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Clinical Pathology & Research Journal
ISSN: 2642-6145

Artificial Neural Networks in Pancreatic Cancer: Modernization in Risk Prediction and Early Diagnosis

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Editorial

Volume 8 Issue 1

Received Date: November 15, 2024

Published Date: November 25, 2024

DOI: 10.23880/cprj-16000209

Keywords

Pancreatic Cancer; Risk Prediction; AI Models; Diagnostic; Treatment; ANN

Abbreviations

ANN: Artificial Neural Network; ML: Machine Learning; AI: Artificial Intelligence.

Editorial

Pancreatic cancer is spreading worldwide with 12th most common causing cancer. It is also leading on 7th cause of mortality among all other cancer types. In past 5 years, the survival rate is less than 6% associated with poor prognosis. The reason behind poor prognosis is late diagnosis of cancer. By 2030, pancreatic cancer is projected to become leading cause of cancer deaths with an unprecedented high-level mortality rate. Due to absence of effective ways in early diagnosis of pancreatic cancer, the disease is becoming advanced by the time a standard diagnosis is initiated. Therefore, the use of Artificial Intelligence in developing tools that allows early and accurate diagnosis of pancreatic cancer is crucial is reducing mortality and improving survival rates [1-4].

AI has come with strong and powerful alternative to conventional methods of diagnostic techniques for pancreatic cancer. AI-based prediction models, use of Machine Learning and deep learning algorithms, that can analyze large datasets from all possible sources, such as image recognition, biomarkers, model approaches for early detection of pancreatic cancer. AI algorithm not only aid in early detection but also benefited in clinical diagnosis and image-based testing [5-7].

In the context of pancreatic cancer treatment, AI models and techniques along with machine learning (ML) algorithms has significantly increased in healthcare. It makes possible in image recognition and screening, diagnosis at early stage and treatment planning. Artificial Neural Network (ANN) and biomarkers models analysis plays a vital role in risk prediction models, diagnosis and early detection to identified high-risk patients on a range of personal health features collected from cohort of pancreatic cancer patients before [8-11].

The paper also highlights early diagnosis's pivotal role in prognosis improvement, extending survival rates, reducing mortality and emerged AI tools and ML algorithms in improving accuracy and speed of early detection by analysis of image recognition and biomarkers. A visual representation of overview of different areas of impact of AI for pancreatic cancer is presented, illustrating its screening and monitoring, detection and diagnosis, treatment, post treatment surveillance [12-13].

The review delves into clinical symptoms like risk prediction models, neural network, early detection. Rare but highly lethal disease have high mortality rate worldwide. The prevalence is influenced by today lifestyle and environmental factors. Ai is also playing crucial role in personalized medicine and it's applications [14]. AI-based diagnostic tools, biomarkers, genetic information help tailor treatment plans at earlier stage.

More probable with personalized medicine, Al has the potential to tailor diagnosis and treatment strategies, optimizing clinical decision making for better outcomes and early risk prediction. Its role in enhancing early detection and diagnostic models using AI and machine learning is emphasized, ML techniques learn patterns allowing

prognosis, prediction, diagnosis and response.

Due to limited early staged treatment options, late diagnosis and rapid progression occurs when the cancer is advanced. Few emerging therapies ongoing to traditional surgery and chemotherapy, targeted therapies and personalized medicine approaches. An innovative approach such as AI-based models, ML algorithms, gene editing, precision medicine and RNA interference strategies.

The latest achievement using AI for early detection and risk prediction models in pancreatic cancer are PrismNN and PrismLR, uses ANN to detect intricate patterns in data features [15]. The Boltzmann machine is used in disease prediction and diagnosis involves more advanced forms like Restricted Boltzmann Machine and Deep Belief Networks in feature extractions, pattern recognition and data impulation. It show how ANN helps to recognize patterns in data through probabilistic methods [16].

Challenges faced are need of powerful tools, cost effective, lack of robust and high-quality data, advanced diagnostic pose barrier to early detection, images quality degrade that becomes unsuitable for AI in image recognition [17]. Data scarcity, tumor heterogeneity, some ethical and privacy concerns, bias in AI Models, integration with clinical workflow and regulatory approval, and medicines.

The review concludes by outlining future research directions, discovery of biomarkers and early detection model for pancreatic cancer and treatment response. ANN and AI-based model are highlighted for their potential to increase the accessibility of targeted therapies and increasing survival rate.

References

1. Yamamoto T, Yagi S, Kinoshita H, Sakamoto Y, Okada K, et al. (2015) Long-term survival after resection of pancreatic cancer: A single-center retrospective analysis. World J Gastroenterol 21(1): 262-268.

2. Huang J, Lok V, Ho Ngai C, Zhang L, Yuan J, et al. (2021) Worldwide Burden of, Risk Factors for, and Trends in Pancreatic Cancer. Gastroenterology 160(3): 744-754.

3. Qian L, Li Q, Baryeh K, Qiu W, Li K, et al. (2019) Biosensors for early diagnosis of pancreatic cancer: a review. Translational Research 213: 67-89.

4. Jan Z, El Assadi F, Abd-alrazaq A, Jithesh PV (2023) Artificial Intelligence for the Prediction and Early Diagnosis of Pancreatic Cancer: Scoping Review. J Med Internet Res 25: e44248.

5. Tekkeşin AI (2019) Artificial Intelligence in Healthcare: Past, Present and Future. The Anatolian Journal of Cardiology 22: 8-9.

6. Chari ST, Kelly K, Hollingsworth MA, Thayer SP, Ahlquist DA, et al. (2015) Early Detection of Sporadic Pancreatic Cancer. Pancreas 44(5): 693-712.

7. Kenner B, Chari ST, Kelsen D, Klimstra DS, Pandol SJ, et al. (2021) Artificial Intelligence and Early Detection of Pancreatic Cancer. Pancreas 50(3): 251-279.

8. Bi WL, Hosny A, Schabath MB, Giger ML, Birkbak NJ, et al. (2019) Artificial intelligence in cancer imaging: Clinical challenges and applications. CA Cancer J Clin 69(2): 127-157.

9. Luchini C, Pea A, Scarpa A (2022) Artificial intelligence in oncology: current applications and future perspectives. Br J Cancer 126(1): 4-9.

10. Muhammad W, Hart GR, Nartowt B, Farrell JJ, Johung K, et al. (2019) Pancreatic Cancer Prediction Through an Artificial Neural Network. Front Artif Intell 2.

11. Mukund A, Afridi MA, Karolak A, Park MA, Permuth JB, et al. (2024) Pancreatic Ductal Adenocarcinoma (PDAC): A Review of Recent Advancements Enabled by Artificial Intelligence. Cancers (Basel) 16(12): 2240.

12. Zhao G, Chen X, Zhu M, Liu T, Wang Y (2024) Exploring the application and future outlook of Artificial intelligence in pancreatic cancer. Front Oncol 14.

13. Mukund A, Afridi MA, Karolak A, Park MA, Permuth JB, et al. (2024) Pancreatic Ductal Adenocarcinoma (PDAC): A Review of Recent Advancements Enabled by Artificial Intelligence. Cancers (Basel) 16(12): 2240.

14. Tripathi S, Tabari A, Mansur A, Dabbara H, Bridge CP, et al. (2024) From Machine Learning to Patient Outcomes: A Comprehensive Review of AI in Pancreatic Cancer. Diagnostics 14(2): 174.

15. Gordon R (2024) New hope for early pancreatic cancer intervention via AI-based risk prediction. Massachusetts Institute of Technology, USA.

16. Hopfield JJ (1933) Foundational discoveries and inventions that enable machine learning with artificial neural networks. Nobel Prize Organization.

17. Parikh RB, Teeple S, Navathe AS (2019) Addressing Bias in Artificial Intelligence in Health Care. JAMA 322(24): 2377-2378.