves, but not merely acquiring a skill. We also hope for students, who understand the limits of these skills and can think about how we can contribute toward promoting further growth of these skills.

