Congress Proceedings & Abstract Book

MEDICRES AI 2024
INTERNATIONAL CONGRESS ON GOOD ARTIFICIAL INTELLIGENCE PRACTICE & INNOVATION IN HEALTH SCIENCES
FEBRUARY 19 - 25, 2024 | VIRTUAL

Startups | Technology Development Centers | Companies | Universities | Associations | MOHs | Governmental Institutions | Hospitals | Venture Capital Firms | Pharma Industry | Hospital Information Systems - HIS

Release 2
April 2nd, 2024

Oral Presentations & Invited Speakers

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Artificial Intelligence in Health From A Legal Perspective

Assoc. Prof. Dr. Ş. Barış Özçelik
Bilkent University, Faculty of Law, Ankara, Türkiye
ORCID: 0000-0002-3666-8366
(Author is grateful to the Scientific and Technological Research Council of Türkiye (TÜBITAK) for the support (Grant No: 122K872) within the project "Legal Analysis of Artificial Intelligence Applications in Health")

Artificial intelligence (AI) is transforming the health sector as many other sectors. It is known that AI is widely used in many areas and activities such as radiology (image analysis), pathology (tissue analysis), disease prediction, diagnosis and treatment, surgical robots, home health care and monitoring, personalized medicine, and drug development. This transformation brings new problems regarding the legal aspects of the issue.

It is possible to gather the legal aspects of AI in health under two general headings: The first one is the handling of AI in health in terms of data and privacy law and the prohibition of discrimination, which are mainly related to the fundamental rights and freedoms of individuals. The second is the examination of liability for damages that may arise from the use of AI in the field of health. Thus, this paper aims to examine AI in health under these two general headings and to develop some suggestions for the establishment of a legal infrastructure that protects and guarantees the rights and freedoms of individuals without being deprived of the benefits provided by AI in health.

Regarding data protection and anti-discrimination law it can be recommended to use reliable AI systems. Reliability in this sense means that it should be proven that the fundamental rights of individuals are considered and an impact analysis is carried out in terms of both the technology and the data set used. It is also important to determine the purposes of data collection and processing in as much detail as possible and to inform the data owners, to monitor whether the data is used for purposes other than the foreseen, to determine the role and extent of human intervention in the use of AI systems, and to train employees with up-to-date information on fundamental rights. On the other hand, where possible and suitable for the purpose, working with synthetic, i.e. computer-generated data can also be recommended to reduce data protection, privacy, or discrimination risks.

As regards liability for AI in health, it seems that there is a need for regulation, at least in certain matters. For example, the revised Product Liability Directive Proposal and the AI Liability Directive Proposal issued by the European Union after the AI Act show the mentioned need. As in these regulations, first of all, product safety rules, standardization principles, and technologies that are not allowed, if any, should be determined. On the other hand, regulations that include software within the scope of product liability and, when necessary, provide convenience to possible victims in terms of proving fault and causal link should be preferred. In the long term, technological development should be monitored and solutions such as compensation funds should be considered, if necessary. All these suggested regulations will positively impact the development of technology, as they will provide legal certainty not only for consumers but also for those who develop and use AI technologies in the health sector.

The Use and Future of Machine Learning in Physiology

Bora REŞITOĞLU
Department of Vocational School of Health Services,
Mersin University, Mersin, Turkey
ORCID: 0000-0003-2703-6831,
boraresitoglu@mersin.edu.tr

Machine learning (ML) is an emerging branch of computational algorithms designed to mimic human intelligence by learning from the surrounding environment. In today's world of large databases, ML is rapidly gaining importance and is used in a wide range of fields. ML is one of the fields in modern computing. A lot of research has been done to make machines intelligent. ML relies on different algorithms to solve data problems. Data scientists state that there is no single type of algorithm that is best for solving a problem. Health problems affect human life. During medical care, healthcare providers collect clinical data about each patient and use information from the general population to determine how to treat that patient. Data therefore plays a fundamental role in addressing health issues, and improved knowledge is crucial to improving patient care. The ability of ML to extract knowledge from data, combined with the centrality of data in healthcare, makes ML research for healthcare very important. ML has been used in healthcare in areas such as diagnosis of diabetic retinopathy, detection of lymph node metastases from breast pathology, autism subtyping by clustering comorbidities, large-scale phenotyping from observational data, and classification of diabetes. ML is also increasingly being used in physiology. Modeling of physiological systems, mood classification in physiological signals, evaluation of diabetic retinopathy from retinal scans, identification of arrhythmias from electrocardiograms and prediction of outcomes from electronic medical records and similar studies are also used in the field of physiology. Parallel to the advances in ML and artificial intelligence (AI), the use of these methods in physiology will increase.
Keywords: Machine Learning, Physiology, Healthcare

Machine Learning

Throughout human evolution, tools have been integral to simplifying various tasks. The creative capacity of the human brain has driven the invention of diverse machines, significantly easing life by facilitating travel, industrial processes, and computing. ML stands out as a noteworthy innovation in this progression. ML serves the purpose of teaching machines efficient data handling. When faced with data that is challenging to interpret manually, ML becomes a valuable tool. The increasing availability of datasets has fueled a growing demand for ML applications. Various industries leverage ML to extract pertinent information from their data. The fundamental objective of ML is to enable machines to learn autonomously from the provided data. (Mahesh, 2020). In recent decades, the field of ML has witnessed notable progress, marked by the development of sophisticated learning algorithms and efficient pre-processing techniques. Among these advancements is the evolution of artificial neural networks (ANNs) into progressively deeper architectures, leading to improved learning capabilities, a paradigm commonly referred to as deep learning (DL) (Janiesh, 2021; Madani, 2018; Silver, 2018).

ML emerged as a significant branch of AI in the 1990s. Departing from symbolic approaches, it employs methods and models rooted in statistics and probability theory. ML algorithms enable machines to acquire the necessary knowledge for a particular task by analyzing an adequate number of data samples. Prior to employing the algorithm, a crucial step called feature extraction is performed, extracting attributes that encapsulate the most specific information. The subsequent stage involves training the system through a specific ML method on sample data to enable the system to recognize features and discern patterns (Avcı, 2021; Langley, 2011; Moein, 2023).

2. Using Machine Learning in Healthcare

Despite the longstanding history of applying AI to medicine, reaching back to the 1970s, a significant number of medical professionals lack familiarity with ML as a concept, its potential applications, and the extensive literature on ML within their specialties. Existing studies highlight the potential for enhancing the quality of prediction and visualization in research through the adoption and application of ML. While numerous studies delve into the data science and statistical foundations of ML tools, there is a notable scarcity of research focusing on evaluation and practical application (Antoniou, 2021)

Applications of ML and artificial intelligence in the healthcare sector include: disease prediction, multidisease prediction, AI assisted surgery, personalized medicine, medical image detection (Pallathadka, 2023; Manne, 2021) If we give examples of studies on the use of ML in health in the literature, these are as follows. Forecasting post-stroke pneumonia through deep neural network methods (Ge, 2019), Deep neural networks for dermatologist-level skin cancer classification (Esteva, 2017), International evaluation of an artificial intelligence system for breast cancer screening (McKinney, 2020), Detection of alzheimer's disease through deep belief network-based classification of structural MRI (Faturrahman, 2017). Prediction of diabetic retinopathy progression in ındividual patients using a deep learning algorithm (Arcadau, 2019). Deep Learning-Based Prediction of Off-Target Effects in CRISPR-Cas9 Gene Editing (Lin, 2018).

3. Using Machine Learning in Physiology

Human physiological data are used as very valuable data in ML. The increasing importance of these data, which can be used jointly in medical physiology and health, especially in the disease prediction feature of ML, may open new fields of study for medical physiologists. The following studies can be given as examples from the literatüre, Phenotyping heart failure using model-based analysis and physiology-informed machine learning (Jones, 2021). Novel pediatric-automated respiratory score using physiologic data and machine learning in asthma (Messinger, 2019). Integrating machine learning techniques and physiology based heart rate features for antepartum fetal monitoring (Signorini, 2020). Physiology based machine learning and data analytics for perinatal monitoring-A novel framework for a comprehensive maternal, fetal, and neonatal profiling (Pini, 2020). While ML applications in healthcare offer promising opportunities, they also bring several risk factors and challenges that require careful consideration. These include key risk factors such as prediction errors and their consequences, system vulnerabilities that compromise protection and confidentiality, and insufficient data availability to achieve reproducible results. We can also add ethical considerations, the potential loss of the personal aspect in healthcare, and challenges related to the interpretability and practical application of ML approaches at the bedside. While ML is paving the way for innovation in healthcare, it requires a comprehensive understanding and management of these risks and challenges to ensure responsible and effective integration of ML technologies into the healthcare system.

References

Antoniou T., Mamdani M,. Evaluation of machine learning solutions in medicine. CMAJ. 193 (36). (2021).

Arcadu F., Benmansour F., Maunz A., et al. Deep learning algorithm predicts diabetic retinopathy progression in individual patients. NPJ digital medicine, 2(1), 92. (2019).

Avci O., Abdeljaber O., Kiranyaz S., et al. A review of vibration-based damage detection in civil structures: From traditional methods to Machine Learning and Deep Learning applications, Mechanical Systems and Signal Processing, 147. (2021).

Esteva A., Kuprel B., Novoa RA., et al. Dermatologist-level classification of skin cancer with deep neural networks. nature, 542(7639), 115-118. (2017).

Faturrahman M., Wasito I., Hanifah N., et al. Structural MRI classification for Alzheimer's disease detection using deep belief network. In 2017 11th International Conference on Information & Communication Technology and System (ICTS) (pp. 37-42). IEEE. (2017).

Ge Y., Wang Q., Wang L., et al. Predicting post-stroke pneumonia using deep neural network approaches. International journal of medical informatics, 132, (2019).

Janiesch C., Zschech P. & Heinrich K. Machine learning and deep learning. Electron Markets 31, 685–695 (2021).

Jones E., Randall E. B., Hummel SL.,et al. Phenotyping heart failure using model-based analysis and physiology-informed machine learning. The Journal of Physiology, 599(22), 4991-5013. (2021).

Langley, P. The changing science of machine learning. Mach Learn 82, 275–279 (2011).

Lin J., Wong KC. Off-target predictions in CRISPR-Cas9 gene editing using deep learning. Bioinformatics, 34(17), i656-i663. (2018).

Madani A., Arnaout R., Mofrad, M., & Arnaout, R. Fast and accurate view classification of echocardiograms using deep learning. Npj Digital Medicine, 1(1). (2018).

Mahesh B. Machine learning algorithms-a review. International Journal of Science and Research (IJSR). [Internet], 9(1), 381-386. (2020).

Manne R., Kantheti SC. Application of Artificial Intelligence in Healthcare: Chances and Challenges. Current Journal of Applied Science and Technology, 40(6), 78–89. (2021) .

McKinney SM., Sieniek M., Godbole V., et al. International evaluation of an AI system for breast cancer screening. Nature, 577(7788), 89-94. (2020).

Messinger AI., Bui N., Wagner BD., et al. Novel pediatric-automated respiratory score using physiologic data and machine learning in asthma. Pediatric pulmonology, 54(8), 1149-1155. (2019).

Moein MM., Saradar A., Rahmati K. et al. Predictive models for concrete properties using machine learning and deep learning approaches: A review. Journal of Building Engineering, 63, 105444. (2023).

Pallathadka H., Mustafa M., Sanchez DT., et al. Impact Of Machıne Learning On Management, Healthcare And Agrıculture, Materials Today: Proceedings, 80(3). 2803-2806. (2023).

Pini N. Physiology based machine learning and data analytics for perinatal monitoring-A novel framework for a comprehensive maternal, fetal, and neonatal profiling. (2020).

Signorini MG., Pini N., Malovini A., et al. Integrating machine learning techniques and physiology based heart rate features for antepartum fetal monitoring. Computer Methods and Programs in Biomedicine, 185, 105015. (2020).

Silver D., Hubert T., Schrittwieser J.et al. A general reinforcement learning algorithm that masters chess, shogi, and go through self play. Science, 362(6419), 1140–1144. (2018).

The Role of Artificial Intelligence in Pharmaceutical Developments: A Bibliometric Analysis

Şerife Efsun ANTMEN*
Department of Biochemistry, Faculty of Pharmacy, Mersin University, Mersin, Turkey.
ORCID: 0000-0003-1270-2408

This study aims to contribute to the literature by conducting a bibliometric analysis of the relationships between parameters such as research areas, countries, citations, and funding sponsors in drug discovery studies involving artificial intelligence.

Drug development is a highly regulated process. To make this process more efficient and functional, artificial intelligence (AI) is one of the technologies that has been much discussed in recent years and is increasingly being used for medical purposes. Examples of digital technologies in pharmacy include the use of laboratory robots or automation in medicinal chemistry.

Using keywords, 54571 studies on drug development and 231610 studies on artificial intelligence were identified. When the keywords were combined in the Web of Science databases, 471 common studies were identified. Basic analysis techniques such as bibliographic matching, co-authorship, concept association, co-citation, and citation network were applied to the data obtained with the VOSviewer bibliometric mapping program, and references, sources, keywords, and authors, which are the units of analysis, were specified. When we look at the fields of study, Pharmacology 185 (39.28%) was followed by Chemistry 77 (16.35%), Biochemistry Molecular Biology 72 (15.29%), Computer Science 60 (12.74%), Engineering 27 (5.73%). Among the countries where the articles were published, the USA has 156 publications, followed by China with 76 publications. The fact that Turkey ranks 20th with 8 articles among 73 different countries shows that artificial intelligence research in pharmacy needs development.

Keywords:Drug development, Artificial Intelligence, Bibliometric.

Artificial Intelligence And Nursing

Asst. Prof. Cevriye OZDEMIR
Faculty member in the Medical Services and Techniques Department, Dialysis Program at Kayseri University Incesu Ayşe and Saffet Arslan Health Services Vocational School.

Summary
It is an undisputed fact that nursing will be affected as new artificial intelligence technologies take over some of the tasks currently performed by nurses. However, opinions are that technology will change the time nurses devote to patient care, but the need for nurses will remain. In the future, AI tools are envisioned as tools that will free nurses from extra-professional activities and allow them to focus their efforts on professional activities using the full scope of their education, training and experience. As new algorithms are integrated into patient care processes, it will be important for nurses to gain experience in interpreting multiple data results and integrating new knowledge into nursing practice. Nurses will need to learn how to integrate AI results into evidence-based practice and balance this knowledge with wisdom gained from nursing experience.
Key words: Nursing, health, artificial intelligence

INTRODUCTION
Artificial intelligence is generally accepted to have started with the invention of robots. It was first discussed in the 1950s and developed rapidly in the 1980s and 1990s. (Amisha et al., 2019). When the investments made in artificial intelligence research are compared with other sectors, it is seen that most of them are made in health applications (CBInsights, 2017).
Artificial intelligence in health can be divided into two subtypes.
•The virtual part ranges from applications such as electronic health record systems to neural network-based guidance in treatment decisions.
•The physical part is about robots that help perform surgeries, smart prosthetics for people with disabilities and elderly care (Hamet & Tremblay, 2017).
The history of artificial intelligence in nursing spans more than four decades. A review of the Medline database shows that it dates back to 1985 with the introduction of expert systems providing clinical decision support, followed by nurse planning models (Ryan, 1985; Sitompul & Randhawa, 1990).
EXAMPLES OF USING ARTIFICIAL INTELLIGENCE IN NURSING
·Stanford University's AI-powered care program includes an intelligent elderly health support system that uses multiple sensors to detect any behavioral changes in elderly people living alone and intensive care unit patients (Brouwer et al., 2022).

·A system for monitoring compliance with hand hygiene is being worked on. This is the first step towards a computerized image-based smart hospital and shows promising results in reducing hospital-acquired infections. The hand hygiene support uses depth sensors that enhance computer vision technology to provide excellent hand hygiene for clinicians and nurses, reducing hospital-acquired infections (Haque et al., 2017; Pusiol et al., 2016).

Yale New Haven Hospital nursing (YNHH) was an early adopter of the Rothman Index, a tool that reflects the severity and risk of illness. They described their perspective as "providing the right counseling at the right time so that we can look at what is meaningful information to achieve desired patient outcomes" (Robert, 2019).

Rothman® Index

Powered by machine learning, the Rothman® Index (RI) provides a universal score of overall patient condition and a visual trajectory of a patient's physiological state. The Rothman Index leverages existing electronic health record data to provide actionable insights and builds a picture of each patient's condition over time - at every age, every disease, every level of care (Rothman et al., 2013).

Research shows that Rothman Index performance is positively influenced by nursing assessment data, so the potential for nurses to influence patient care is significant (Finlay et al., 2014).

oAt YNHH, teams of nurses, called SWATs, use the Rothman Index to identify patients at risk.

oThe SWAT team is a group of experienced nurses trained in critical care, advanced cardiovascular life support and trauma care.

oSWAT teams receive immediate alert notifications on cell phones when the patient's condition deteriorates.

oThe SWAT team reviews the data received and assesses the patient as needed and collaborates with clinical nurses and medical staff on relevant aspects of care.

oSWAT nurses describe themselves as a "second pair of eyes" (Yale New Haven Health, 2017).

·Molly is a virtual nurse developed to provide follow-up care to discharged patients and allow doctors to focus on more urgent cases (Amisha et al., 2019). Molly is also known as the 'health care avatar', specializing in heart failure care. Molly asks patients how they are and then verbally instructs them on how to check their vital signs using the digital scale and blood pressure monitor provided. Once the checks are complete, she reports the results and advises the patients on what action to take. The system works through an app on a mobile phone or tablet.

·In Japan, nurses use AI-powered robots in long-term care homes and hospital settings to assist patients with activities of daily living and enable social interaction (Buchanan et al., 2020).

·Nurses in a Canadian healthcare organization use virtual health care assistant apps (chatbots) to support people diagnosed with mental health problems. It is designed as a mental health chatbot that thinks like a therapist. Here Tess is a mental health chatbot. "If you're having a panic attack in the middle of the day or want to talk about something before you go to sleep, you can connect with her through an instant messaging app like Facebook Messenger (or if you don't have an internet connection, just send a text to a phone number) and Tess will respond immediately." She states. Tess is the brainchild of Michiel Rauws, founder of X2 AI, an artificial intelligence startup in Silicon Valley (Joerin et al., 2019).

·By working with nursing teams to identify areas where AI technologies can add value for the healthcare team and patients, Microsoft is contributing to the application of AI technologies in three key healthcare practice areas: clinical, financial and operational.

It is an undisputed fact that nursing will be affected as new artificial intelligence technologies take over some of the tasks currently performed by nurses. However, the view is that technology will change the time nurses devote to patient care, but the need for nurses will remain. Nursing experience, knowledge and skills will shift to learning new ways of thinking and processing information; the nurse will become an information integrator, health coach and provider of human care, supported by AI technologies. Technology companies are creating new ethical positions that help AI teams deal with issues of bias, publishing specific statements about the fairness, accountability and transparency of data used in the creation of AI systems (The Medical Futurist, 2018).

Since 2014, nursing-centered robotics project grants have been funded by the National Science Foundation (NSF) to promote the use of robots in nursing activities. To date, NSF has invested over 3 million dollars to learn how robots can fulfill nursing functions. Nurses are actively engaged in the creation and use of robots designed for patient care and support for older adults. Robots are seen as assistants that can help nurses at the bedside or in the community (The Medical Futurist, 2018).

There is a prevailing view in the literature that artificial intelligence will never replace the role of nursing in patient care. Providing contact and building relationships with patients are the cornerstones of the nursing profession. The literature suggests that nurses need to take an active role and learn how to integrate new technologies and tools (Robert, 2019).

In the future, AI tools are envisioned as tools that will free nurses from extra-professional activities and allow them to focus their efforts on professional activities using the full scope of their education, training and experience (Robert, 2019). As new algorithms are integrated into patient care processes, it will be important for nurses to gain experience in interpreting multiple data results and integrating new knowledge into nursing practice. Nurses will need to learn how to integrate AI results into evidence-based practice and balance this knowledge with wisdom gained from nursing experience.

References

Amisha, Malik, P., Pathania, M., & Rathaur, V. (2019). Overview of artificial intelligence in medicine. Journal of Family Medicine and Primary Care, 8(7), 2328. https://doi.org/10.4103/jfmpc.jfmpc_440_19

Brouwer, V. H. E. W., Stuit, S., Hoogerbrugge, A., Ten Brink, A. F., Gosselt, I. K., Van der Stigchel, S., & Nijboer, T. C. W. (2022). Applying machine learning to dissociate between stroke patients and healthy controls using eye movement features obtained from a virtual reality task. Heliyon, 8(4), e09207. https://doi.org/10.1016/j.heliyon.2022.e09207

Buchanan, C., Howitt, M. L., Wilson, R., Booth, R. G., Risling, T., & Bamford, M. (2020). Predicted Influences of Artificial Intelligence on the Domains of Nursing: Scoping Review. JMIR Nursing, 3(1), e23939. https://doi.org/10.2196/23939

CBInsights. (2017). Healthcare Remains The Hottest AI Category For Deals. CB Insights. https://www.cbinsights.com/research/artificial-intelligence-healthcare-startups-investors/

Finlay, G. D., Rothman, M. J., & Smith, R. A. (2014). Measuring the modified early warning score and the Rothman Index: Advantages of utilizing the electronic medical record in an early warning system. Journal of Hospital Medicine, 9(2), 116–119. https://doi.org/10.1002/jhm.2132

Hamet, P., & Tremblay, J. (2017). Artificial intelligence in medicine. Metabolism, 69, S36–S40. https://doi.org/10.1016/j.metabol.2017.01.011

Haque, A., Guo, M., Alahi, A., Yeung, S., Luo, Z., Rege, A., Jopling, J., Downing, L., Beninati, W., Singh, A., Platchek, T., Milstein, A., & Fei-Fei, L. (2017). Towards Vision-Based Smart Hospitals: A System for Tracking and Monitoring Hand Hygiene Compliance.

Joerin, A., Rauws, M., & Ackerman, M. Lou. (2019). Psychological Artificial Intelligence Service, Tess: Delivering On-demand Support to Patients and Their Caregivers: Technical Report. Cureus. https://doi.org/10.7759/cureus.3972

Pusiol, G., Esteva, A., Hall, S. S., Frank, M., Milstein, A., & Fei-Fei, L. (2016). Vision-Based Classification of Developmental Disorders Using Eye-Movements (pp. 317–325). https://doi.org/10.1007/978-3-319-46723-8_37

Robert, N. (2019). How artificial intelligence is changing nursing. Nursing Management, 50(9), 30–39. https://doi.org/10.1097/01.NUMA.0000578988.56622.21

Rothman, M. J., Rothman, S. I., & Beals, J. (2013). Development and validation of a continuous measure of patient condition using the Electronic Medical Record. Journal of Biomedical Informatics, 46(5), 837–848. https://doi.org/10.1016/j.jbi.2013.06.011

Ryan, S. A. (1985). An expert system for nursing practice. Journal of Medical Systems, 9(1–2), 29–41. https://doi.org/10.1007/BF00992520

Sitompul, D., & Randhawa, S. U. (1990). Nurse scheduling models: a state-of-the-art review. Journal of the Society for Health Systems, 2(1), 62–72.

The Medical Futurist. (2018). The Top 12 Social Companion Robots. The Medical Futurist.

Yale New Haven Health. (2017). A look at: Adult SWAT nurse team. Yale New Haven Health System. https://www.ynhhs.org/publications/bulletin/archive/110917/a-look-at-adult-swat-nurse-teamdvocates-for-safe-responsible-opioid-prescribing

Are Future Nurses Ready for Digital Health? The Impact of Advancing Technology on the Nursing Profession

Prof. Dr. Yurdanur Dikmen
Director of the Graduate School of Health Sciences at Kocaeli University of Health and Technology

The developments in science and technology in the 21st century not only complicate the lives of individuals but also create a complex environment for professions, institutions, and societies, necessitating social, cultural, economic, and even political changes for survival. Ongoing demographic shifts, rapid population growth, globalization, and environmental issues worldwide will lead to significant changes in healthcare systems and nursing in the near future. Futurists anticipate that in the 2050s, professions will undergo restructuring, and the importance of nursing in the healthcare system will increase. In the 2050s, nurses are expected to maintain a crucial role in healthcare by utilizing their knowledge and skills in information technologies. Nursing associations and organizations predict that nurses will take on new roles in areas such as mobile applications in healthcare, web-based care and education applications, health informatics, telemedicine applications, simulation, virtual universities and distance education, as well as artificial intelligence applications Expectations from artificial intelligence methods involve replicating human cognitive abilities through computers and enabling computers to acquire a certain level of learning ability. Artificial intelligence (AI) is anticipated to save time for nurses in direct patient care, enhance nursing skills, create leisure time for healthcare professionals to improve their relationships with patients, and enable nurses to provide evidence-based and personalized care. The rapid development of AI applications has also accelerated advancements in robotic technologies.

The concept of a "Robot Nurse" has emerged with the presence of humanoid robots in healthcare. Today, robots can facilitate non-contact communication between patients and their families in intensive care settings, accompany elderly individuals or those living alone at home, identify their physiological needs, and even facilitate communication with physicians. Robots can assist nurses in performing basic patient care tasks. The integration of AI and robotic technologies into healthcare and nursing practices is a relatively new concept with great potential. Technological advancements, such as electronic health records, mobile health, telehealth, and remote patient monitoring, have been initiated in past years to enhance the quality and safety of patient care. Nowadays, these technologies are progressing further with integration into AI-based robots. For instance, the robot called Robear, designed for physically demanding tasks, assists in lifting patients and transferring them from one place to another. Pepper Robot, equipped with a camera to perceive human emotions, sound to detect gender, and the ability to speak in 20 different languages, provides hospital orientation for patients.

The IV Robot RIVA ensures the preparation of intravenous medications and infusions in accurate doses, contributing to patient safety, cost-effectiveness in medication use, and minimizing errors. In response to the high infectivity of the coronavirus, the robot Grace, designed in 2020, can communicate with isolated patients and obtain vital signs. As technology advances, robots continue to develop and diversify. Considering healthcare system expenditures, the use of AI and robot technologies is expected to reduce costs. Simultaneously, the integration of these technologies with nurses' experience, knowledge, and critical thinking skills is foreseen to enhance the quality of services. However, there are concerns that the development of AI and robot technologies may deviate from the requirements of contemporary nursing philosophy, posing risks to the profession's efficiency compared to human labor. The potential transfer of nursing tasks to robots performing beyond human capabilities is perceived as a threat to nursing practice. The ethical and moral implications of humanoid robots have also become subjects of debate. Questions about the involvement of robots in healthcare, their legal rights and payments, and, most importantly, the responsibility in the event of malpractice are being discussed. In conclusion, nurses must adapt to the changing world and its needs. Integrating courses on health informatics, AI, innovation in nursing, the use and management of robot nurses, strategic management, and change management into nursing education curricula, providing nurses with the equipment and budget to technologically advance themselves in clinical settings, and establishing research and development nursing centres in hospitals are recommended to meet the demands of the evolving healthcare landscape

Digital Transformation Management in the Age of Artificial Intelligence

Emel GÜMÜŞ
TIMC CNO – Tashkent,
Istinye University-Istanbul

Aim: To assess the foundations of digital transformation, the impact of artificial intelligence and digital transformation on the healthcare sector, the definition and significance of digital transformation, the concept of artificial intelligence, artificial intelligence techniques such as machine learning, deep learning, natural language processing, the impact and significance of digital technologies, the opportunities presented by digital transformation, and the impact of digital transformation on the business world, society and organisations."
Method: This study has been prepared by compiling domestic and foreign sources.
Conclusion: In conclusion, the integration of digital transformation, artificial intelligence, and advanced technologies into the healthcare sector has showcased significant potential to revolutionize various aspects of medical practices. The foundations of digital transformation, emphasizing extensive data collection and analysis, have empowered organizations to extract valuable insights and transform information into actionable knowledge. The pivotal role of artificial intelligence, particularly in machine learning and deep learning techniques, has opened avenues for automating and enhancing various healthcare processes, ranging from disease diagnosis to personalized treatment options.
Cloud computing has emerged as a key enabler, simplifying data accessibility, improving business processes, and reducing costs through scalable and shared services. The impact of these digital technologies extends beyond organizational boundaries, influencing both the business world and society at large.
Specifically within the healthcare domain, artificial intelligence has demonstrated its prowess in disease diagnosis and prognosis through the analysis of medical images. The potential for personalized treatment options based on genetic data and patient history highlights a transformative approach to healthcare. Moreover, wearable devices and sensors, coupled with artificial intelligence, contribute to efficient patient monitoring, offering healthcare professionals valuable insights to optimize patient care.
Digital transformation has also played a crucial role in managing health records effectively, ensuring data integrity, and facilitating easy access to information. The patient experience and communication have been enhanced through telehealth and remote medical applications, providing patients with more options and convenience.
In summary, the amalgamation of digital transformation and artificial intelligence in the healthcare sector not only improves operational efficiency but also promises breakthroughs in diagnosis, treatment, and patient care. As these technologies continue to evolve, their positive impact on the healthcare landscape is expected to grow, ultimately contributing to a more advanced and patient-centric healthcare system
Keywords: Artificial intelligence, Digital Transformation, health care

Opinions Of Physicians, Nurses And Patients About Artificial Intelligence And Robotic Nurses

Emel GÜMÜŞ
TIMC CNO – Tashkent,
Istinye University-Istanbul

Aiim: The aim of this study is to evaluate the opinions of physicians, nurses and patients about working with artificial intelligence and robot nurses and to determine the opinions about the use of robots in the field of health.
Method: The study was conducted with in-depth individual interview technique, one of the qualitative research methods. The sample of the research consisted of 13 physicians, 17 nurses and 15 patients who volunteered to participate in the research working at the university, the ministry of health and private hospitals. “Semi-Structured Individual In-Depth Interview Form for Healthcare Professionals” and “Semi-Structured Individual In-Depth Interview Form for Patients” were used as data collection tools. Before the data collection stage, the approval of the ethics committee and informed consent of the participants participating in the study were obtained. The data obtained in the research were analyzed using content analysis and MAXQDA Pro 2021 program.
Findings: findings from the qualitative phase of the study; “impact of artificial intelligence technologies in health services” , “the use of robots and artificial intelligence”, “take care of humanoid robots” and “humanoid robots” working with under the headings of the four main theme, the main theme is connected to the 12 sub-themes and codes in the form of A has been investigated.
Conclusion: As a result of this study, the opinions of physicians, nurses and patients about artificial intelligence and robot nurses were examined, and their opinions about artificial intelligence technologies and robot nurses were evaluated. Participants predict that artificial intelligence technologies and robot nurses will make positive and negative contributions to the health system and will be involved in the implementation process.
Keywords: Artificial intelligence, robot nurses, nurse, health care

Diagnosing SARS- CoV-2 Infection by Artificial Intelligence During the Pandemic

Gül BAYRAM1
Sema Erden ERTÜRK1
1Department of Vocational School of Health Services, Mersin University, Mersin, Turkey

Artificial intelligence (AI) is of increasing importance in microbiological diagnosis. AI can be used in a variety of applications in the field of microbiology and offers significant advantages in this field. During the COVID-19 pandemic artificial intelligence studies were widespread to control pandemic. Artificial intelligence has played a crucial role to overcome SARS- CoV-2 infection. Various artificial intelligence studies related to SARS- CoV-2 infection diagnosing were evaluated in this study. Artificial intelligence models have been developed to help diagnose COVID-19 based on medical images such as chest X-rays and CT scans. These models can quickly identify virus-related patterns in imaging data. Another analyse method was to evaluate Massive numbers of rRT-PCRs to understand spread of virus and its variants. Besides this Machine Learning algorithms were used to develop prognostic and diagnostic models to predict the need for intensive care, intubation, and mortality risk for COVID-19 patients. These AI applications have played a crucial role in responding to the pandemic, improving diagnostics, tracking and tracing the virus, and supporting research efforts. In conclusion COVID-19 pandemic has demonstrated the immense potential of artificial intelligence (AI) and data-driven technologies in addressing public health crises. The rapid development and deployment of AI applications during the pandemic have shown that these tools can play a crucial role in various aspects of emergency response and healthcare management. These AI applications not only help control the spread of current pandemics but also will enhance our preparedness for future health crises.
Key words: Artificial intelligence, SARS- CoV-2, infection, pandemic

Introduction

Artificial intelligence (AI) has proven to be a valuable tool in various aspects of pandemic management, including predicting the spread of infection and optimizing healthcare resources. AI can be used to develop mathematical models and simulations that predict the spread of infectious diseases (1). These models take into account various factors such as population density, mobility, and healthcare infrastructure. This is important to manage the capacity of health systems and use resources more efficiently (2). Artificial intelligence can evaluate PCR test results faster and help make faster decisions in emergency situations. During the pandemic rapid interpretation of PCR tests were overwhelming issue time to time related to sampling and different PCR kits. In patients with suspected COVID-19, when the RT-PCR test was negative, diagnosis and treatment were applied based on CT or other clinical information. At this point AI could be used to evaluate these tests to diagnose rapidly suspected patients. In this study, various artificial intelligence studies related to SARS- CoV-2 infection diagnosing were evaluated during the pandemic.

Materials and Methods

There were different studies using AI to understand spread, diagnose and treat the infection. Those studies were investigated by a computer-based literature search was performed using the PubMed and Tr index search engines.

Results and Discussion

Various studies and reports have highlighted the significant role that artificial intelligence (AI) has played during the COVID-19 pandemic. AI technologies have been employed in several ways to address various challenges posed by the pandemic, including epidemiological modelling, drug discovery and vaccine development, diagnostics, contact tracing and monitoring, remote patient monitoring, natural language processing, supply chain management, robotics (2). There are various studies conducted during the pandemic. Gangloff et al aimed to develop and evaluate machine learning models to improve the performance of COVID-19 diagnosis using routine clinical and laboratory data. 536 outpatients and inpatients were included in the study between March 20, 2020, and May 5, 2020. 106 COVID groups 430 in the NOT-COVID group were included in the study. Logistic regression, random forest, and neural network models were applied. Each model was used to diagnose COVID-19 using different sets of variables. As a result of the study researchers detected that AUC values have increased by machine learning models (3). Giray et al reported that CAtenA's preliminary evaluation results matched 86% of the negative results and 90% of the positive results provided by expert analysis. It was suggested that the PCR analysis used in CAtenA should be improved (2). Alvargonzalez et al evaluated virus variants' Ct (cycle threshold) pattern by ML algorithm. Researchers indicated that integrating machine learning algorithms with rRT-PCR results can provide valuable supplementary information and enhance the effectiveness of COVID-19 testing and pandemic control. Also, it was established AI plays a crucial role in determining the sequence of the virus, which is vital for tracking and analyzing different variants of pathogens like the SARS-CoV-2 virus responsible for COVID-19 (5). Üstebay et al used eight supervised ML algorithms (SVM, LR, RF, XGBoost, MLP, ET, Cat-Boost, and k-NN) to predict COVID-19 prognostics (6). They aimed to develop the models and determine the importance of clinical and blood test features in each prognostic prediction model. The findings revealed that the characteristics of C-reactive protein, lymphocytes, lactic acid and serum calcium ratio had a significant impact on COVID-19 prognostic predictions. Jakob et al developed a machine learning-based algorithm for a clinical assessment of COVID-19 patients (7). Researchers detected that ML algorithm can identify asymptomatic/mild COVID-19 patients at risk of progressing to advanced COVID-19. Torun et al used "metasurface" platform for the direct detection of COVID-19. A machine algorithm was used to select those metasurfaces that enhance light and virus interaction. This study showed high sensitivity and specificity (95.2%) on PCR-positive and negative clinical samples and also allowed to distinguish different SARS-CoV-2 variants (8).

These are just a few examples of how AI has played a significant role during the COVID-19 pandemic. The pandemic has highlighted the potential of AI to provide innovative solutions and support various aspects of public health and healthcare systems in times of crisis. These AI applications have played a crucial role in responding to the pandemic, improving diagnostics, tracking and tracing the virus, supporting research efforts. COVID-19 pandemic has demonstrated the immense potential of artificial intelligence (AI) and data-driven technologies in addressing public health crises. The number of studies on RT-PCR and machine learning algorithm during the pandemic period is limited. The rapid development and deployment of AI applications during the pandemic have shown that these tools can play a crucial role in various aspects of emergency response and healthcare management. These AI applications not only help control the spread of current pandemics but also will enhance our preparedness for future health crises.

REFERENCES

1.Shamman, Ali H et al. “The artificial intelligence (AI) role for tackling against COVID-19 pandemic.” Materials today. Proceedings vol. 80 (2023): 3663-3667. doi:10.1016/j.matpr.2021.07.357

2.Jiao, Zengtao, et al. "Application of big data and artificial intelligence in epidemic surveillance and containment." Intelligent Medicine 3.01 (2023): 36-43.

3.Gangloff, Cedric, et al. "Machine learning is the key to diagnose COVID-19: A proof-of-concept study." Scientific Reports 11.1 (2021): 7166.

4.Giray, Burcu Gürer, and Gökçe Güven Açik. "Comparing artificial intelligence based diagnosis with expert results in SARS-COV-2 RT-qPCR." The European Research Journal (2023): 1-5.

5.Cabrera Alvargonzález, Jorge, et al. "Proof of concept of the potential of a machine learning algorithm to extract new information from conventional SARS-CoV-2 rRT-PCR results." Scientific Reports 13.1 (2023): 7786.

6.Ustebay, Serpil, et al. "A comparison of machine learning algorithms in predicting COVID-19 prognostics." Internal and Emergency Medicine 18.1 (2023): 229-239.

7.Jakob, Carolin EM, et al. "Prediction of COVID-19 deterioration in high-risk patients at diagnosis: an early warning score for advanced COVID-19 developed by machine learning." Infection (2021): 1-12.

8.Torun, Hulya, et al. "Machine learning detects SARS-CoV-2 and variants rapidly on DNA aptamer metasurfaces." MedRxiv (2021): 2021-08.

The Role Of Artificial Intelligence In Stem Cell Studies

Leyla BAHAR
Department of Stem Cell and Regenerative Medicine, Health Sciences Institute, Mersin University, Mersin, Turkey

Use of artificial intelligence (AI); Data analysis in stem cell studies can play an important role in many areas such as drug development, cell therapy and understanding biological mechanisms. Stem cell studies often involve large data sets. Artificial intelligence algorithms can analyze these large data sets quickly and effectively. Data mining and analytics techniques can provide valuable information about stem cell behavior, differentiation potential, and other important properties. In molecular modeling, AI can help model complex interactions at the cellular and molecular level. This can be used to understand stem cell behavior, develop targeted therapies, and identify factors on cell differentiation. Artificial intelligence can also be used in the drug discovery process. Recently in the prediction of Cell Differentiation and Development, AI can help in predicting the differentiation potential of stem cells and managing these processes. This stiuation allows the development of treatments and therapies that target specific cell types. Artificial intelligence applications are being to identify and understand diseases by analyzing genetic and molecular data. It can also be used to understand disease mechanisms by modeling the effects of certain diseases on stem cells. Optimization and automation studies have also accelerated with AI. It can be used to optimize and automate experimental design, data collection, and laboratory operations. This situation allows researchers to work more quickly and efficiently. Additionally, in information integration; the ability to integrate large data sets from different sources can be used to provide researchers with a more comprehensive understanding.

These roles enable AI in stem cell studies to play a key role in a number of critical areas, including data analysis, modelling, drug discovery, disease understanding, cell differentiation and optimizing laboratory processes.

INTRODUCTION

Artificial intelligence (AI) is a branch of science that aims to provide human-like intelligence and learning abilities to computer systems, machines or software. AI attempts to simulate human-like intelligence characteristics of a computer such as reasoning, learning, perceiving, understanding, language comprehension, problem solving, etc. while performing tasks. It includes subfields such as artificial intelligence, natural language processing, deep learning, machine learning, and expert systems. With developing technology, artificial intelligence is being integrated into many industries and our daily lives and is used in many areas.

As a result of the advancement of artificial intelligence techniques and developing technologies, stem cell research supported by artificial intelligence is developing rapidly. Studies using deep learning, machine learning and artificial intelligence contribute greatly to stem cell research. However, new studies are still needed in the implementation and clinical practiJce of these approaches. The use of AI in stem cell studies offers researchers important opportunities for more in-depth analyses, rapid discoveries, and more effective development of potential treatments. Artificial intelligence (AI) can play a number of important roles in stem cell studies. The use of AI can offer a number of advantages that can assist researchers in data analysis, prediction, modeling and auditing mechanisms. Many examples can be given from some potential areas of the use of AI in stem cell research. This study aims to examine and discuss the application of artificial intelligence in stem cell therapy and how it affects the way medicine is practiced, thereby creating a path to a regenerative future.

1- Information Integration:

The ability to integrate large data sets from different sources can be used to provide researchers with a more comprehensive understanding. These roles enable AI in stem cell studies to play a key role in a number of critical areas, including data analysis, modelling, drug discovery, disease understanding, cell differentiation and optimizing laboratory processes.

According to research, AI used in stem cells has the potential to be used as an auxiliary tool in imaging. However, the common belief is that AI applications are new and maturing in this field. For this reason, one of the ultimate goals is to provide guidance and assist researchers in future research (Issa et al., 2022; Krajcer et al., 2022).

2-Data Analysis and Integration:

Artificial intelligence can analyze large amounts of genomic data quickly and effectively. This allows obtaining more information about the genetic properties, differentiation potential and other important properties of stem cells. Integration of various data sources can be achieved. AI can combine data from laboratory experiments, clinical studies, and other sources. This can provide a comprehensive and versatile perspective. Big Data Analysis can be performed with artificial intelligence in Data Analysis and Modeling. Stem cell studies often involve large data sets. Artificial intelligence algorithms can analyze these large data sets quickly and effectively. This can help obtain important information about stem cell behavior, differentiation potential and genetic characteristics. Although the development of algorithms in artificial intelligence is progressing rapidly, their actual use in biomedical engineering and clinical practice is still well below their potential. This is because any algorithm must be based in part on clinical and personal utility, scientific validation, application testing, and additionally be fair before being incorporated into existing workflows. In this sense, there is much to be gained by the combination of artificial intelligence and human intelligence (HI). It is crucial to understand the transcription factors that control the self-renewal of human embryonal carcinoma cells and human embryonic stem cells to be used in regenerative medicine. Correlating gene expression levels with downstream targets after RNAi-based ablation of OCT4 function allows prediction of motif-specific sustained expression modules suitable for self-renewal and differentiation of embryonic stem cells and induced pluripotent stem cells. (Jung et al, 2010).

AI refers to the imitation of human intelligence by loading external data into a machine, creating the ability to interpret and learn [Haenlein,2019], and then uses these learnings to predict and self-regulate in similar or new scenarios [Wang,2019]. AI-based technologies can potentially aid clinical decision support in real-time, which can enable responsiveness in medicine (He et al, 2019). Artificial intelligence uses automated algorithms to solve problems and helps with tasks such as analyzing large amounts of data sets, data mining, observing patterns, and predicting outcomes that are very difficult with human intelligence (Kumar et al, 2011). To overcome some of the limitations, various working groups have implemented different artificial intelligence algorithms to create an automated approach for accurate segmentation and colony quality prediction. Artificial intelligence has raised great hopes in this regard and has become a synergistic approach that enhances human experience (Kumar et al, 2016).

3 Assess the Morphology and Molecular Modeling:

Gene therapy is a field that has been making waves since clinical trials were first introduced. The preliminary results were very exciting and prompted many researchers to take action. At the same time, the ability of stem cells to differentiate into specific other cells is seen as a great potential for therapeutic use in gene therapy. Realizing this potential depends on optimized and effective protocols for genetic manipulation of stem cells. It is widely believed that gain and loss of function approaches through gene therapy are necessary to understand specific gene functions. Such approaches would be particularly valuable in stem cell studies. The introduction of scalable computer systems may be an important step in understanding stem cell potential and dynamics. For this reason, some studies are investigating computer models that will support the investigation of the behavior and organization of viruses on regenerative tissues, including genetically modified stem cells (Adly et al, 2011).

A fundamental function of dentistry is to produce dental crowns through dental technology, and the morphology of dental crowns is an important parameter to evaluate their acceptability. Therefore, a related study used AI and machine learning (ML) to evaluate tooth morphology. It has been revealed that artificial intelligence can help in the development of digital dental technologies in facilitating the process in digital dental technology (Fan et al, 2024). Artificial intelligence can help model complex interactions at the cellular and molecular level. This can be used to understand stem cell behavior, develop targeted therapies, and identify factors on cell differentiation. By modeling the interactions of stem cells at the molecular level, artificial intelligence can help understand complex processes such as cell differentiation, growth and development.

4- Drug Discovery and Development:

AI can evaluate the effectiveness and safety of drugs using stem cell-based models. This can be used to develop new treatment methods or improve existing treatments. For example, it can perform molecular screening for potential drugs that can be used to treat certain diseases and analyze the data obtained as a result of these screenings. By analyzing genetic data and biological interactions, artificial intelligence can play an important role in the discovery of stem cell-based treatments and drugs. This could be particularly useful for developing stem cell-based treatments for certain diseases.

Mpro, the main protease of SARS-CoV-2 in anti-COVID-19 therapy, is among the potential targets and is important due to its important role in the life of the virus. Studies on Mpro inhibitors and applications of artificial intelligence in drug design explore the latest developments in this field. AI leverages comprehensive datasets and advanced algorithms to facilitate the design and identification of Mpro inhibitors that are believed to be effective in the future. The use of artificial intelligence, including predictive modelling, molecular docking and structure-based drug repurposing, is becoming widespread. Methods in artificial intelligence-driven drug discovery are among the priorities in identifying potential candidates that can be effective in antiviral treatment. In times when COVID-19 threatens global health, researching antiviral solutions targeting Mpro may be of critical importance to prevent the virus (Haghir Ebrahim Abadi et al, 2024).

There are specific challenges in regenerative medicine production. These; There may be situations such as cost effectiveness, efficiency, large scale in production. It may also include situations such as the absence of automation and quality control systems, and the absence of closed and modular systems (Polak et al., 2010). Every year, many publications are published covering regenerative biology, where experimental studies are carried out, but there is not yet an international guideline containing standard, high-quality data sets on regenerative medicines on this subject. Additionally, tools to analyze existing datasets to obtain deeper meaningful patterns and reliable insights are also lacking. There are a limited number of non-AI-based computational methods, platforms and tools available for regenerative therapies. In an effort to derive such methods, a new computational method for understanding the physiological controls in planarian regeneration was developed by Lobo and Levin (Durant et al, 2016).

5- Cell Differentiation and Development Prediction:

Artificial intelligence algorithms can predict how stem cells may differentiate into specific cell types. This can be used to provide better control over cell differentiation. Artificial intelligence can help predict the differentiation potential of stem cells and manage these processes. This allows the development of treatments and therapies that target specific cell types (Malta et al, 2018). Another important use of artificial intelligence is stem cell research, which is the characterization of stem cells using mathematical models. By using artificial intelligence algorithms, analysis of complex data sets can be achieved, and by creating mathematical models that describe the behavior and properties of the stem cell, these models can predict the differentiation potential of stem cells and help develop their use in regenerative medicine (Issa et al., 2022). After stem cell transplantation, AI can analyze data to predict the risk of cell death, developing predictive models that assist clinicians (Shouval et al., 2015). The planarian's extraordinary ability to regenerate body parts could be a potential model for leading-edge regenerative medicine research. Another computational platform, KeyGene (Roost et al., 2015), can predict the tissue origin of various cell types. In addition to identifying stem cell derivatives, it can also find the equivalent stage of human PSC differentiation products (Morris et al., 2014).

6 Disease Models and Diagnosis:

Recently, in a study conducted by the International Business Machines Corporation (IBM) research team, a new algorithm combining deep learning and machine learning was developed for the early diagnosis of breast cancer [40]. Using comprehensive clinical data, data on mammography images and biomarkers, the development of breast cancer could be predicted in 87% of cases studied, with the number of missed breast cancer diagnoses observed to be greatly minimized when radiologists matched accuracy (Ayelet et al., 2019).

Artificial intelligence can play an important role in understanding the mechanisms of diseases through the use of stem cells. It can especially be used to get to the root of diseases and develop more effective treatment strategies. Artificial intelligence can help identify and understand diseases by analyzing genetic and molecular data. It can also be used to understand disease mechanisms by modeling the effects of certain diseases on stem cells. Artificial intelligence can model the effects of diseases at the stem cell level using genetic and molecular data. This can contribute to the understanding of diseases and the development of more effective diagnostic and treatment strategies. Modern medicine is now starting to evolve from reactive treatment to stem cell treatment and is transforming towards regeneration. At this stage, damaged cells are replaced with new cells that will perform the same function. Stem cell therapy is currently used in the treatment of orthopedic, autoimmune, neurological, inflammatory and traumatic pathologies. Various studies are being conducted on this subject for many different diseases. Additionally, the answer to new disease-free anti-aging conditions may also be found. (Srinivasan et al., 2021).

Stem cells have been evaluated as a promising treatment option for heart failure (HF) with cell-based therapy. Numerous clinical trials with cell-based therapies with stem cells for HF have demonstrated encouraging results, but they are not without inconsistencies and limitations. Technological advances in bioinformatics, precision medicine, multiomics, artificial intelligence (AI), and machine learning (ML) are demonstrating new insights and approaches for stem cell research and therapeutic development. Integration of new technologies into stem cell therapy for HF will help address some of the following issues: 1) comparison of pre- and postclinical studies, 2) technical challenges in obtaining high-quality and reliable therapeutic lead cells, 3) optimal selection of individually optimal therapeutic cell types and populations. Precision medicine applications for patients in personalized treatment options such as application. These studies reveal the current status of AI use for HF in clinics. It also offers new perspectives on the development of computational-assisted cell-based therapy in the process of precision medicine and AI/ML (Chowdhury et al.,2024). Artificial intelligence techniques are being made useful in pediatric patients by simplifying patient recruitment and retention, making precise planning of treatments, and predicting clinical outcomes. By learning the inputs of patient data and combining them with new data, it can be used to optimize clinical trials of innovative stem cell and gene therapies in terms of complexities and costs. By complementing human intelligence with machine intelligence, pediatrics can have a high impact on ongoing advances in many areas of science. However, how long it will take to achieve the real effect is still a big mystery. Therefore, the most important question to be answered is: Can AI effectively and accurately predict new AI strategies? (Sniecinski, 2018).

7- Personalized Medicine:

Artificial intelligence (AI) and machine learning, which are widely used forms in medicine, show powerful ways to leverage important aspects of large data sets and intelligent algorithms. These systems can help revolutionize treatments, access to medical care, and improve outcomes, especially in reproductive medicine. Whether it is in more robust embryo and oocyte sorting, more accurate follicular measurement, AI will help patients and clinicians provide the best and personalized care. However, despite all the strengths of artificial intelligence, algorithms are not yet immune to bias. In fact, it is vulnerable to many of the demographic and socioeconomic biases that current healthcare systems face. When both the advantages and limitations of artificial intelligence are not well understood, there may be misdiagnoses and further discrimination in the field of healthcare. Having knowledge about the use of artificial intelligence in medicine, and especially how it can work optimally in reproductive medicine, will enable clinicians to advance in reproductive medicine. And it will ultimately enable the creation and use of targeted machine learning-based innovations to build healthy families(Jiang et al., 2023).

Can artificial intelligence be both intelligent and ethical? As with all scientific breakthroughs, it is necessary to critically evaluate ethical concerns and biases before widespread adoption, especially when AI technology has a direct impact on personal medical outcomes and healthcare. Often recognized as an objective decision-making tool, AI is not immune to ethical challenges. Developing a new AI system requires vast amounts of data; This will raise concerns about privacy, data ownership and Health Insurance(Jiang et al., 2023).

Combining genomic and stem cell data allows creating personalized treatment plans based on individuals' genetic profiles. However, alongside these advantages, challenges such as ethical issues and data security should also be taken into consideration. Ethical standards and guidelines regarding the use of artificial intelligence play an important role in the use of this technology in healthcare.

Optimization and Automation:

Artificial intelligence can be used to optimize experimental design, speed up data collection processes, and automate laboratory operations. This allows researchers to work more efficiently. The promise of regenerative medicine has never been more tangible to patients, the public, and researchers in recent times. In addition, there is an increasing growth in the direct-to-consumer marketing of unauthorized stem cell treatments throughout the world. Patients, concerned members of the public, research participants, journalists and healthcare professionals are likely to be unable to access accurate information on scientifically validated stem cell treatments (Master et al., 2021). Parallel to the developments in cell-based therapies, there are also major transformations and transitions in technology platforms that make it easier to present and find information online. The widely used Google is constantly changing its algorithms and business models in ways that are often incomprehensible to the individual user (Mager et al., 2023).

CONCLUSION

Recently, the use cases of Artificial intelligence and machine learning (ML) are rapidly expanding and making significant contributions to various medical applications, including personalized medicine, medical imaging, as well as robotic surgeries. Research in this field has been constantly increasing over the years. The current situation is that while AI can solve many medical problems, the consensus among researchers is that research should be examined from many perspectives. Opinions are that artificial intelligence is still inadequate in many areas, from the image quality used in the training sets to the suitability of the sample size. Therefore, uncalculated events may occur that the algorithm cannot predict. Despite its beneficial aspects, many mistakes can be made in stem cell treatment administered to patients. With the advancement of research and technology in the field of modern medicine, artificial intelligence (AI) is coming to an important position in solving complex errors in regenerative medicine. For the success of the treatment, it is important to achieve accuracy and precision in analyzing productive and healthy stem cells, which have all the characteristics of a natural cell. Therefore, paying attention to the increasing use of AI will increase the accuracy of the results of stem cell studies. In the next stages of clinical stem cell research, leveraging the power of computational tools and using AI/ML at its core will make it easier to understand the benefits and limitations of stem cell therapy. It will also provide a systems perspective for implementing personalized medicine and stem cell therapies with clarity and accuracy.

REFERENCES

1) Adly AS, Aboutabl AE, Ibrahim MS. (2011). Modeling of gene therapy for regenerative cells using intelligent agents. Adv Exp Med Biol. 696:317-25. doi: 10.1007/978-1-4419-7046-6_32. PMID: 21431572.

2) Ayelet Akselrod-Ballin, Michal Chorev, Yoel Shoshan, Adam Spiro, Alon Hazan, Roie Melamed, et al. (2019). Predicting Breast Cancer by Applying Deep Learning to Linked Health Records and Mammograms Radiology 292:2, 331-342.

3) Chowdhury MA, Zhang JJ, Rizk R, Chen WCW. (2024). Stem cell therapy for heart failure in the clinics: new perspectives in the era of precision medicine and artificial intelligence. Front Physiol. Jan 9;14:1344885. doi: 10.3389/fphys.2023.1344885.

4)Durant F, Lobo D, Hammelman J, Levin M. (2016). Physiological controls of large-scale patterning in planarian regeneration: a molecular and computational perspective on growth and form. Regeneration (Oxf). 3:78-102.

5) Fan FY, Lin WC, Huang HY, Shen YK, Chang YC, Li HY, Ruslin M, Lee SY. (2024). Applying machine learning to assess the morphology of sculpted teeth. J Dent Sci. Jan;19(1):542-549. doi: 10.1016/j.jds.2023.09.023. Epub 2023 Oct 5. PMID: 38303893; PMCID: PMC10829735.

6)Haenlein M, Kaplan A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. Calif Manage Rev. 61:5-14.

7) Haghir Ebrahim Abadi MH, Ghasemlou A, Bayani F, Sefidbakht Y, Vosough M, Mozaffari-Jovin S, et al. (2024). AI-driven covalent drug design strategies targeting main protease (mpro) against SARS-CoV-2: structural insights and molecular mechanisms. J Biomol Struct Dyn. Jan 29:1-29. doi: 10.1080/07391102.2024.2308769.

8) He J, Baxter SL, Xu J, Zhou X, Zhang K. (2019). The practical implementation of artificial intelligence technologies in medicine. Nat Med. 25:30-36

9)Issa, J., Abou Chaar, M., Kempisty, B., Gasiorowski, L., Olszewski, R., Mozdziak, P., & Dyszkiewicz-Konwińska, M. (2022). Artificial-Intelligence-Based Imaging Analysis of Stem Cells: A Systematic Scoping Review. Biology, 11(10), 1412. https://doi.org/10.3390/biology11101412

10) Jiang VS, Pavlovic ZJ, Hariton E. (2023). The Role of Artificial Intelligence and Machine Learning in Assisted Reproductive Technologies. Obstet Gynecol Clin North Am. Dec;50(4):747-762. doi: 10.1016/j.ogc.2023.09.003.

11)Jung M, Peterson H, Chavez L, Kahlem P, Lehrach H, et al. (2010) A Data Integration Approach to Mapping OCT4 Gene Regulatory Networks Operative in Embryonic Stem Cells and Embryonal Carcinoma Cells. PLOS ONE 5(5): e10709.
12)Krajcer Z. (2022). Artificial intelligence in cardiovascular medicine: historical overview, current status, and future directions. Tex Heart Inst. J. 49 (2), e207527. 10.14503/THIJ-20-7527
13)Kumar R, Sharma A, Siddiqui MH, Tiwari RK. (2016). Prediction of Metabolism of Drugs using Artificial Intelligence: How far have we reached? Curr Drug Metab. 17:129-141.
14)Kumar R, Sharma A,Varadwaj P, Ahmad A, Ashraf GM. (2011). Classification of oral bioavailability of drugs by machine learning approaches: a comparative study. J Comp Int Sci. 2:1-18.
15) Mager A. Norocel O.C. Rogers R. (2023). Advancing search engine studies: the evolution of Google critique and intervention (Editorial). Big Data Soc10
16) Malta, T. M., A. Sokolov, A. J. Gentles, ve ark. (2018). Machine Learning Identifies Stemness Features Associated with Oncogenic Dedifferentiation. Cell, 173(2), 338-354.e315.
17) Master Z. Matthews K.R.W. Abou-el-Enein M. (2021). Unproven stem cell interventions: A global public health problem requiring global deliberation. Stem Cell Rep. 16: 1435-1445.
18)Morris SA, Cahan P, Li H, Zhao AM, San Roman AK, Shivdasani RA, et al. (2014). Dissecting engineered cell types and enhancing cell fate conversion via CellNet. Cell. 158:889-902.
19)Mukherjee S, Yadav G, Kumar R. (2021). Recent trends in stem cell-based therapies and applications of artificial intelligence in regenerative medicine. World J Stem Cells. 13(6): 521-541.
20) Mukherjee S, Yadav G, Kumar R.(2021). Recent trends in stem cell-based therapies and applications of artificial intelligence in regenerative medicine. World J Stem Cells 13(6): 521-541.
21) Mukherjee S, Yadav G, Kumar R.(2021). Recent trends in stem cell-based therapies and applications of artificial intelligence in regenerative medicine. World J Stem Cells. 13(6): 521-541.
22) Polak DJ. Regenerative medicine (2010). Opportunities and challenges: a brief overview. J R Soc Interface.7 Suppl 6: 777-781.
23) Roost MS, van Iperen L, Ariyurek Y, Buermans HP, Arindrarto W, Devalla HD, et al. (2015). KeyGenes, a Tool to Probe Tissue Differentiation Using a Human Fetal Transcriptional Atlas. Stem Cell Reports. 4:1112-1124.
24) Shouval, R., M. Labopin, O. Bondi, et. al. (2015). Prediction of Allogeneic Hematopoietic Stem-Cell Transplantation Mortality 100 Days After Transplantation Using a Machine Learning Algorithm: A European Group for Blood and Marrow Transplantation Acute LeukemiaWorking Party Retrospective Data Mining Study. Journal of Clinical Oncology. 33(28), 3144.
25) Sniecinski, I., & Seghatchian, J. (2018). Artificial intelligence: A joint narrative on potential use in pediatric stem and immune cell therapies and regenerative medicine. Transfusion and apheresis science: official journal of the World Apheresis Association: official journal of the European Society for Haemapheresis, 57(3), 422–424.
26) Srinivasan, M., Thangaraj, S. R., Ramasubramanian, K., Thangaraj, P. P., & Ramasubramanian, K. V. (2021). Exploring the Current Trends of Artificial Intelligence in Stem Cell Therapy: A Systematic Review. Cureus, 13(12), e20083.
27) Wang L, Zhang HC, Wang Q. (2019). On the concepts of artificial intelligence and innovative design in product design. IOP Conf Ser Mater Sci Eng;573:12095.

THE SUCCESS OF FACE2GENE AS AN IDENTIFICATION TOOL FOR RARE GENETIC DISEASES

Nazan Eras
Mersin University, Vocational School of Health Services, Mersin, Turkey
E-mail: nazaneras@gmail.com
Orcid ID: 0000-0001-5475-1684

Introduction: According to the National Institutes of Health (NIH), there are approximately 7000 rare diseases, the vast majority of which are genetic syndromes. The diagnosis of rare genetic diseases is extremely difficult. Face2Gene, one of the new technologies, can facilitate the diagnosis of patients with rare genetic syndromes by comparing the patient's characteristics with the facial images it contains.

Objective: This study aims to evaluate the ability to interpret facial morphology in rare diseases.
Materials and Methods: Publications with the words "Rare genetic diseases and Face2Gene" were scanned in Pubmed, Web of Science, and Google Scholar databases until December 2023, and 22 studies that met the criteria were included in the study. Case reports were excluded from the study.

Results: The sample of the study consists of 31216 patients with rare genetic diseases. When the patients were examined according to their gender, 51.2% were female and 48.8% were male. The diagnostic accuracy of Face2Gene was 84.83%.

Conclusion: The Face2Gene app may be a useful tool to support clinical geneticists in identifying children with rare diseases. More clinicians using the Face2Gene application may contribute to increased diagnostic accuracy.

The Dance Of Clinical Oncologists With Artificial Intelligence «Now» And «Future»

Prof. Dr. Özgür Tanrıverdi, M.D, M.Sc., PhD.
Muğla Sıtkı Koçman University, Faculty of Medicine,
Department of Medical Oncology, Türkiye

Artificial intelligence, which is the computer science that deals with the simulation of intelligent behavior in computers, aims to support decisions or carry out certain tasks by computers following algorithms created by humans or learned by computer methods. Machine learning is a subfield of artificial intelligence. It consists of the process by which a computer can improve its performance by continuously incorporating newly created data into an existing iterative pattern. In deep learning, a subfield of machine learning and mathematical algorithms come into play.

Artificial intelligence has more acceptable developments in medical fields dealing with images, especially radiology and pathology.

On the other hand, it can be thought that its place in clinical oncology will show itself more clearly with the developments that will take place in the future.

The current state of AI for clinical oncologists is the exploration of vast data captured by electronic health records, allowing researchers to identify patterns of clinically relevant parameters using individual and historical data as aggregate data.

In clinical oncology, radiomics integrated with artificial intelligence can be applied to evaluate and predict clinical data. Not only radiomics, but also histopathological, molecular, and genomic data can be used for prognostic purposes. Risk stratification, treatment complications, survival and response to treatment are some of the prognostic parameters that can be accessed using artificial intelligence algorithms.

Until the integration of artificial intelligence, calculating the cancer risk individuals had before a cancer diagnosis or the risk stratification for recurrence in a patient with cancer was limited by the amount of data that could be examined retrospectively and analyzed using traditional statistical methods.

One of the most open areas of artificial intelligence in clinical oncology may be the development of its potential to predict treatment-related toxicity due to radiation and chemotherapy. As a matter of fact, algorithms obtained with machine learning were able to predict visits to emergency rooms and hospital admissions due to symptoms related to cancer treatment.

Thanks to algorithms obtained with artificial intelligence, survival prediction for many types of cancer, including breast, prostate, and lung cancers, is on the verge of becoming more predictable. As a matter of fact, it has been reported that artificial intelligence-based algorithms can show better accuracy rates in predicting survival than traditional analytical approaches. This is a significant advance because predicting survival in clinical oncology could help more appropriately tailor treatment strategies and even steer clear of futile efforts.

Another positive approach is the place of artificial intelligence in the evaluation of radiological response to treatment. Predicting the complete pathological response after neoadjuvant treatments and identifying patients who may be candidates for a conservative approach have become possible with the integration of artificial intelligence. It was also emphasized that the use of both immunotherapy and targeted drugs in metastatic patients could reduce the economic burden with more accurate response evaluation rates. Recently, pharmacogenomic algorithms developed to predict individual treatment response have also been integrated into artificial intelligence applications.

Artificial intelligence cannot be expected to replace clinical oncologists in personalized cancer treatment, but it can be seen as a tool that will help oncologists provide more precise and accurate care by making better use of genomic, radiomics, metabolomics and pharmacogenomics data.

In conclusion, in addition to the rapid developments in molecular oncology and cancer genetics, the integration of artificial intelligence into clinical oncology seems inevitable in terms of both study design and better understanding of the results in the wide scientific study network from basic oncology research to clinical research, where unknown molecular properties are investigated.

References

1. Farina E, Nabhen JJ, Dacoregio MI, et al. An overview of artificial intelligence in oncology. Future Sci OA 2022; 8 (4): FSO787.
2. Chua IS, Gaziel-Yablowitz M, Korach ZT, et al. Artificial intelligence in oncology: path to implementation. Cancer Med 2021; 10(12): 4138–4149
3. Rassy E, Pavlidis N. Progress in refining the clinical management of cancer of unknown primary in the molecular era. Nat Rev Clin Oncol 2020; 17(9): 541–554.
4. Jie Z, Zhiying Z, Li L. A meta-analysis of Watson for Oncology in clinical application. Sci Rep.-2020; 11(1): 5792.

The Role of Artificial Intelligence in Clinical Coding: A Bibliometric Analysis

Sema ERDEN ERTÜRK
Department of Vocational School of Health Services, Mersin University, Mersin, Turkey
ORCID:0000-0002-1988-8674

Objective: Clinical coding is the transformation of medical data in the form of free texts used in the health field into various codes and making them available for statistical analysis.Artificial intelligence in clinical coding is computer systems that can interpret and transform data in the health field and aim to produce accurate results for users. This study aims to analyze the measurable qualities of publications associated with artificial intelligence related to the coding of diseases used in the field of health. The data analysis of the publications was done using the Web Of Science database, which is the most widely used among the existing indexes.

Method: A total of 10 years of studies in the field of disease coding and artificial intelligence between 2014 and 2023 were reviewed. In the Web Of Science database; keywords determined for the use of artificial intelligence related to coding in the field of health, and coding of diseases were scanned. Research articles were included in the study and other publications were excluded. In the bibliometric study, VOSviewer was used to create a graphical network structure

Results: The number of publications according to keywords was found to be 6951. After determining the publications according to the inclusion and exclusion criteria, the number of articles was 4322. The studies show an increasing trend from 2014 to 2023. According to the results obtained from the graphical network model of key matches in the VOSviewer program, the top five keywords were machine learning, artificial intelligence, deep learning, COVID-19, and health care. It was observed that the United States of America has the highest number of publications in this field compared to other countries. Other findings are that the most used language is English, the web of science category is medical informatics, and the index is Science Citation Index Expanded.

Conclusion: The study summarized a total of 4322 results and tried to provide a comprehensive perspective on the studies in the field of artificial intelligence in clinical coding. One of the reasons why there are more studies in medical informatics may be due to the development of machine learning algorithms in recent years and the increase in the application of artificial intelligence in healthcare. The existing knowledge on coding and recording of diseases in healthcare is not sufficient despite the rapid growth in the literature. Therefore, more detailed studies on the subject are recommended.

Keywords:Artificial intelligence, Clinic coding, Bibliometric, Coding of diseases, Deep learning

Introduction

The term artificial intelligence was born in the 1950s (Guo Y, 2020) and coined by John McCarthy, a professor of computer science at Stanford University (Couch, 2023).Artificial intelligence is the theories, methods, technologies and applications of research aimed at simulating, extending and extending human intelligence. In short, artificial intelligence is the systems that enable machines to do things that require human intelligence (Jiang, 2022). Artificial intelligence is used in many fields such as medicine, manufacturing, technology, research and the development of systems to manage data (Agrawal, 2023).

Clinical coding is a system of classifying medical records into structured codes and assigning them to similar groups (Dong, 2022). The coded data generated is used for a variety of purposes ranging from health management and decision-making to billing and research (Venkatesh, 2023). Clinical coding is mostly done manually, which is time-consuming and inefficient. Therefore, it leads to errors in coding. Artificial intelligence is a branch of computer science that can analyze complex medical data. In any data set with potential to exploit meaningful relationships in a dataset can be used to predict diagnosis, treatment and outcomes in many clinical scenarios.

1.Differences of Bibliometric Research Compared to Systematic Reviews

Bibliometric analysis was conducted using the Web Of Science database. Bibliometric analyses are different from systematic reviews or scoping reviews (Grant MJ, 2009). In systematic reviews, various databases are used to search the literature on a specific topic and the results are then filtered according to predetermined inclusion and exclusion criteria to obtain a limited number of articles (Özdağoğlu, Özdağoğlu, Topoyan, & Damar, 2020). In many cases, these filtered articles are also used to obtain new data for studies such as meta-analysis (Geber, et al., 2007). In scoping reviews, different databases are also searched and articles are retrieved and filtered (Seperia B. Wanyama, 2022). The filtered literature is usually limited in number and then analyzed in terms of the study designs used in the retrieved documents. Bibliometric analysis uses large databases such as Web of Science and Scopus to analyze and map data. In addition, bibliometric analysis provides information on topics such as citations and research collaboration (Sweileh, 2019).

2. Database in Use

In the data analysis of the publications, the Web of Science database, the most widely used among the existing indexes, was used. Although Web of Science has been criticized for its impact factor, it still remains the most widely used database among existing indexes (Falagas, 2008). Web of Science with fast, advanced, general search database functions has also ability to search for citations, references and dates. It provides various facilities for all kinds of author, group author, full source title and keyword searches. In the cited reference search, the cited authors, works and their years can be limited according to the cited authors, works and their years, as well as the cited author index and the cited work index are also offered to the user if the researcher needs (Falagas, 2008). In addition, one of the other advantages of the database is that it is easy for researchers to transfer the data to the Excel program and make the data ready for statistical analysis. (Nagarkar, 2015).

3. Bibliometric Search Method

In this study, VOS viewer software program was used to create and visualize a bibliometric network. VOS viewer is a software tool used to create maps based on network data (Van Eck, 2013) (Guo Y, 2020). In the study, all indexes scanned from the Web of Science database were accessed using the Mersin University network. In the research, the Web of Science database for the years 2000-2023 was searched according to the leading keywords related to the use of artificial intelligence in clinical coding.

In the Web Of Science database; keywords identified for coding in the field of health, coding of diseases and the use of artificial intelligence were searched. The keywords were combined with Boolean operators and the search strategy was created as follows: "artificial intelligence OR neural network OR deep learning OR machine learning" AND "electronic medical records OR clinical coding OR coding Clinical OR health care coding OR health care". Based on the keywords and the necessary merging, the number of publications was found to be 6951. Publications other than articles and publications outside the years 2014-2023 were excluded from the study. After determining the publications according to the inclusion and exclusion criteria, 4322 articles were included in the study. In the VOS viewer program, We succeeded to perform temporal and spatial analysis, word co-occurrence analysis, co-authorship analysis and co-country analysis .

Bibliometric Indicators

According to the results of the map based on the VOS viewer network data of the publications, the first five most frequently used languages in publications on the role of artificial intelligence in clinical coding were determined as English, German, French, Spanish and Chinese, respectively. The network map of countries was created and the minimum number of documents belonging to a country was determined as 5 and the minimum number of citations as 3. 41 out of 85 countries meet this threshold. The countries working most intensively on the subject were identified as the USA, China, the UK, India and Canada. In the records, Medical Informatics ranked first in the Web of Science category as a research area.

Figure 1 shows the number of publications and citation status between 2014 and 2023. The graph shows that as the year increases, the number of publications in this subject also increases. It was found that the number of citations also increased depending on the year. Since 2023 was not completed, a decrease was seen at the end of the graph.

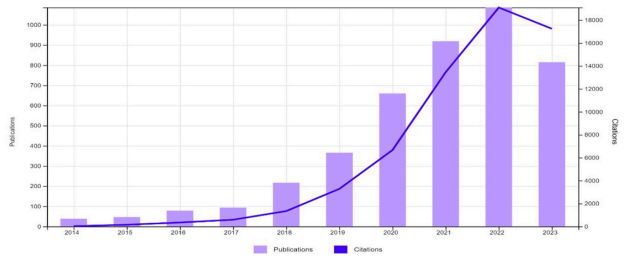

Figure 1. Distribution of bibliometric records by year

Figure 2 shows the network map of the most frequently used keywords by authors publishing on the role of artificial intelligence in clinical coding. In the network map, keywords that were repeated at least 5 times were taken. As a result of this criterion, 116 of the total 2688 keywords met this threshold. On the map, 10 different clusters were found with 10 different colors. The authors determined that the keywords with the highest frequency of repetition were machine learning, artificial intelligence, health services, health records.

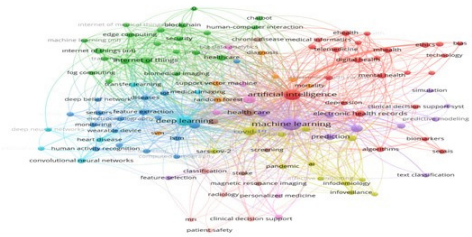

Figure 2. Most frequently used keywords network map

Figure 3 shows a density map in the VOS viewer network map showing the relationship between institutions. Institutions with higher color density were found to have stronger connections in articles on artificial intelligence in clinical coding. According to the results, institutions such as Harvard Medical School, Stanford University and MIT were found to rank high.

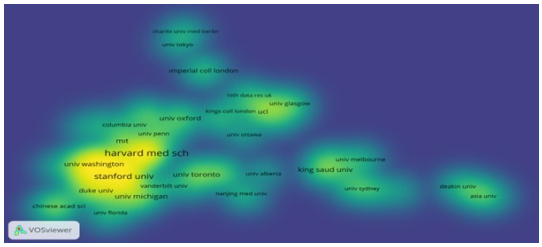

Figure 3. Map of the relationship between institutions

Table 1.Distribution of top 10 cited publications in bibliometric records (Deo, 2015) (Ting, 2017) (Che, 2018) (Abràmoff, 2018) (Kavakiotis, 2017) (Razzak, 2018) (Gianfrancesco, 2018) (Wang, 2020) (Michie, 2017) (Jiang Y. &., 2020)

Title	Authors	Publication Year	Total Citations	Average per Year
Machine Learning in Medicine	Deo, Rahul C.	2015	1394	154,89
Development and Validation of a Deep Learning System for Diabetic Retinopathy and Related Eye Diseases Using Retinal Images From Multiethnic Populations With Diabetes	Ting, Daniel Shu Wei; Cheung, Carol Yim-Lui; Lim, Gilbert; Tan, Gavin Siew Wei; Quang, Nguyen D.; Gan, Alfred; Hamzah, Haslina; Garcia-Franco, Renata; Yeo, Ian Yew San; Lee, Shu Yen; Wong, Edmund Yick Mun; Sabanayagam, Charumathi; Baskaran, Mani; Ibrahim, Farah; Tan, Ngiap Chuan; Finkelstein, Eric A.; Lamoureux, Ecosse L.; Wong, Ian Y.; Bressler, Neil M.; Sivaprasad, Sobha; Varma, Rohit; Jonas, Jost B.; He, Ming Guang; Cheng, Ching-Yu; Cheung, Gemmy Chui Ming; Aung, Tin; Hsu, Wynne; Lee, Mong Li; Wong, Tien Yin	2017	1079	154,14
Recurrent Neural Networks for Multivariate Time Series with Missing Values	Che, Zhengping; Purushotham, Sanjay; Cho, Kyunghyun; Sontag, David; Liu, Yan	2018	852	142
Pivotal trial of an autonomous AI-based diagnostic system for detection of diabetic retinopathy in primary care offices	Abramoff, Michael D.; Lavin, Philip T.; Birch, Michele; Shah, Nilay; Folk, James C.	2018	576	96
Machine Learning and Data Mining Methods in Diabetes Research	Kavakiotis, Ioannis; Tsave, Olga; Salifoglou, Athanasios; Maglaveras, Nicos; Vlahavas, Ioannis; Chouvarda, Ioanna	2017	513	73,29
Deep Learning for Medical Image Processing: Overview, Challenges and the Future	Razzak, Muhammad Imran; Naz, Saeeda; Zaib, Ahmad	2018	481	80,17
Potential Biases in Machine Learning Algorithms Using Electronic Health Record Data	Gianfrancesco, Milena A.; Tamang, Suzanne; Yazdany, Jinoos; Schmajuk, Gabriela	2018	449	74,83
Triboelectric Nanogenerator (TENG)-Sparking an Energy and Sensor Revolution	Wang, Zhong Lin	2020	430	107,5
Developing and Evaluating Digital Interventions to Promote Behavior Change in Health and Health Care: Recommendations Resulting From an International Workshop	Michie, Susan; Yardley, Lucy; West, Robert; Patrick, Kevin; Greaves, Felix	2017	399	57
Effects of COVID-19 on hotel marketing and management: a perspective article	Jiang, Yangyang; Wen, Jun	2020	394	98,5

5. Results

This bibliometric analysis provided information on the current state of research on Artificial İntelligence in Clinical Coding until the last quarter of 2023. The study summarized a total of 4322 results and attempted to provide a comprehensive overview of studies in the field of Aİ in clinical coding. İt was determined that in the clinical coding process, the artificial intelligence system uses machine learning and natural language processing (NLP) tools to learn important patterns from clinical data. A large number of studies have been conducted in the medical field. One of the reasons for this can be considered as the development of machine learning algorithms in recent years and the increase in the application of artificial intelligence in healthcare. Published articles on Aİ in clinical coding were found to have increased significantly over the years. Despite this rapid growth, the current knowledge on coding and recording of diseases in healthcare was not sufficient. Therefore, more detailed studies on the subject are recommended.

References

1. Abràmoff, M. D. (2018). Pivotal trial of an autonomous Aİ-based diagnostic system for detection of diabetic retinopathy in primary care offices. NPJ digital medicine.
2. Agrawal, P. K. (2023). Artificial İntelligence: Past, Present And Future. Pharmacy and Pharmaceutical Sciences.
3. Che, Z. P. (2018). Recurrent neural networks for multivariate time series with missing values. Scientific reports.
4. Couch, J. R. (2023). Artificial İntelligence: Past, Present and Future. Journal of the South Carolina Academy of Science.
5. Deo, R. C. (2015). Machine learning in medicine. Circulation, 1920-1930.
6. Dong, H. F. (2022). Automated clinical coding: what, why, and where we are? npj Digit. Med.
7. Falagas, M. E. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: strengths and weaknesses. FASEB journal : official publication of the Federation of American Societies for Experimental Biology, 338–342.
8. Geber, S., Tallon, D., Trelle, S., Schneider, M., Jüni, P., & M., E. (2007). Bibliographic study showed improving methodology of meta-analyses published in leading journals 1993–2002. Journal of Clinical Epidemiology, 773-780.
9. Gianfrancesco, M. A. (2018). Potential biases in machine learning algorithms using electronic health record data. JAMA internal medicine, 1544-1547.
10. Grant MJ, B. A. (2009). A typology of reviews: an analysis of 14 review types. Health İnf Libr J., 91-108.
11. Guo Y, H. Z. (2020). Artificial İntelligence in Health Care: Bibliometric Analysis. J Med İnternet Res.
12. Jiang, Y. &. (2020). Effects of COVİD-19 on hotel marketing and management: a perspective article. İnternational journal of contemporary hospitality management, 2563-2573.
13. Jiang, Y. L. (2022). Quo vadis artificial intelligence? Discov Artif İntell 2.
14. Kavakiotis, İ. T. (2017). Machine learning and data mining methods in diabetes research. Computational and structural biotechnology journal, 104-116.
15. Michie, S. Y. (2017). Developing and evaluating digital interventions to promote behavior change in health and health care: recommendations resulting from an international workshop. Journal of medical İnternet research.
16. Nagarkar, S. P. (2015). Text mining: an analysis of research published under the subject category ‘İnformation Science Library Science’in Web of Science Database during. Library Review, 248-262.
17. Özdağoğlu, A., Özdağoğlu, G., Topoyan, M., & Damar, M. (2020). A predictive filtering approach for clarifying bibliometric datasets: an example on the research articles related to industry 4.0. Technology Analysis & Strategic Management, 158-174.
18. Razzak, M. İ. (2018). Deep learning for medical image processing: Overview, challenges and the future. Classification in BioApps: Automation of Decision Making, 323-350.
19. Seperia B. Wanyama, R. W. (2022). Where you search determines what you find: the effects of bibliographic databases on systematic reviews. İnternational Journal of Social Research Methodology, 409-422.
20. Sweileh, W. M. (2019). A bibliometric analysis of health-related literature on natural disasters from 1900 to 2017. Health Research Policy and Systems, 2-11.
21. Ting, D. S. (2017). Development and validation of a deep learning system for diabetic retinopathy and related eye diseases using retinal images from multiethnic populations with diabetes. Jama, 2211-2223.
22. Van Eck, N. J. (2013). VOSviewer manual. Leiden: Univeristeit Leiden, 1-153.
23. Venkatesh, K. R. (2023). Automating the overburdened clinical coding system: challenges and next steps. npj Digit. Med.
24. Wang, Z. L. (2020). Triboelectric nanogenerator (TENG)—sparking an energy and sensor revolution. Advanced Energy Materials.

How AI Integrated Computational Simulations will Shape the Future of Drug Discovery?

Assistant Professor Soykan AĞAR, Ph.D.
Kocaeli Health & Technology University (English Education), Kocaeli, Turkey
E-mail:
soykan.agar@kocaelisaglik.edu.tr
drsoykanagar@gmail.com

The future of drug discovery, especially in fields like oncological research, lies in precise targeting of target molecules whatever their origins are. In oncological A.I. integrated in silico simulations, there is no more cancer type classifications, solely the classification of target molecules and their structures are studied. This emphasizes the great change and the significance of A.I. integrated computational studies. Our ongoing studies have revealed promising insights into various drugs, contributing valuable data to our organic pharmaceutical chemistry database, particularly in understanding the roles of functional groups. The intricate intersection of medicinal chemistry, oncological research, and artificial intelligence heralds a new era of pharmaceutical innovation. The inception of a new chemical structure on paper, devoid of laboratory synthesis or experimental validations, prompts the need for predictive assessments concerning its indications, toxicity, and binding mechanisms on the target molecule with specific regioselectivity. The ability to foresee the preferred functional groups of target molecules and their strong bonds, as well as the prediction of repeating amino acids or nucleotides and their frequency, plays a pivotal role in shaping the trajectory of drug design and development. In the current landscape, pharmaceutical companies find themselves in the midst of an era marked by the excessive production of chemotherapeutic drugs, predominantly composed of non-targeted molecules. More academic collaborations can solve this to find targeted molecules. In the field of medicinal chemistry & oncological research, intertwined with artificial intelligence integration, the pursuit of innovative organic-pharmaceutical drug design has emerged as a cornerstone strategy. This extends beyond exclusively, targeting DNAs and encompasses a comprehensive approach toward the intricate pathways, as well as the molecular targets of RNAs and proteins. By scrutinizing the affinity, the binding score, the mode of binding, and the nucleotide regioselectivity of different functional groups in drugs, we were able to draw meaningful comparisons and contrasts. This analysis involves examining the overlapping outcomes from computational simulations, A.I. software, and multi-spectroscopic analyses. Through this comprehensive approach, it becomes possible to anticipate both the new effects and repurposing effects of de novo designed drugs. The goal is always to create medications that are not only efficient and enduring but also have reduced toxicity and a specific regioselective focus on their target.

In Silico Drug Repurposing of Nerol in the Inhibition of Cancerous DNA

Soykan Agar1, Barbaros Akkurt2

1,*Kocaeli Health and Technology University, Faculty of Pharmacy, Yeniköy Mahallesi Ilıca Caddesi No:29, Başiskele/Kocaeli, Türkiye.
soykan.agar@kocaelisaglik.edu.tr
2Istanbul Technical University, Faculty of Science and Letters, Department of Chemistry, 34469 Maslak, Sariyer, Istanbul, Türkiye.
akkurtb@itu.edu.tr
****Corresponding author. E-mail: soykan.agar@kocaelisaglik.edu.tr***

ABSTRACT

Over the past few years, there has been extensive research into the potential anti-cancer properties of Nerol. Its natural origin and a possible anti-cancer indication have also garnered attention. With in silico drug repurposing simulations, molecular docking and molecular dynamics results confirmed that Nerol has the potential to be used as an effective cancerous cell DNA silencer to cause apoptosis. The encouraging results from these investigations have prompted the synthesis of new analogs. In vitro and in vivo future of this compound seems to be sparkling since its regioselectivity towards Guanine nucleotides is promising and a differentiating tool to selectively choose cancerous genes that have high Guanine percentages to be suppressed.

Keywords: Nerol, Anti-cancer, Monoterpenes, DNA, Molecular Docking, Molecular Dynamics, In silico Drug Repurposing.

INTRODUCTION

Cancer poses a significant global health threat, accounting for around 10 million deaths annually. In 2020 alone, there were 19.3 million new cases reported, with over 70% of fatalities occurring in developing nations. Projections from the International Agency for Research on Cancer suggest that by 2030, cancer-related deaths could reach 13 million, underscoring the urgent need for innovative research in combating this disease (1–3).

Cancer is fundamentally a genetic disorder resulting from abnormalities in the mechanisms regulating cell growth and equilibrium. The gradual accumulation of mutations in a cell's DNA can trigger its transformation into a tumor cell, enabling unchecked proliferation and survival. These mutations endow tumor cells with various capabilities, including evading growth control, resisting immune surveillance, inducing inflammation, promoting invasion and metastasis, altering cellular metabolism, sustaining growth signaling, resisting apoptosis, achieving immortality, fostering angiogenesis, and enhancing genomic instability and mutation. Ultimately, tumor cells infiltrate neighboring tissues and metastasize to distant sites, accounting for the majority of cancer-related deaths. The most lethal cancer types include lung, colon, breast, prostate, liver, and gastric cancers (4–7).

Essential oils and plant extracts containing monoterpenes represent rich sources of bioactive compounds with a long history of medicinal use. Recent years have witnessed growing interest in monoterpenes such as Nerol, primarily due to their promising chemo preventive and chemotherapeutic properties (8–10). This compound has sparked exploration among medicinal chemistry researchers, aiming to develop novel analogs with enhanced anticancer potential (11–13).

MATERIALS AND METHODS

Geometric Optimizations and Molecular Docking Simulations

Using Gaussian 09, Gauss View 6.0 and Avogadro software programs, density functional theory (DFT)/B3LYP and 6-31G(d,p) principle were employed for geometric optimization for the Nerol ligand. Intrinsic water molecules of 1BNA (PDB ID: 1BNA) were removed and hydrogen addition was completed according to the acidic pH of cancerous cell DNA, pH 5.5. AutoDock Vina 1.1.2 is used for molecular docking simulations with statistically accepted 30 posed runs, yielding a total of 300 poses in total with ten trials. Ligand. Docking scores were expressed in kcal/mol, representing Gibbs free binding energy. The overall Gasteiger charges and geometrically optimization of the structure were done. Polar hydrogen atoms were added. The protonation states of ligand Nerol and target molecule 1BNA molecules were adjusted according to pH 5.5 (14, 15). Optimal binding energy poses within the best-clustered data were selected as initial structures for subsequent Molecular Dynamics (MD) simulations for each drug.

Molecular Dynamics (MD) Simulations

Ligands underwent Molecular Dynamics (MD) simulations using the Schrödinger's Maestro Desmond 2023 program, with 50 ns time periods per each run, comprising 5000 poses at 10 ps intervals. All of the MD simulations were re-run two more times after the initial findings with varying seed numbers to ensure precise simulation parameters and dsDNA-bound ligand complex structures. The study evaluated the dynamic traits of the ligand-receptor complexes over time. The system's grid box was established at 100 × 100 × 100 Å3 with a 0.5 Å spacing for the dsDNA target molecule. TIP3P-type water molecules were added, along with 0.15 M NaCl ions to neutralize the system. Initial structures for MD simulations were derived from the most favorably binding docking poses. Temperature and pressure parameters regarding NPT were at 310 K with Nose-Hoover temperature coupling and constant pressure of 1.01 bar via Martyna Tobias-Klein pressure coupling and the force-field for the simulation was OPLS 3.0. No system constraints were imposed, and default initial velocity values for forcefield calculations were used (16-18). Best posed MD results were gathered after the stability of the complex (ligand-receptor) was formed.

RESULTS

Since cinceole and citronellol derivatives have proven antineoplastic affinity within the A549 cell lines, it is best to study its analogue Nerol for its anti-cancerous indications and mode of binding mechanism, as we did similar investigations on similar molecules (19).

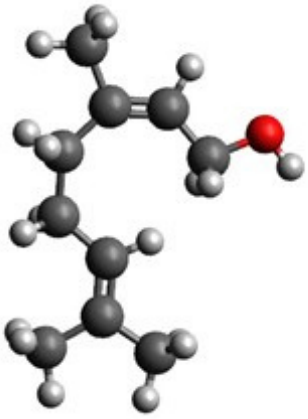

Figure 1. The geometrically stabilized chemical structure of Nerol under OPLS 3.0 and pH 5.5.

As can be seen from the docking simulations below in Figure 2, quite strong H-bondings occur between Nerol and 1BNA mimicking the nuclear medium of cancerous cell DNA at pH 5.5. The docking Δ(ΔG) energy was found to be -13.1 kcal/mol which is clearly an indication of cancerous DNA nucleotide inhibition. Usually, good inhibition values in the scientific literature are mostly around -10 to -11 kcal/mol (20). Passing this range greatly means that this route to eliminate cancerous cells is distinct possibility for the future of this study.

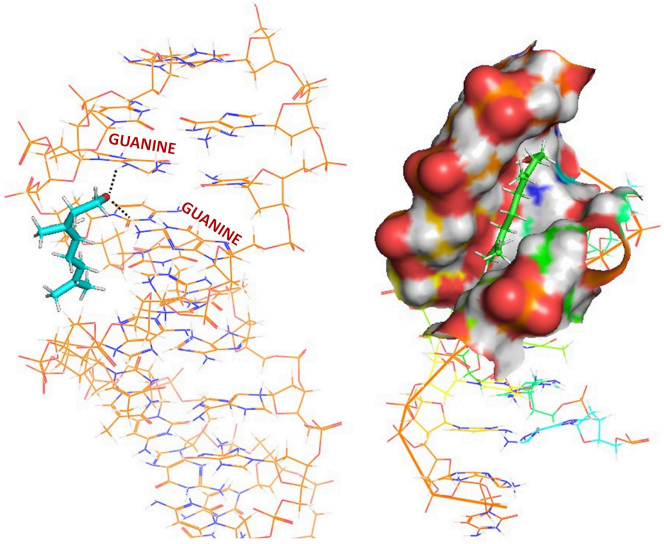

Figure 2. The Guanine silencing regioselectivity of Nerol on 1BNA along with its minor groove mode of binding taken from the best pose in the Molecular Dynamics results.

In Figures 2 and 3, the ligand (essential oil Nerol) specifically chooses minor groove area depending on its cluster analyses. In the optimum conditions, it is expected to have maximum of 2 or 3 main clusters that the docked poses accumulate on top of each other to verify the precision and correctness of the simulation. Nerol has displayed such wonderful result that it has a single major cluster where its docking energies are around -13 kcal/mol. This explicitly proves that it is a very strong inhibitor where it should be studied along with its analogues.

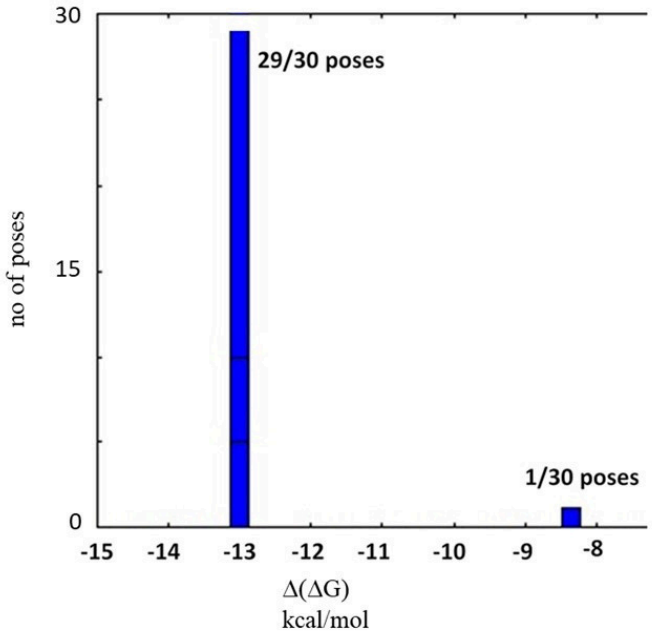

Figure 3. The cluster data of docking results

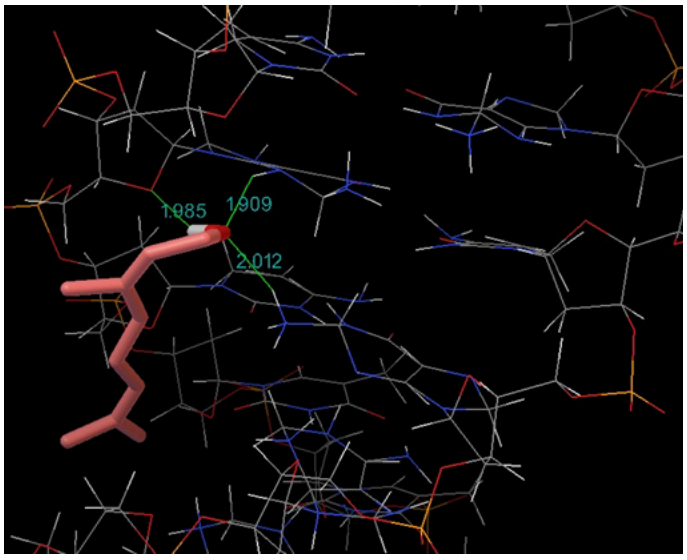

Figure 4. H-bonds (in terms of Å distances) of Nerol to multiple Guanine nucleic bases in the Molecular Dynamics poses.

According to Figure 4, Nerol binds to phosphodiester backbone of 1BNA with 1.985 Å, whilst to two Guanine nucleotides with 1.909 and 2.012 Å. It solely chooses Guanine nucleic acids strongly via its Hydroxyl Oxygens. This shows the fact that Nerol is a Guanine regioselector in terms of organic chemistry and its pharmaceutical aspect. In case of a need to silence a specific cancerous gene, if that gene of interest has high Guanine percentage compared to other nucleic acids, this information elucidated regarding Nerol will be useful to supress that cancer type. So, in cancer types that go apoptosis via gene silencing rather than regulatory RNA, protein or RNA mechanisms, Nerol seems to be an excellent candidate drug molecule

CONCLUSION

Cancer is a life-threatening condition and there is an annual death toll of about ten million, which makes it a very important issue. Among the currently used anti-cancer medicinal molecules, terpenes form an intriguing class of compounds that need to be investigated further. In this paper, we have investigated the anti-cancer behavior of Nerol, possessing a resemblance to Citronellol, which is known to be an antineoplastic agent. The results of our investigations showed that there is a strong interaction between Nerol and cancerous cell 1BNA, specifically acting as a Guanine regioselector. Nerol binds to 1BNA with significant strength, thereby making it a good drug candidate to several cancer types that can suppress via genes.

ACKNOWLEDGEMENTS

i. Funding statement

This study was funded by Kocaeli Health and Technology University supercomputer infrastructure and Assistant Professor Soykan Agar at the faculty of Pharmacy.

ii. How the ethical issue was handled (name the ethical committee that approved the research)

All in silico data was studied and represented with honest work and since it was an in silico study not an experimental study, there was no such need for ethical committee approval for this research paper which is compatible with the laws of national ethical committee.

iii. Authors contribution

Soykan Agar: Writing the original draft, results and in silico simulations, checking the final draft, supervision. Barbaros Akkurt: Checking the final draft, proofreading, technical check.

iv. Availability of data (if apply to your research)

It can be shared with open access in case of journal asks of us.

REFERENCES

1. Jazieh A, Da'ar OB, Alkaiyat M, Zaatreh Y, Saad AA, Bustami R, et al. Cancer Incidence Trends From 1999 to 2015 And Contributions Of Various Cancer Types To The Overall Burden: Projections To 2030 And Extrapolation Of Economic Burden In Saudi Arabia. CMAR. 2019 Nov;Volume 11:9665–74.
2. Valery PC, Laversanne M, Clark PJ, Petrick JL, McGlynn KA, Bray F. Projections of primary liver cancer to 2030 in 30 countries worldwide. Hepatology. 2018 Feb;67(2):600–11.
3. Smittenaar CR, Petersen KA, Stewart K, Moitt N. Cancer incidence and mortality projections in the UK until 2035. Br J Cancer. 2016 Oct;115(9):1147–55.
4. Almeida CA, Barry SA. Cancer: Basic Science and Clinical Aspects [Internet]. Wiley; 2011. Available from: https://books.google.com.tr/books?id=j0RV27loexoC
5. American Cancer Society. What is Cancer? Cancer Basics [Internet]. 2022 [cited 2024 Feb 9]. Available from: https://www.cancer.org/cancer/understanding-cancer/what-is-cancer.html
6. Mayo Clinic Staff. Cancer- Symptoms and Causes - Mayo Clinic [Internet]. 2022 [cited 2024 Feb 9]. Available from: https://www.mayoclinic.org/diseases-conditions/cancer/symptoms-causes/syc-20370588
7. NCI staff. What is Cancer? NCI [Internet]. 2021 [cited 2024 Feb 9]. Available from: https://www.cancer.gov/about-cancer/understanding/what-is-cancer
8. Marques THC, Marques MLBGCB, Lima DDS, Siqueira HDS, Neto JDN, Branco MDSBGC, et al. Evaluation of the neuropharmacological properties of nerol in mice. WJNS. 2013;03(01):32–8.
9. Souza MRP, Coelho NP, Baldin VP, Scodro RBL, Cardoso RF, da Silva CC, et al. Synthesis of novel (-)-Camphene-based thiosemicarbazones and evaluation of anti- Mycobacterium tuberculosis activity. Natural Product Research. 2019 Dec 2;33(23):3372–7.
10. Islam MT, Quispe C, Islam MdA, Ali ES, Saha S, Asha UH, et al. Effects of nerol on paracetamol-induced liver damage in Wistar albino rats. Biomedicine & Pharmacotherapy. 2021 Aug;140:111732.
11. Teixeira R, Da Silva A, Siqueira R, Gonçalves VH, Pereira H, Ferreira R, et al. Synthesis of Nerol Derivatives Containing a 1,2,3-Triazole Moiety and Evaluation of Their Activities against Cancer Cell Lines. J Braz Chem Soc [Internet]. 2018 [cited 2024 Feb 9]; Available from: http://jbcs.sbq.org.br/audiencia_pdf.asp?aid2=5450&nomeArquivo=2018-0380AR.pdf
12. Silva GDSE, Marques JNDJ, Linhares EPM, Bonora CM, Costa ÉT, Saraiva MF. Review of anticancer activity of monoterpenoids: Geraniol, nerol, geranial and neral. Chemico-Biological Interactions. 2022 Aug;362:109994.
13. Gezici S, Sekeroglu N, Kijjoa A. In vitro Anticancer Activity and Antioxidant Properties of Essential Oils from Populus alba L. and Rosmarinus officinalis L. from South Eastern Anatolia of Turkey. IJPER. 2017 Sep 30;51(3s2):s498–503.
14. Agar S, Alparslan L, Akkurt B. De novo Drug Design to Suppress Coronavirus RNA-Glycoprotein via PNA-Calcitonin. Journal of the Turkish Chemical Society, Section A: Chemistry.
15. Agar S, Akkurt B, Ulukaya E. New Drug Design to Suppress Nonalcoholic Steatohepatitis.
16. Cheraghi S, Şenel P, Dogan Topal B, Agar S, Majidian M, Yurtsever M, et al. Elucidation of DNA-Eltrombopag Binding: Electrochemical, Spectroscopic and Molecular Docking Techniques. Biosensors. 2023 Feb 21;13(3):300.
17. Şenel P, Agar S, Sayin VO, Altay F, Yurtsever M, Gölcü A. Elucidation of binding interactions and mechanism of Fludarabine with dsDNA via multispectroscopic and molecular docking studies. Journal of Pharmaceutical and Biomedical Analysis. 2020 Feb;179:112994.
18. Şenel P, Agar S, İş YS, Altay F, Gölcü A, Yurtsever M. Deciphering the mechanism and binding interactions of Pemetrexed with dsDNA with DNA-targeted chemotherapeutics via spectroscopic, analytical, and simulation studies. Journal of Pharmaceutical and Biomedical Analysis. 2022 Feb;209:114490.
19. Rodenak-Kladniew B, Castro MA, Crespo R, Galle M, de Bravo MG. Anti-cancer mechanisms of linalool and 1,8-cineole in non-small cell lung cancer A549 cells. Heliyon. 2020; 6: e05639.
20. Agar S, Akkurt B, Ulukaya E. The Inhibition Mechanism of Pancreatic Ductal Adenocarcinoma via LXR Receptors: A Multifaceted Approach Integrating Molecular Docking, Molecular Dynamics and Post-MD Inter-Molecular Contact Analysis. Asian Pac J Cancer Prev. 2023 Dec 1;24(12):4103–9.

The Role of Artificial Intelligence in Nursing Care

Ufuk AKKURT
Mersin University, Vocational School of Health Services, Mersin, Turkey
E-mail: uakkurt@mersin.edu.tr
ORCID: 0000-0001-6380-5699

Artificial intelligence has become a rapidly developing field in the health sector and has shown significant developments in the field of nursing. This technology has an important potential to improve the quality of nursing care. This review was written to evaluate the place of artificial intelligence in nursing care.

The concept of human has an important place in the nursing profession and holism approach is adopted in many nursing theories. According to the philosophy of holism, the person should be handled with a holistic approach physiologically, socially, psychologically and spiritually. However, repetitive routine work also occupies an important place in the working hours of nurses.

Artificial intelligence-supported monitoring systems and wearable technologies can monitor the vital signs of patients instantly and help to make emergency interventions by detecting possible complications in advance. In this way, it allows nurses to intervene in a timely manner and accelerate the healing processes of patients.

As a result, the use of artificial intelligence in repetitive routine tasks in the nursing profession has a significant time-saving potential. However, its role in the process of care and therapeutic interaction with the patient is uncertain. In addition, it is thought to be ineffective in the interaction process involving human-specific emotions such as compassion. The future of the nursing profession will be determined by the studies and experiences to be gained in this field.

Keyword: artificial intelligence, nursing, care, kindliness, future,

ARTIFICIAL INTELLEGENCE IN BURN DISEASES AND DIAGNOSIS: CURRENT APPLICATIONS AND FUTURE EXPECTATIONS

Prof. Dr. Meriç YAVUZ ÇOLAK*, Caner İNCEKAŞ* Ayşe YAVUZ DERMAN*
Prof. Dr. Mehmet HABERAL**
* ***Biostatistics Department, Faculty of Medicine, Baskent University, Ankara, TÜRKİYE***
** ***MD,FACS, FICS (Hon), Professor, Surgery, Chairman, Department of General Surgery, Transplantation and Burn Institutes,Faculty of Medicine, Founder and President, Baskent University,Ankara,TÜRKİYE***

Burns are one of the most common health problems both in the individual and in the health system all over the world. Burn care/disease research has become increasingly sophisticated over the years. Methods such as artificial intelligence, deep learning and machine learning are statistics-based computer sciences that can statistically reveal significant relationships in raw data and support the early diagnosis, treatment and rehabilitation process in many medical conditions. It is applied in different fields of medicine such as drug development, personal patient treatment, patient monitoring. With the complex data structure and expansion of databases in healthcare services, the importance of artificial intelligence applications is increasing. Modeling of the data analyzed with statistical methods with machine learning, deep learning and artificial intelligence algorithms, more precise measurements are made in medicine, the workload of health workers is alleviated and the costs of health expenses are reduced. Burns are one of the most common causes of trauma worldwide. For this reason, the development of appropriate statistical methods with the data obtained in burn diagnosis, treatment and rehabilitation, and the application of artificial intelligence and machine learning techniques improve public health, reduce costs and advance burn care. Burn wounds and the depth of the wounds can be detected quickly with systems developed with appropriate machine learning methods.

Considering the growth of novel statistical approaches like machine learning, deep learning, neural networks, image processing mainly artificial intellegence approaches and bioinformatics in burn care/research, and the complexities and challenges of burn care, Burn care professionals should have sound knowledge of these basic and olso novel statistical approaches. As technology expands and innovative statistical methods are applied together with software, big data has begun to be obtained in modern healthcare services, and decision support systems have begun to be obtained by analyzing and transforming these big data into meaningful ones. By using traditional and new statistical approaches together in clinical applications and creating decision support systems, very useful results can be obtained in the fields of drug development, radiodiagnostics and personalized treatment involving big data. Novel statistical approaches based on the Artificial Intelligence, Machine Learning, Deep Learning, Image Processing methods, Neural Networks and Bioinformatics have allowed the expansion of our current knowledge regarding the burn care/diseases and fire disaster research.

Artificial Intelligence applications are very important in burn care and diagnosis related research. In the early diagnosis of sepsis and organ dysfunction, which are common burn sequelae, a prognostic and predictive decision support system can be created by modeling laboratory results and vital signs together. Prediction of survival of burn patients, prediction of burn healing time, predicting the length of hospital stay of burn patients can be explained by these novel statistical approaches. Also, genomic structure and underliying patways of burns can be analyzed with Bioinformatic approaches. Image processing in burn care/diseases studies are also valuable results for segmentation and classification of burn injuries, separating burn wounds, classification of burns by depth of injuryand dual-imaging system for burn depth diagnosis and determination of skin burns degree. Overall objective of this study is to improve awareness of artificial intelligence and machine learning methods and bioinformatics among burn care and diseases researchers.

The aim of this study is to reveal the use of artificial intelligence, machine learning and deep learning, and bioinformatics methods in burn care, diagnosis and treatment research and to evaluate the current situation and future expectations.

Key Words: Artificial Intellegence in Burn Care and Diseases, Machine Learning, Deep Learning, Bioinformatics