DRUG INFORMATION CENTER BULLETIN
FACULTY OF PHARMACY
ASSIUT UNIVERSITY

Ass. Uni. D.I. Bull., Vol.20, No.2, June 2025

AU-PHA-PIC-30-07

كلية الصيدلة

جامعة أسيوط

In This Issue…

Editorial Board

Tel. 088/2080388 & 088/2411556
E-mail: clinipharm_assiut@yahoo.com
Website: www.aun.edu.eg/clinpharm
FB Page: facebook.com/DIC.pharmacy

رقم الايداع: 12632 لسنة 2005

This Bulletin is a free quarterly periodical issued by the Drug Information Center (DIC) located at Faculty of Pharmacy, Assiut University

Artificial Intelligence in the Medical Fields

Why is AI used in health care?

Artificial Intelligence (AI) in the medical field is revolutionizing healthcare, from diagnostics to treatment and drug discovery. It leverages machine learning to analyze vast datasets, providing faster and more accurate insights than traditional methods. This leads to improved patient outcomes, reduced costs, and new possibilities for preventative and personalized care. As AI technology continues to advance, its impact on medicine will only continue to grow, creating new opportunities for innovation and ultimately improving the lives of patients worldwide.

What is Machine learning?

Machine learning, a key component of AI, is used in healthcare to significantly reshape the field by enhancing medical diagnosis and treatment. By processing vast amounts of clinical data, algorithms can identify patterns and predict medical outcomes with unprecedented accuracy. This technology aids in analyzing patient records, medical imaging, and discovering new therapies, thus helping healthcare professionals improve treatments and reduce costs. Machine learning enables precise disease diagnosis, customized treatments, and detection of subtle changes in vital signs, which might indicate potential health issues. Natural Language Processing (NLP) is the most common application used in healthcare.

NLP algorithm is a branch of artificial intelligence (AI) that focuses on enabling computers to understand, interpret, and generate human language.
This form of AI used in healthcare is reshaping the healthcare industry. NLP is being used in a wide range of health data applications, such as improving patient care through better diagnosis accuracy, streamlining clinical processes, and providing more personalized services.
For example, NLP can be applied to medical records to accurately diagnose illnesses by extracting useful information from health data. Additionally, it can be used to identify relevant treatments and medications for each patient or even predict potential health risks based on past health data. Furthermore, NLP also provides clinicians with powerful tools for managing large amounts of complex data – something which would typically take much longer to do manually.
Natural language processing is proving to be an invaluable tool in healthcare, allowing medical professionals to use artificial intelligence to more accurately diagnose illnesses and provide better personalized treatments for their patients. This form of AI in healthcare is quickly becoming a must-have in the modern healthcare industry and is likely to become even more sophisticated, with applications expanding to a wider range.

What are AI applications in the medical field?

AI is transforming healthcare by assisting in patient monitoring, diagnostics, and treatment recommendations. Here are several **AI-powered websites and platforms** in the medical field, along with **examples of diseases they help diagnose or manage**

1) **AI in patient monitoring** is revolutionizing healthcare by enabling real-time tracking, predictive analytics, and early warning systems. It could significantly reduce inefficiency in healthcare, improve patient flow and experience, and enhance caregiver experience and patient safety. In the long term, we expect healthcare clinics, hospitals, social care services, patients, and caregivers to be connected to a single, interoperable digital infrastructure utilising passive sensors in combination with ambient intelligence. The following are some AI websites and platforms in patient care:

- **Current Health- Care-at-home platform**

  Use: Remote patient monitoring using wearable devices. It is used for Chronic conditions, post-acute care, COVID-19 monitoring.
  AI Role: Enables healthcare organisations to deliver care at home through remote patient monitoring, telehealth, and patient engagement tools. It predicts patient deterioration and tracks vitals in real-time.
  Website: www.currenthealth.com

- **Biofourmis**

  Use: Predictive analytics for heart failure, oncology, and more. Used for heart failure, oncology recovery, post-surgical care.
  AI Role: Personalizes care using continuous data and machine learning.
  Website: www.biofourmis.com

- **Clew Medical**

  Use: CLEW offers the first FDA-cleared, AI-based clinical predictive models for high-acuity care. AI platform for ICU patient, and high-risk monitoring.
  AI Role: Predicts clinical deterioration hours in advance. As It provides real-time AI-powered monitoring and surveillance, enabling clinicians to detect sepsis earlier, ensure timely interventions, and streamline compliance with evolving regulatory requirements
  Website: www.clewmed.com

- **VitalConnect**

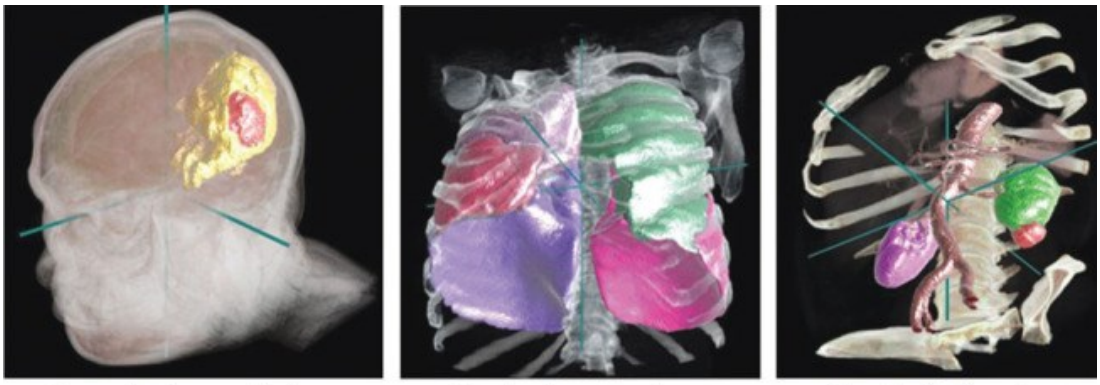
  Use: wearable biosensor called the VitalPatch, which continuously monitors physiological data and transmits it wirelessly to a mobile device and then to the cloud. It can monitor heart rate, heart rate variability, respiratory rate, activity and other vital signs and biometric parameters. It is especially useful for post-surgical care.
  AI Role: Real-time vital sign analysis and alerting.
  Website: www.vitalconnect.com.

2) Diagnostic role by image analysis:

AI algorithms can analyze medical images (X-rays, MRIs, CT scans) to detect subtle anomalies and assist in diagnosing diseases like cancer or stroke, often exceeding human accuracy. It is used in several medical specialties including:

1. Pneumonia in radiology.
2. Dermatology (a convolutional neural network was trained with clinical images and was found to classify skin lesions accurately).
3. Pathology (one study trained AI algorithms with whole-slide pathology images to detect lymph node metastases of breast cancer and compared the results with those of pathologists)

Radiotherapy cancer treatment: The segmentation of the images is time consuming and performed manually by an oncologist using specially designed software to draw contours around the regions of interest. On the other hand, the AI-based technology can cut this preparation time for some types of cancer, and the waiting times for starting potentially life-saving radiotherapy treatment can be dramatically reduced. The image shows a potential application for the AI- based imaging technology, include quantitative radiology for monitoring tumour progression, planning for surgery and radiotherapy planning.



Quantitative radiology Radiation oncology Surgical planning

The new AI technology in healthcare, tools like ForeSee Medical and intelligent algorithms, now possess the ability to interpret massive datasets at unprecedented speeds. Advanced deep learning systems can detect diseases earlier, craft individualized treatment strategies, and even automate complex tasks, such as certain aspects of drug discovery. These leaps forward can improve patient safety, reduce operational costs, and elevate the overall standard of care. The promise of AI in healthcare extends into the future, where connected digital ecosystems and powerful analytics engines will reshape our understanding of health and disease.

2. Treatment and Therapy:

- **Personalized medicine:**

AI helps tailor treatment plans based on individual patient characteristics, optimizing drug dosages and therapies. AI algorithms analyze genetic, clinical, and imaging data to recommend individualized treatment plans, especially in complex diseases like cancer and Alzheimer's disease. This allows for more precise targeting of therapies and better prediction of patient responses.

- **Drug discovery:**

AI accelerates the process of identifying new drug targets and optimizing drug designs, potentially leading to faster development of life-saving medications.

- **Robotics and surgery:**

AI-powered robots assist surgeons with precision and efficiency, reducing surgical errors and recovery time.

Are there challenges for Artificial Intelligence in Healthcare?

As healthcare organizations increasingly invest in the use of artificial intelligence in healthcare for a range of tasks, the challenges facing this technology must be addressed, as there are many ethical and regulatory issues that may not apply elsewhere.

Some of the most pressing challenges for AI used in healthcare include data privacy and security, patient safety and accuracy, training algorithms to recognize patterns in medical data, integrating AI with existing IT systems, gaining physician acceptance and trust, and ensuring compliance with federal regulations. Data privacy is particularly important as AI systems collect large amounts of personal health information which could be misused if not handled correctly. Additionally, proper security measures must be implemented to protect sensitive patient data from exploitation for malicious purposes.

AI systems must be trained to recognize patterns in medical data, understand the relationships between different diagnoses and treatments, and provide accurate recommendations that are tailored to each patient. Furthermore, integrating AI with existing IT systems can introduce additional complexity for medical providers, as it requires a deep understanding of how existing technology works to ensure seamless operation.

Finally, gaining acceptance and trust from medical providers is critical for the successful adoption of AI in healthcare. Physicians need to feel confident that the AI system is providing reliable advice and will not mislead them. This means that transparency is essential – physicians should have insight into how the AI system is making decisions so they can be sure it is using valid, up-to-date medical research. Additionally, compliance with federal regulations is essential to ensure that AI systems are used ethically and do not compromise patient safety.

References

1. *Lee SI, Celik S, Logsdon BA, et al. A machine learning approach to integrate big data for precision medicine in acute myeloid -leukemia. Nat Commun 2018;9:42*
2. Rojas-Carabali, W., Agrawal, R., Gutierrez-Sinisterra, L., Baxter, S. L., Cifuentes-González, C., Wei, Y. C., ... & Agrawal, R. (2024). Natural Language Processing in Medicine and Ophthalmology: A Review for the 21st-century clinician. *Asia-Pacific Journal of Ophthalmology*, 100084.
3. *Bush J. How AI is taking the scut work out of health care. Harvard Business Review 2018. https://hbr.org/2018/03/how-ai-is-taking-the-scut-work-out-of-health-care.*
4. *https://medicus.ai*.
5. *https://pmc.ncbi.nlm.nih.gov/articles/PMC7640807/#:~:text=Artificially%20intelligent%20computer%20systems%20are,prescriptions%2C%20and%20remotely%20treating%20patients.*

A promising avenue against HIV

What is HIV?

Human immunodeficiency virus (HIV) is a virus that attacks the body's immune system. It is a retrovirus, meaning it uses its own genetic material to take over the host cell and make copies of itself. Acquired immunodeficiency syndrome (AIDS) occurs at the most advanced stage of infection. HIV targets the body's white blood cells, weakening the immune system specifically white blood cells called CD4 cells. AIDS is a serious condition where the immune system is severely weakened, making the body vulnerable to infections and certain cancers. HIV is transmitted through certain body fluids, including blood, semen, vaginal fluids, and breast milk.

Blood tests that identify antibodies or the virus itself are used to diagnose HIV

What is the treatment protocol of HIV?

There is no cure for HIV, but effective antiretroviral therapy (ART) can suppress the virus and allow people with HIV to live long, healthy lives and prevent transmission to others.

- **Antiretroviral therapy (ART):**

  There is no cure for HIV, but effective antiretroviral therapy can suppress the virus and allow people with HIV to live long, healthy lives and prevent transmission to others. It is a combination of medications that suppress the virus, allowing the immune system to recover and preventing transmission.

- **Viral suppression:**

  This is typically achieved through adherence to a prescribed ART regimen. The amount of virus in the blood can be reduced to undetectable levels. Regular viral load testing helps monitor the effectiveness of treatment and ensure that viral suppression is achieved and maintained.

What is the role of CRISPER gene editing in HIV treatment?

CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) offers a promising avenue for developing new therapies to address HIV, but it still in the early stages of development. CRISPR gene editing, specifically CRISPR-Cas9, holds promise as a potential tool for eliminating HIV from infected cells, but it's not yet a cure.

There are several distinct CRISPR-based strategies being developed to combat HIV, each targeting. Different aspects of the virus or its interaction with human cells. These strategies include:

- **Direct excision of HIV DNA**: CRISPR-Cas9 can be used to target specific DNA sequences within the HIV genome, allowing researchers to either inactivate the virus or excise it entirely from infected cells.
- **Activation of latent virus "Shock and Kill":** Modified CRISPR systems can be used to reactivate dormant HIV in latently infected cells. This makes the virus visible to the immune system helping to purge the latent reservoir.
- **Editing host genes required for HIV infection:** CRISPR can disrupt host genes essential for HIV entry, such as CCR5, making immune cells resistant to infection.

CRISPR-based strategies can precisely remove or inactivate HIV from immune cells in some preclinical models:

Humanized Mouse Models: Sequential treatment with antiretroviral therapy and CRISPR-Cas9 in HIV-infected humanized mice led to the elimination of HIV DNA from blood, lymphoid tissue, bone marrow, and brain, with no detectable virus after treatment

Patient-Derived Cells: CRISPR delivered via lentivirus or adeno-associated virus vectors successfully excised HIV DNA from patient-derived immune cells engrafted in mice, resulting in a decline of replication-competent virus

Real Enquiries

At the " Drug Information Center" we respond to enquiries from the professional health team as well as from others. Here's one of the enquiries received at the center

Inquiry: How is acid reflux managed during lactation?

Summary of the answer:

Regarding antacids, although no published information on the aluminium, calcium or magnesium content of milk during maternal antacid therapy could be found, additional intake of these minerals by a nursing mother is unlikely to surpass that found in other infant foods. In addition, oral absorption of aluminium and magnesium is poor. Due to these factors, reviewers generally consider the use of antacids during breastfeeding to be acceptable.

GER that occurs during breastfeeding can be treated in the same way as in non-lactating women. Lifestyle changes can be tried first, followed by occasional antacids as needed. If these measures are insufficient, a histamine H_2-blocker or proton pump inhibitor (PPI) can be used. Famotidine appears to be the most suitable H_2 blocker for use during lactation. Information on PPIs during breastfeeding is limited to omeprazole and pantoprazole, so they are preferred.

Sources

1) Anderson PO. Treating Gastroesophageal Reflux and Heartburn While Breastfeeding. Breastfeeding Medicine. 2018; 13(7):463-64.

2) Dağlı Ü, Kalkan IH. Treatment of Reflux Disease During Pregnancy and Lactation. Turk J Gastroenterol. 2017;28(Suppl 1); S53-S56.

Test Your Knowledge

1. Tenecteplase is used primarily to reduce mortality associated with which of the following clinical problems?

A. Diabetes
B. Myocardial infarction
C. Haemorrhage
D. Prostate cancer
E. None of the above

2. The principal toxic effect of heparin is

A. haemorrhage
B. bronchospasm
C. chills
D. fever
E. hair loss

3. Hyoscyamine has the same action as atropine, but is

A. twice as potent
B. three times more potent
C. ten times more potent
D. half as potent
E. one-fourth as potent

4. Albuterol is usually administered by which route?

A. IV
B. Nasal
C. IM
D. Rectal
E. Oral

Answers:

1. (B) 2. (A) 3. (A) 4. (B)

Ask the expert

Do herbs have a role in the management of Helicobacter pylori infection?

Herbs and plant extracts are widely studied as alternative or complementary options for managing Helicobacter pylori infections, primarily due to the rising prevalence of antibiotic resistance. Several have shown notable anti-H. pylori activity in laboratory and clinical studies. As:

Chamomile extracts demonstrate significant activity against H. pylori, especially when extracted using ethanol or ethyl acetate. The primary active component, apigenin, helps reduce H. pylori colonization and inflammation.
Thyme, containing thymol and carvacrol, inhibits H. pylori growth and reduces urease activity.
Liquorice extract, which is rich in flavonoids, enhances the rates of H. pylori eradication and exhibits antibacterial effects, including against antibiotic-resistant strains. It also inhibits H. pylori without significantly impacting other beneficial bacteria.