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TRAINING OF PHD STUDENTS AT MEDICAL UNIVERSITIES IN JAPAN

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This article provides a comprehensive overview of the training of PhD students at medical universities in Japan, examining the multifaceted components that underpin its success and identifying emerging challenges. Japan's doctoral education system in medicine is characterized by a rigorous curriculum that integrates advanced coursework with clinical exposure and independent research. Emphasis is placed on multidisciplinary training, including subjects such as biostatistics, medical ethics, and scientific communication, which collectively prepare candidates for careers in translational medicine. Supervision models are notably robust, employing a dual mentorship approach that combines academic and professional guidance. This structure is further supported by the use of Individual Development Plans (IDPs), which enable personalized academic progression and timely degree completion.

Financial and infrastructural support is another pillar of the system, with generous fellowships from the Japan Society for the Promotion of Science (JSPS) and access to world-class research facilities. Internationalisation is actively pursued through joint degrees, overseas research placements, and English-taught programmes that promote global engagement. Despite these strengths, key challenges persist, including the tension between clinical and academic responsibilities, competitive publication expectations, and the need for greater diversity and mental health support among doctoral candidates.

The article also contrasts Japan's system with the less structured and less resourced PhD training landscape in Ukraine, offering comparative insights that may inform international education reform. The study concludes with recommendations for future research, including longitudinal studies on career outcomes and the integration of emerging technologies into doctoral training. Overall, Japan's model exemplifies a forward-looking and globally competitive approach to medical doctoral education.

Keywords: *PhD training, medical education, Japan, doctoral supervision, internationalisation, research infrastructure, curriculum design.*

Єлагіна Н. І., Федчишин Н. О. Підготовка здобувачів ступеня доктора філософії в медичних університетах Японії

У статті проаналізовано систему підготовки здобувачів наукового ступеня PhD у медичних університетах Японії з акцентом на її структурні елементи, ефективність функціонування й актуальні виклики. Розглянуто особливості PhD освіти в Японії, що ґрунтується на комплексній освітньо-науковій підготовці та поєднує міждисциплінарне теоретичне навчання, клінічну практику й дослідницьку діяльність. Визначено, що ключовими складниками навчальних програм є дисципліни з біостатистики, медичної етики й наукової комунікації, які сприяють формуванню інтегральної компетентності у сфері трансляційної медицини. Досліджено роль інституту наставництва, що реалізується через модель подвійного наукового керівництва. Проаналізовано впровадження індивідуального плану професійного розвитку як інструмента персоналізованого оцінювання академічного прогресу й забезпечення своєчасного завершення програми. Окрему увагу приділено фінансовій та інфраструктурній підтримці здобувачів, зокрема через стипендіальні програми Японського товариства сприяння науці, доступ до сучасного дослідницького обладнання та клінічних баз. Розглянуто процеси міжнародної інтеграції PhD-програм шляхом реалізації програм подвійного диплома, міжнародних стажувань і викладання навчальних дисциплін англійською мовою. Здійснено

порівняльний аналіз японської та вітчизняної моделей підготовки здобувачів PhD у сфері медицини. Сформульовано пропозиції щодо перспективних напрямів досліджень, орієнтованих на оцінювання довгострокових результатів, посилення інтернаціоналізації й упровадження цифрових технологій у докторську освіту.

Ключові слова: *підготовка здобувачів ступеня доктора філософії (PhD), медична освіта, Японія, наукове керівництво, інтернаціоналізація, дослідницька інфраструктура, розроблення навчальної програми.*

The problem formulation. Japan's advanced medical research landscape is underpinned by a well-organised doctoral training system that fosters innovation, clinical integration, and international competitiveness [6]. For instance, the University of Tokyo's Graduate School of Medicine offers a highly regarded PhD programme that combines rigorous laboratory research with clinical practice, producing graduates who contribute to cutting-edge fields such as regenerative medicine and precision oncology. With a population facing increasing health challenges related to ageing, Japan has adapted its doctoral education to address translational research that bridges bench science and patient care. The country's strategic focus on global collaboration is reflected in programmes like the "Top Global University Project," which funds exchanges between Japanese PhD candidates and institutions in the US, Europe, and Asia. This article examines the comprehensive structure of PhD training in medical universities across Japan, detailing curriculum components, supervision, funding, and internationalisation [13], providing a clear understanding of the system's strengths and ongoing challenges.

To meet the evolving demands of medical science, Japanese doctoral programmes are designed with a multidisciplinary curriculum that integrates courses in medical ethics, biostatistics, and scientific communication alongside laboratory research. This ensures that candidates develop a holistic understanding of their field, equipped not only with technical expertise but also with the skills necessary for effective dissemination and ethical consideration of their work. Research seminars, workshops, and collaborative projects further complement this approach by fostering critical thinking and peer engagement, which are essential for innovation in medicine. Importantly, these programmes emphasize the early and active involvement of doctoral candidates in grant writing, conference presentations, and academic publishing, preparing them for the rigours of an academic or clinical research career.

Supervision in Japanese medical PhD programmes is another pillar of the system's success, featuring close mentorship within active research groups led by senior faculty members. The use of Individual Development Plans (IDPs) allows for tailored monitoring of student progress and the setting of clear milestones, which supports timely completion of degrees. This structured supervision model encourages doctoral candidates to actively engage in both independent research and collaborative projects, often embedded within clinical settings. Such integration ensures that students gain practical experience that aligns with their research, bridging theoretical knowledge and real-world application. The mentorship also includes training in research ethics and responsible conduct, which are crucial in maintaining academic integrity.

Financial and infrastructural support further distinguishes Japan's doctoral training in medicine. Many students receive competitive stipends funded by government agencies such as the Japan Society for the Promotion of Science (JSPS), allowing them to dedicate themselves fully to their research. Universities provide access to state-of-the-art laboratories, clinical research centres, and digital resources, fostering interdisciplinary collaboration and innovation. Moreover, the internationalisation of doctoral programmes is actively promoted through partnerships with leading global institutions and opportunities for co-supervision and joint degrees. These initiatives not only enhance research quality but also prepare candidates to participate in and contribute to international scientific discourse. Together, these components position Japan as a leader in medical doctoral education, while ongoing challenges include balancing clinical and research training and further expanding global engagement.

Analysis of recent research and publications. Recent literature offers valuable insights into Japan's doctoral education. Yonezawa et al. (2016) describe how Tokyo Medical and Dental University (TMDU) prioritises early integration of students into funded research projects, which increases publication output and practical skills [14]. Yamamoto et al. (2021) report that Keio University's structured mentorship system, which pairs each doctoral student with both a primary clinical supervisor and a secondary research mentor, has raised PhD completion rates by 15% over five years [13, p. 48]. Meanwhile, MEXT's (2022) official reports show that government grants such as the JSPS Fellowships support approximately 40% of medical doctoral students nationwide, facilitating international study and collaboration [6]. However, scholars note challenges remain in balancing clinical duties with research demands, particularly in university hospitals where faculty juggle patient care and supervision roles.

A growing body of research in Ukraine has focused on comparative approaches to doctoral education. Scholars highlight the necessity of integrating pedagogical and comparative education components into the training of PhD candidates, which ensures not only academic preparedness but also international compatibility of qualifications [3]. Furthermore, debates concerning the classification of doctoral qualifications – such as the differences between the PhD, professional doctorate, and higher doctorate – illustrate the complexity of aligning Ukraine's doctoral programmes with global frameworks [2]. These discussions are directly relevant when juxtaposing Ukraine's evolving doctoral system with Japan's more established structure, which maintains a balance between disciplinary depth and broader academic competence.

Research aim and the tasks. This article aims to analyse the structure and effectiveness of PhD training at Japanese medical universities, examining its distinct features and practical outcomes. The objectives of the article are as follows: 1. to detail the curriculum and pedagogical approaches employed; 2. to explore supervision models emphasising the quality of mentorship; 3. to assess funding mechanisms and the availability of research infrastructure; 4. to review internationalisation strategies alongside career preparation; 5. to identify systemic challenges and prospects for further development.

Research methods. The research methodology involved systematic review of policy documents from MEXT, university doctoral programme brochures (e.g., University of Osaka, Nagoya University), and peer-reviewed articles published between 2015 and 2025. Additional qualitative insights were drawn from interviews with faculty supervisors at Tohoku University and Hiroshima University. Comparative analysis with international doctoral standards, including those from the European University Association (EUA), was applied to contextualise findings. Data on student demographics, research outputs, and funding sources were analysed from annual reports and national databases.

Results of the research. To provide a comprehensive understanding of the training of PhD students at medical universities in Japan, it is essential to examine multiple interconnected aspects of doctoral education. The structure and curriculum define the academic and research foundation upon which candidates build their expertise. Supervision and mentorship are critical for guiding students through complex scientific inquiries and supporting their professional development. Funding and infrastructure form the backbone that enables sustained research activity and access to cutting-edge technologies. Internationalisation and career development highlight the system's orientation towards global collaboration and the preparation of graduates for diverse professional paths. Finally, discussing challenges and opportunities offers a balanced perspective on current limitations and avenues for future enhancement, which is vital for continuous improvement. Together, these thematic areas create a holistic framework that captures the strengths and dynamics of PhD training in Japan's medical universities.

1. Structure and Curriculum

PhD programmes in Japanese medical universities typically span three to four years and generally require candidates to hold either a Doctor of Medicine (MD) or a Master of Science (MSc) degree prior to admission. For example, at the University of Kyoto, the first year of the programme is dedicated to intensive

coursework designed to provide a robust foundation for research. Compulsory subjects include advanced biostatistics, which equips students with quantitative tools essential for analysing complex medical data, as well as medical ethics, ensuring that candidates understand the moral implications of clinical research. Additionally, scientific communication courses train students to effectively present and publish their findings in internationally respected journals [4, p. 137]. After this preparatory phase, students embark on focused, in-depth research projects on cutting-edge topics such as neurodegenerative diseases, cancer immunotherapy, or stem cell biology.

The curriculum is further enriched by regular research seminars and colloquia, where doctoral candidates present their ongoing work to interdisciplinary panels comprising faculty and fellow students. This setup fosters a culture of critical dialogue, allowing candidates to refine their hypotheses, receive diverse feedback, and develop resilience in defending their ideas. Such forums encourage collaboration across specialisations and stimulate innovative approaches to medical challenges.

A hallmark of the Japanese system is the use of an Individual Development Plan (IDP), which students and supervisors review at least annually. This dynamic tool helps set realistic milestones, such as conference presentations or manuscript submissions to leading journals. Moreover, clinical exposure is carefully integrated into the curriculum through partnerships with university hospitals. For instance, the University of Tsukuba's programme includes clinical rotations in haematology wards, ensuring that students maintain a clear understanding of patient contexts and clinical needs that inform their laboratory research. This blend of rigorous coursework, regular academic discourse, and hands-on clinical experience defines a comprehensive training pathway that prepares PhD candidates for translational medicine careers.

2. Supervision and Mentorship

Supervision in Japanese medical doctoral programmes is delivered through a structured dual mentorship model that enhances both scientific and professional development. At Keio University, for example, each student is paired with a primary supervisor who is an expert in their specific research area, such as cardiovascular physiology or molecular oncology. Complementing this, a secondary mentor provides broader career guidance, methodological advice, and helps the student navigate academic challenges and opportunities beyond the laboratory. This dual approach promotes interdisciplinary thinking and supports students' holistic growth [13, p. 51].

Mentors themselves undergo formal training workshops aimed at improving supervision quality and student wellbeing – a pioneering initiative at Tokyo Medical University [11]. These workshops address best practices in mentorship, mental health awareness, and fostering academic integrity, thus ensuring a nurturing research environment. Supervisory committees convene biannually to evaluate student progress, discuss challenges, and recalibrate goals, a practice that significantly reduces dropout rates and promotes timely degree completion.

Moreover, co-authorship between students and supervisors is highly encouraged and considered an integral part of the training process. At Osaka University, students regularly publish joint papers with their mentors, which not only enhances their research productivity but also teaches essential skills in collaboration, manuscript preparation, and peer review. Such practices ensure that doctoral candidates graduate as competent researchers ready to contribute to the global medical community.

3. Funding and Infrastructure

PhD students in Japan typically benefit from comprehensive financial support mechanisms designed to enable full dedication to research activities [5]. The Japan Society for the Promotion of Science (JSPS) offers prestigious fellowships that provide monthly stipends ranging approximately from 200,000 to 300,000 Japanese yen, sufficient to cover living costs and tuition fees. These stipends are often supplemented by university scholarships and internal funding schemes. For example, Tohoku University allocates competitive internal grants specifically for doctoral students to support conference travel, laboratory consumables, and other research-related expenses.

In terms of research infrastructure, students have access to cutting-edge facilities equipped with advanced technologies such as cryo-

electron microscopes, next-generation sequencing platforms, and mass spectrometry equipment. Institutions like RIKEN – a leading national research institute collaborating extensively with medical universities – offer unparalleled resources that foster interdisciplinary and translational research [9]. In addition to physical infrastructure, workshops on grant writing, ethics compliance, and project management are routinely provided to prepare students for securing external funding. This training includes guidance on applying for international grants, for example, from the U.S. National Institutes of Health (NIH) or the European Horizon programmes, promoting research independence and competitiveness on a global scale.

4. Internationalisation and Career Development

Japanese medical universities place strong emphasis on internationalisation as a core component of doctoral training. The University of Tokyo offers joint PhD programmes in collaboration with prestigious institutions such as Harvard Medical School, enabling students to spend up to one year abroad conducting collaborative research projects [12]. Such mobility opportunities enhance exposure to diverse scientific cultures and broaden academic networks. Additionally, many courses and seminars are offered in English to accommodate international students and promote cross-cultural academic exchange, contributing to vibrant and diverse research communities.

Doctoral candidates are actively encouraged to present their work at leading international conferences such as the American Association for Cancer Research (AACR) annual meeting or the European Society of Cardiology Congress [8]. Career development centres at universities like Nagoya University offer specialised workshops in scientific communication, entrepreneurship, and intellectual property management, equipping graduates with transferable skills essential for academia, industry, or clinical research roles. Partnerships with pharmaceutical companies and biotech firms provide practical networking opportunities, facilitating smooth transitions from doctoral studies to professional employment.

5. Challenges and Opportunities

Despite its strengths, Japan's PhD training system in medical universities faces several ongoing challenges. Balancing clinical responsibilities with research commitments can be difficult for supervisors who often have demanding hospital duties, occasionally limiting their availability for mentorship. While funding is generally generous, the competitive nature of fellowships and scholarships places pressure on students to publish extensively, which can negatively affect mental health and work-life balance. There is also a recognised need to enhance diversity among doctoral candidates, with efforts underway to increase enrolment of women and international students [7].

Japan's doctoral education system is characterised by strong institutional support, internationalisation initiatives, and well-defined progression paths for PhD candidates. In contrast, Ukraine continues to refine its third-cycle programmes, introducing reforms in supervision, curriculum design, and quality assurance. Ukrainian scholars increasingly recognise the relevance of comparative perspectives, particularly with regard to Asian models that share historical and structural similarities [1, p. 145]. Moreover, the integration of advanced pedagogical components into PhD training, such as comparative education studies, reflects Ukraine's efforts to strengthen the academic dimension of doctoral preparation [3]. However, the challenge of aligning national doctoral qualifications with international typologies remains significant, underscoring the need for further harmonisation with practices observed in Japan and beyond [2].

Recent digital innovations, accelerated by the COVID-19 pandemic, such as virtual laboratories and remote collaboration platforms, offer new opportunities to increase flexibility and accessibility of doctoral training. The expansion of interdisciplinary research centres and the promotion of more joint-degree programmes are also priorities identified to foster innovation and international competitiveness.

In comparison, Ukraine's PhD training system in medical universities presents a contrasting profile. Ukrainian doctoral programmes tend to last four years with a heavier emphasis on coursework in philosophy, history of science, and foreign languages, while research training is often more isolated and less clinically integrated. Financial support is generally

insufficient, with many students self-funding or facing delays in stipend payments. International exposure is limited due to visa challenges and language barriers. Unlike Japan's structured career development services, Ukrainian PhD holders frequently encounter difficulties in securing research positions or transitioning to industry, with no comprehensive alumni tracking system in place. While reforms inspired by the Bologna Process seek to modernise Ukrainian doctoral education, significant gaps remain in infrastructure, funding, mentorship, and international engagement compared to Japan.

Conclusions and prospects of further research. The analysis of PhD training at medical universities in Japan reveals a robust and strategically structured system that effectively prepares candidates for high-level careers in biomedical research and clinical science. Through a well-designed curriculum integrating advanced coursework, clinical immersion, and research seminars, Japanese institutions foster both academic rigour and translational relevance. Structured supervision via dual mentorship models ensures consistent academic support and professional development, contributing to high completion rates and research productivity. Furthermore, significant government and institutional funding mechanisms – complemented by cutting-edge infrastructure – enable doctoral candidates to pursue innovative research in well-resourced environments. These structural strengths are amplified by Japan's growing emphasis on internationalisation and career preparation, including global mobility schemes and targeted professional training.

Despite its clear advantages, the Japanese model is not without limitations. The dual demands on clinical academics, who must balance patient care with research supervision, pose a challenge to the scalability and sustainability of mentorship practices. Additionally, while Japan provides generous financial support for doctoral candidates, the competitive landscape often generates pressure to publish prolifically, potentially contributing to stress and burnout. Measures to support mental health and well-being must become a more integral component of PhD training programmes. Another area requiring continued attention is the diversification of the doctoral student body, including the recruitment and retention of women, international candidates, and those from underrepresented backgrounds. The recent acceleration in digital pedagogy offers promising tools to address accessibility and flexibility, yet the long-term integration of these innovations requires careful institutional planning and investment.

Comparatively, Ukraine's PhD training in medical education – though undergoing reform – remains hampered by structural limitations in funding, infrastructure, and international mobility. Japan's model, particularly in its emphasis on mentorship quality, research integration with clinical practice, and global engagement, may serve as a reference point for future improvements in Ukrainian doctoral education. However, such adaptation must be sensitive to local contexts, institutional capacities, and national research priorities. As both nations face complex public health challenges and shifting global demands, doctoral education must remain a dynamic and responsive component of the medical education ecosystem.

Future research could expand upon several key areas. First, longitudinal studies tracking the career trajectories of PhD graduates in Japan would provide deeper insight into the long-term effectiveness of current training models. Second, comparative international analyses – especially between Japan and similarly developed biomedical research nations – could highlight best practices in doctoral supervision, research ethics training, and innovation pathways. Third, investigations into the mental health and well-being of doctoral candidates, particularly in high-pressure academic environments, would inform the design of more sustainable and supportive systems [10]. Finally, as artificial intelligence and digital medicine become increasingly central to medical research, further exploration is warranted into how Japanese PhD curricula are adapting to incorporate these emerging disciplines. These lines of inquiry will be crucial for ensuring that PhD programmes in Japan and beyond continue to produce competent, resilient, and globally minded medical researchers.

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