Egyptian Journal of Animal Health

P-ISSN: 2735-4938 On Line-ISSN: 2735-4946
Journal homepage: https://ejah.journals.ekb.eg/

Article Review

Artificial intelligence uses in clinical and laboratory diagnosis

Maha M. El Alem

Chief Researcher of Pathology

Animal Health Research Institute (AHRI) (Zagazig branch),

Agriculture Research Center (ARC), Egypt

Received in 16/4/2025
Received in revised from 11/5/2025
Accepted in 16/6/2025

Keywords:

artificial intelligence, laboratory medicine Healthcare clinical diagnosis support system and veterinary AI.

ABSTRACT

The clinical applications of medical artificial intelligence (AI) aids in diagnosis which playing important role in treatment protocols and decision-making, so that accelerate the system of health care via introducing more information accompanied by available health data.

Artificial intelligence technologies include Varity of machine learning approaches with the structural data, for example traditional support vector machines as well as neural networks, plus advanced deep learning techniques. As well as, they provide unstructured data for the natural language processing. Recently, AI applications playing important role in veterinary medicine, in addition to broader industry valuable tool.

AI recorded its value in accelerate the accuracy ai addition to efficiency of detecting and diagnosing animal diseases, moreover their treatment. This technology considered as a very good support system in collaboration with veterinarians. Moreover, innovation in healthcare system acceleration.

AI accompanied with everyday life plus medical practices via advancements as excellent health monitors moreover diagnostic algorithms.

INTRODUCTION

Artificial intelligence (AI) is nowadays playing an important role in clinical diagnosis and treatment. The progress of medical AI includes programs performed to help clinicians in diagnoses process, selection of proper thera-

Corresponding author: Maha M. El Alem, Pathology Dept., Animal Health Research Institute (AHRI), Agricultural Research Center (ARC), Zagazig branch, Giza, Egypt
Email address: drmahaelalem@yahoo.com
DOI: 10.21608/ejah.2025.442191

pies and predicting outcomes of patient. These systems aid technologies such as artificial neural networks (**ANNs**), fuzzy expert systems, hybrid intelligent systems, moreover evolutionary algorithms. Advances in excellent medical technologies are made the way for the emergence of medicine new fields.

By **2021**, the AI application in the sector of healthcare considered fully operational. AI opportunity in veterinary medicine is expected to grow rapidly and supporting many applications as imaging, prediction of diseases, treatment of cancer and radiology (**Rahul, 2023**). Recently, many devices implemented in laser-based technology playing an important role in screening of skin in addition to veins.

These devices dealing with tasks simply and locating veins for drawing blood or placing IVs, improving the medical professionals and patients alike process. AI's involvement in diagnosis of medical dates from 1970s within the MYCIN at Stanford University, a system performed to identify bacterial infection development.

Nowadays, artificial intelligence act via gathering data; interpreting it; learning from patterns and delivering the intended outcomes (**Davenport and Kalakota, 2017**).

Applications of AI in Veterinary Practice

The National Animal Disease Referral Expert System (**NADRES**), made by ICAR NIVEDI, act as a synchronized platform aids in alarm mechanisms and rapid actions for stakeholders. Its firstly focus lies in the prediction; prevention and management outbreaks of animal diseases, involve zoonotic threats via leveraging exchange of data , epidemiological analysis and adaptive strategies when required.

AI integration and advances play a critical role in animal diseases addressing presents transformative opportunities for preempt the outbreaks plus the animal health sector enhancement (**Savleen et al. 2022**).

Artificial intelligence play excellent role in clinical settings; such as left atrial enlargement detection in dog exposed to thoracic radiographs (**Li et al. 2020**).

Clinical microbiology is improved AI techniques. Moreover; genomic data from bacterial isolation, outcomes the analysis of metagenomic on original samples in addition to mass spectrometry data obtained from the isolated bacteria as well as the high-resolution digital images are some of the substantial datasets being utilized to construct AI-based diagnostic system (**Peffer-Smadja et al. 2020**).

The microscopic traditional techniques, represented in Gram staining, ova and detection of parasite, moreover, the histopathological analysis, play significant advancements via machine-based image processing. Neural networks play excellent role in differentiating Gram-positive or Gram-negative bacteria and in identifying cocci or bacilli via blood culture samples (**Smith et al. 2018**).

The applications of Computer vision have provide excellent role in protozoa in fecal samples stained with trichrome identification with providing validated programs help accuracy and recognition limitations (**Mathison et al. 2020**).

Machine learning systematic studies aid in antibiotic identification with susceptibility and resistance profiles. Moreover; the prevalent machine learning approaches supported vector machines; genetic algorithms; artificial neural networks moreover fast classifiers (**Weis et al. 2020**).

Animal welfare assessing is important for maintaining health insurance; productivity; recognition of injuries or stress factors and prevention of declines in well-being. This measure has considered essential as a marketing strategy for promoting humane practices in animal treatment. Moreover, many visual professional or veterinarians inspections could be subjective and resource-intensive via training requirements. Advancements in remote sensing, computer vision and AI considered innovative technologies for biometric monitoring of cattle behaviors as chewing behavior for extraction the critical physiological parame-

ters tied of welfare (**Sigfredo et al. 2022**).

As well as, AI systems incorporating machine learning and deep learning models have been involved in prediction analysis.
These systems are utilized for monitoring, physiological changes in animals for early detection of infections, stress factors, diseases, or parasites (**Neethirajan et al. 2017; Neethirajan and Kemp, 2021**).

Sensor technology is recently used in livestock management. For instance, electronic collars and ear-tag sensors for sheep offer reliable data collection with accuracy exceeding 90% for specific operational parameters (**Mansbridge et al. 2018**).

Predictive protocol leveraging historical data have also been explored to evaluate traits like carcass quality from an early age (**Shahinfar et al. 2019**).

CONCLUSION:

In recent decades, technological innovation in healthcare has accelerated. The use of AI offers solutions to many animal-related issues. Furthermore, AI-driven algorithms developed by veterinarians play a crucial role in diagnosing diseases

REFERENCES:

Davenport T, Kalakota R. 2019 . The potential for artificial intelligence in healthcare. *Future Healthc J.* 6:94.

Jiang F, Jiang Y, Zhi H. 2017. Artificial intelligence in healthcare: past, present and future. *Stroke Vasc Neurol.* (2):230–243.

Li S, Wang Z, Visser LC, Wisner ER, Cheng H. 2020. Pilot study: application of artificial intelligence for detecting left atrial enlargement on canine thoracic radiographs. Vet. Radiol. Ultrasound., 61(6): 611-618.

Mansbridge N, Mitsch J, Bollard N, Ellis K, Miguel-Pacheco GG, Dottorini T, Kaler J. 2018. Feature selection and comparison of machine learning algorithms in classification of grazing and rumination behaviour in sheep. Sensors (18): 3532.

Mathison BA, Kohan JL, Walker JF. 2020. Detection of Intestinal Protozoa in Trichrome-Stained Stool Specimens by Use of a Deep Convolutional Neural Network. *J Clin Microbiol.* 58:e02053–19.

Neethirajan S, Kemp B. 2021. Digital livestock farming. Sensing and Bio-Sensing Research 32, 100408.

Neethirajan S, Tuteja SK, Huang ST, Kelton D. 2017. Recent advancement in biosensors technology for animal and livestock health management. Biosensors and Bioelectronics (98):398–407.

Rahul V. 2023. 8 ways artificial intelligence (AI) is improving veterinary medicine. https://vetsource.com/blog/8-examples-artificial-intelligence-veterinary-medicine/

Peiffer-Smadja N, Dellière S, Rodriguez C. 2020. Machine learning in the clinical microbiology laboratory: has the time come for routine practice? *Clin Microbiol Infect Off Publ Eur Soc Clin Microbiol Infect Dis* .

Savleen K, Rajesh A, Neelesh S, Abha T, Nishi P, Ayushi S. 2022. Artificial Intelligence and its Application in Animal Disease Diagnosis. J. Anim. Res., 12(1): 1-10.

Shahinfar S, Kelman K, Kahn L. 2019. Prediction of sheep carcass traits from early life records using machine learning. Computers and Electronics in Agriculture 156): 159–177.

Sigfredo F, Claudia GV, Eden T , Frank RD 2022. The livestock farming digital transformation: implementation of new and emerging technologies using artificial intelligence. Anim Helth Res. Rev., 23 (1) 59-71.

Smith KP, Kang AD, Kirby JE. 2018. Automated Interpretation of Blood Culture Gram Stains by Use of a Deep Convolutional Neural Network. *J Clin Microbiol.* 56:e01521–17.

Smith KP, Kirby JE. 2020. Image analysis and artificial intelligence in infectious disease diagnostics. *Clin Microbiol Infect Off Publ Eur Soc Clin Microbiol Infect Dis.*

Weis CV, Jutzeler CR, Borgwardt K. 2020. Machine learning for microbial identification and antimicrobial susceptibility testing on MALDI-TOF mass spectra: a systematic review. *Clin Microbiol Infect Off Publ Eur Soc Clin Microbiol Infect Dis.*