

2026年度 東京都立大学大学院 人間健康科学研究科
2026 Graduate School of Human Health Sciences, Tokyo Metropolitan University

博士前期課程 入学試験問題（夏季）

Master's Course Examination (Summer)

理学療法科学域 Department of Physical Therapy

筆記（専門） / Special subject

試験時間/ Examination time 9 : 00~10 : 30 (90分間 / 90minutes)

注意事項

1. 試験開始の合図があるまで、この問題冊子を開いてはいけません。

Wait to open this question booklet until you receive the signal to begin the examination.

2. 問題は大問題が3問、問題冊子は7ページです（表紙、白紙を除く）。

The question booklet contains 3 major questions and consists of 7 pages (excluding the cover page and a blank page).

3. 試験中に、問題冊子の印刷不鮮明、ページの落丁・乱丁及び解答用紙の汚れ等に気付いた場合には、手を挙げて監督員に知らせてください。

If you notice unclear printing, missing or misordered pages in the question booklet or stains on the answer sheet during the examination, please raise your hand to inform the invigilator.

4. 解答用紙の所定欄には、監督員の指示に従って、受験番号・氏名を記入してください。

Please write your name and examinee's number in the designated box on the answer sheet, following the invigilator's instructions.

5. 解答は解答用紙の解答欄に日本語または英語で記入してください。

Write your answers in Japanese or English in the answer sections of the answer sheet.

6. 問題冊子の余白及び挿入されている白紙は適宜使用して結構ですが、どのページも切り離してはいけません。

The margins of the question booklet and any inserted blank pages may be used as appropriate, but no pages should be cut out or separated.

7. 試験終了まで退室はできません。

You are not allowed to leave the room until the end of the examination.

8. 解答用紙は必ず提出してください。問題冊子は持ち帰ってください。

The answer sheet must be handed in. The question booklet must be taken home.

Question 1. Please choose the appropriate answer for each question.

Q1. Which statement is the most appropriate?

- a. A closed-chain motion always provides larger ranges of motion than an open-chain motion.
- b. A closed-chain motion occurs when the distal segment of the joint moves relative to a fixed proximal segment.
- c. A closed-chain motion occurs when the proximal segment of a joint moves relative to a fixed distal segment.
- d. A closed-chain motion is an unusual motion in humans.

Q2. Which of the following statements is true?

- a. The larger a muscle's cross-sectional area, the greater its force-producing potential.
- b. In pennate muscles, nearly all muscle fibers run parallel to one another.
- c. A muscle can produce the greatest force as it nears a maximally shortened position.
- d. All

Q3. Which of the following events follows the mid-stance period of a gait cycle?

- a. Foot flat
- b. Heel off
- c. Toe off
- d. Early swing

Q4. Which of the following is an intervention study?

- a. Observation of continuous treatment in a specific group
- b. Evaluation of the effectiveness of the treatment that is usually performed
- c. Prospective comparison of treatment divided into two groups
- d. Comparison of past treatment outcomes

Q5. Which of the following is **not** appropriate when conducting clinical research?

- a. Research subjects were recruited using posters.
- b. The research content was explained verbally to the subjects while they were shown written materials.
- c. Data processing was conducted anonymously.
- d. The obtained data was stored in a shared folder on a computer.

Q6. Which test can be used to evaluate balance?

- a. 6-minute walk test
- b. Functional reach test
- c. Physiological cost index
- d. Modified Ashworth scale

Q7. Which of the following variables is classified as a ratio scale?

- a. Manual muscle testing grade for the quadriceps
- b. Number of repetitions performed during a 30-second sit-to-stand test
- c. The Brunnstrom stage for stroke patients
- d. Body region of pain

Q8. Which of the following is considered personal information under the Personal Information Protection Law?

- a. Hobbies
- b. Age
- c. Blood type
- d. Telephone number

Q9. Which muscles are active during forced inspiration?

- a. Rectus abdominis muscle
- b. External oblique muscle
- c. Internal oblique muscle
- d. Sternocleidomastoid muscle

Q10. Which muscles act in hip extension, adduction, internal rotation, and knee flexion?

- a. Tensor fasciae latae
- b. Vastus intermedius
- c. Semitendinosus
- d. Sartorius

Q11. Which of the following statements about body measurements is correct?

- a. Weight is measured at around 6:00 p.m.
- b. Height is measured without spreading the toes.
- c. Chest circumference is measured at the end of exhalation, while the individual is at rest.
- d. Spina-Malleolar Distance (SMD) is measured from the anterior superior iliac spine to the lateral malleolus.

Q12. Which of the following statements correctly describes walking in elderly people compared with young people?

- a. Stride length increases
- b. Arm swing decreases
- c. Double-support phase becomes shorter
- d. Distance between the toes and the ground during the swing phase increases

Q13. When viewing a standing posture from the side, which of the following is not aligned with the line of gravity?

- a. Earlobe
- b. Greater trochanter
- c. Acromion
- d. Lateral malleolus

Q14. Which of the following muscles causes dorsiflexion of the ankle joint?

- a. Tibialis anterior
- b. Peroneus longus
- c. Tibialis posterior
- d. Flexor digitorum longus

Question 2. Read the following article and answer the following questions.

Importance: Chronic low back pain (LBP) is a prevalent and costly condition, and regular physical activity may reduce its risk. Walking is a common and accessible form of physical activity, but its association with the risk of chronic LBP is unclear.

Objective: To examine whether accelerometer-derived daily walking volume and walking intensity are associated with the risk of chronic LBP.

Design, setting, and participants: This prospective population-based cohort study used data from the Trøndelag Health (HUNT) Study in Norway, with a baseline in 2017 to 2019 and follow-up in 2021 to 2023. The study included individuals without chronic LBP at baseline and with at least 1 valid day of device-measured walking.

Exposure: Daily walking volume (minutes per day) and walking intensity, expressed as metabolic equivalent of task (MET) per minute.

Main Outcomes and Measures: The primary outcome was self-reported chronic LBP at follow-up, defined as pain lasting 3 months or longer in the past 12 months. Poisson regression was used to estimate adjusted risk ratios (RRs) with 95% CIs of chronic LBP according to daily walking volume and mean walking intensity.

Results: A total of 11 194 participants aged 20 years or older (mean [SD] age, 55.3 [15.1] years; 6564 women [58.6%]) were included in the analysis. At follow-up (mean [SD] follow-up time, 4.2 [0.3] years), 1659 participants (14.8%) reported chronic LBP. Continuous measures of both walking volume and walking intensity were inversely associated with the risk of chronic LBP using restricted cubic splines models. Compared with participants walking less than 78 minutes per day, those walking 78 to 100 minutes per day had an RR for chronic LBP of 0.87 (95% CI, 0.77-0.98), those walking 101 to 124 minutes per day had an RR of 0.77 (95% CI, 0.68-0.87), and those walking 125 minutes or more per day had an RR of 0.76 (95% CI, 0.67-0.87). Compared with a mean walking intensity of less than 3.00 MET per minute, participants with walking intensity of 3.00 to 3.11 MET per minute had an RR for chronic LBP of 0.85 (95% CI, 0.75-0.96), those with walking intensity of 3.12 to 3.26 MET per minute had an RR of 0.82 (95% CI, 0.72-0.93), and those with walking intensity greater than or equal to 3.27 MET

per minute had an RR of 0.82 (95% CI, 0.72-0.93). After mutual adjustment, the association remained largely similar for walking volume but was attenuated for walking intensity.

Conclusions and Relevance: In this cohort study, daily walking volume and walking intensity were inversely associated with the risk of chronic LBP. The findings suggest that walking volume may have a more pronounced benefit than walking intensity.

Source:

Haddadj R, Nordstoga AL, Nilsen TIL, et al. Volume and Intensity of Walking and Risk of Chronic Low Back Pain. *JAMA Netw Open*. 2025;8(6):e2515592.

Q1. Explain what a cohort study is.

Q2. Explain the definition of 95% CIs.

Q3. Explain the subjects of this experiment.

Q4. How did daily walking volume and walking intensity affect the risk of developing chronic low back pain, and which was more strongly associated with a reduced risk?

Question 3. Read the following abstract and answer the following questions.

Importance: Cerebral palsy (CP) is the most common developmental motor disorder in children. Robot-assisted gait training (RAGT) using a wearable robot can provide intensive overground walking experience.

Objective: To investigate the effectiveness of overground RAGT in children with CP using an untethered, torque-assisted, wearable exoskeletal robot.

Design, setting, and participants: This multicenter, single-blind randomized clinical trial was conducted from September 1, 2021, to March 31, 2023, at 5 rehabilitation institutions in Korea. Ninety children with CP in Gross Motor Function Classification System levels II to IV were randomized.

Intervention: The RAGT group underwent 18 sessions of RAGT during 6 weeks, whereas the control group received standard physical therapy for the same number of sessions during the same period.

Main outcome and measures: The primary outcome measure was the Gross Motor Function Measure 88 (GMFM-88) score. Secondary outcome measures were the GMFM-66, Pediatric Balance Scale, selective control assessment of the lower extremity, Pediatric Evaluation of Disability Inventory-Computer Adaptive Test (PEDI-CAT), 6-minute walking test scores (distance and oxygen consumption), muscle and fat mass via bioelectrical impedance analysis, and gait parameters measured via 3-dimensional analysis. All assessments were performed for all patients at baseline, at the end of the 6-week intervention, and after the 4-week follow-up.

Results: Of the 90 children (mean [SD] age, 9.51 [2.48] years; 49 [54.4%] male and 41 [45.6%] female) in the study, 78 (86.7%) completed the intervention, with 37 participants (mean [SD] age, 9.57 [2.38] years; 19 [51.4%] male) and 41 participants (mean [SD] age, 9.32 [2.37] years; 26 [63.4%] male) randomly assigned to the RAGT and control groups, respectively. Changes in the RAGT group significantly exceeded changes in the control group in GMFM-88 total (mean difference, 2.64; 95% CI, 0.50-4.78), GMFM-E (mean difference, 2.70; 95% CI, 0.08-5.33), GMFM-66 (mean difference, 1.31; 95% CI, 0.01-2.60), and PEDI-CAT responsibility domain scores (mean difference, 2.52; 95% CI, 0.42-4.63), indicating independence in daily living at postintervention assessment. At the 4-week follow-up, the RAGT group showed significantly

greater improvements in balance control (mean difference, 1.48; 95% CI, 0.03-2.94) and Gait Deviation Index (mean difference, 6.48; 95% CI, 2.77-10.19) compared with the control group.

Conclusions and relevance: In this randomized clinical trial, overground RAGT using a wearable robot significantly improved gross motor function and gait pattern. This new torque-assisted wearable exoskeletal robot, based on assist-as-needed control, may complement standard rehabilitation by providing adequate assistance and therapeutic support to children with CP.

Source:

Ja Young Choi , Seung Ki Kim , Juntaek Hong ,et al. Overground Gait Training With a Wearable Robot in Children With Cerebral Palsy: A Randomized Clinical Trial. *JAMA Netw Open*. 2024 7(7):e2422625.

Q1. Explain what a single-blind randomized clinical trial is.

Q2. Which evaluation items were significantly improved in the RAGT group?

- a. GMFM-88, GMFM-66, PEDI-CAT (Responsibility) , GDI
- b. SCALE, PEDI-CAT (Mobility) , 6MWT
- c. GMFM-88, SCALE, GDI, Pediatric Balance Scale
- d. GMFM-66, PEDI-CAT (Daily Activities) , Muscle mass

Q3. Which of the following is the most appropriate feature of the robotic gait training used in this study?

- a. Fully automatic walking control on a treadmill
- b. Sitting posture assistance with upper limb support
- c. Torque-assisted type that provides assistance according to the patient's efforts
- d. Fully passive movement guidance by remote control

Q4. Explain two clinically significant findings from this study.

Q5. What ethical considerations are important when conducting research with children? Please list and explain eight key points.