Chapter 19

ARTIFICIAL INTELLIGENCE: PREDICTED POSSIBILITIES, PROSPECTS AND CONSEQUENCES OF APPLICATION IN MEDICINE AND PHARMACY

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INTRODUCTION

The peculiarity of the monograph presented in this article, which the authors draw attention to, is that it is made using artificial intelligence (AI). AI is a branch of computer science that deals with the development of intelligent machines capable of performing tasks that usually require human intelligence. These systems can be trained to perform certain tasks, such as image recognition, natural language understanding, or playing games. AI technology encompasses a wide range of methods, including machine learning, natural language processing, robotics, expert systems, etc. The goal of AI research is to create machines that can reason, understand, and learn like humans and use these capabilities to improve human life and solve complex problems.

In most cases, the algorithm for solving AI problems is unknown in advance. Today, there are many approaches to both understanding AI problems and creating intelligent systems. This new science is related to neuroscience, including cognitive neuroscience, systems neuroscience, and computational neuroscience. Like all computer sciences, it uses mathematical tools. Philosophy and robotics are of particular importance to it.

AI is a relatively young field of research, founded in 1956. Its historical path resembles a sinusoid, each ‘rise’ of which was initiated by a new idea.

As for the history of its emergence and development, the term AI was first coined by a group of scientists at a conference held in 1956 at Dartmouth College (New Hampshire, USA). Their goal was to develop computer systems capable of performing tasks that usually require human intelligence. The US Department of Defence invested heavily in several projects that were eventually abandoned due to underestimated complexity and lack of computing power at the time.

Today, the development of AI is on the rise and is based on the application of the results already achieved in other fields of science, industry, business and everyday life. Unlike the development of human intelligence, which took

tens of thousands of years, strong AI will be able to develop almost exponentially – in a split second, surpassing the abilities of the human mind by tens, thousands, or millions of times. The moment in future history when AI surpasses the human mind is called the 'technological singularity'. It is impossible to predict what will happen after the technological singularity is reached, as humanity has never dealt with something much smarter and more powerful than the human brain.

According to a United Nations (UN) announcement on 31 October 2023, UN Secretary-General Antonio Guterres formed the High-Level Advisory Body on AI, which brought together a group of experts to provide guidance on the use of AI[1]. After lengthy negotiations, on 2 February 2024, European Union (EU) countries unanimously approved the AI Bill, which sets obligations for AI based on its potential risks and impact. The new rules prohibit certain AI applications that threaten the rights of citizens, including biometric categorisation systems based on sensitive characteristics and the untargeted collection of facial images from the Internet or CCTV footage to create facial recognition databases. Emotion recognition in the workplace and in schools, as well as AI that manipulates human behaviour or exploits human vulnerabilities, are strictly prohibited. However, a wide range of AI applications in medicine and pharmacy is of particular scientific and practical interest. That is why the purpose of our work was to study the history of AI, its development opportunities and threats, as well as to summarise the prospects for the use and consequences of AI in medicine and pharmacy.

1. Prospects for the use and consequences of artificial intelligence

Prospects for the use and consequences of AI are difficult to predict, but scientists and legislators are already closely monitoring new developments and trying to predict them, and prevent negative consequences by introducing strict restrictions. For example, the use of biometric identification systems (BIS) by law enforcement agencies is prohibited, except in exhaustively listed and narrowly defined situations. Real-time CIP can only be deployed if strict security measures are in place, such as time and geographical restrictions, and with specific prior judicial or administrative authorisation. Such uses may include the targeted search for a missing person or the prevention of a terrorist attack. The use of such systems after the fact is considered to be a high-risk use that requires a judicial authorisation related to a criminal offence. The Law also provides for clear obligations for other high-risk AI systems due to their significant potential harm to health, safety, fundamental rights, environment, democracy and the rule of law[2]. The law was formally adopted by the Council

[1] В ООН створили Консультативний орган з питань ШІ. Ю. Поліковська https://ms.detector.media/internet/post/33326/2023-10-27-v-oon-stvoryly-konsultatyvnyy-organ-z-pytan-shi

[2] Закон про штучний інтелект. https://biz.ligazakon.net/analitycs/226659_vroparlament-ukhvaliv-zakon-pro-shtuchniy-ntelekt-yak-ukrana-mozhe-skoristatisya-novimi-mozhlivostyami

of the EU after technical clarifications. It entered into force twenty days after its publication in the EU's Official Journal and will be fully applicable 24 months after entry into force, with the exception of certain provisions.

Examples of high-risk uses of AI include critical infrastructure, education and training, employment, basic private and public services (e.g. healthcare, banking), certain law enforcement systems, migration and border management, justice, and democratic processes (e.g. election influence). Such systems must assess and mitigate risks, keep logs of use, be transparent and accurate, and provide for strong human oversight. Citizens will have the right to lodge complaints against AI systems and receive explanations for decisions based on high-risk AI systems that affect their rights.

General-purpose AI (GPAI) systems and the GPAI models on which they are based will have to meet certain transparency requirements, including compliance with EU copyright law. More powerful GPAI models that may pose systemic risks will be subject to additional requirements, including performing model assessments, assessing and mitigating systemic risks, and reporting incidents. In addition, artificial or fake images, audio or video content ('dipshots') must be clearly labelled as such. With the AI Law, the EU emphasises the importance of trust, transparency and accountability when dealing with new technologies, while ensuring that the technology thrives and stimulates European innovation. The law imposes strict transparency obligations on high-risk AI systems, while such requirements for general-purpose AI models will be relaxed. The obligations for general-purpose AI models will apply after 12 months, and the rules for AI systems embedded in regulated products after 36 months. The fines for violations range from €7.5 million or 1.5% of turnover to €35 million or 7% of global turnover, depending on the type of violation[2].

In turn, the US Department of Commerce is considering new regulatory measures to restrict the export of closed AI models to China, whose software is kept secret. Such actions will complement a series of measures taken over the past two years to completely block the export of AI chips to China to slow down Beijing's development of advanced technologies for military purposes. Currently, American AI giants such as Microsoft, OpenAI, and Alphabet, which have developed some of the most powerful closed-source AI models, sell them to anyone in the world without proper oversight.

Government and private researchers are concerned that U.S. adversaries could use these models, which mine vast amounts of text and images to summarise information and create content to launch aggressive cyberattacks or even create powerful biological weapons.

Developing controls on the export of AI models, the US may apply a threshold contained in the AI Order issued in October 2023, based on the amount of computing power required to train the model. When this threshold is reached, the developer must disclose its plans to develop an AI model and provide the results of testing to the US Department of Commerce. This computing power threshold may be the basis for determining which AI models

will be subject to export restrictions. The US has also revised the rules for restricting the supply of advanced AI chips to China for national security reasons[3].

Thus, the degree of AI penetration is so significant that leading experts are expressing opinions on how to regulate the pace of its development. This issue is receiving considerable attention from those who are currently shaping the technological component of the world's development: Elon Musk, Mark Zuckerberg, Joseph Bezos. A large number of specialists are currently involved in leading laboratories and institutes for the development of AI.

AI is a product of scientific thought from different countries. Therefore, deepening international cooperation is an essential condition for the development of this technology. As early as 1930, John Maynord Keynes, in his scientific work 'Economic Opportunities for Our Grandchildren', discussed new technologies and said that 'we are gradually being "swallowed up" by technological unemployment, which is due to the fact that we are inventing means of reducing the need for labour faster than we can find applications for the freed-up labour force'. In the early 1980s, American scientist Jaron Lanier coined and popularised the term 'virtual reality' by founding the first virtual reality company, VPL Research. In 2014, he initiated a scientific debate related to AI in the context of its benefits and risks. This topic was continued when, in the same year, the founder of SpaceX and Tesla, Elon Musk, stated that AI is more dangerous than nuclear war and the greatest threat that humanity as a civilisation can face. He argues that AI can even start a war by producing fake news, faking accounts and creating false press releases, or simply manipulating information. Musk claimed that AI is capable of taking control of the defence industry, using hacking attacks and disinformation to start a war. Therefore, it is necessary to strictly regulate and restrain its development at the state level.

A famous British scientist and science populariser, Professor Stephen Hawking, answering a question about the new technology he used to communicate with the outside world, warned that the emergence of a full-fledged AI could be the end of the human race. He argued that the speed of AI's reorganisation is much faster than that of humans, who are limited by slow biological evolution, and over time, it will become increasingly difficult for humans to compete with AI. In July 2017, the management of the social network Facebook shut down its artificial intelligence system after machines began to communicate in their own non-existent language that people did not understand. The system used chatbots, which were initially created to communicate with real people, but gradually began to communicate with each other.

Today, AI evokes a great number of conflicting emotions, ranging from the active promotion of technologies related to its further development to its complete rejection. It is the continuous computerisation and the world of 'big

[3] https://lb.ua/world/2024/05/08/612270_ssha_planuie_zaboroniti_novi_versii_shi.htm1

data' that have actually become the ones that determine our development today.

Today is a turning point in the development of computer science, programming, robotics, neuroscience, etc., after which we will face a world of machines that replace or surpass humans in certain qualities.

Currently, the literature contains many definitions and interpretations of AI as a specific field of science, according to which AI is: – a robot or program that can replace a person in any activity; – a branch of computer science that deals with the formalisation of tasks that resemble those performed by humans; – a science and technology capable of reproducing the thinking processes of the human brain and directing them to the creation and processing of various computer programs, as well as intelligent machines that can completely replace and simplify human work.

Experts say that by 2045, humans will be inevitably displaced from many areas. AI research is based on database analysis. AI is fully capable of analysing and understanding them on its own.

The areas of practical application of AI in today's environment are primarily education and medicine (pharmacy), which form the basis for the development of society in general. Obviously, the rapid development of AI creates not only additional opportunities and threats for its consumers, but also encourages the average person to become more aware and responsible.

In particular, Nick Bostrom, Professor of Philosophy at the University of Oxford, in his book Artificial Intelligence. Stages. Threats. Strategies' concludes that the development of intelligence, both artificial and human, is inevitable. The only question is in which direction this development will be directed. A significant event that has recently shaped the trend of further development of the AI industry is the US investment in an academic institute for its study. Domestic scientists are also dealing with AI-related issues[4].

2. Artificial intelligence and its potential in medicine and pharmacy

Currently, universities in the USA, the Netherlands, China, Japan and other countries are actively developing programmes and creating AI-enabled medical facilities. The use of AI in medicine was first described in 1976, when a computer algorithm was used to identify the causes of acute abdominal pain. AI makes it possible to detect diseases such as skin cancer and diabetic retinopathy; to improve pathology classification, for example, to describe scanned images in radiology or electrocardiogram (ECG) features; to predict disease patterns, a prime example of which is machine learning (ML) algorithms developed during the COVID-19 pandemic. Wireless or contactless technologies have been particularly important during the COVID-19 pandemic, as they require the least amount of contact between infected patients and healthcare workers. Radio

[4] Штучний інтелект: сутність, аналіз застосування, перспективи розвитку / А. К. Погореленко // *Науковий вісник Херсонського державного університету. Сер. : Економічні науки.* 2018. Вип. 32. С. 22–27. URL: http://nbuv.gov.ua/UJRN/Nvkhdu_en_2018_32_6

frequency sensing technology is able to collect information from the patient's body. Transmitting this information through AI algorithms yields valuable results without any direct involvement of healthcare professionals**.** Remote non-contact sensing technologies integrated with intelligent ML algorithms are able to provide correct results in real time, which can be easily used by clinicians to monitor and diagnose the disease, namely COVID-19 symptoms, such as respiratory disorders in the form of shortness of breath, etc.

In terms of diagnostics, medical device manufacturers are actively researching and developing applications that use AI to analyse computed tomography (CT) images to improve CT images, as well as for laboratory blood tests, collecting data from blood pressure monitors, electrocardiographs and other devices, and even studying patients' DNA to select the most appropriate treatment methods.

In the context of laboratory diagnostics and mass screening in laboratory medicine, AI can be used to make operational decisions and to automate or augment human workflows. Specific applications include instrument automation, error detection, prognostication, result interpretation, test use, genomics, and image analysis.

In ophthalmology, AI is used to confirm the diagnosis of diseases, read images, perform topographic mapping of the cornea, and calculate intraocular lenses. Two imaging methods are used as diagnostic methods in ophthalmology practice: digital fundus photography and optical coherence tomography. In the near future, AI and ophthalmologists are expected to provide automated devices for early diagnosis and timely treatment of diseases in this area.

In cardiology, the implementation of AI in cardiovascular diseases is gradually gaining momentum and will eventually cover the entire spectrum of risk stratification, diagnosis, treatment, and prognosis. Classification algorithms have already been applied in several software packages for echocardiographic image pre-processing (image segmentation). This suggests that the selection of patients for referral to specialised and costly imaging can be optimised using AI. Recently, ML has been applied to integrate genetic and clinical information to improve coronary heart disease prognosis compared to conventional risk factors. The introduction of tools for better detection of arrhythmias and other ECG abnormalities can facilitate better risk stratification and remote patient monitoring using smartphone apps. The use of AI in orthopaedics allows for the assessment and quantification of spinal curvature in scoliosis, and algorithms have been developed that can calculate Cobb's angle using surface topography before using X-rays and three-dimensional images. Subsequently, AI was used to detect other types of spinal pathology, such as disc herniations or vertebral fractures. In addition, real-time image segmentation is used as a navigation tool in spinal surgery.

In dentistry, AI and neural networks are actively used in radiology to facilitate diagnosis, planning and prediction of treatment outcomes. In orthodontics, they can facilitate diagnosis and treatment planning. In addition,

AI is spreading in periodontics, and in the above-mentioned studies, it was used to assess bone loss around the implant and predict the development of periodontitis.

Thus, AI has a high potential in the healthcare sector. Public and private healthcare institutions can already implement and use AI and thus facilitate the transition from scientific research to real-world application. If successfully implemented, AI can reduce the workload of healthcare professionals and improve the quality of their work by reducing errors and increasing accuracy[5].

Highly complex minimally invasive (i.e., with a minimal incision) surgeries of any organ are performed by surgeons at St Panteleimon's Lviv City Clinical Hospital. At the end of 2020, the international postal and logistics group Meest purchased and delivered a state-of-the-art daVinci surgical robot system from the United States. The technology allows surgery without direct contact between the surgeon and the patient, which is very important in the case of complex infections or viruses. Doctors call it a 15-year advance in Ukrainian medicine. This is a state-of-the-art device used for oncological and urological operations, as well as for surgical interventions in hard-to-reach places. The daVinci robot consists of two units: a control centre for the surgeon-operator and four robotic arms. One arm transmits the image to the screen, two perform the doctor's actions, and the fourth is his assistant. It is a fully automated robot controlled by a surgeon from a distance. It was created to operate without contact with the patient. The robot allows specialists from other countries to operate at a distance with highly qualified skills. When a patient has severe infections or viruses, it helps to avoid or reduce the level of infection of medical staff and the surgeon himself. With this technique, all the surgeon's movements are coordinated and very precise, and all vibrations of the surgeon's movements are blocked at the level of computer systems. This is a progress in the development of Ukrainian medicine. The robot is not intended for open surgery, but for minimally invasive surgery, which means it allows for operations through small punctures in the human body up to 1 cm[6]. In January 2024, cardiac surgeons at St Panteleimon's Hospital of the First Medical Association of Lviv performed the first heart surgery in Ukraine using a DaVinci robot, saving a man with a pre-infarction condition. The operation lasted three hours and was successful. On the fourth day after the operation, the patient was discharged from the hospital without any complaints[7].

The use of AI in medicine and pharmacy continues to evolve, making significant contributions to improving diagnosis, treatment and management of medical data and the distribution and logistics of medicines and medical devices. AI in surgery offers great opportunities to improve the quality of surgeries and increase the speed of patient recovery. One of the main applications of AI is to

[5] https://umj.com.ua/uk/publikatsia-241221-rozvitok-shtuchnogo-intelektu-v-suchasnij-meditsini

[6] https://city-adm.lviv.ua/news/science-and-health/medicine/282637-vidteper-u-likarni-shvydkoi-dopomohy-lvova-ie-robot-khirurh-davinci

[7] https://city-adm.lviv.ua/news/science-and-health/medicine/282637-v

help plan and execute complex surgical procedures. AI algorithms can analyse medical images, identify pathologies, determine the best access routes for surgery, and develop individual treatment plans for each patient.

AI can also assist surgeons in real-time during operations by providing recommendations on the best steps and warning of possible complications. This helps to reduce the risk of errors and improve the accuracy of operations, which in turn contributes to a quicker recovery of patients and reduced recovery time after surgery.

The use of AI in pharmacy is regulated by various healthcare, data protection, ethics, and security laws and regulations. In Ukraine and the EU, there are several key legislative acts that confirm and regulate the possibility of using AI in this area. Below are the main areas of legislative regulation and relevant regulations (Tables 1 and 2).

Table 1

Name and brief description of legislative and regulatory acts governing medical and pharmaceutical activities related to AI in Ukraine

№ p/p	Name of the legislative act	Brief description of the legislative act
1.	The Law of Ukraine 'On Medicinal Products'[8].	This law regulates the procedure for the development, registration, production, quality control, sale and advertising of medicines. The use of AI can be integrated into these processes, in particular to optimise the development and quality control of medicines.
2.	The Law of Ukraine 'On Personal Data Protection'[9].	Regulates the processing of personal data, which is important for the use of AI in the analysis of medical records and patient data.
3.	Order of the Ministry of Health of Ukraine No. 1948 dated 21.08.2020[10].	Approves the procedure for conducting expert evaluation of registration materials for medicines, including requirements for information to be contained in instructions for medical use. This may include data collected and analysed using AI.
4.	Law of Ukraine 'On Advertising' No. 3136-XI of 30.05.2023[11].	Regulates the procedure for advertising of medicinal products and requirements for pharmaceutical information contained in advertising. The use of AI to create or analyse advertising content must comply with the requirements of this Law.

[8] Закон України «Про лікарські засоби» https://ips.ligazakon.net/document/T222469

[9] Закон України «Про захист персональних даних» https://www.president.gov.ua/documents/2297vi-11567

[10] Наказ МОЗ України № 1948 від 21.08.2020 року. https://zakon.rada.gov.ua/laws/show/z1054-20#Text

[11] Закон України «Про рекламу» № 3136-XI від 30.05.2023 року https://zakon.rada.gov.ua/laws/show/3136-20#Text

Table 2

Name and brief description of legislative and regulatory acts governing medical and pharmaceutical activities related to AI in the European Union

№ p/p	Name of the legislative act	Brief description of the legislative act
1.	EU Directive 92/27/EEC of 31.03.1992. 'On the Labelling of Medicinal Products for Human Use and on the Package Insert'[12].	Regulates the requirements for information about medicines, which must be reliable and based on evidence-based medicine. AI can help ensure compliance with these requirements.
2.	Directive 2001/83/EC of the European Parliament and of the Council of 06.11.2001. 'On the Community code of laws relating to medicinal products for human use'[13].	Regulates various aspects of the development, production and marketing of medicines, including the use of new technologies such as AI.
3.	Regulation (EU) 2016/679 (GDPR)[14].	The General Data Protection Regulation regulates the processing of personal data in the EU, which is important for the use of AI in medical data analysis. It ensures patient rights and data security requirements.
4.	Regulation (EU) 2017/745[15].	The Medical Device Regulation, which includes requirements for software that can be classified as a medical device. It concerns the use of AI in medical and pharmaceutical applications.

Other international standards and codes of ethics: Code of Ethics of the International Federation of Pharmaceutical Manufacturers, Code of Marketing Practice for Pharmaceutical Manufacturers of the European Business Association, and others that contain requirements for the use of pharmaceutical information and promotion, which can be supported by AI technologies. WHO recommendations on the use of digital technologies in medicine (pharmacy), including AI.

The application of AI in pharmacy opens up new horizons for the development of the industry and the improvement of healthcare. Here are some key areas where AI is actively used: drug discovery, virtual research, clinical trial optimisation, personalised medicine, disease prediction, inventory management and logistics, improved patient care (chatbots and virtual assistants), analytics and database management (Table 3).

[12] Директива ЄС 92/27/ЄЄС від 31.03.1992 року. «Про маркування лікарських засобів для людини та про анотацію-вкладиш в упаковці» https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31992L0027

[13] Директива Європейського парламенту і Ради ЄС 2001/83/ЄС від 06.11.2001року. «Про звід законів Співтовариства по відношенню до лікарських препаратів для людини». https://zakon.rada.gov.ua/laws/show/984_013-01#Text

[14] Регламент (ЄС) 2016/679 (GDPR). https://ips.ligazakon.net/document/MU16144

[15] Регламент (ЄС) 2017/745. https://www.dnv.com/services/medical-devices-regulation-eu-2017-745-mdr-138310/

Table 3

Areas of application, directions, types and their characteristics for the use of AI in pharmacy

№ p/p	Field of application	Areas of AI application in pharmacy	Types of AI applications and their characteristics
1.	Development of new medicines	Potential drug discovery and virtual research	**Analysing large amounts of data:** AI analyses massive biological and medical databases to identify new potential drug targets. **Virtual screening:** The use of machine learning algorithms to model and predict the interaction between molecules and biological targets, which significantly speeds up the process of identifying promising compounds. **Molecular modelling:** AI algorithms help to predict the structure and behaviour of molecules, which allows predicting their efficacy and safety before laboratory experiments are conducted. **Reduced development time:** AI can reduce the time it takes to develop new drugs, enabling faster time to market.
2.	Optimising clinical trials	Recruitment of research participants and data monitoring	**Analysing medical records:** AI analyses electronic medical records to identify the most appropriate candidates for clinical trials, taking into account various criteria such as age, gender, medical history, etc. **Speeding up the recruitment (selection) of participants:** Using AI for automated participant selection allows for faster recruitment of study groups, which reduces the overall time to trial completion. **Real time:** AI systems monitor data in real time, detecting abnormalities or adverse reactions, allowing for a quick response to changes in patient conditions. **Data analytics:** AI algorithms analyse trial results, helping to identify patterns and draw conclusions about the efficacy and safety of drugs.

Table 3 (continued)

3.	Personalised medicine	Individual pharmacotherapy regimens and disease prognosis	**Genetic data:** AI analyses patients' genetic data to select the most effective and safe medicines and their dosage. **Comprehensive analysis:** Taking into account medical history, lifestyle, and other factors, AI helps to develop individualised treatment plans. **Risk analysis:** AI uses big data to analyse the risks of developing diseases, allowing timely preventive measures to be taken. **Early detection:** By analysing symptoms and medical history, AI can predict the development of a disease at an early stage.
4.	Inventory management and pharmaceutical logistics	Supply chain optimisation	**Demand forecasting:** AI analyses data on drug consumption and predicts future demand, which helps to avoid shortages or surpluses. **Inventory optimisation:** AI helps to manage inventory efficiently, reducing storage costs and minimising losses due to expiry.
5.	Improving patient care	Chatbots and virtual assistants and support for pharmacists	**Consultations:** AI-based chatbots can provide patients with advice on the use of medicines, answering questions and making recommendations. **Reminders:** Virtual assistants can remind patients to take their medications, which can help improve adherence to treatment plans. **Quick access to information:** AI systems help pharmacists quickly find the necessary information about drugs, their interactions, and recommended doses, which improves the quality of consultations.
6.	Analytics and data management	Analysing large amounts of data	**Trend detection:** AI analyses large amounts of data to identify emerging trends in medication use, treatment effectiveness, and side effects. **Strategy development:** Based on the findings, AI helps develop new healthcare strategies to improve the quality of care and reduce costs.

In recent decades, there has been a significant increase in interest in the use of AI in healthcare, which is changing the paradigm due to the increasing availability of medical data and the rapid advancement of analytical methods. It can be applied to various types of medical data, both structured and unstructured. The main fields of medicine where AI tools are used include oncology, neurology, cardiology, endocrinology, dentistry, etc. The world's largest IT companies, including Microsoft, IBM, Intel, Google, etc., have their own AI-based developments that help solve similar problems. For example,

IBM Watson, an AI-enabled supercomputer created by a group of researchers led by David Ferucci, is used to help make management decisions in the treatment of lung cancer patients.

Thus, AI has a significant development potential in medicine (pharmacy) and is used in various areas, including.

Diagnostics and medical image processing: AI can help doctors diagnose diseases quickly and accurately, as well as analyse X-ray, CT and MRI images. Machine learning systems can detect abnormalities or disease characteristics in images, which helps in the timely detection and treatment of patients;

Predicting diagnoses: AI can analyse large amounts of clinical data to help predict disease risks, identify optimal treatment regimens and options for each patient;

Treatment optimisation: AI can tailor treatment recommendations for each patient, taking into account their individual medical history, genetic characteristics, and risks;

Development of new drugs: AI is used to analyse the molecular structures and properties of chemical compounds, which helps to select potentially effective compounds for further testing as potential drugs;

Electronic medical records and data processing: AI helps to automate the processing and analysis of medical records, making it easier for doctors and patients to access information and facilitating faster and more accurate decision-making.

CONCLUSIONS

Any development always involves benefits and risks. AI is already present in all spheres of human life. The task today is to optimise potential risks from it. Leading experts in this field are working to ensure that the consequences of AI functioning are economically and socially significant rather than destructive. At present, AI cannot predict the consequences of its mistakes, as it lacks the ability to recognise factors that are beyond the scope of automated algorithms.

Leading experts in this field should focus on ensuring that the results of AI's functioning are economically and socially significant, not destructive. This process should be clearly regulated and have qualitative goals.

The use of AI in medicine helps to improve diagnosis, treatment and management of medical data. The use of AI in pharmaceuticals is regulated by laws and regulations relating to the development, registration, marketing and processing of various drug databases.

Ukrainian and European legislation provides a legal basis for the integration of AI into the pharmaceutical industry, while taking into account the need for data protection and ethical standards.

The application of AI in pharma has great potential to improve various aspects of the industry, from drug development to inventory management and patient care. With the ability to analyse large amounts of data, optimise processes and individualise pharmacotherapy, AI can significantly improve the efficiency and quality of pharmaceutical services.

SUMMARY

The peculiarity of the article 'Artificial Intelligence: Projected Possibilities, Prospects and Consequences of Application in Medicine and Pharmacy' is that it was prepared by the authors using artificial intelligence. It is known that there are a number of legislative restrictions on the use of AI in a number of sectors of the national economy, which is associated with high risks for the global community.

However, of particular scientific and practical interest is the wide range of possibilities for applying AI in medicine and pharmacy. That is why the purpose of this paper is to study the history of AI, its development opportunities and threats, as well as to summarise the prospects for the use and consequences of AI in medicine and pharmacy.

In the first chapter of the monograph 'Prospects for the Use and Consequences of Artificial Intelligence', the authors review the history of the term and identify the prospects and threats of AI use.

The second chapter of the monograph, Artificial Intelligence and its Potential in Medicine and Pharmacy, discusses aspects of AI application in medicine, in particular in various medical specialities and specialisations. The author also examines the legal and regulatory framework in Ukraine and the EU that governs the use of AI in pharmacy and medicine. The scope, directions, types and characteristics of the use of AI in pharmacy are analysed.

It is established that the use of AI in pharmacy has great potential to improve various aspects of the industry, from the development of new drugs to inventory management and improved patient care. Thanks to the ability to analyse large amounts of data, optimise processes, and individualise pharmacotherapy, AI can significantly improve the efficiency and quality of pharmaceutical services.

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