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ARTIFICIAL INTELLIGENCE IN CLINICAL AND MORPHOLOGICAL RESEARCH: SCIENTIFIC OPPORTUNITIES, ACADEMIC INTEGRITY, AND RESPONSIBLE IMPLEMENTATION

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Abstract

Relevance. Artificial intelligence (AI) has become one of the principal drivers of digital transformation in contemporary biomedical science, significantly expanding the analytical capabilities of clinical and morphological research. AI-powered technologies support automated biomedical image analysis, digital pathology, morphometric assessment, and processing of large-scale biomedical datasets, thereby improving research efficiency, standardization, and reproducibility. At the same time, the widespread adoption of generative AI has introduced new ethical, legal, and academic challenges, including AI hallucinations, fabricated references, undisclosed AI-assisted manuscript preparation, and risks to academic integrity. These developments highlight the need for comprehensive institutional governance, transparent disclosure of AI-assisted contributions, and effective quality assurance mechanisms ensuring responsible implementation of AI in biomedical research.

Purpose: The aim of this study was to critically evaluate the role of artificial intelligence in contemporary clinical and morphological research, summarize its current and emerging applications, and examine how adherence to the principles of academic integrity ensures the reliability, transparency, reproducibility, and scientific validity of AI-assisted research.

Methods: This investigation was undertaken at the State Non-Profit Society "Danylo Halytsky Lviv National Medical University." It was grounded in an extensive review and critical appraisal of current scholarly literature, global directives concerning the ethical application of artificial intelligence, the Ukrainian legal framework pertinent to academic probity, and institutional policies implemented by tertiary educational establishments. The methodological approach

integrated a bibliographic review, systematic analysis, comparative legal analysis, synthesis of information, and critical appraisal, further augmented by an assessment of institutional best practices in academic integrity management, the detection of textual appropriation, AI governance, proactive educational interventions, semantic similarity detection, and overall research rigor validation.

Results: Artificial intelligence significantly augments the investigative capacities of clinical and morphological research by facilitating autonomous tissue delineation, cellular identification, quantitative morphometric assessment, digital histopathological examination, advanced biomedical image analysis, and sophisticated decision-support platforms. Prudent implementation consequently enhances analytical precision, replicability, methodological standardization, and overall research efficacy, concomitantly fostering interdisciplinary synergy with molecular biology, genomics, bioinformatics, and clinical practice. The investigation elucidates that upholding academic probity mandates robust institutional governance encompassing legal frameworks, proactive educational strategies, semantic similarity detection, AI-generated content discernment, source verification, expert peer evaluation, and sustained quality assurance mechanisms. Institutional experience at the State Non-Profit Society “Danylo Halytsky Lviv National Medical University” showed that plagiarism screening performed during 2021–2025 included 7302 academic manuscripts, with an overall rejection rate of only 9.29%, indicating the predominantly educational and preventive role of institutional quality assurance. Particular attention is devoted to preventing AI hallucinations, fabricated references, inaccurate citations, and other manifestations of academic misconduct through transparent reporting, expert validation, and continuous human oversight.

Conclusions: Artificial intelligence ought to be regarded solely as a supportive methodological instrument, rather than an autonomous originator of scientific findings or conceptual innovation. The successful integration of AI into clinical and morphological investigations is contingent upon strict adherence to principles of scholarly probity, transparent disclosure of machine-assisted contributions, rigorous expert authentication, assessment of semantic fidelity, robust protection of confidential data, and effective institutional governance. A synergistic alignment of computational advancements with empirically grounded scientific methodologies and continuous human oversight represents the most sustainable strategic framework for ensuring reliable, verifiable, ethically responsible, and internationally competitive biomedical research.

Keywords: *artificial intelligence, academic integrity, clinical research, morphological research, digital pathology, plagiarism detection, research ethics, responsible AI, scientific publishing, biomedical research.*

Introduction. The rapid advancement of artificial intelligence (AI) has become a major driver of digital transformation in biomedical science, fundamentally reshaping clinical and morphological research (Brydges, 2025; Smuha, 2025; Viswanathan et al., 2022; Zarella et al., 2023). These AI-driven methodologies have substantially augmented investigative capacities, enabling automated examination of histological and cytological specimens, highly accurate quantitative morphological assessment, three-dimensional tissue reconstruction, digital histopathology, extensive biomedical data processing, and the discernment of intricate biological patterns often unobservable through conventional analytical techniques. Consequently, AI fortifies analytical precision, consistency, standardization, and research productivity, simultaneously expediting the generation of novel biomedical knowledge (Brydges, 2025). The pervasive integration of machine learning, deep learning, and computer vision paradigms has further accelerated the advancement of computational pathology and morphology, offering crucial support

for automated tissue segmentation, cellular recognition, quantitative immunohistochemical evaluation, spatial tissue analysis, and diagnostic decision support systems (Viswanathan et al., 2022; Wang et al., 2025; Yuan et al., 2024). These sophisticated technologies serve to diminish observer-dependent variability, enhance the objectivity of quantitative assessments, and foster robust interdisciplinary collaboration among diverse fields such as pathology, clinical medicine, molecular biology, genomics, and bioinformatics. This collective effort thereby facilitates the transition toward precision medicine and data-driven biomedical research (Brydges, 2025; Smuha, 2025; Zarella et al., 2023).

Nevertheless, amidst these substantial advancements, the burgeoning application of AI concurrently presents notable ethical, jurisprudential, and scholarly challenges (Hagendorff, 2020; Smuha, 2025; Zdravkova, 2026). To address these challenges, contemporary plagiarism detection systems and academic integrity platforms – including Plagiarism Detector Pro, Plag.in.ua, StrikePlagiarism,

UNICHECK/Turnitin, Viper, and specialized AI-content detection technologies – have become important components of institutional quality assurance (Abbadia, 2024; Shah, 2025). Their combined application facilitates the detection of textual similarities, paraphrased plagiarism, AI-generated content, citation irregularities, bibliographic inconsistencies, and other manifestations of academic misconduct (Abbadia, 2024; Shah, 2025; Weber-Wulff et al., 2023). However, automated assessment should complement rather than replace expert evaluation, as reliable assessment of scientific quality requires critical appraisal by qualified specialists capable of evaluating methodological rigor, scientific validity, originality, and ethical compliance (ICAI, 2021).

Accordingly, the responsible integration of AI into clinical and morphological research should be guided by the principles of academic integrity, transparency, human oversight, scientific accountability, and rigorous validation of AI-assisted outputs (Anwar et al., 2024; Hagendorff, 2020). Harmonizing technological innovation with ethical governance and evidence-based scientific methodology provides a solid foundation for generating reliable biomedical knowledge, improving research quality, advancing digital pathology, and strengthening the international competitiveness of biomedical science (Brydges, 2025; Smuha, 2025; Zarella et al., 2023). Against this background, the present review aims to summarize current evidence on the application of artificial intelligence in clinical and morphological research, critically evaluate its scientific opportunities and limitations, examine emerging challenges related to academic integrity and responsible AI use, and identify practical approaches for the ethical, transparent, and scientifically sound implementation of AI technologies in biomedical research and scholarly publishing.

Purpose of the Study: The aim of this study was to critically evaluate the role of artificial intelligence in contemporary clinical and morphological research, summarize its current and emerging applications, and examine how adherence to the principles of academic integrity ensures the reliability, transparency, reproducibility, and scientific validity of AI-assisted research.

Methods: A complex review and critical analysis of contemporary scientific literature,

international recommendations on the ethical use of artificial intelligence, the current Ukrainian regulatory framework governing academic integrity, and institutional policies of higher education institutions were conducted. Particular attention was devoted to legislative provisions regulating the responsible use of generative AI in academic activities, institutional approaches to research integrity, AI governance, plagiarism detection, and quality assurance in scientific publishing (Hagendorff, 2020, Smuha, 2025). The methodological framework combined bibliographic review, systematic analysis, comparative legal analysis, synthesis, and critical appraisal to evaluate current approaches to integrating AI at the State Non-Profit Society “Danylo Halytsky Lviv National Medical University” into clinical and morphological research, digital pathology, and responsible scientific practice (Brydges, 2025, Ji et al., 2023). Institutional experience in academic integrity management, preventive educational strategies, semantic plagiarism detection, expert assessment, and continuous quality monitoring was also analyzed (Abbadia, 2024, Shah, 2025). These complementary methodological approaches enabled a balanced assessment of both the scientific opportunities provided by AI and the ethical safeguards required for its responsible implementation in biomedical research (Ethics of artificial intelligence and robotics, 2026, ICAI, 2021).

Results & Discussion. Adherence to the principles of academic integrity is a fundamental prerequisite for the safe, ethical, and responsible integration of artificial intelligence (AI) into clinical and morphological research (Dwivedi et al., 2023, Hagendorff, 2020). Advances in digital technologies have transformed biomedical investigations by enabling automation of routine analytical procedures, processing of large-scale datasets, improvement of morphometric accuracy, and greater objectivity in the evaluation of morphological specimens (Brydges, 2025). Nevertheless, AI should be implemented in accordance with the principles of transparency, accountability, human oversight, and the researcher's responsibility for the reliability and validity of scientific findings (Dwivedi et al., 2023, Ethics of artificial intelligence and robotics, 2026, ICAI, 2021, Smuha, 2025).

Machine learning has substantially expanded the capabilities of contemporary clinical and

morphological research. AI applications include automated segmentation of histological and cytological specimens, cellular recognition, classification of pathological alterations, quantitative immunohistochemical assessment, high-precision morphometry, three-dimensional tissue reconstruction, spatial tissue analysis (ICAI, 2021), and processing of large biomedical datasets. These technologies improve reproducibility, reduce observer-dependent variability, and enhance the standardization of morphological assessment. Their integration into digital pathology, computer-assisted diagnostics, digital biobanks, and multidisciplinary platforms combining pathology, clinical medicine, molecular biology, genomics, and bioinformatics is accelerating the transition toward precision and computational medicine (Brydges, 2025).

Generative AI has also become an important auxiliary tool in scientific publishing. It facilitates literature retrieval, organization of scientific information, language editing, translation, manuscript drafting, and preparation of preliminary tables and graphical materials, thereby reducing manuscript preparation time and improving international scientific communication (Dwivedi et al., 2023). However, international recommendations consistently emphasize that AI cannot be recognized as an author or co-author of scientific publications. Responsibility for study design, methodological rigor, data accuracy, interpretation of findings, scientific conclusions, and the final manuscript remains exclusively with the human authors (Dwivedi et al., 2023, ICAI, 2021, Smuha, 2025). Accordingly, the use of AI should be transparently disclosed, and all AI-assisted outputs should undergo expert verification and critical scientific evaluation before publication (Anwar et al., 2024, Hagendorff, 2020, ICAI, 2021).

Maintaining academic integrity requires a comprehensive institutional framework that combines legal regulation, preventive education, methodological support, technical expertise, and continuous quality assurance (Smuha, 2025). Modern plagiarism assessment should extend beyond quantitative text-similarity indices to include semantic analysis, verification of citation accuracy and bibliographic integrity, evaluation of manuscript structure, and identification of AI-assisted content (Abbadia, 2024, Amirzhanov et al., 2025, Foltýnek et al., 2020, Shah, 2025). Contemporary approaches to plagiarism

detection increasingly incorporate text-analysis algorithms capable of identifying different forms of plagiarism, including direct copying, paraphrasing, and more concealed forms of textual borrowing (Amirzhanov et al., 2025). Systematic reviews also demonstrate that plagiarism detection is a multidimensional task requiring a combination of similarity-based, semantic, and contextual approaches rather than reliance on a single quantitative similarity score (Foltýnek et al., 2020).

Although specialized AI-detection tools provide valuable support, they cannot replace expert judgment. Empirical evaluation of AI-content detection systems has demonstrated limitations in reliably distinguishing human-generated from AI-generated text (Elkhatat et al., 2023, Weber-Wulff et al., 2023). Similarly, recent methodological approaches emphasize the importance of assessing AI-generated plagiarism at both sentence and document levels rather than treating detection as a simple binary classification problem (Quidwai et al., 2023). Therefore, the combination of automated screening, independent peer review, critical appraisal of scientific evidence, and expert evaluation of clinical and morphological findings offers the most reliable approach to safeguarding research quality and minimizing academic misconduct (Hagendorff, 2020, Foltýnek et al., 2020, ICAI, 2021, Weber-Wulff et al., 2023).

Particular attention should be paid to generative AI hallucinations, which may produce fabricated references, fictitious citations, inaccurate statistical information, erroneous clinical or morphological interpretations, and misleading scientific conclusions that appear plausible despite lacking factual support (Anwar et al., 2024, Dwivedi et al., 2023, Ji et al., 2023). The incorporation of such unverified information into scientific publications poses a significant threat to research integrity. Therefore, AI-generated content should always be validated against primary scientific sources and critically assessed by qualified experts before being incorporated into scholarly work (Anwar et al., 2024, Dwivedi et al., 2023, Ethics of artificial intelligence and robotics, 2026).

Recent institutional experience at the State Non-Profit Society “Danylo Halytsky Lviv National Medical University” has further demonstrated the growing importance of semantic analysis technologies

for detecting paraphrased plagiarism, concealed textual borrowing, and AI-assisted manuscript generation. As generative AI systems continue to evolve, reliance solely on conventional similarity indices is no longer sufficient. Instead, semantic assessment combined with bibliographic verification, independent peer review, and expert scientific evaluation provides a more reliable strategy for preserving publication quality and academic integrity (Abbadia, 2024, Amirzhanov et al., 2025, Foltýnek et al., 2020, Shah, 2025). General ethical principles concerning AI development and deployment further support the need to combine automated technological assessment with human responsibility and contextual evaluation (Dwivedi et al., 2023, Ethics of artificial intelligence, 2025, Hagendorff, 2020).

Institutional monitoring at the State Non-Profit Society “Danylo Halytsky Lviv National Medical

University” also provides quantitative evidence supporting the effectiveness of comprehensive academic integrity systems. Analysis of primary plagiarism screening conducted during 2021–2025 demonstrated that 7302 academic manuscripts underwent institutional evaluation, resulting in 4213 formal expert reports. The overall rejection rate was only 9.29% (Table 1), whereas more than 90% of submissions were approved following the initial assessment or after correction of minor technical deficiencies. These findings indicate that contemporary plagiarism screening serves primarily an educational and preventive function (ICAI, 2021, Abbadia, 2024, Foltýnek et al., 2020), promoting manuscript quality and responsible research practice rather than imposing punitive measures.

Table 1

Results of Plagiarism Screening and Academic Integrity Assessment, 2021–2025	
Indicator	Value (2021–2025)
Academic manuscripts screened	7302
Expert reports issued	4213
Overall rejection rate	9.29%
Successfully approved manuscripts	>90%
Predominant causes of rejection	Technical citation errors, bibliographic inaccuracies, isolated text similarity, academic writing deficiencies

Source: Created by the authors

A particularly important observation is the progressive decline in the proportion of manuscripts requiring rejection over recent years, reflecting continuous improvement in academic writing, more accurate citation practices, greater compliance with publication standards, and increased awareness of responsible research conduct (ICAI, 2021, Abbadia, 2024). Analysis of rejected manuscripts further demonstrated that most deficiencies resulted from technical citation errors, bibliographic formatting inconsistencies, isolated textual similarities, and weaknesses in academic writing rather than deliberate scientific misconduct. These findings highlight the educational value of plagiarism screening and underscore the importance of preventive training and methodological support within institutional quality assurance systems (ICAI, 2021, Shah, 2025).

Accordingly, rigorous multi-stage verification of factual information, validation of cited references using authoritative international bibliographic databases, critical appraisal of AI-assisted outputs, and independent confirmation of scientific statements remain indispensable (Anwar et al., 2024, Hagendorff, 2020). Contemporary plagiarism assessment has evolved far beyond simple text-similarity analysis. Modern quality assurance integrates semantic text analysis, bibliographic verification, AI-content detection, repository-based similarity assessment, and expert review. This multidimensional approach improves the identification of paraphrased plagiarism, concealed textual borrowing, and AI-assisted content while ensuring reliable interpretation by experienced reviewers (Abbadia, 2024, Shah, 2025). Information security and protection of confidential data constitute another essential

component of responsible AI use. Uploading patients' personal information, confidential institutional documents, or other restricted materials to publicly accessible generative AI platforms is unacceptable. Likewise, employing AI to manipulate research findings, fabricate experimental data, conceal authorship, or replace genuine intellectual contribution fundamentally violates the principles of academic integrity and may seriously undermine scientific credibility and institutional reputation (ICAI, 2021, Smuha, 2025, Ethics of artificial intelligence and robotics, 2026). Effective governance also depends on the continuous refinement of institutional policies regulating AI-assisted research. Higher education institutions should regularly update internal guidelines, establish transparent disclosure requirements, provide systematic education in academic writing and digital ethics, strengthen researchers' AI literacy, and monitor the responsible use of AI in scholarly activities (Hagendorff, 2020, Smuha, 2025). Alignment of institutional regulations with international recommendations further reinforces research integrity and promotes a sustainable culture of responsible scientific practice (ICAI, 2021, Smuha, 2025).

Institutional Perspectives on Responsible AI Implementation. At the State Non-Profit Society “Danylo Halytsky Lviv National Medical University”, the responsible integration of artificial intelligence (AI) into clinical and morphological research requires a comprehensive governance framework that combines technological innovation with rigorous standards of academic integrity and research ethics (Hagendorff, 2020; Viswanathan et al., 2022; Wang et al., 2025; Zarella et al., 2023). Beyond adopting AI-assisted analytical tools, the institution should ensure transparent policies, continuous methodological training, ethical oversight, and regular revision of research governance in accordance with evolving international recommendations (Ethics of artificial intelligence and robotics, 2026, Smuha, 2025; Zdravkova, 2026). Particular emphasis should be placed on transparent disclosure of AI-assisted contributions, independent validation of AI-

generated outputs, protection of research data, implementation of semantic plagiarism detection technologies, and multidisciplinary collaboration among clinicians, morphologists, biomedical researchers, biostatisticians, information technology specialists, and research ethics committees (Abbadia, 2024, Anwar et al., 2024; Viswanathan et al., 2022; Wang et al., 2025; Yuan et al., 2024; Zarella et al., 2023). Such an integrated approach supports responsible innovation while preserving scientific independence, transparency, reproducibility, patient confidentiality, and ethical accountability (Hagendorff, 2020, Smuha, 2025; Zdravkova, 2026).

Future priorities for the State Non-Profit Society “Danylo Halytsky Lviv National Medical University” include harmonizing institutional regulations with international standards for responsible AI use, developing discipline-specific ethical guidance, expanding educational programs on AI literacy, continuously monitoring academic integrity indicators, and strengthening international collaboration in biomedical research and publication ethics (ICAI, 2021, Smuha, 2025). Collectively, these measures provide a sustainable framework for transparent, reproducible, and ethically responsible clinical and morphological research.

Determination of the Extent of AI Use Across the Sections of the Scientific Manuscript. During the preparation of this manuscript, artificial intelligence (AI) was used exclusively as an auxiliary tool for literature retrieval, information synthesis, analytical support, language refinement (Table 2), translation, and technical editing (Hagendorff, 2020, ICAI, 2021). The scientific rationale, conceptual development, critical appraisal of the literature, interpretation of clinical and morphological evidence, formulation of the conclusions, and final approval of the manuscript were performed independently by the authors. The approximate extent of AI-assisted support across the individual sections of the manuscript is presented below. Overall estimated AI contribution: approximately 15–20% of the manuscript preparation process (Table 3).

Table 2

Estimated AI-Assisted Contribution Across Different Manuscript Development Tasks

Manuscript section	Estimated contribution	AI
Literature search and information synthesis	30–50%	
Language editing and stylistic refinement	30–40%	
Structural organization of the manuscript	20–30%	
Formatting and technical editing	30–40%	
Scientific concept and manuscript design	0%	
Critical interpretation of scientific evidence	0%	
Discussion	0%	
Conclusions	0%	
Final scientific approval	0%	

Source: Created by the authors

Table 3

Estimated AI Contribution to Manuscript Preparation

Section	Approximate AI Use
Introduction	up to 20%
Aim	up to 5%
Materials and Methods	up to 15%
Results and Discussion	up to 20%
Conclusions	up to 10%
Literature search, source organization, translation, and language editing	up to 30%

Source: Created by the authors

Artificial intelligence (AI) was used exclusively as an auxiliary tool to facilitate literature retrieval, information synthesis, manuscript organization, language refinement, English translation, and technical editing. AI-assisted support also contributed to improving manuscript structure and generating alternative scientific wording where appropriate. AI was not used to generate experimental data, statistical analyses, morphometric measurements, clinical observations, diagnostic interpretations, figures, tables, bibliographic references without subsequent verification, scientific hypotheses, or conclusions. Interpretation of the evidence, critical appraisal of the literature, scientific reasoning, and final decision-making remained entirely under the responsibility of the authors. All AI-assisted outputs underwent mandatory expert verification, were validated against primary scientific sources whenever applicable, and were revised in accordance with the principles of academic integrity,

transparency, and scientific reproducibility. The authors assume full responsibility for the originality of the manuscript, the accuracy of the presented data, interpretation of clinical and morphological evidence, scientific conclusions, and the final version of the manuscript. Artificial intelligence served solely as a research-support tool designed to improve the efficiency of manuscript preparation and scientific communication. It did not replace professional clinical or morphopathological expertise, independent scientific judgment, critical thinking, or personal academic responsibility.

The authors declare that they have no financial, professional, or personal conflicts of interest that could have influenced the objectivity of the research results, their interpretation, or the conclusions presented in this manuscript. The authors also confirm that no external financial, commercial, or personal interests influenced the design, preparation, analysis, or reporting of the study. The authors acknowledge the journal's double-

blind peer-review policy and confirm that the required declaration regarding the presence or absence of conflicts of interest is submitted through the journal's editorial system. This procedure is intended to preserve the anonymity of the authors and ensure the independence, objectivity, and impartiality of expert evaluation throughout the editorial and peer-review process.

Conclusions. Artificial intelligence has become an important enabling technology in contemporary clinical and morphological research, expanding analytical capabilities through automated biomedical image analysis, high-precision morphometry, digital pathology, large-scale biomedical data processing, and advanced data integration. Responsible application of AI can improve standardization, reproducibility, analytical efficiency, and evidence synthesis while facilitating the generation of new biomedical knowledge. However, scientific validity and credibility depend on strict adherence to the principles of academic integrity, transparency, reproducibility, and scientific responsibility. AI should therefore be regarded exclusively as an auxiliary research tool rather than an independent source of scientific evidence or intellectual contribution. Transparent disclosure of AI-assisted contributions, combined with expert verification, critical appraisal, and scientific validation, is essential before AI-assisted content is incorporated into scholarly publications. Reducing the risks associated with AI hallucinations, fabricated

references, inaccurate citations, erroneous data interpretation, and other forms of academic misconduct requires a comprehensive quality assurance system integrating bibliographic verification using authoritative scientific databases, semantic assessment, independent peer review, expert evaluation of clinical and morphological evidence, transparent reporting of AI-assisted contributions, and continuous human oversight. Such an integrated approach minimizes the dissemination of unreliable scientific information and strengthens confidence in biomedical research. Future advances in clinical and morphological sciences will increasingly rely on machine learning, digital pathology, multimodal biomedical image analysis, intelligent clinical decision-support systems, and interdisciplinary collaboration among pathology, clinical medicine, molecular biology, genomics, bioinformatics, and data science. Sustainable implementation of these technologies will require continuous refinement of ethical standards, institutional governance, academic integrity policies, researcher education, and transparent regulation of AI-assisted scientific practice. Ultimately, integrating artificial intelligence with evidence-based scientific methodology, expert human judgment, academic integrity, and effective institutional governance provides a sustainable foundation for ensuring the reliability, reproducibility, ethical accountability, and international competitiveness of contemporary clinical and morphological research.

Conflict of Interest

The author certifies that no conflict of interest (financial, professional, or personal) exists that could have influenced the objectivity of the research results or conclusions. The integrity of the double-blind peer review process was ensured through a mandatory declaration of the absence of conflict of interest submitted via the journal's editorial system. This protocol guaranteed complete author anonymity and the independence of the expert evaluation throughout the entire editorial cycle.

Declaration on the Use of Generative Artificial Intelligence.

During the preparation of this manuscript, the authors used Claude (Anthropic, model Claude Opus 5) for literature and bibliographic data search, verification of references, organization of materials, calculation of descriptive statistics (frequencies, percentages, averages, and summary indicators), preparation of figures, and language editing and formatting of the text. The research concept, methodology, data collection, analysis, interpretation of findings, and scientific conclusions were developed exclusively by the authors. All outputs generated with the assistance of artificial intelligence were critically reviewed, verified, and revised by the authors, who bear full responsibility for the integrity, accuracy, and content of the manuscript. Artificial intelligence is not a co-author of this work.

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ШТУЧНИЙ ІНТЕЛЕКТ У КЛІНІЧНИХ І МОРФОЛОГІЧНИХ ДОСЛІДЖЕННЯХ: НАУКОВІ МОЖЛИВОСТІ, АКАДЕМІЧНА ДОБРОЧЕСНІСТЬ ТА ВІДПОВІДАЛЬНЕ ВПРОВАДЖЕННЯ

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Реферат:

Актуальність Штучний інтелект (ШІ) став одним із провідних рушіїв цифрової трансформації сучасної біомедичної науки, суттєво розширюючи аналітичні можливості клінічних і морфологічних досліджень. Технології на основі ШІ забезпечують автоматизований аналіз біомедичних зображень, цифрову патологію, морфометричну оцінку та опрацювання великих масивів біомедичних даних, сприяючи

підвищенню ефективності, стандартизації та відтворюваності наукових досліджень. Водночас широке впровадження генеративного ШІ породжує нові етичні, правові та академічні виклики, зокрема галюцинації ШІ, фальсифікацію бібліографічних посилань, нерозкриття факту використання ШІ під час підготовки рукописів та ризику порушення принципів академічної доброчесності. Зазначені тенденції зумовлюють необхідність комплексного інституційного регулювання, прозорого розкриття інформації щодо використання ШІ та ефективних механізмів забезпечення якості, спрямованих на відповідальне впровадження ШІ в біомедичні дослідження.

Мета. Метою дослідження було критично оцінити роль штучного інтелекту в сучасних клінічних і морфологічних дослідженнях, узагальнити його сучасні та перспективні напрями застосування, а також дослідити, яким чином дотримання принципів академічної доброчесності забезпечує надійність, прозорість, відтворюваність і наукову валідність досліджень із використанням ШІ.

Матеріали та методи. Дослідження виконано на базі Державного некомерційного товариства «Львівський національний медичний університет імені Данила Галицького». Воно ґрунтувалося на розширеному огляді та критичному аналізі сучасної наукової літератури, міжнародних рекомендацій і нормативних документів щодо етичного застосування штучного інтелекту, законодавчої бази України у сфері академічної доброчесності, а також інституційних політик, запроваджених закладами вищої освіти. Методологічний підхід включав бібліографічний огляд, системний аналіз, порівняльно-правовий аналіз, синтез інформації та критичне оцінювання, доповнені аналізом інституційних практик у сфері забезпечення академічної доброчесності, виявлення текстових запозичень, регулювання використання ШІ, проведення профілактичних освітніх заходів, виявлення семантичної подібності та комплексної оцінки наукової якості.

Результати. Штучний інтелект суттєво розширює дослідницькі можливості клінічних і морфологічних досліджень, забезпечуючи автоматизоване окреслення тканин, ідентифікацію клітин, кількісну морфометричну оцінку, цифрове гістопатологічне дослідження, розширений аналіз біомедичних зображень та використання сучасних систем підтримки прийняття рішень. Рациональне впровадження таких технологій сприяє підвищенню точності аналізу, відтворюваності результатів, методологічної стандартизації та загальної ефективності досліджень, одночасно стимулюючи міждисциплінарну взаємодію з молекулярною біологією, геномікою, біоінформатикою та клінічною практикою.

Проведене дослідження показало, що забезпечення академічної доброчесності потребує належного інституційного регулювання, яке охоплює нормативно-правові засади, профілактичні освітні стратегії, виявлення семантичної подібності, ідентифікацію контенту, створеного ШІ, перевірку джерел, експертне оцінювання та постійне функціонування механізмів забезпечення якості. У науковому відділі Державного некомерційного товариства «Львівський національний медичний університет імені Данила Галицького» протягом 2021–2025 років перевірки на плагіат було піддано 7302 наукові та навчальні тексти, при цьому загальний рівень відхилення становив лише 9,29 %, що свідчить про позитивну освітню та превентивну роль системи забезпечення якості. Особливу увагу приділено запобіганню галюцинаціям ШІ, фальсифікованим бібліографічним посиланням, неточному цитуванню та іншим проявам академічної недоброчесності шляхом прозорого декларування використання ШІ, експертної валідації та постійного людського контролю.

Висновки. Штучний інтелект доцільно розглядати виключно як допоміжний методологічний інструмент, а не як автономне джерело наукових результатів або концептуальних інновацій. Успішна інтеграція ШІ в клінічні та морфологічні дослідження залежить від неухильного дотримання принципів академічної доброчесності, прозорого розкриття інформації про внесок технологій машинної обробки, ретельної експертної верифікації, оцінки відповідності змісту першоджерелам, належного захисту конфіденційних даних та ефективного інституційного регулювання. Поєднання технологічних досягнень із емпірично обґрунтованими науковими методами та безперервним людським контролем є найбільш стійкою стратегічною моделлю для забезпечення надійності, верифікованості, етичної відповідальності та міжнародної конкурентоспроможності сучасних біомедичних досліджень.

Ключові слова: *штучний інтелект, академічна доброчесність, клінічні дослідження, морфологічні дослідження, цифрова патологія, виявлення плагіату, дослідницька етика, відповідальний штучний інтелект, наукові публікації, біомедичні дослідження.*

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